JOHN HARVEY KELLOGG (1852-1943)

PRINTED WORKS BY JOHN H. KELLOGG OR BATTLE CREEK SANITARIUM DOCTORS, CA. 1890-1940

FOOD AND DIETETICS

TABLE SHOWING THE NUTRITIVE VALUES OF THE FOOD SUBSTANCES IN COMMON USE.

	Water.	Albuminous Elements.	Starch.	Fruit Sugar.	Cane Sugar.	Free Fat.	Free Acids.	Pectose.	Non-nitrogenous Substances.	Salts.	Cellulose.	Proportion of Carbonaceous to Nitrogenous.	Total Nutritive Value.	Total Food Units in One Ounce.
Grains.														
Barley	14	10.5	66.7			2.4				2.6	3.8	6.5	82.2	95,900
South Russian	14	12.7	70.9							2.4		5.5	86	97,600
Buckwheat	12.7	10	71.8			1.9				1.9	1.7	7.3	85.6	99,600
Corn, Flint	13.1	10.2	68.5			4.8				1.4	1.7	7.1	84.9	103,600
Corn, Dent	13.4	9.4	68.5			5				1.5	2.2	7.8	84.4	103,000
Corn, Sweet	13.4	11.4	62.7			7.8				1.8	2.9	6.1	83.7	106,600
Irish Moss	16	22	56.3			1.4				1.4	2.9	2.6	81.1	98,300
Millet	11.8	10.5	68.2			4.2				2.8	2.5	6.9	85.7	102,200
Oats	12	10.7	58.3			7.8				3.3	17.9	6.1	80.1	100,600
Rice	12.6	6.7	78.5			.9				.8	.5	11.8	86.9	90,800
Rye, Winter	8.7	11	74.6			1.9				2.3	1.5	6.9	89.8	104,200
Rye, German	8	14	78									5.5	92	107,500
Wheat, Poland	13.2	21.5	61.9			1.5				1.9		2.9	86.8	104,100
Wheat, White	12.8	11.6	71			1.3				1.6	1.7	6.2	85.8	99,500
Wheat, Diehle	12.2	13.8	72.2							1.8		5.2	87.8	100,700
Wheat, Japanese	12.4	16.5	65			1.6				1.5	2.9	4	84.7	100,700
Flour.														
Arrowroot	18		82									82	82	91,800
Banana	14.9	2.9	77.9			.5				2.2	1.6	27	83.5	92,700
Barley	14.8	11.4	71.2			1.5				.6	.5	6.3	84.7	105,300
Bean	10.3	23.2	59.4			2.1				2.5	1.7	2.6	88	100,000
Buckwheat	13.5	8.9	74.3			1.6				1	.7	8.5	85.8	100,100
Cornmeal	14.2	9.7	69.5			3.8				1.3	[illegible]	7.5	84.3	101,500
Graham	13	11.7	69.9			1.7				1.8	1.9	6.1	85.1	99,400
Oatmeal	7.7	15.1	67.2			7.1				2	.9	4.9	91.4	115,100
Pea	11.4	25.2	57.2			2				1.9	1.7	2.3	87.3	105,100
Rye	13.7	11.6	69.7			2				1.4	1.6	[illegible]	84.7	99,800
Wheat	11.6	11.1	75.4			1.1				.6	.2	6.8	88.2	103,200
Breads.														
Barley Bread	12.4	9.4	64.4	4.7		1				3.8	4.3	7.4	83.3	93,400
Beaten Biscuit		11.7	80			1.2						6.9	92.9	109,500
Graham Bread		9.5	53.3			1.4						5.7	64.2	76,900
Graham Crackers		9.8	70			13.6						8.4	93.4	127,300
Granola		15	75			3						5	93	113,200
Granut	7.18	11.55	77.06			1.41				2.8		6.7	92.8	105,300
Granose		15.4	79.1			2.3						5.2	96.8	116,600
Macaroni	13.1	9	76.8			.3				.8		8.5	86.9	99,700
Manna	15.3	1.9	18.1	49					5.6		10.1	3.3	74.6	84,100
Passover Bread		11.7	80			1.2						6.9	92.9	109,500
Rye Bread	12.3	6.1	46.9	2.3		.4				1.5	.5	8.1	57.2	61,900
Ryo Bread	11.6	9.3	67.7	3.6		1				2.1	4.7	7.7	83.7	95,800
Rolls		11.7	80			1.2						6.7	93.9	109,500
Sticks		11.7	80			1.2						6.7	93.9	109,500
Swedish Speise Bread	12	10	72.3	3.1		1				.6	1.5	7.7	87	101,400
White Bread	45.1	5.3	46	2.3		.8				.5		9.2	54.9	63,700
Whole-Wheat Bread	13	8.7	60	4		6				3	5.3	8	81.7	99,500
Whole-Wheat Wafers		9.8	70			13.6						8.4	93.4	127,200
Whole-Wheat Zwieback		13.6	70			2						5.2	85.6	103,700
White Zwieback	13.3	8.5	73.3	1.8		1				.6	1.5	9	85.2	98,900
Nuts.														
Almonds	4.8	21		17.3		54.9				2		3.4	95.2	189,600
Beechnuts	4	21.9		13.2		57.4				3.5		3.2	96	193,200
Brazil Nuts	5.3	17		7		66.8				3.9		4.2	94.2	202,600
Butternuts	4.4	27.9		3.5		61.2				2.9		2.3	95.5	200,700
Chestnuts, Fresh	45	6.2		42.1		5.4				1.3		7.6	55	99,900
Chestnuts, Dried	5.9	10.7		74.2		7				2.2		7.4	94.1	116,400
Cocoanuts	14.1	5.7		27.9		50.6				1.7		13.5	85.9	163,400
Filberts	3.7	15.6		13		63.3				2.4		6	96.3	204,100
Hazelnuts	7.1	17.4		7.2		62.6				2.5	3.2	4	89.7	192,700
Hickory Nuts	3.7	15.4		11.4		67.4				2.1		5.1	96.3	206,800
Peanuts	9.2	25.8		24.4		38.6				2		2.4	90.8	162,700
Pecans	3	11		23.3		71.2				1.5		7.6	97	212,200
Pine Nuts	3.8	6.5		26.2		60.7				2.8		13.5	96.2	193,400
Pistachios	4.2	22.3		16.3		54				3.2		16.7	95.8	185,000
Walnuts, Black	2.5	27.6		11.7		56.3				1.9		2.5	97.5	196,400
Walnuts, Soft Shelled	2.5	16.6		16.1		65.4				1.4		4.7	97.5	203,600
Sanitas Nut Products.														
Almond Butter	4.8	21		17.3		54.9				2		3.4	95.2	189,600
Bromose		19.6		39.4		24						3.3	83	133,500
Malted Nuts	2.6	23.7		43.9		27.6				2.2		3.1	97.4	153,300
Malt Honey	31.17	3.87		14.91						.44		3.1	19.2	77,700
Maltol				75		20							95	135,200
Nut Meal		28.3		1.8		46.2						1.6	76.3	160,500
Nuttolene	60	17.12		9[illegible]		19.46				1.51		1.6	34.06	67,700
Protose	64.22	21.30		4.86		10.28				1.40	5.94	.61	35.07	60,100
Peanut Butter		16.4		9.5		26.4						2.1	52.3	101,800
Fruit.														
Apple	84.8	.4		7.2			.8	4.8		.5	1.5	18	13.7	13,900
Apple, Dried	27.9	1.3		42.8	8		3.6	4.8	6.5	1.6	5.1	42.8	67	63,500
Apricot	81.2	.5		4.6			1.2	6.1		.8	5.3	9.2	13.5	13,200
Blackberry	86.4	.5		4.1			.2	1.4		.4	7	8.2	6.6	6,500
Banana	73	1.9	5.6			.6			23.2	1	.3	12.5	26.7	30,200
Cherry	79.8	.7		10.2			.9	1.8		.7	5.9	14.5	14.3	14,000
Cherry, Dried	49.8	2		31.2		.3			14.3	1.6	2.4	22.9	49.4	54,000
Cranberry	89.6	.1		1.5			2.3			.2	6.3	15	4.1	2,800
Currant	84.7	.5		6.4			2.2	.9		.7	4.6	12.8	10.7	9,200
Dates, Dried	33	9			58							6.4	67	77,900
Figs, Dried	31.2	4		49.8						2.9	12.1	12.4	56.7	61,500
Gooseberry	85.7	.5		7.1			1.4	1.4		.4	3.5	14.2	10.8	10,900
Grapes	78.2	.6		14.3			.8	2		.5	3.6	23.8	18.2	18,800

Lemon	[illegible]	1		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Muskmelon	89.5	.6			9.3					6		15.5	10.5	11,300
Nectarines	82.9	.6			15.9					6		26.5	17.1	18,600
Olives, Green	58	1.1				27.6			11.6	1.7		35.6	42	85,100
Olives, Ripe	64.7	1.7				25.9			4.3	3.4		19.8	35.3	71,300
Orange	86.9	.8			11.6	.2				.5		14.7	13.1	14,600
Peach	80	.7			4.5		.9	7.1		.7	6.1	6.4	13.9	13,700
Pear	83.2	.4			8.2		.2	3.3		.3	4.4	20.5	12.4	13,600
Pear, Dried	29.4	2		29.1	.4		.8	4.5	14.9	1.7	6.9	27.3	63.7	57,600
Persimmons	66.1	.8			31.5	.7				.9		40.2	33.9	38,200
Pineapple	89.3	.4			9.7	.3				.3		2.5	10.7	21,200
Plum	84.9	.4	10.3		3.6		1.5	4.6		.7	4.3	9	10.8	10,500
Pomegranate	76.8	1.5			19.5	1.6				.6		14	23.2	28,000
Prune, Fresh	81.2	.8			6.3		.8	4.9		.7	5.4	7.7	13.4	14,750
Prune, Dried	29.3	2.3		44.4	5		2.7	4.3	12.4	1.4	1.5	25.4	69.2	73,600
Raisin	32	2.4		54.6		.6			7.5	1.2	1.7	26.1	66.3	74,500
Raspberry	85.7	.4			3.9		1.4	.7		.5	7.4	9.7	6.9	85,800
Strawberry	87.6	1.1	.2		6.3	.5	.9	.5		.8	2.8	6.1	10.1	8,100
Watermelon	92.1	.4			6.7	.2				.3		17	7.6	8,600
Whortleberry	78.4	.8			5		1.6	.9		1	12.8	8.2	9.3	8,900
Honey	24.6			26.2	44.9				2	2.3		73.1	75.4	81,800
Syrup	20.6	8		72.8	1.8				3.8	.2		98	79.4	88,900
Vegetables.														
Asparagus	93.7	1.8		.4		.3			2.3	.5	1	1.6	5.3	6,300
Beans, Field	13.5	25	48.3			1.7				3.5	8	2	78.5	94,400
Beans, French or Kidney	11	23.7	55.6			2.2				3.7	3.8	2.4	85.2	102,000
Beans, White	15	26.9	48.8			3				3.5	2.8	1.9	82.2	110,900
Beans, Lima	9	21.9	60.6			1.6				2.9	4	2.8	87	103,500
Beans, String	88.7	2.7	5.5	1.2		.1				.6	1.2	2.5	10.1	11,600
Beet	87.5	1.3				.1			9	1.1	1	1	11.5	12,200
Beet, Sugar	71.6	2			12.6	.5			7	1	11.6	6.9	16.8	19,000
Carrot	86.8	1.2				.3			9.2	1	1.5	7.9	11.7	12,800
Cauliflower	90.9	2.5			1.2	3			3.4	.8	.9	2	8.2	9,500
Celery	84.1	1.5			.8	.4			11	.8	1.4	8.1	14.5	16,300
Cucumber	95.2	1.2			1				1.4	.4	.8	.2	4	4,400
Cabbage, Red	90	1.8			1.7	.2			4.2	.8	1.3	3.3	8.7	9,700
Cabbage, Winter	80	4			1.2	.9			10.4	1.6	1.9	3.1	18.1	21,000
Cabbage, White	90	1.9			2.3	.2			2.6	1.2	1.8	2.6	8.2	8,700
Lentils	12.3	25.9	53			1.9				3	3.9	2.1	83.8	101,500
Lentils, German	11.7	33	30.3			8.7				2.7	13.6	1.2	74.7	103,700
Lettuce, Head	94.3	1.4				.3			2.2	1	.8	1.8	4.9	5,200
Melon	90.4	1			2.2	.3			4	.7	1.4	6.5	8.2	9,100
Onion	86	1.7			2.8	.1			8	.7	.7	6.4	13.3	14,700
Peas, African	6.5	23.4	57.8			6				3	3.3	2.7	90.2	113,800
Peas, Green, Shelled	12.7	21.7	57.7			1.9				2.8	3.2	2.7	84.1	100,700
Peas, Green, Garden	78.4	6.4	12			5				.8	1.9	2	1.7	35,400
Peas, Small	10.3	24.6	52.6			3.5				2.6	6.4	2.2	83.3	103,300
Parsnip	82	1.2				.6			7.2	1	8	6.5	10	17,300
Potato	75	2.2				.2			21	1	.6	9.6	24.4	27,200
Potato, Sweet	71.8	1				.2			25.3	.7	1	25.5	27.2	30,200
Pumpkin	90.3	1.1	5.1		1.5	.1				.7	1.2	6	8.5	9,200
Spinach	88.5	3.5			.1	.6			4.3	2	1	1.4	10.5	11,500
Squash	90.3		1.1		1.4	.1			5.2	.7	1.2	6.1	8.5	8,800
White Turnip	92.5	1.5				.2			3	.7	2.1	2.1	5.4	6,000
Tomato	92.4	1.6			2.5	.3	1.8			6	.8	2.8	6.8	5,800
Meats.														
Beef, Lean	72	19.3				3.6				5.1		.18	28	37,000
Beefsteak	68.6	18.9				12.2				.8		6	31.4	58,400
Egg, Entire	74	14				10.5				1.5		75	26	47,000
Egg, White	78	20.4								1.6			22	29,300
Egg, Yolk of	52	16				30.7				1.3		.9	48	101,600
Fish, White of	78	18.1				2.9				1		.16	23	33,400
Fish, Brook Trout	77.8	19.2				2.1				[illegible]		[illegible]	22.2	33,000
Fowl	63.7	19.3				16.3				[illegible]	[illegible]	[illegible]	36.3	69,500
Mutton, Lean	72	18.3				4.9				[illegible]	[illegible]	.26	28	38,800
Oysters	88.3	6	3.3			1.3				[illegible]	[illegible]	.7	11.7	15,600
Pork, Ham	39	9.8				48.9				[illegible]	[illegible]	4.9	61	139,200
Poultry	74	21				3.8				[illegible]	[illegible]	.18	26	39,900
Salmon	77	16.1				5.5				[illegible]	[illegible]	.34	23	37,200
Veal	63	16.5				15.8				[illegible]		.95	37	64,200
Milk and Butter.					Milk Sugar									
Cows' Milk	86	4.1			5.2	3.9				.8		2.2	14	21,700
Buttermilk	88	4.1			3.6	.7				.8		1	9.2	11,700
Mothers' Milk	89.1	3			5.4	3.2				.4		2.5	12	15,500
Skimmed Milk	88	4			3.8	1.8				.8		1.4	10.4	14,600
Cream	66	2.7			2.8	26.7				1.8		11	34	75,200
Cheese, Cottage	72	20.6			4.3	1				1.8		.25	28	37,400
Cheese, Stilton	32	26.2			34.5	3.3				4		1.4	68	85,000
French Butter	12.6				.2	86.4				.8		86.6	87.4	221,400
Swedish Butter	13.8	.6			.6	84.4				.6		142	86.2	217,600
Milk of Cow Tree	58	17		2.8		35.2				.5		2.2	40.2	93,600

The lowly tuber's rôle on the stage of history —

The Saga of the Potato

Condensed from The American Mercury

Norman Taylor
Botanical Editor of "Webster's New International Dictionary"

FROM THE PLUNDER of Peru came the first potato. But no priest or pirate of the conquest ever guessed that the tuber he trod underfoot on the upland Peruvian plain would spread to every corner of the temperate zone and be worth more than all the mines of Potosi. No dream of Inca gold, not the very Temple of the Sun itself, would buy one year's potato crop today.

We owe the first mention of the potato to Pedro de Cieza de Leon who, in 1538, the year after the conquest, left newly settled Cartagena, crossed the steaming Isthmus of Panama, and scrambled up the face of the Andes. There he discovered the mother of all potato chips, which, instead of being cooked by heat, was cured by frost and then dried. This *chuñu* was, and still is, the staple food of those Indians who live above the zone where corn can be grown. Vast quantities of *chuñu* were stored for the Indian army, for tribute to the Great Inca, and against famine. Potato culture was highly developed; guano was brought up from the sea islands, an elaborate irrigation system was maintained, and many different varieties were grown.

For years after the conquest a motley mixture of priests, pirates and soldiers traveled homeward across the blood-soaked Isthmus. Forty thousand carriers of Inca loot perished there. On one of those trips, probably between 1580 and 1585, someone carried the first potato to Europe. From Spain it went to Italy, and by 1588 it reached the hands of Charles l'Ecluse, keeper of the botanical garden of Vienna. Neither Sir Walter Raleigh nor Sir Francis Drake brought the potato from Virginia to Ireland, for it did not grow in Virginia in their time. The Raleigh legend is pure myth, but the romantic Irish have always clung to it fondly. The Germans insist that Drake is their man, and today his statue stands in Offenberg, with an inscription reading

SIR FRANCIS DRAKE
Introducer of the Potato into Europe in
the Year of Our Lord 1580

The Raleigh and Drake ca-by the Board of Education, his small business failed, his friends quit him and he couldn't get work. He sued for malicious prosecution.

In such cities as Boston, New York or Chicago it would have taken him so many months to vindicate himself that his life would have been ruined. A month and two days after his attorney asked for trial a jury awarded him a judgment of $18,000.

A west-coast agent for a brand of golf clubs found another representative working his territory. Thirty-nine days after he asked for trial a court awarded him $458.56 for services rendered and for damages. A minor matter, perhaps, but not to the man who brought suit. In Brooklyn he would have waited at least four years for a decision.

A man owned two pictures, said to be worth $25,000. They were in the hands of an agent who died and the executors of the estate refused to give them up. A prospective buyer was on hand and the man could not get the pictures. Twenty-nine days after he asked for trial the court put the pictures into his hands.

A widow found herself unable to collect, from an insurance company, $3000 she believed due her upon the death of her husband. She was ill and with no means of support. In most cities she would have been forced to take whatever the company wanted to pay, for she was financially unable to carry a suit through the courts for years. In Los Angeles, through a court decision, she had her $3000 in 44 days.

Some cases are not decided for two months, a few take longer for various reasons, but extinct is the plaintiff who cannot get quick justice if he and his attorney so desire. The system does not bother its head when both sides want delay; it is concerned primarily with clearing the way for people like you and me when we have a just cause and deserve immediate relief. Other courts say guilty defendants must be tried and forced to pay for their sins, but they don't say when. A year or even five years from today will do. The Los Angeles Superior Court says, "Do it next month!"

Ewell D. Moore, a prominent Los Angeles attorney, writing in the *Los Angeles Bar Bulletin*, said: "There is no delayed justice in Los Angeles trial courts. That which has been done here of course can be accomplished in other jurisdictions with the coöperation of judges and lawyers."

How to get that coöperation? Through a volcanic upheaval of public opinion. What happened in Los Angeles will happen in your city only when everybody, as in Los Angeles, gets mad at once.

nards, still widely current, were based partly upon the groundnut and partly upon the sweet potato.

The potato, like all new foods, was slow to overcome the prejudices of the people, in spite of the most exalted attention. Scientists not only wrote it up, but improved it. Marie Antoinette wore its blossoms in her hair. Scotch divines thundered against it, because it was not mentioned in the Bible and yet was the forbidden fruit, so they said, that caused Adam's fall. English apprentices, save for once a week, had it banned from their diet. Frederick the Great planted potatoes in the Lustgarten, and his grandson threatened to cut off the noses of all who would *not* plant them. There was even a Potato War in Germany.

Through all this fanfare the potato gradually came into its birthright because poor people of northern Europe found that if there wasn't much else to eat, potatoes would keep body and soul together. And nowhere was poverty so bitter and the potato so welcome as in Ireland. The Irish lavished pet names upon the lowly tuber. Priests and altar boys marched up and down their fields drenching the crop with holy water. They little dreamed that failure of the crop would one day decimate their country.

In 1719 a group of Irish Presbyterians founded the town of Londonderry, N. H., and started potato growing in the United States. This was more than 130 years after Drake and Raleigh were supposed to have carried the potato from Virginia to Europe. But, as an occasionally imported food, potatoes were known in New England long before that. Coming perhaps from Bermuda, potatoes appeared on a dinner menu of Harvard College in 1708.

The original potato from Peru was small and had eyes so deeply set that cutting them out practically destroyed the tuber. Early potato champions set out to improve this knobby, hollow-eyed deformity, but they first had to fight a lot of ignorant botanists. These alarmed England with statements that the potato must be poisonous because it was first cousin to the henbane, the Jimson weed and tobacco. The first potato breeder of note, Antoine Auguste Parmentier, mixed a bit of propaganda with his science by giving a potato dinner at Paris to which Lavoisier and Benjamin Franklin were invited. The whole menu consisted of potatoes cooked in various ways.

In those days the potato was so steadily propagated by cuttings or buds (its eyes) that it often failed to flower at all, or else the flowers set no seeds. With this came waning vigor, particularly in the ability to resist disease. All the varieties used in America before 1850 were of European origin and suffered from this weakness. The Rev. Chauncey E. Goodrich of Utica, N. Y., imported from the Andes the seeds of several varieties. From this fresh stock, after a few cross-pollinations, he produced a variety in 1853 that he called the Garnet Chili, from which was later derived the Early Rose, a variety still widely grown today. The Early Rose and the Garnet Chili have been more prolific than Solomon. From different combinations of them came all the early and late varieties that long-haul railway journeys soon demanded.

The potato didn't sweep to its victory unimpeded. Along the eastern slopes of the Rocky Mountains grows a wild relative of the potato, the buffalo-burr. Upon this a certain beetle innocently nibbled. As the potato crept westward during the Civil War the range of the cultivated potato and this wild one overlapped, and the insect turned to the lusher feeding of the cultivated plant, soon becoming a number one pest. Spreading eastward, it reached the Mississippi by 1868 and the Atlantic coast by 1874. All Europe quickly set quarantines against American potatoes, and the beetle didn't reach Europe until the World War when it was accidentally introduced near Bordeaux, and is now actively fought by the French.

An earlier potato blight greatly influenced the course of history. Until 1844 Ireland had reasonably good crops. She needed them, for by that time the potato was the chief food of her peasants. A crop failure came in 1846, diminishing the supply and infecting the seed. The Irish tried every conceivable thing that hunger and terror could suggest but still the crops failed and nearly a million peasants died of starvation. The young and progressive fled to America; more than a million and a half came to New York within the next few years, to be taken at once under the wing of Tammany Hall and so to become rulers of the city. Fresh waves of potato pilgrims fled here as the blight spread to Germany and Poland. Thus the potato forever links the Incas with the sturdy immigrants who have played so large a part in the development of America.

Every scene, even the commonest, is wonderful, if only one can detach oneself, casting off all memory of use and custom and behold it, as it were, for the first time — simply, artlessly, ignorantly, like a baby, who lives each moment by itself and tarnishes the present by no remembrance of the past.

— *The Journal of Arnold Bennett*

BULLETIN OF THE

AMERICAN MEDICAL TEMPERANCE ASSOCIATION

Editors: N. S. Davis, M. D.; T. D. Crothers, M. D.; J. H. Kellogg, M. D.

IS THE USE OF ALCOHOL, AS IT EXISTS IN FERMENTED AND DISTILLED LIQUORS, AS A BEVERAGE, EVER HARMLESS?

This question is suggested by the following paragraph from an otherwise very judicious editorial article on the inevitable bad influence of the ordinary saloon, in one of the best Chicago daily papers. The paragraph is as follows: —

"Communities want places where they can procure beverages not necessarily injurious if pure, and if not taken too frequently or in too great quantities."

The paragraph clearly implies that the writer believes if alcoholic beverages are only *pure* and "not taken too often or in too large quantities," they are desirable and not necessarily injurious. His belief is also that of all the moderate drinkers from the common laborer to the millionaire; and it remains the chief obstacle in the way of banishing their use as beverages from all civilized communities.

But its entire fallacy has been a thousand times demonstrated both by experience and by the most accurate experimental tests known to modern science. Only a small part of the evils produced by the different kinds of alcoholic drink are attributable to adulterations or impurities, as shown by repeated analyses by chemists of reputation both in this country and in Europe. The only ingredient in any and all varieties of fermented and distilled drinks that exerts an important influence on human health and morals, is the *alcohol* they contain; and that alcohol is the same whether in beer, wine, or whisky.

If taken by any individual in health, it is always injurious in direct proportion to the quantity taken and the length of time its use is continued. Consequently "communities" do not

The Food Value of Alcohol.— Dr. John Madden (*American Medicine*, May 4, 1901) says that the fats and the carbohydrates are not poisonous in any quantity; alcohol, on the other hand, is a violent protoplasm poison.

The fats and carbohydrates are capable of being changed into a reserve supply of fat, which is deposited chiefly beneath the skin, and constitutes a store of latent energy upon which the organism calls whenever stress of circumstances makes increased expenditure of energy necessary. Alcohol cannot be thus converted and stored.

The carbohydrates and fats protect the nitrogenous tissues from undue waste. Alcohol hastens their waste.

The oxidation of the carbohydrates and fats proceeds in such a manner that all the oxygen necessary for their conversion is supplied by the normal process of respiration. Alcohol, on the other hand, makes the demand for oxygen so great that it cannot be supplied by the normal process of respiration. Oxygen to supply this demand, is, therefore, abstracted from the tissues, causing a derangement in their functions and emtabolism.

All tissue activity is immediately accelerated by the ingestion of a real food. The ingestion of alcohol is followed by a partial or incomplete inhibition of both glandular and muscular activity as well as a marked diminution in the quality of the mental processes.

Of course we are speaking now of the effects of food contrasted with the effects of alcohol in normal persons not accustomed to alcohol or any similar drug in any quantity.—*The Medical Age, June, 1901.*

"want [need] places where they can procure beverages [alcoholic] not necessarily injurious if pure;" simply because all fermented and distilled beverages are necessarily injurious, whether pure or impure; for alcohol promotes neither strength nor natural nutrition, but diminishes both. Instead of protecting the living body from the injurious effects of exposure to heat, or cold, or wet, it makes the body more liable to such injurious; and it also renders the living body more liable to attacks of all infectious diseases, and more liable to die if attacked.

When taken into the stomach, it passes by absorption directly into the blood, and is carried in it to every structure of the body, and diminishes both the sensibility of the nerves and the vital properties of the protoplasm of which all organized structures are made, and thereby it lessens every natural function until it is either destroyed by oxidation or eliminated from the system. And yet, by its effect in lessening the sensibility of the brain and nerves, the person taking it is less conscious of all mental impressions, thinks he is lighter, stronger, and can do more mentally and physically, and continues to thinks so, when he can neither walk straight nor talk intelligently. Consequently alcoholic beverages are always and "necessarily injurious" to persons in health, whether pure or impure. And no community needs a place or places where they can be obtained for use as beverages. If all such plans were left to stand on their own merits and demerits without paying a money bribe to the public conscience in the form of liberal license fees, they would be speedily recognized as public nuisances and removed as such. As I have said elsewhere, it is not the saloon, the canteen, or the man who sells, but the alcoholic beverage itself, that insidiously and certainly poisons the blood, degenerates the brain, and sears the conscience of whoever uses it, in direct proportion to the quantity he uses. N. S. D.

Alcoholism and Tuberculosis.—Professor Brouardel, one of the most eminent medical men in Paris, while addressing the recent congress on tuberculosis in that city, said that

"J. Simon was right in saying, 'The wretched lodging house is the purveyor of the public house;' and we can add to it that the public house is the purveyor of tuberculosis. In fact, alcoholism is the most potent factor in propagating tuberculosis. The strongest man who has once taken to drink is powerless against it." N. S. D.

DR. AUGUST SCHMIDT, an eminent German investigator, says: "Alcohol should be regarded as a respiratory poison, because it interferes with the interchange of the gases of the entire body by disturbing the normal life processes of the individual cells." And he might have added, also by diminishing the depth and efficiency of respiration in direct proportion to the quantity of the alcohol taken. N. S. D.

REPORT OF THE MEETING OF THE AMERICAN MEDICAL TEMPERANCE ASSOCIATION.

THE tenth annual meeting of the American Medical Temperance Association was held in the parlors of the Ryan Hotel, St. Paul, Minn., June 5, at 9 A. M. Owing to some fault in the announcement, only a small number gathered. Dr. J. A. Work, of Elkhart, Ind., was called to the chair. The Secretary's report was read, showing a gain of ten members during the year, and increasing correspondence, and greater interest in the subject. Dr. Madden, of Milwaukee, read the first paper on "The Recrudescence of Alcohol." This was discussed by Drs. Garber, Fuller, Crothers, Amundson. After which Dr. Madden offered the following resolutions, which were passed unanimously: —

"*Whereas*, The American Medical Temperance Association, the members of which are physicians and medical teachers who have devoted years to the study of alcohol and its effects, and who are conversant with the work done by scientific men the orld over to determine the effects of alcohol when given in natural structure and function of the living body in proportion to the quantity used, and the length of time its use is continued, is proved by the results of every experimental investigation concerning it, instituted by eminent scientific men, both in this country and Europe. And their verdict is abundantly confirmed by the history and condition of the inmates of every asylum for the poor, the feeble-minded, the epileptic, the insane, and the inebriate; those of every reformatory and prison, by the records of every police and criminal court; and by the details of every well-kept registry of vital statistics.

As concerns danger to human life, every intelligent reader of the public press knows that the ordinary use of alcoholic liquors by persons claiming to be in health, is the direct cause of more suicides, homicides, and murders every month than are produced by all the other poisons known to toxicologists in a year. Then why not now, at the beginning of this twentieth century of the Christian era, cease calling alcoholic liquors stimulants or restoratives; not only speak of them as subtle and dangerous poisons in every household, but also concentrate all the facts known to science, clinical experience, and in economic and criminal records, in favor of having alcohol and all liquors containing two per cent or more of it, placed on the statutes of the several States along with arsenic, strychnine, etc., to be sold and used under the same regulations and penalties as other poisons dangerous to the public health and morals? If this were accomplished, it would soon remove one of the chief corrupting influences from the general field of politics, and place it under the domain of the police and health authorities, aided by the courts, where it legitimately belongs. And it would do more to prevent tuberculosis and all forms of human degeneracy than all the other measures combined.

Chicago, Ill., April 29, 1901.

COLONEL RAY ON THE USE OF INTOXICATING LIQUORS IN THE ARMY.

THE published military record of Col. P. H. Ray, now Commandant of District and Post at Fort Snelling, Minn., shows that he served through the war of the Rebellion, entering the volunteer service in the Wisconsin Infantry in 1861, and rising from the position of private to that of captain in 1864. He held prominent staff positions during the war, and was at Selma and Montgomery, Ala., and Forts Johnson and Raleigh, N. C. He was with the expeditions at Yellowstone and against the Sioux Indians, and was stationed at Forts Lowell, Apache, Halleck, Gaston, and McDowell. He had various commands from 1877 to 1897. He was sent by the President on special mission to report on conditions along the Yukon River. He organized the 3d U. S. Volunteers at Macon in 1898, was promoted to the colonelship, and commanded the regiment in Cuba in 1898-99, and was then assigned to command District and Post at Fort Egbert, Alaska, where he remained till transferred to Fort Snelling.

At various times he has received honorable mention from commanding officers for deeds of generous daring, and from the President, secretary of war, and Major General Miles for the efficient discharge of all his duties in the responsible positions to which he had been appointed, and which required constant vigilance, sound judgment, and great ability.

His opportunities for observing the effect of intoxicating beverages on soldiers in field and camp have not been surpassed by many, if any, officers, and his views, which he frankly expresses, are entitled to consideration and respect.

Here is his opinion of the canteen, a name which has been mollified into "The Army Post Exchange."

H. D. DIDAMA.

WAR DEPARTMENT, FORT SNELLING, MINN., June 16, 1901.
H. D. Didama, M. D.

MY DEAR SIR: I noted the action of Dr. Seamans at both conventions, and regret that he did not confine himself to the truth, both in regard to the per cent of drinking men in the army and that the sale of beer is necessary to provide a suitable ration in the tropics. I believe he was reported in the papers as saying that the ration for the army was the same for all latitudes. This is not true.

In my experience I have never found that a drinking place was necessary in any military establishment to maintain discipline or to preserve the health, comfort, or content of any command where active operations are being carried on, and I have found such establishments to be a nuisance, and often a menace to the welfare of a command in the field. I have often seen them abated with a rough hand, and always with good results.

When stimulants in any form are necessary, they should be issued without cost to the soldier, and carefully controlled. There is in our army at the present time better material than in any other army in the world, and this, if properly handled, will make the best soldiers. To secure such result, the drinking element must not be encouraged, but on the contrary should be thoroughly suppressed.

The conditions existing at both Chickamauga and Tampa should be sufficient to deter any sane man from again attempting the sale of liquor in a camp of volunteers. The hard drinkers *will* get drunk, and *will* go where they can get whisky, as long as they have money; when that is gone they may come to the canteen to get beer on credit. Our best officers get rid of such men as soon as possible, and they are not a factor that should be considered or catered to.

With my Post there has been less drunkenness without the canteen than with it, but I attribute the most of this to getting rid of some rough characters.

In my opinion the worst feature of the canteen is having officers who serve the troops, handle intoxicants that make men drunk, take their money, and then sit on a court to try them for *being* drunk. My observation has been that company commanders who may be in charge of a canteen are very loth to prefer charges against men to whom they have given credit with which to buy beer on which to get drunk; for I have seen as much drunkenness in a canteen as I ever saw in a trader's store of the old time.

I do not think we are called upon to accept "an alternative," as some put it, that a canteen is the lesser of two evils; the fact that it is an evil is sufficient to condemn it, and to confirm the action of Congress as right and just.

As long as officers do not countenance it, but consistently punish all drunken offenders, beer drinking will not be popular in the army, rowdyism will disappear, and discipline will improve. I believe that medical officers and officers of the army agree that alcohol in any form should never be used as a beverage in the tropics. I regret that the canteen has caused so much contention, and that any part of the army should be made so offensively notorious; but now the matter is up, I hope it may be settled for good and all, not only for the good of the service, but for humanity. Very truly yours,

P. H. RAY.

WAR DEPARTMENT, FORT SNELLING, MINN.,
July 18, 1901.

MY DEAR DOCTOR: Yours received. I am grateful to you for the interest and stand you have taken. I hope there will be no more legislation on the subject, and that there is an end to retailing liquor to soldiers by any U. S. official, for any purpose. I inclose under separate cover a copy of the *Journal of the Military Service Institution* in which Captain Lewis touches on the canteen question under the head of "Discipline in the Army."

There is an important point in regard to efficiency which I have not mentioned, and that is the effect of beer on the physical endurance of men. Several times within the last ten years I have noticed, when extra and continued exertion has been required in marching, that in every instance the first men to drop out of the ranks and fall by the wayside have been the beer drinkers.

With the development of the long-range weapons and the necessarily greater distances to be passed over under attack, the modern soldier must be an athlete, not only to carry him through the zone of fire, but to enable him to shoot accurately. From my own experience I know that drinking beer detracts from the accuracy of the soldier's shooting.

To put aside all other questions, it would be the height of inexpediency for the government to make itself a party to the policy that would render a soldier inefficient at a critical time on the battle-field, after having maintained him for several period of the sale of alcoholic drinks by *one* hour on Saturday night. Dr. Carter carefully collected from every dispensary and from the out-patient department of every hospital the number of cases of surgical injury due to drunken assaults on Saturday nights and Sunday mornings for a certain number of weeks before and after the curtailment of the hours. He was enabled to show, without a single chance exception at a single institution, an extraordinary diminution since the curtailment of the hours of sale, a fact which not improbably influenced the magistrates to maintain the curtailment in spite of the great pressure that was put upon them to do the reverse. . . . We have shown that many leaders of the profession have viewed the question of our national habits with seriousness. The medical profession throughout the kingdom will be acting in the spirit of the true physician in refusing to be satisfied till legislation does for the mortality from alcoholism what it has done for the mortality from whole groups of other diseases which do not so fatally affect the people."

That the legislation thus advocated by the *Lancet* does not refer merely to drunkards or those who drink to *excess*, is evident from this declaration: "It is idle to think that any provision for confirmed drunkards will materially benefit either them or the nation, unless efforts are made by the legislature and by society to prevent their being manufactured wholesale." This is certainly a true and important declaration; and the efforts required are very simple and effectual. The legislature needs only to declare alcohol a poison, to be sold under the same rules as other dangerous poisons, and society need only to abstain from its use and the mortality from alcoholism will certainly be reduced to a much desired minimum.

N. S. D.

Vital Statistics of France.— In a recent communication to the French Académie de Médecine, by M. Henri Monod, it was shown that the birth-rate in France from 1896-1898 was only 22.9, and the death-rate for the same period 21.3, thus indicating an almost stationary population. It was further stated that the mortality of infants under one year of age during the same period was 247 in every 1,000 infants born,— certainly a poor showing for the country whose people consume more alcohol, in proportion to its population, than any other in either Europe or America. N. S. D.

ALCOHOL AND INFECTIOUS DISEASES.

ONE of the most recent, as well as most extensive experimental investigations concerning the influence of alcohol on the action of several of the well-known infections, is that of Dr. Laitinen, an account of which is given in *Zeitsch. f. Hyg. und Infect.*, July 19, 1900. The chief infections used were cultivations of the tubercle, anthrax, and diphtheria bacilli, and the animals used were dogs, rabbits, guinea pigs, fowls, and pigeons, aggregating in number more than three hundred and forty.

The alcohol used was a twenty-five-per-cent solution of ethyl alcohol in water, and the amount given, proportional to the weight of the animal, varied from 1½ c.cm. in the pigeons, to 60 c.cm. in some of the dogs. In some experiments single large doses were used to produce acute alcoholic effects, and in others, small doses were administered daily for several months.

The general result, however, was the same in all. Dr. Laitinen found that in every experiment the administration of alcohol in any form was to render the animal distinctly more susceptible to the infection than was the control animal having no alcohol.

These results, added to those obtained by Prof. A. C. Abbott a few years since, should be regarded as sufficient to demonstrate the evil effects of alcohol in the more important infectious diseases, so far as laboratory experiments on animals can be made applicable to the human race. But the same experimentation with alcohol on man is going on in almost every community throughout Christendom, and has been for many generations in the past. We can easily find in every community those who take alcohol every day, some in the form of beer or wine, others in whisky or brandy. Some take it in doses large enough to produce acute alcoholism or intoxication. Others take small but daily doses, and produce only chronic effects. Alongside of each of these classes are others who drink no alcohol, and therefore serve as controls for comparison. If any physician wishes to have a demonstration of the influence of alcohol on the vital resistance of man to infections of every kind, he needs only to keep an accurate record of the attacks of disease and their results for a very few years on his own patrons and their families. He will find that the man or woman who uses alcohol, and their children, suffer more frequent attacks of disease, and yield a higher ratio of mortality than those who use none. There are now, and have been for many years, several thousand soldiers in the British army in India and other parts of the world who are total abstainers from alcoholic drinks, while the rest of the army take their daily ration of alcohol.

The annual reports of the register-general of the army uniformly show that the total abstainers suffer a markedly less ratio of sickness and mortality than the rest of the army. During the Civil War, while our army was on the Peninsula, there was much sickness from both malarial and typhoid fevers, and as there had been no regular alcoholic liquor ration for the soldiers, it was deemed best to give each soldier a moderate daily ration of liquor as a preventive of sickness. But Dr. F. H. Hamilton, who was then at the head of the medical staff with that division of the army, tells us in his work on "Military Hygiene" that the sickness was so markedly increased by the alcoholic ration as to cause its banishment in less than sixty days. To cite further proof that alcohol universally increases man's liability to attacks of disease seems like a waste of time. That the presence of alcohol in the human system lessens metabolism, impairs the hemoglobin, and diminishes protoplasmic activity, and thereby renders the individual more liable to attacks of all infections, has been abundantly demonstrated on animals in the laboratory, and on men in every climate and in every field of human industry. N. S. D.

Alcohol in the French Army.—In the Paris correspondence of the *British Medical Journal*, March 9, 1901, we find the following letter of instruction recently issued by the French Minister of War: "The circular of May, 1900, has forbidden the sale of any *eau de vie* or liquor with an alcoholic basis, or any of the numerous preparations known as *apéritifs* in any barrack, canteens, camps, or fields of maneuvers.

"This measure will give good results from the point of view of the prophylaxis of alcoholism in the army; but the abuse of drink outside barracks being always possible, the interdiction on canteens will have its full effect only if by means of moral action exerted by the officers, and by anti-alcoholic instruction, the soldier knows of a certainty that the use of alcohol diminishes the resistance to fatigue and disease, while the habit of sobriety has the best influence from both the physical and moral points of view. I have consequently decided that lectures on the effects and dangers of alcoholism shall be delivered concurrently with regulation lectures on hygiene before the troops either by officers, or by military surgeons. I inclose the program of these lectures.

"*Signed*, GENERAL ANDRÉ."

This surely indicates work in the right direction, and where it is most needed. N. S. D.

Professor Max Kassowitz and Alcohol.—In a recent article in the Vienna *Times*, Professor Kassowitz, one of the most eminent clinicians of Austria, says: "Out of the rapid consumption of alcohol have grown the most serious, hygienic, moral, economic, and social injuries. Alcohol undermines the health of individuals and generations; that it destroys family life, increases pauperism, and fills the jails and insane asylums, is so evident, and is by scientific investigation so surely established, that no difference of opinion concerning it is held among earnest people." N. S. D.

Alcohol and Insanity.—The *British Medical Journal*, March 9, 1901, in noticing the annual report of the Royal Edinburg Asylum for 1900, by Dr. Clouston, states that the number of patients under treatment was 1,384; the number of admissions during the year, 472, it being 38 above the average for the last five years. The discharges were 315, and the deaths 99. In 115 of those admitted, *i. e.*, about 25 per cent of the whole, drink was assigned either as the sole or the contributory cause. Of the men alone, one third were alcoholic cases; and the report states as positive that "for every man in whom excessive drinking caused absolute insanity, there were twenty in whom it injured the brain, blunted the moral sense, and lessened the capacity for work in lesser degrees. It is further stated that "Dr. Clouston's alcoholic lunatics had risen from an average of 15½ per cent in the years 1874–1888, to 21½ per cent in 1889–1898; to 22½ per cent in 1899, and now to 24½ per cent in 1900." Thus "the national drink bill went steadily up, and the national degeneracy progressed." S. S. D.

In a city of over a hundred thousand inhabitants there is at present a great temperance agitation. The agitators comprise a few clergymen, several politicians, one of whom was formerly a distiller, some teachers, and several bankrupt business men. They are all intensely engaged in trying to correct the defects which follow from the use of alcohol and to educate public sentiment concerning the nature and use of spirits. There are over two hundred physicians in that city, not one of whom is identified with this movement, and not one has taken any interest to educate the public or to teach the nature and character of alcohol. In the two medical societies which meet often, and the proceedings of which are reported in the daily press, there is no reference to alcohol as a poison or as a dangerous remedy. The statements of the temperance reformers concerning the danger and loss from alcohol are ignored by the physicians. Of the eighteen thousand persons passing through the police court in that city for one year, sixteen thousand were classified as intemperate and drunkards. Other equally startling facts relating to the presence of alcohol and the injury which follows from its use attract no attention medically. There can be no doubt that many of the physicians in that city are suffering for want of business, and find it difficult to live as they would wish to from the small income they receive. Yet there is a neglected field of practical medicine right at their doors. The alcoholic problems which await solution from medical study are numerous and far reaching. These will furnish fields of practice for every one of these physicians of equal importance to that which follows from the prominence of the typhoid germ or the smallpox epidemic. The scientific, medical, and hygienic study of alcohol and its diseases naturally belongs to the physician, and can not be understood by any other person. It is always a reflection on the intelligence of medical men when they refuse to discuss a question of this character, and tacitly concede to the theories and the means for cure adopted by nonexperts. In this city of a hundred thousand inhabitants there should be a distinct society for the medical study and teaching of the problems which grow out of the use of alcohol. This society should teach the public the best means and methods to neutralize and correct the evils. This subject should be on a par with bad sewage, bad water, and other medical and hygienic topics which concern the public. These thousands of poor drunkards who drift back and forth from the saloons to the jails should all come under medical care and be protected and housed. This can be done only by medical teaching and by medical men. It is this neglected field of medical practice that awaits occupation in almost every section of the land.

T. D. C.

PROFESSOR DE BOCK, of the University at Brussels, in a recent paper on "The Influence of Alcohol on Mental Works," makes the following significant statements: —

Alcohol acts in a different manner upon the psychic centers and upon the motor centers. In small doses, it paralyzes the sensory and intellectual organs, but overexcites the motor organs. This preliminary period of excitation of the motor centers is of variable duration. In large doses, it quickly causes paralysis of various cortical regions, motor and sensory. It was not demonstrated by Krapelin that small doses of alcohol produced an excessive excitement of the psychic functions previously to their paralysis.

"These discoveries have an interesting application in the study of drunkenness. They give the key to the symptoms which characterize it, and furnish for it a complete explanation.

"Under the influence of alcohol the perception of exterior impressions and the comprehension become difficult; whence the drunken man's loss of location and direction, the difficulty one finds in arousing his attention. The diminution in the power of association reduces the value of the work furnished, makes the drunkard incapable of comprehending and of formulating a line of reasoning the least complicated.

"The want of penetration and reflection shows itself in the carelessness of his speech and acts. The meanness of his thought, the tendency to drivel, idle talk, to stereotyped expressions, to obscene puns, to speak in a foreign tongue, show the changed quality of the associations.

"Since, on the other hand, alcohol facilitates the discharge of motor impulses, the individual who has absorbed it feels himself stronger; but this freedom given to the muscular system is in its turn the origin of those impulsive, violent, unguarded, and incomprehensible acts, of those rash exploits and foolish bravados, and unfortunately, also, of those crimes of passion which embroil the individual who finds himself under its influence. That is how a harsh word, a simple accident, a bad example, suffices to lead to the mad acts of a band of drinkers. Thence is the verbosity of the drinker, his readiness to cry, to sing, to make an uproar.

"The nobler modes of mental activity disappear, their inhibitory action fails; the individual who has drunk loses all reserve, all feeling of timidity or of embarrassment; all the considerations which regulate acts and speech have lost their power. The innumerable conventionalities which rule our manner in all their details, have lost all value. The man who has drunk feels no further constraint, has acquired audacity, and acts without regard to the opinion of others; he speaks with his heart open; lays down his opinion frankly, without disturbing himself about the disastrous effects his speech may have, divulges secrets that have been committed to his confidence, and lays bare before the indifferent and strangers the inmost hopes of his being." T. D. C.

A RECENT case has been the subject of some bitter controversy. A man of some prominence was taken with pneumonia. His attending physician began to give large quantities of spirits for fear his strength would fail. Later in the case another physician was called in, who advised an increase of the quantity of spirits given. After a while a consultant from a large city disagreed with the treatment and ordered the discontinuance of all spirits. The patient had been delirious after the first week and at times quite violent. The removal of alcohol was followed by a clearing of his mental condition, and he was able to write a will and dispose of some business matters to the satisfaction of his friends. Later, he died, and the question was raised if the withdrawal of the use of spirits was not the cause of death. Both the family physicians and consultant defended their position with great earnestness. The restoration of his mental condition by the removal of alcohol was considered evidence of the damage from the use of spirits, and the continued prostration and death were cited on the other side as evidence of heart failure from the withdrawal of the spirits. The controversy is unfortunate in many respects, but will no doubt serve to impress the facts that alcohol is an exceedingly dangerous drug, and can not be used safely in any respiratory diseases. T. D. C.

THE New York School of Clinical Medicine, a post-graduate institution, has arranged for a special study of drug diseases in the department of neurology. For a long time there has been an increasing interest in the neuroses and psychoses of diseases which follow from the use of alcohol and narcotic drugs. No instructions are given on these subjects in the medical colleges or post-graduate schools. As a result of this failure, quacks of all degrees and irregulars have sprung into notoriety, claiming to treat these diseases by unknown methods and measures which in most cases are disastrous. The trustees of this college believe that the time has come to make this a new department in the study of neurology, and that the demand for instruction will be appreciated by physicians in all sections of the country. Dr. T. D. Crothers, of Hartford, has been appointed to give instruction in this department, and will begin with a course of six lectures on diseases and neuroses associated with and following from the use of alcohol and opium, and their medico-legal relations. T. D. C.

THE PASSING OF ALCOHOL.

THE last three years have witnessed a great decline in the use of alcohol and a change of opinion among the authorities in regard to it. The indications for its use are becoming more and more circumscribed and abridged, though it is, perhaps, more proper to say that the indications are now being recognized and studied. In years gone by it was customary to give alcohol, not for any special indications, but simply because the patient was sick in bed or only feeling bad. It was a common remedy, found in nearly every home, easy to take, not at all dangerous, having a decided effect, chiefly upon the mind, in a very short time. It also had a reputation, venerable by all antiquity, of being the king of stimulants; that by its use in a critical moment men had been snatched from the very jaws of death; that it was the one remedy to give first and freely in all cases of accident. To-day men are studying its composition, its doses, its effects upon the heart, the nervous system, the kidneys, and the liver. It is king no more except it shall stand the test; for scientists and workers in the laboratory, with unsatisfied hands and indifferent hearts, are analyzing this ruler of stimulation which the people have set up. The end is not yet, though it has been shown that the feet are of clay.

Among the students of the drug it was first announced that alcohol was a stimulant only in certain moderate doses; after that it was a sedative. The report is now abroad that it is an anesthetic and sedative in all doses, that it has a primary stage of excitement, but is never truly stimulating.

But another reputation had alcohol some years ago,— that it was an appetizer, a tonic, assisting digestion, promoting strength, leading back with a strong hand reluctant health. To-day there are men rising up to deny this, claiming that in certain diseases of the gastric mucosa it is even injurious.

And that which once we gave in place of food for the fever-famished body must now sit upon the shelf under suspicion of having beckoned on, rather than fought back, the angel and the shroud. Scientific men are even beginning to study the relationship of alcohol as a beverage and the liability to certain diseases or to a particular form of any disease.

Dr. Le Gendre, of Paris, has come to the following conclusions: —

1. The abuse of alcoholic beverages predisposes to and aggravates most of the diseases found in hospitals.

2. All alcoholic beverages are harmful. The most noxious are those containing aromatic essences; for instance, absinthe and the so-called aperitive or aperient bitters.

3. Alcoholic beverages are productive of most harm when taken upon an empty stomach, or when taken between meals.

4. An individual making a habitual use of alcohol or of various liquors, or of too much wine (more than one liter daily), inevitably becomes an alcoholic, even if he has never been in a state of drunkenness.

5. Alcohol is a poison, the habitual use of which, sooner or later, but nevertheless unfailingly, impairs the structure of organs most essential to life, — the stomach, the liver, the kidneys, the blood-vessels, the heart, and the brain.

6. Alcohol is an excitant, a stimulant, but not a strength-producing agent.

7. It does not take the place of food; it creates a distaste for food.

8. He who frequently drinks alcohol, or who drinks too much wine (more than a liter daily), is more susceptible to disease. If he becomes ill, his illness is always more serious. The habitual drinker is exposed to delirium tremens.

9. Alcohol, by weakening the lungs, prepares the soil for phthisis; many a consumptive has been an alcoholic. Alcohol weakens tissue resistance.

10. Among the children of alcoholic parents are recruited the idiots, the epileptics, the mentally and physically dwarfed, according to the *Medical Standard*.

Sir James Clark, in "A Treatise on Pulmonary Consumption," says that "among the causes of tuberculous cachexia, a free indulgence in alcoholic spirits holds an important place; while this pernicious habit is one of the most powerful means of debasing the morals of the people, and of extinguishing the best feelings of human nature, it is no less effective in destroying the physical constitution. There is good reason to believe that the use of spirituous liquors among the working classes of the country is productive of consumption and tuberculous disease to an extent far beyond what is usually imagined. The blanched, cadaverous aspect of the spirit-drinker bespeaks the condition of his internal organs. The tale of his moral and physical degradation is indelibly written upon his countenance. The evil, however, does not rest here, for by destroying his own health he entails on his unhappy offspring the predisposition to tubercular disease."

Dr. Joseph M. Matthews, president of the American Medical Association, writes to the editor of the *New Voice* as follows: —

"It is the concensus of opinion of the medical profession that where a reduced vitality of the system is brought about from any cause or condition, that said loss of tone of the physical body would induce a tuberculous disposition; in other words, that by the free use of alcoholic spirits the physical body is brought to a low standard of health, and would predispose the same to and produce a soil in the lung in which the special germ could propagate rapidly."

These things are only straws, perhaps, but they show that a current of professional opinion has set in from the East, and the time is coming when we will prescribe alcohol intelligently, for certain indications, in certain doses. As a beverage, however, men will not cease from drinking until they are given a new thirst and a new throat. — *Charlotte Medical Journal.*

ALCOHOL AS A REMEDY IN DISEASE.

AMONG the many scientific items of progressive medicine are to be noted the investigations in regard to the use of alcohol, — formerly one of the most popular of all remedies, prescribed alike, *ad libitum*, by physicians, quacks, and laymen, given in all forms of disease, to all sorts and conditions of men, women, and children, with scarce a thought of its physiological action, and no definite knowledge of its effects on disease, and no apprehension of the possible evils that might follow its use.

But it is no longer king. Like all other creatures, it must come down and undergo the critical test of scientific research. If it stands this test, it will be consigned to its proper place in materia medica. If, on the other hand (and which now seems most probable, if not inevitable), it shall be ascertained that it is neither a stimulant nor in any sense a food, and hence is lacking in those essential features which could render it of any value as a supporting treatment, then its high claims as a great remedy will be groundless; if, added to this, it is shown to paralyze the dynamic action of cell life, destroy the leucocytes, and thus render the system less able to battle against the various micro-organisms that are constantly seeking an ingress into some of the organs and tissues of the body; if, also, its action is to cripple or arrest tissue metamorphosis or normal metabolism, and thus prevent active and healthy elimination of the necessary wastes that is so essential to life; if, added to this arraignment, it shall be fairly understood that the habitual use of alcoholic liquors, instead of preventing disease, does exactly the reverse, that it decreases normal vital resistance, and thus renders the system more susceptible to the inroads of disease,— then all these indictments, added to the well-known and commonly accepted truths of its production and hereditary transmission of various disorders of the mind and nervous system, to say nothing of the moral obloquy attending its use, are, it seems to us, sufficient evidence to regard the heretofore familiar bottle of whisky or the bottle of the sick room as an agent of an unknown quantity, especially for evil.

Popular beliefs should never bias the judgment of a doctor. For centuries people believed in witchcraft, and even at this enlightened day all sorts of vagaries are believed in by not a few. Quack and patent nostrums fill the shelves of our druggists in every town and hamlet, and are eagerly bought and swallowed by all classes of people. Osteopathy flourishes, and fills the coffers of its subtle managers.

Christian science deceives its votaries to such an extent that tender children are sacrificed on her altar by their own parents. Hideous deformity! Less excusable than the Hindu woman, who, to appease the wrath of a god, tears from her breast her shrieking infant, and consigns it to the turbulent waves of the Ganges.

All this goes to prove that error, however gross, finds easy lodgment in the human mind, and is exceedingly difficult of extraction.

There is another fact in this connection. The public mind has access to sources of information on nearly all subjects affecting the popular weal except medical subjects. Religion, law, politics, ethics, are daily discussed and widely disseminated by the pulpit, forum, and printing press. Not so with medicine. The science and art of disease and remedy are taught behind closed doors, and only to that class of men and women who are expected to make it their life work. Hence the great masses, however intelligent they may be on other topics, know nothing of the animal economy, the diseases to which it is subject, nor the remedies best suited to relieve or cure. Here, then, is the apology for the credulity of the popular mind — ignorance.

With reference to alcoholic and vinous liquors, one other factor has been most patent in the use of this class of remedies; that is, they please the palate and are easy to take. Men have always been governed more by appetite than by reason; but the physician of to-day and of the near future will not allow popular whims or appetites to bias his judgment. He seeks for truths based on scientific research. To the great laboratories of the world he looks for the flood-light that will expose fallacies, however "time-honored," and with radiant fingers wreathed with hope for sick and fallen humanity, signals to the painstaking physician, "This is the way, walk ye in it."

We hazard the suggestion that the time is close at hand when the medical profession, duly weighing the overwhelming array of evidence against the use of alcohol, will restrict it to a very narrow limit, — *if they do not discard it altogether.* — *I. A. Mac Swain.*

THE New York Central Railroad employs thirty thousand men. About one per cent are dismissed yearly for spirit drinking. Twenty years ago nearly twenty per cent were discharged yearly for this cause. The demand for temperate men grows steadily every year, and the supervision of the habits of all persons engaged on the road and train service is more and more exact.

BULLETIN OF THE

AMERICAN MEDICAL TEMPERANCE ASSOCIATION.

Editors: N. S. Davis, M. D.; T. D. Crothers, M. D.; J. H. Kellogg, M. D.

THE LONDON "LANCET" ON LEGISLATION AGAINST NATIONAL INTEMPERANCE.

A RECENT number of the *Lancet* has an article on this subject, in which it says: "It is, we are glad to think, foreign to the disposition of medical men to enter into political controversy on public questions. But in regard to the question of alcohol it is scarcely possible that they should remain altogether silent. The growing number of deaths from alcoholism and the increasing consumption of it by the people, men and women, and especially women, make it incumbent on medical men who have studied the question to place their views clearly before the public. We have received a copy of an address by Dr. William Carter, of Liverpool, on National Intemperance, who has clearly perceived the necessity for speaking out. . . . He speaks as a leading consulting medical man and justice of the peace of Liverpool, in which city there is a constant and hard struggle on the part of the authorities with the social conditions that produce degeneration and disease. . . . In regard to every great group of disease, this fall in mortality holds, save in the dietetic group, which is subdivided into three headings,—deaths from starvation, deaths from scurvy, and deaths from intemperance. Deaths from starvation have fallen from 18 to 12 per 1,000,000; deaths from scurvy have remained stationary; but deaths from intemperance have risen from 45 per 1,000,000 of those living in 1888 to 77 per 1,000,000, in 1897. . . . He shows how typhus fever, smallpox, and hydrophobia have been controlled almost to complete disappearance by the effective administration of the law. He maintains that law can do much to control and diminish deaths from alcohol. One fact with medical bearings he adduces. The magistrates of Liverpool, under the powers of an Act of 1872, determined to curtail the

The Manila Drink Scandal.

A calm statement of facts prepared by James B. Dunn, Gen. Sec. of the National Temperance Society.

In a recent issue of "Leslie's Weekly," Mr. Irving Hancock says:

"Of all the problems that confront us in the reconstruction of the Philippines, the gravest and wickedest is one of our own importation. The Manila saloons, taken collectively, are the worst possible kind of a blot on Uncle Sam's fair name. The city's air reeks with the odors of American whisky and beer."

This is a serious charge. Now what are the facts? In the hopes of securing these from the highest official sources, the United States Senate, on the 2d day of March, adopted the following resolution:

"That the President be requested, if not incompatible with the public interest, to send to the Senate a statement of the number of saloons that have been established in Manila, P. I., since the occupation of that city by the U. S. forces; who conducts these saloons; who are their patrons and what kind of liquors are sold, and the quality of such liquor.

"The President is also requested to inform the Senate of the number, if any, of saloons run on the American or English plan in Manila before we occupied the place.

"The President is also requested to inform the Senate whether or not it is within his power, as Commander-in Chief of our military forces, to suppress all saloons in Manila and prohibit and prevent the sale of liquor to our soldiers."

As up to this date, April 7th, no reply has been received, we give in this leaflet, facts and figures which cannot be questioned. It is an acknowledged fact that when, on the 13th day of August, 1898, the vanguard of American troops—under the folds of Old Glory—entered Manila, under the same flag there also entered the vanguard of American saloonists.

"Almost as soon as the American soldiers had stacked arms in the city," says Mr. Hancock, "a score of American rum shops were opened, and as there was not enough American civilians disposed to embark in the disreputable business, natives were enlisted in the traffic, and to-day there is not a thoroughfare of any length in Manila that has not its long line of saloons, while street cars carry flaunting advertisements of this and that brand of American whisky, gin, brandy and beer." No wonder that an intelligent native asked an American friend, pointing to the long line of saloons on the Escolta, "Is this the civilization you bring?"

Well might the "Champion of Fair Play," a liquor organ, boast, "Beer and Whisky go with the flag to our new possessions and no obstacles are interposed. The government shares in the profits," and the "Wine and Spirit News," another liquor paper, exultingly exclaim:

"As one result of American occupancy of Manila the liquor business has reached enterprising proportions, and is now considered as one of the leading, as well as one of the respectable kinds of business. Already the street cars are topped with large signs detailing the exquisite qualities of certain whiskies."

The Beer Trade Follows the Flag.

The trade that follows the flag is the BEER trade. Hear what Vice-President Morton, of the Santa Fé Railroad, says:

"The acquisition of the Philippines is not greatly increasing our trade across the Pacific. Year before last our exports to Manila were $200,000 and last year they were $400,000, but the increase was greatly made up of the liquid traffic from Milwaukee and that country up there. Beer follows the flag."

Take the following official figures and judge for yourselves: In 1896 the total exports in value from the United States to the islands was $162 446. Of this amount only $1,415 represented liquor. In the year 1899 our total exports thither amounted to $404,193 Of this sum $143 697 was for drink. That is, out of a total increase of $241 747, $142,-282 was for drink. Or in other words, while the total trade in 1899 was only a little over twice the total trade in 1896, the value of the drink we sent into the Philippines in 1899 was almost 100 times the value of the drink we sent thither in the year 1896.

Study the Following Figures.

Total value of all fermented and distilled liquors exported to the new possessions:

	1897.	1898.	1899.	1900 January 1, (7 months).
Cuba................	$28,333	$10,180	$629,225	$503,955 "
Porto Rico..........	2,532	3,808	214,423	62 853 "
Philippines.........	663	337	143,697	192,653 "

Note the stupendous increase in the Philippines. For twelve months ending June 1, 1898, it was but $337, while for the seven months preceding January 1, 1900, it was $192,653.

These are the official statistics of the Treasury Department at Washington No wonder that Bishop James M. Thoburn of the M. E. Church, writing from Manila, should say:

"Drunken soldiers meet me everywhere."

President Schurman on Drunken Americans and Sober Filipinos.

In an article in the New York "Independent" President Schurman, chairman of the commission sent by President McKinley to the Philippine Islands, said:

"I regret that the Americans allowed the saloon to get a foothold on the Islands. That has hurt the Americans more than anything else, and the spectacle of Americans drunk awakens disgust in the Filipinos. We suppressed the cock-fight there and permitted the taverns to flourish. One emphasized the Filipino frailty and the other the American vice. I have never seen a Filipino drunkard."

President Schurman further said: "It was unfortunate that we introduced and established the saloon there to corrupt the natives and to exhibit to them the vices of our race."

In an address before the Liberal Club of Buffalo, on Dec. 14, President Schurman, in referring to the sobriety of the Filipinos, quoted the following remark as made to him by a native:

"You have brought us the blessings of civilization, and you have lined our most beautiful street in Manila, the Escolta, with 500 saloons." Then President Schurman added, "That is truly the worst thing we have ever done. Had we allowed them to go on with their cockfighting and stopped our own saloons, it would have been better."

These are severe charges to be made by President Schurman against this government saloon expansion business. President Schurman says he "regrets that a saloon was allowed to get a foothold on the island."

Who allowed this? is an important question. That "this has hurt the Americans more than anything else" is what the National Advocate, with all the leading religious and temperance journals have all along charged, and who is responsible for this? The Philippine Islands are under military rule, and the President and the War Department cannot only close every saloon, but can say what shall and what shall not be imported into those islands.

About two years ago, when a delegation of the National Temperance Society called the attention of the President to orders issued by certain generals during the Civil War, closing saloons within their districts, notably that of Gen. Lewis Wallace, closing all the saloons in the cities of Covington, Newport and Cincinnati, the President replied: "Yes, but those cities were under military rule, and he could do it."

Now, we ask, cannot General Otis issue a similar order for Manila and the district he commands, which is also under military rule?

There is now lying upon our desk, as we write, a letter from Major-General Shafter, written from Santiago, in which, after denouncing the sale of intoxicating drinks in the canteens and on military reservations, he says:

"I have absolutely prohibited the sale of liquor or of the opening of saloons in the city of Santiago, and have refused permission for cargoes of beer to come from the States here."

Surely, President McKinley can do for Manila what General Shafter did for Santiago? If he does not, and allows the saloon to be opened there and shiploads of beer to land there, then he and he alone should be held re ponsible for the condition of things which President Schurman so much regrets.

Is this the "benevolent assimilation," the "higher civilization" of which so much has been said? "Suppressing cockfights" and "opening taverns," the expansion of "American vice."

Drunken men common under the American Red, White and Blue. No drunken Filipino under the red and yellow of Spain, and who is responsible for this change?

If the grogshops of Manila are corrupting the natives, dishonoring the nation and disgusting the Filipinos with our republican civilization, why not close them?

And President McKinley could have prevented them being opened. Why does he not close them now? Our soldiers are transported to the Philippines at an average cost, it is said, of $1,000 each, which taxpayers must pay. Then to have bartenders made of some and drunkards made of others is to add insult to injury to our entire home population. Is this the policy of "benevolent assimilation?" Is this the higher civilization of which we boast? It is a policy, criminal, idiotic and satanic.

"Shall I not visit for these things, saith the Lord, and shall not my soul be avenged on such a nation as this?"—Jer. 5: 9.

In an address at the Fifth Avenue Presbyterian Church, New York City, Lieut. E. W. Hearne, of the Fifty-first Iowa Volunteers, lately returned from Manila, said:

"The Filipinos while pagans and semi-civilized, are moral and sober. They first learn of Christianity from the profane sailor, and when they see immense numbers of drunken, profane and immoral soldiers representing this country they have little respect for the religion they profess. 'If that is your religion,' they say, 'we prefer our own.'"

Mr. W. B. Miller, who has charge of the Army and Navy work of the Young Men's Christian Association, in speaking of the campaign in the Philippines, said:

"So great was the effect of the drunkenness and irreverence of the American soldier in the Philippines that one man writing to me from Manila, said that two missionaries gave up their work among the natives and went to work on the army. They realized the uselessness of their work when there was an immoral and drunken army representing this country on hand. One drunken soldier can do more evil than two missionaries can undo. The sending of whisky and questionable things to Manila is not a badge of honor to this country."

Insanity Among the Soldiers.

A brief item appeared in the daily papers recently, stating that the War Department had received an order from General Otis, at Manila, for 1,000 pairs of handcuffs and 200 pairs of leg shackles. What for? For insane American soldiers at Manila. The item did not surprise us. We were prepared for it. A few weeks ago there sat in our office an officer who came on from Manila in a transport with some 200 insane soldiers on their way to San Francisco. "Drink and dissipation," said this officer, "with the hot climate, caused insanity in nearly every case." A chaplain, writing from Manila says, "the accursed American saloon is at the bottom of many a soldier's insanity."

From May 1, 1898, to April 1, 1900, according to official records, there have been 83 suicides in the armies of the United States, nearly every one due to insanity.

During the same period nearly one thousand soldiers have been shipped from their various posts in Hawaii, Porto Rico, Cuba and the Philippines to the military insane asylum in Washington.

Of these about 90 per cent. have come from the Philippines.

Since Dec. 1 last there have been 29 suicides there, all due to insanity.

The percentage of suicides in the Philippines is the largest in the history of modern armies, and even rates higher than where with besieged troops, sometimes without food and water, the suffering soldiers have sought an end to their troubles in death.

"Mentally deranged," is the comment of Gen. Otis on each of these deaths, but behind each is a story of suffering which even the horrors of the civil war, which lasted four years, cannot duplicate.

For this alarming increase of insanity among the soldiers at Manila there must be a cause. What is it? For this roll of national disgrace some one must be responsible. Who is it? According to War Department officials no soldiers were ever better treated, better fed and clothed than Gen. Otis's army in the Philippines. What than is the cause? Of course there is the deadly climate and the trying hardships of a bushwhacking campaign, but back of all, and chief of all, there is the deadly drink poison and the numerous saloon pests.

A Chaplain from Manila who carefully studied the condition of things there, says: "Not less than two-thirds of these victims from whom light and hope and reason have departed, owe their fearful downfall to the drink which the administration has permitted to be sold in camps and in the Philippines."

These unfortunates only a few months ago went forth from their homes with unclouded vision, strong bodies, elastic step and patriotic hearts. So said the government when they passed a rigid examination. How different their return to home and native land, mental moral and social wrecks. Every star of hope extinguished in midnight darkness. The prayers and tears and petitions of the motherhood of this nation avail not. How heart-sickening this wholesale demoralization and utter ruin of the young men.

And all this one man could have prevented. With one stroke of his pen President McKinley could have banished the drink curse from the army and kept it out of the Philippines. Seeing that he has failed in this his duty, let every lover of his country and friend of the soldier appeal to Congress to "right this wrong."

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Coffee and Rheumatism

THOUSANDS of coffee drinkers suffer from pains in the shoulders, back, neck, limbs and other parts, not being aware that the defect is due to rheumatism, of which coffee is the real cause. With every cup of coffee, one takes into his system more uric acid than would be absorbed by drinking the same quantity of urine. An ordinary cupful of urine would contain about a grain of uric acid, whereas a cupful of coffee contains four grains of caffein, which, in its effects on the body, is practically the same as uric acid. It is for this reason that Gautier and other eminent authorities in dietetics condemn coffee in the strongest terms to all persons suffering from the rheumatic diathesis, as well as those who are the subjects of gravel, gastralgia, dyspepsia or Bright's disease.

What Gautier has said of coffee is equally true of tea, which contains four grains of caffein to the cup, and contains, besides xanthin, hypoxanthin, adenin and other poisons, most of which are also uric acid equivalents.

Cocoa and chocolate, besides these uric acid bodies, contain oxalic acid, which is equally as poisonous as uric acid. Cocoa contains in addition, one per cent of cocaine, one of the most dangerous of all narcotic poisons.

Tea and coffee and their congeners should be wholly banished from the table. They are not needed; they have no food value; they only interfere with digestion, and besides contribute in no small degree to the establishment of many of the most distressing and intractable maladies.

The Meat Boycott

A REMARKABLE feature of the widespread and still spreading meat boycott is the fact that no one has expressed any apprehension that the meat-abstainers are going to suffer any depreciation in strength as the result of their abstinence, nor any sympathy for the abstainers as though they were subjected to any real hardship or were suffering any real privation. This is a clear indication of great public enlightenment respecting the real position of meat as an article of diet. The meat strike of a few years ago opened the eyes of thousands to the non-essential character of flesh meats as strength and energy supporting foods. Everybody has always known that turkey and chicken were mere luxuries that could well enough be dispensed with without injury, and now the fact is becoming understood that beefsteak and roast beef are also luxuries which may be without detriment or loss, except perhaps in gustatory pleasure, exchanged for beans or lentils, good whole wheat bread and oatmeal.

A most interesting feature of the meat boycott is the fact that thousands of well-to-do men and women who have no personal interest in the question of prices of meat or other foodstuffs are profiting by the great object lesson which is presented in the spectacle of a million or more of men, women and children suddenly dispensing with flesh foods of all sorts while going on about their usual pursuits without inconvenience or complaint. Multitudes of intelligent people are asking themselves the question whether they are not eating more meat than is good for them, and there is evidence that many thousands who are in no way connected with the labor unions are joining the ranks of the meat-abstainers because of the conviction that the flesh of animals is a food *de luxe*, and not an essential part of a rational dietary, and something that may relinquished with profit.

The Porto Rican finds everywhere enough good food produced spontaneously and going to waste, or developed with almost no effort on his part, to furnish him with abundant sustenance; and yet he works, and he works hard. He needs little or no clothing for warmth, for frost is a thing unknown to this genial clime; the children play in the streets and frolic in the sunshine until they are eight or ten years old, clad only in the glassy brown ancestral garments with which mother Nature provided them. But civilization demands clothes, and imposes the necessity for many superfluities and luxuries, the cost of which is far in excess of the actual essentials for sustenance. So the Porto Rican paterfamilias must toil early and late to keep up with the growing demands of the new civilization that is forcing itself upon him.

The Porto Rican labors on the plantations or in the sugar mills, works hard from dawn till sunset, and often travels several miles to reach his work, sometimes taking a three or four mile run home during the noon hour so as to lunch in his own palm-leaf hut with his merry, dusky-skinned wife and growing youngsters.

The diet of the Porto Rican peasant consists almost exclusively of rice, beans, garabanzas (a bean-like legume), plantains, bananas, squashes, potatoes, cocoanuts, and a great variety of succulent and farinaceous roots, with juicy fruits and melons too numerous to recount. He eats a little lard for fat, perhaps the cheapest and safest he can get, notwithstanding its objectionable origin, for it is at least sterile. With proper instruction, he should be able to get from the cocoanut a fat far more digestible, pure, sweet and absolutely wholesome. At present a large part of the cocoanut crop of the island goes to waste. An acre of bearing cocoanut trees will produce from five hundred pounds to a ton of most delicious fat and with absolutely no care or cultivation except the trouble of gathering the nuts and *separating the oil.*

Here is a fine opportunity for American enterprise to exercise itself in a most useful, beneficent and undoubtedly successful way. The 1,000,000 inhabitants of Porto Rico need approximately seventy-five tons of fat daily, an annual consumption of not less than 25,000 tons of fat. A fringe of trees planted along the roadways of the island and bordering the fields of sugar cane, pineapples and coffee would easily produce this 50,000,000 pounds of oil, the value of which, deducting the cost of production, would not be less than three or four million dollars. Some enterprising Yankee will see this opportunity and will improve it to the great advantage of the Porto Ricans and the filling of his own pocket.

If the Porto Rican peasant gets a taste of meat now and then, it is only a little fresh or salted fish, codfish generally, or a bit of bacon, and it is only as a relish and not as a staple article of diet. The typical Porto Rican is practically a vegetable feeder. He dwells in a rich tropical climate and veritably thrives on the fat of the land, and notwithstanding the depressing effects of a hot tropical sun, which naturally lessens both the aptitude and the capacity for hard work, he performs fully as much labor in a day as does the average laborer in the temperate zone. The manager of a large plantation (a farmer from New York State) stated to the writer that his Porto Rican laborers continually surprised him with the prodigies of work which they performed. He felt sure that they accomplished nearly twice as much as the average farm hand at home.

The thousands of laboring men who have recently entered upon a meat boycott may be assured by the experience of their hardy brethren in Porto Rico that they are in no danger either of starvation or of becoming mollycoddles because of their meat abstaining.

THE EFFECT OF ALCOHOL ON THE NERVOUS SYSTEM IN THE LIGHT OF RECENT SCIENTIFIC RESEARCH.

BY W. H. RILEY, M. D.,

Superintendent of the Colorado Sanitarium, Boulder, Colo.

THE evil effects of alcohol upon the body become more and more apparent and conspicuous when the search-light of modern scientific methods is focused upon this subject. It has been well known to physicians and scientific men for a number of years that the use of alcohol, even in moderate quantities, when long continued, produces various diseases of the nervous system, such as paralysis, insanity, apoplexy. In hundreds and even thousands of cases of those who have been addicted to the use of this poison for any considerable time, by post-mortem examination, severe and distinct organic changes have also been found in the brain and other parts of the nervous system.

The immediate evil effect of alcohol in moderate quantities, however, has not been so clearly understood or appreciated until more recent methods of study have been applied to this line of investigation. The fact is now thoroughly established that alcohol, even in small quantities, does produce serious structural changes

FIG. 1. A healthy nerve cell of the brain of a cat: n, single axis cylinder, which extends some distance outside of the drawings, and in some cases in the nervous system of man, may be two or three feet long. c, c, are collateral branches of the axis cylinder. The other branches of the nerve cell are called the protoplasmic branches, and extend only a short distance from the body of the cell.

in the human being, truth is circumscribed by the limits of his perceptions, and is mingled with error.

He is most like God who has the fullest and purest conception of truth, and in whose life the truth has fullest expression. To attain to this distinction we have a task which calls for the fullest exercise of our noblest talents. All around us lie heaps of doctrines, theories, traditions, superstitions, mingled with truth and error. To select the true, to reject the false, to cut loose from tradition and superstition, to detect fraud and humbug, to battle with selfish propensities, and to stand for pure, unadulterated truth, is the highest calling of mankind; but it is a battle that comparatively few have the courage to fight. None, however, can expect with any show of reason to be accounted faithful who have not consecrated their powers to the struggle. This is not a battle for personal advantage, but a strife for heaven and humanity. The example of self-denial for truth's sake is an inspiring one. By it the world has been preserved from ruin. By it every step in advancement has been made.

Every man carries with him continually two distinct intelligences. Each of these is determined to assume control of the life, and they are contrary one to the other. One is animated by the impulses of the body. These impulses clamor for the gratification of the flesh, for natural pleasures, for selfish aggrandizement. The other receives its impulses from without the body. They come from above. They are unselfish, pure, noble. They call for self-restraint and self-denial. It is along the lines of this consciousness, the spiritual sensibility, that truth lies. Error crowds the pathway of the fleshly mind. He who would walk in truth must be prepared to deny self. Self-denial lies at the very threshold of Christian experience, as indeed it does at the doorway of every reform.

People who live for truth will be mocked by the selfish crowd as victims of a fad; but the difference between the truth and a fad is as high as heaven is above the earth. God will vindicate the truth in every respect, and will vindicate those who stand with the truth.

Truths which relate to our physical well-being stand with all other truths. They are God's gift to men as truly as is the revelation of moral principles or a moral and spiritual Saviour. He who despises these hates wisdom, and he that hates wisdom wrongs his own soul.

THE WAYSIDE INN.

I HALTED at a pleasant inn,
As I my way was wending;
A golden apple was the sign,
From knotty bough depending.

Mine host — *it was an apple tree* —
He smilingly received me,
And spread his choicest, sweetest fruit
To strengthen and relieve me.

Full many a feathered guest
Came through his branches springing;
They hopped and flew from spray to spray,
Their notes of gladness singing.

Beneath his shade I laid me down,
And slumber sweet possessed me;
The soft wind blowing through the leaves
With whispers low caressed me.

And when I rose and would have paid
My host so open-hearted,
He only shook his lofty head;
I blessed him and departed.

— *Our Dumb Animals.*

in the different tissues of the body. These organic changes can be demonstrated in the human body after death caused by acute alcoholic poisoning, and in the bodies of lower animals that have been given moderate quantities of alcohol, and killed a few hours after the administration of this poison, the cells of the body being then subjected to a careful microscopical examination.

The purpose of this paper is to bring out clearly, if possible, and to emphasize the fact *that alcohol in moderate quantities does produce, in a short time, serious organic changes in the nerve cells of the brain and central nervous system.* To make the matter clearer it may first be necessary to place before the mind of the reader some facts with reference to the finer anatomy of the nervous system, and the internal structure of the nerve cells which form its essential tissue.

The central nervous system, consisting of the brain and spinal cord, is made up of different kinds of tissue: First, the nerve tissue proper, which is composed of nerve cells; second, connective tissue, which forms the framework of the nerve system, and the supporting tissue for the cells; third, the blood vessels and lymphatics, the function of which is to carry food to the nerve cells and to the other tissues of the brain, and also to carry off waste matter.

Figure 1 is an illustration of a nerve cell, and shows how the nerve cell is made up of several different parts. It takes all these different parts and processes to form a nerve cell in its entirety. This cell, or nerve unit, is usually considered as made up of two parts in general: first, the central part, described as the body of the cell; and second, the various branches or processes that are attached to the body of the cell, and extend out in various directions from it. From one standpoint, the body of the cell is, perhaps, the more important part, as it has control of the life and nutrition of all the other parts and branches of the nerve cell connected with it. The branches, or processes, which extend out from the cell body, are attached to the central part, or body, in somewhat the same manner as the branches of the tree are connected directly with the main trunk. As the branches of the tree are a part of the tree, so these branches, or processes, of the nerve cell are really a part of the nerve unit. As will be seen in Fig. 1, these processes extend out in nearly every direction from the body of the cell. There is usually one process much longer than the others, and this may be two or three feet in length. In the illustration this is marked n. Its entire length is not represented, for this would be impossible; but in many cases, as, for instance, in the nerve cells in the lower part of the spinal cord, this particular branch extends down the lower limb, and ends finally in the skin on the sole of the foot, in this case being three or more feet in length.

These nerve cells, as we term them, are the units or fundaments which make up the whole nervous system. They may be looked upon as real living animals, for such, indeed, they are,— very small, to be sure, so small that we must have a powerful microscope to see them; yet these little bodies are alive and active, and take in food from the blood. Each cell has its peculiar duties to perform, the same as individual members of society have each their particular place and vocation. These nerve units have various shapes, forms, and sizes, many of them being of the same shape as that shown in the illustration; others are star shaped, some are flask shaped, some spindle shaped, and still others have irregular forms of various kinds. These nerve cells, as before stated, are microscopical in size, but some of them are comparatively large, and in some of the lower animals they are sufficiently large to be seen by the naked eye. In order to study their shape and form, their internal structure, and the various changes that occur in them as the result of poisons like alcohol, and disease processes, it is necessary first to color or stain these nerve cells with a dye so that they may be better seen, and then to observe them carefully under a powerful microscope. There are millions of these little living nerve units in the brain and nervous system, and it is by their activity that we are enabled to feel, to see, to hear, to smell, to move; in short, to perform all the functions of intelligent men and women. Whenever they become diseased, or their function is in any way impaired, some of our senses, or our faculties, or the function of some organ in the body, become impaired or destroyed. In order that these microscopical bodies may do their work properly, it is necessary that they be kept perfectly healthy, and that they have the proper amount and the right kind of food.

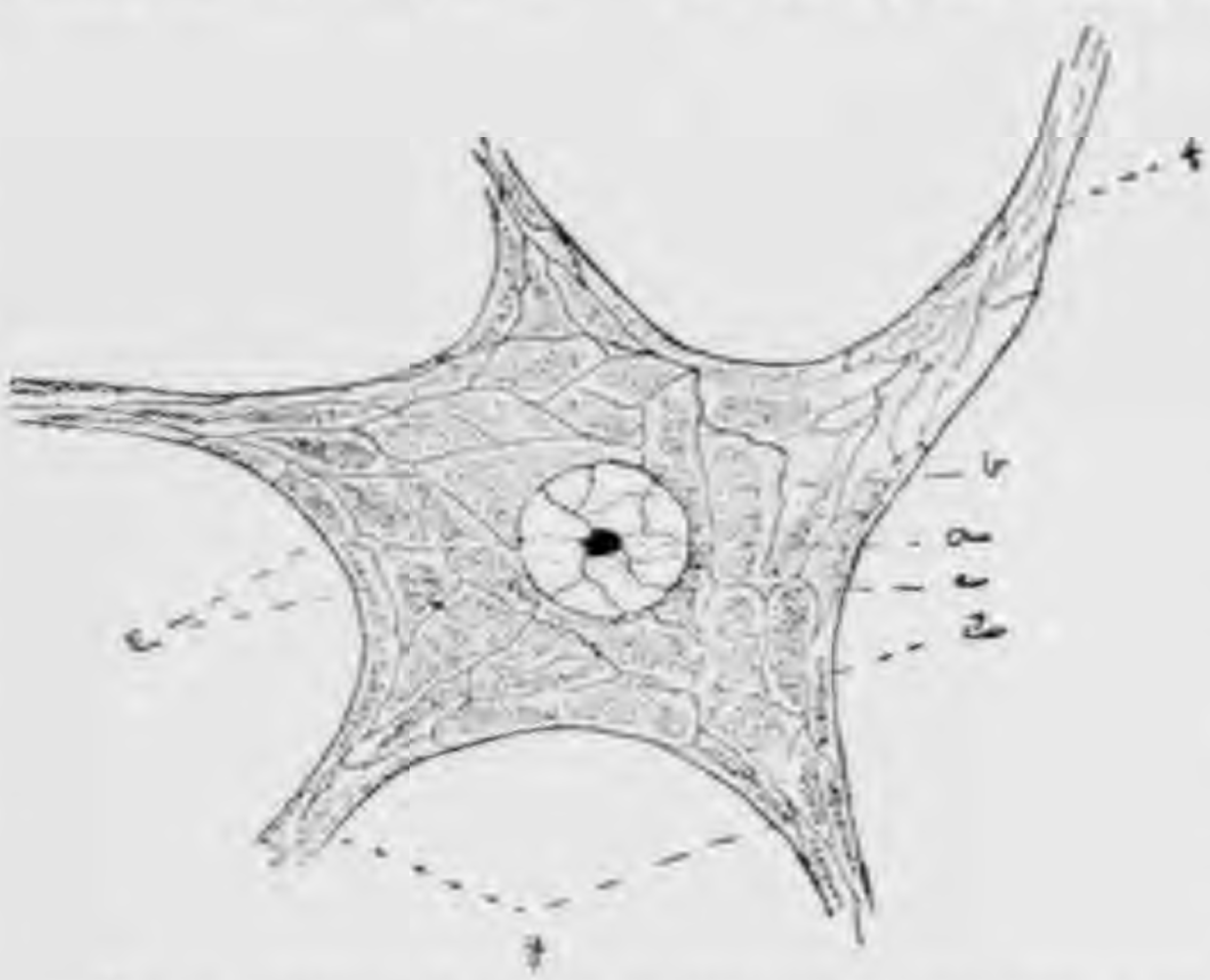

FIG. 2. (After F. R. Bailey, in *Medical Record*.) The body of a human nerve cell, showing the internal structure of a cell, and the beginning of the different branches or processes which extend out from it: *a*, nucleolus; *b*, nucleo-reticulum; *c*, nuclear membrane; *d*, cyto-reticulum; *e*, chromophilic bodies; *f*, axis cylinder process; *g*, protoplasmic processes.

We may regard each of these little nerve bodies as a minute machine, the purpose of which is to transform into nerve energy the energy that we take into our bodies in food. This nerve energy is a real form of energy, and not a myth. The nerve current travels along the nerve fibers that are attached to the body of the nerve cell, and passes from the brain and the central nervous system out, in one instance, to the muscles, to make them contract, or along another nerve path to the heart to keep it in motion. Other currents travel along still other lines to the stomach and to the bowels, and to all the different organs of the body, keeping them stimulated and active and performing their functions properly. No mechanism conceived by the mind of man is so complex and so delicate in its make-up as these little nerve cells. It is really wonderful how well they retain their integrity under so many varied and harmful conditions. In order to appreciate more fully how delicate the make-up of these little nerve cells is, we may notice briefly some of the main points in their internal structure, as revealed by the microscope when they have been properly stained for this study.

Figure 2 shows the body of a nerve cell with part of the processes that are attached directly to the body, but it does not show all of the processes, as does Fig. 1. One may notice in this first a little black point in the center of the cell. This is known as the nucleolus. Outside of this is another larger space, showing white in the illustration, which is known as the nucleus. Scattered throughout this white space is a fine meshwork composed of delicate nerve fibers, which is usually spoken of as a nucleo-reticulum.

Outside of the nucleus is the principal part of the cell, known as the cytoplasm. We may notice in this a network of nerve fibrils similar to those seen in the nucleus. This is called the cyto-reticulum. Scattered through the cytoplasm of the cell are small masses of matter which stain or color very readily with certain dyes, and are therefore called chromophilic bodies. They are represented by the dark-colored patches within the cell body. All of these different parts of the body of the nerve cell are shown in Fig. 2. When seen under the microscope these chromophilic bodies have a somewhat granular appearance. They are supposed to be the food matter for the cell, and are composed of highly complex and elaborated substances that have been transformed by the cell from the food substances brought to it by the blood current. During our waking and active hours we are constantly using up nerve energy. This nerve energy is manufactured within these little nerve cells out of the energy that is stored up in the chromophilic bodies that we are now describing.

When one becomes fatigued by exercise, the energy in the nerve cell is nearly all used up, and we find by examination of the lower animals after they are fatigued that these chromophilic bodies are very much lessened in number and in quantity, and the nerve cell is very much smaller, and irregular in outline. This would seem to emphasize the fact that the little nerve cell is a very perfect and complex machine for transforming the nerve energy out of the latent or potential energy that we take into our bodies in our food. These chromophilic bodies are more susceptible to influences, perhaps, than any other part of the cell, and consequently when any poison like alcohol comes in contact with the cell, the effect is first seen by changes in them. In fact, the changes which occur in these chromophilic bodies furnish us a very delicate test of the effect of different substances upon the nerve cells of the nervous system.

The fibrous network, or reticulum, in the body of the cell, is that part which has to do with originating and transmitting nerve currents. This part of the nerve body is not so sensitive to different substances and poisons, and consequently changes are not observed in these fine fibrils so quickly as in the chromophilic bodies. Nevertheless they are very delicate, and their structure is very easily affected by alcohol and other poisons that may be brought to the cell in the blood current.

(To be concluded.)

WELL NAMED JUDAS.

BY T. E. BOWEN.

UNDER the heading, "Woolly Judas Slain for Turning Saint," appears an interesting piece of news from the great Armour stock yards in Chicago. If the better nature of a dumb animal could be so awakened as to cause him to submit himself to the cruel knife of the butcher, rather than continue his questionable occupation of leading thousands of his fellows to the same doom, ought there not to be left in the human heart some chord of sympathy to be touched as the thousands of dumb animals pass by to their execution,—all to satisfy an appetite that in no way contributes to the health of its possessor?

"CHICAGO, March 24: Judas Iscariot, for eight years a traitor to his fellow sheep, turned saint this week, and paid the penalty of death for it. He was slain because his awakened conscience would not permit him to continue his old game of leading innocents to slaughter.

"Judas was a big wether. He came from Wyoming. At his début in the Armour sheep pens at the stock yards, he attracted no attention; but when the time came to drive a thousand sheep to slaughter, he placed himself in the lead, and walked bravely to the slaughter pen, but at the door he turned to one side, and walked back to his old quarters. His victims kept on, and were soon reduced to mutton. Next day another thousand sheep were told off, Judas among them. Again he marshaled the host, and led it to the threshold of the shambles, and stood to one side while the thousand went to their death.

"Judas instantly became a favorite. He was petted, fed on the best, and given cozy quarters. He saved the men hours of work chasing sheep. If the woolly victims were to be transferred from pen to pen, Judas would be sent among them and they followed his lead. During eight years he led uncounted thousands of his kind to slaughter. They never lost faith in him until too late. He knew all the intricacies of the pens. In and out, across and beyond, up to the slaughter he marched at the head of the sheep, and at the door invariably turned 'about face,' and watched the others go to their doom.

"He waxed big and fat, and grew in knowledge. Last month he began to show symptoms of despondency. It was observed that a suspicious moisture was in his eyes when he did his daily 'stint.' Once, instead of leading the sheep to slaughter, he balked, and refused to take his place at the head of the procession. The butchers petted and fed him, but an ugly temper developed. Finally he refused absolutely to play the traitor. When placed in the sheep pen, he started a rebellion, and the butchers aver that he told the sheep what their fate was to be, because it was almost impossible to drive them. He was placed in solitary confinement for several days, and then put back at work. He was worse than ever, and could not be brought to reason.

"Then sentence of death was pronounced. He was led up to the slaughterhouse, resisting at every step. Two of the butchers pleaded for a reprieve, but in vain, and there, on the spot where he had sent so many to be sacrificed, his own life was taken."

THE HEALTH OF THE BUSINESS MAN.

BY CHARLES T. HOWARD.

EXERCISE, as every one knows, is a great aid to digestion, and when a business man is deprived of it by sedentary employment, digestion goes on more slowly, and if eating is done in the ordinary way, with the usual combinations, decomposition takes place in the intestines, and poisons are formed. These, being absorbed into the blood, make it impure, paralyze the nerves and brain to a degree, and render thinking difficult. To remove these poisons, alcoholics, blood purifiers, and acid drinks are often used, which, according to their strength, injure the kidneys and other tissues with which they come in contact.

In order promptly to remove imperfectly digested food, the business man often resorts to medicines. These are more or less ineffective, and enlargement of the

THE EFFECT OF ALCOHOL ON THE NERVOUS SYSTEM IN THE LIGHT OF RECENT SCIENTIFIC RESEARCH.

BY W. H. RILEY, M. D.,

Superintendent of the Colorado Sanitarium, Boulder, Colo.

(Concluded.)

EXPERIMENTS have been made upon the lower animals, particularly the rabbit, the dog, and the cat, to determine, if possible, the immediate effects of alcohol upon the internal structure of the nerve cell. These experiments have been followed out somewhat as follows: An animal like the rabbit has been fed a moderate amount of alcohol with its food, the amount given being sufficient to pro-

a b

FIG. 1 (after F. R. Bailey, in *Medical Record*) is an illustration of the nerve cells from the human brain. The nerve processes of the cell are not shown in the drawings. *a* represents two healthy nerve cells; *b*, the nerve cells from the brain of a case of acute alcoholism. In *a* the chromophilic bodies are shown distinctly; in *b* they are dissolved and scattered, and have largely disappeared, from the internal use of alcohol.

G. H. Sept 1900

duce slight or moderate intoxication. The animals have been killed at different periods after eating the food containing alcohol, and the nerve cells and the central nervous system have been subjected to careful microscopical examination by the latest and most approved methods of study. Some animals have been killed in a few minutes after the drug has been administered; others, in a few hours. In more than one instance, changes have been found in the nerve cells in less than an hour after the administration of the alcohol. A German investigator by the name of Dehio, and also Dr. C. C. Stewart, of Clark University, Mass., have brought out some interesting and convincing facts along this line. Dr. Stewart found distinct retrograde and pathological changes in the body of the nerve cells of the rabbit fifty minutes after the administration of a moderate quantity of alcohol. The same changes were also observed in a more marked degree in the case of other rabbits that were killed and whose nerve cells were examined some fifty-four hours after the administration of the alcohol.

The same changes that have been observed in the nerve cells of these lower animals under the administration of alcohol have also been observed in the brain cells of man in cases where death has been produced by acute alcoholic poisoning. The nature of the first changes found both in the rabbit and in other lower animals, and also in man from alcoholic intoxication, is a dissolving and scattering through the body of the cell of the chromophilic bodies previously described. The change is apparently the same whether alcohol is given to the lower animals, like the rabbit, for experimental purposes, or whether it is taken by man himself for the purpose of gratifying his perverted appetite. The opinion of all investigators is unanimous that alcohol causes a breaking down and dissolution of the chromophilic bodies. The larger the quantity of alcohol taken, and the more severe the poisoning, the greater are the changes found in the nerve cell. If the poisoning is continued for any length of time, as it is in cases of chronic alcoholism, then the more solid structure of the why this is so. They all tell the same story: They are in the business to make money, and women patronize most lavishly the publications containing the absurd plates and patterns that are farthest from reasonable designs. This does not excuse the publishers, but it puts the blame where it belongs, upon the buyers. Let women require fashion books, if fashion books they must have, and patterns that conform to sensible standards, and the downfall of nonsensical standards will be speedy and permanent.

However, even now, when the sensible demand is small, patterns are not hopeless. Individual gumption and taste can prune them of their surplus decoration, enlarge them where needful, and curtail them where curtailment is required. In other words, if patterns are adapted to the individual, instead of adopted outright, they can be made to serve one well.

Women are very slow in learning that the effect of a toilet depends upon its "lines," as artists say, upon its coloring, its suitability to the figure, complexion, and occasion, upon its grace, and not upon any 13-15-14 puzzle arrangement of details. One half of the ingenuity expended upon many a piece of "fancy work" that is devoid of fancy, but represents a deal of outlay of time, patience, and skill, will make a gown that conforms to health, comfort, and simple beauty.

The art of selection is an important feature of dress. The kind of gown that one should wear has to be determined, if it is to be successful, by the lines of the natural figure, the time and place of its wearing, and also by the circumstances of the wearer. The tall, slender woman looks like an undraped Maypole in a sheath-shaped princess gown, but remarkably well in a plaited or gathered skirt hung from a lining waist over which a blouse effect is devised under a bolero.

The very stout woman looks best in a gown with unbroken lines from under the arm to the bottom of the dress, with a back that has narrow side-forms running to the shoulder seams, and fullness let into the back of the skirt below the waist line: the front should have surplice folds graduated to a point, not at the waist line, as is usual, but low down on the abdomen; it is hideously ugly to emphasize the abdomen and bust by contracting the waist line and calling attention to the *embonpoint* above and below by making the line of contraction the beginning or end of decoration. The waist line of the stout woman should be obliterated in front, and barely suggested at the sides and back.

Now when fashion is making it so easy for the timid to adopt a style of dressing that shall give the body enough covering, not too much, and shall leave it unrestricted, the utmost effort should be made by every woman to set up for herself, and therefore help maintain for all women, a standard of simplicity. The wife of the public man in the metropolis has different requirements in the matter of clothes from those of the ranchman's wife on the prairie, but the wife of the public man owes it to herself and to all other women not to debase her influence by making a clotheshorse of herself.

A fine fitness in apparel adds much to its charm, and if it is fine and fit, it is good so long as it holds together.

Queens do not alter the cut of their robes with every dry-goods opening. Why, then, do their subjects, and especially why do the free and enlightened daughters of republics? The fact is that in dress we have been neither free nor enlightened, but the bondage is of our own making. We can throw it off whenever we will. Let women rise against the usurpations of fashion mongers and dressmakers, remembering that their bodies are temples worthy of the tenderest care.

nerve cell breaks down under its influence, and in some instances the cell is entirely destroyed, and disappears.

Figure 1 is an illustration of nerve cells from the human brain; *a* represents the cell in a healthy condition, and the chromophilic bodies can be distinctly seen; *b* is an illustration of the nerve cells from the brain of a man who died of acute alcoholic poisoning. It will be noticed that in this nerve cell the chromophilic bodies have largely disappeared, and in place of the granular substances being collected together in masses, as is shown in *a*, they are dissolved and scattered, and have almost entirely disappeared from the body of the cell. The changes represented in *b* are the same as those observed in the nerve cells of rabbits and others of the lower animals that have been fed alcohol, and in which cases the examination of the nerve cells has been made within a few hours after the administration of the poison. It should be emphasized that this dissolution and disappearance of the chromophilic bodies within the cell is a retrograde process, and is the initial step in the breaking down of the nerve cell, which goes on from bad to worse with the use of alcohol. The dissolving and disappearing of these chromophilic bodies is known as chromatolosis, and is the first change that occurs in the degeneration of the cell.

FIG. 2. (After F. R. Bailey, in *Medical Record*.) Nerve cells from the cerebellum, or hind brain; *c* represents healthy cells; *d*, cells that have been poisoned by such diseases as sunstroke, diabetes, and uremic poisoning accompanying diseases of the kidneys. In *d* of this illustration the chromophilic bodies are also dissolved in the cell by the poisons of these diseases.

G.H. Sept 1900

Figure 2 portrays the changes that occur in the nerve cells in certain diseases, such as sunstroke, diabetes, diseases of the kidneys, in which poisons are accumulated and retained in the body, and affect the nerve cells; *c* represents the healthy nerve cell, while *d* represents the diseased nerve cell, caused by poisons that accumulate in the body as a result of these diseases.

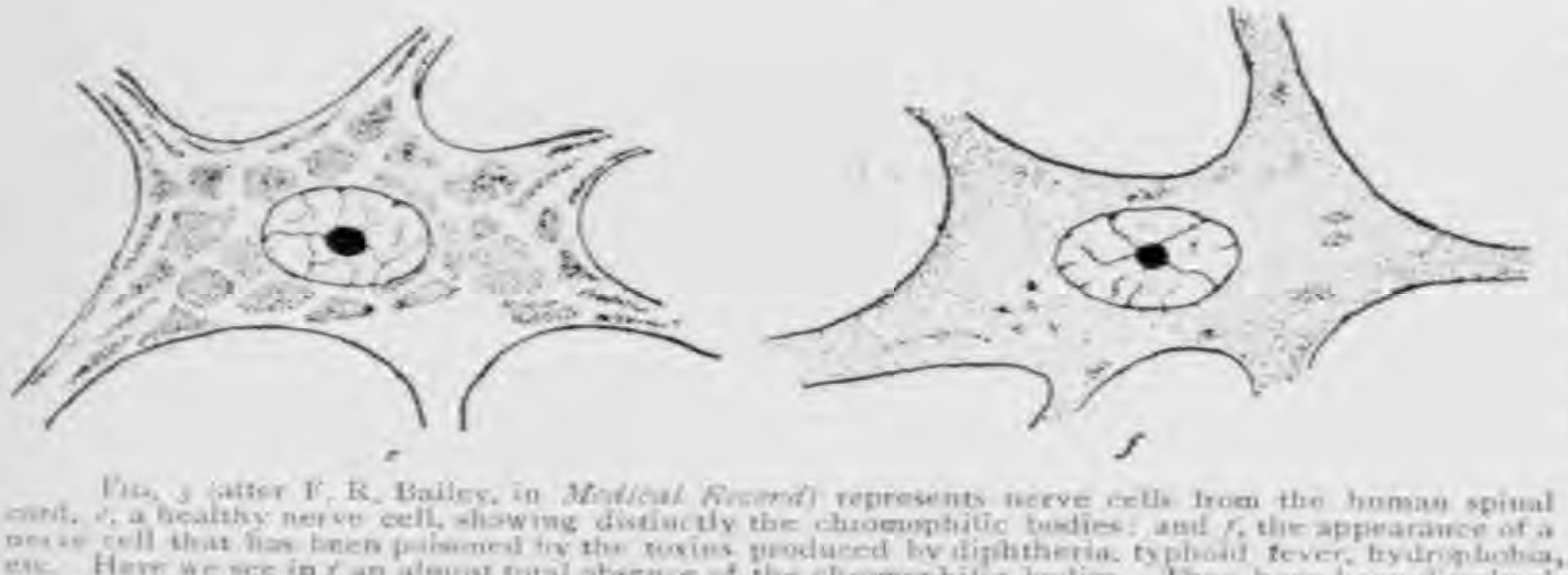

FIG. 3 (after F. R. Bailey, in *Medical Record*) represents nerve cells from the human spinal cord, *e*, a healthy nerve cell, showing distinctly the chromophilic bodies; and *f*, the appearance of a nerve cell that has been poisoned by the toxins produced by diphtheria, typhoid fever, hydrophobia, etc. Here we see in *f* an almost total absence of the chromophilic bodies. They have been dissolved and scattered by the poisons of these diseases. We may see from these illustrations the effect of three classes of poisons upon the nerve cells. These three classes of poisons produce the same degenerative changes in the body of the nerve cell.

G.H. Sept 1900

Figure 3 represents the changes produced in the nerve cell as a result of the poisons of infectious diseases, such as diphtheria, typhoid fever, hydrophobia; *e* represents a healthy nerve cell with the chromophilic bodies distinct, while *f* represents the cell after it is acted upon by the poisons of these diseases.

In figures 1, 2, and 3 we have a very telling example of the effect of different kinds of poisoning on the nerve cell. From this we can see that alcohol is an active poison, producing the same changes in the nerve cell as do the poisons of diphtheria, typhoid fever, diabetes, and other constitutional diseases. These changes in the nerve cell already referred to are the initial or beginning changes. When alcohol is used for any considerable length of time, the retrograde process goes on, and more severe changes are noticed in the nerve cell.

Figures 4 and 5 are drawn from the nerve cells found in the brain of a man who died of alcoholic insanity. It will be noticed that the nerve branches in Fig. 4 are very much swollen and distorted and broken down. In Fig. 5 are seen the degenerative changes that have occurred in the body of the cell as well as in its branches. Compared with a healthy nerve cell, Fig. 1, page 466, August number, there is a decidedly different appearance.

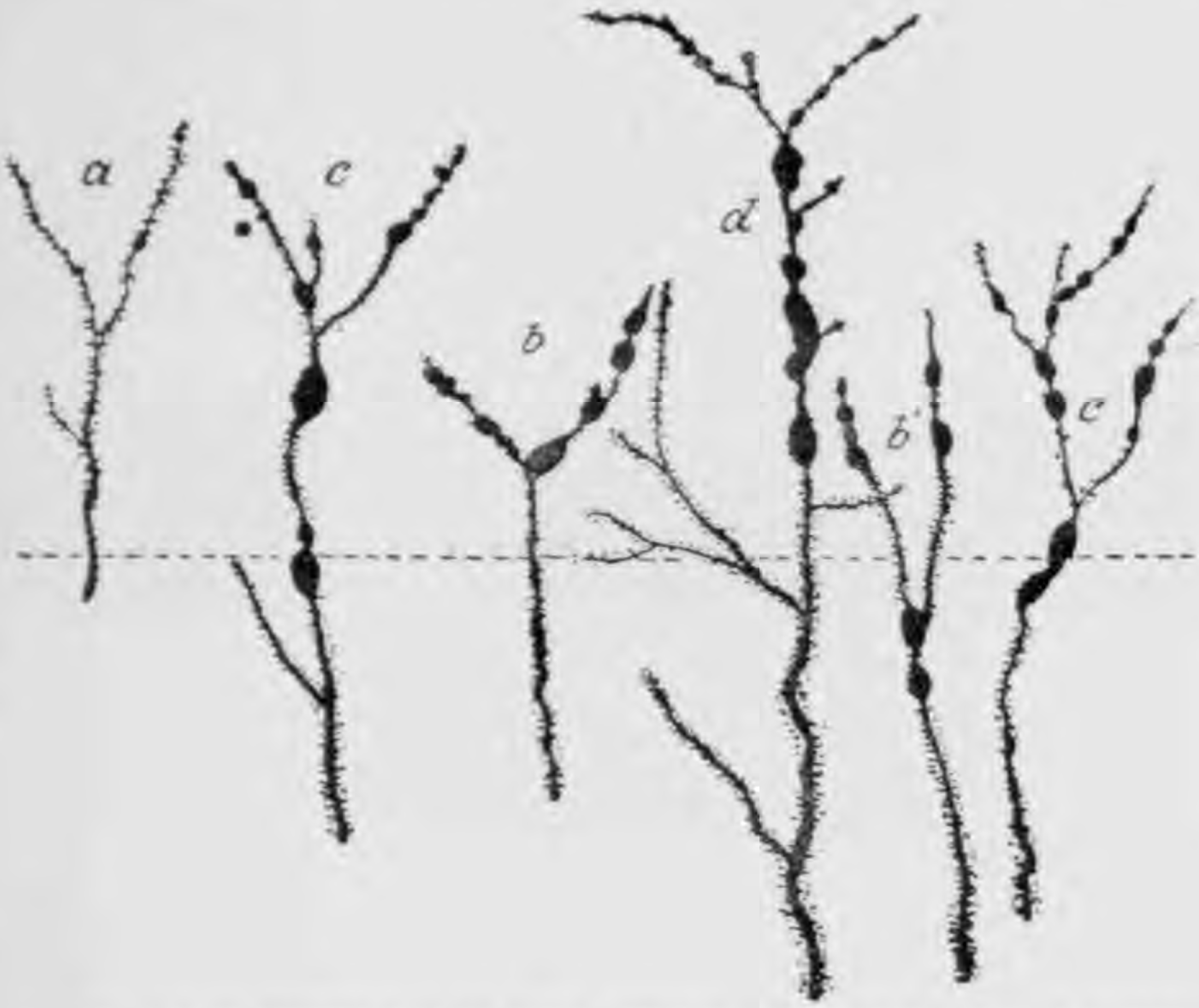

Fig. 4 is an illustration of the nerve branches and fibers in a case of alcoholic insanity. The patient died of this disease, and when the nerve fibers were examined under the microscope, they were shown to be swollen and broken down in the manner illustrated in the drawing. These swellings of the nerve fibers, as seen in this illustration, are characteristic effects produced by alcohol, and are usually seen in the brain of those dying from alcoholic insanity.

G H · Sept 1900

Since alcohol causes these various changes in the nerve cells of the brain and in the nervous system of man, it is no wonder that when he is intoxicated his mind is clouded, his speech is incoherent and thick, that his ideas are disconnected, his vision is blurred, objects seem distorted; he has hallucinations and illusions of various kinds; he staggers. How can any one whose nerve cells are broken down by this poison think and act as one who is sane and healthy?

Many, of course, may argue that an occasional spree does not injure their health, but if feeding a rabbit or a cat a moderate amount of alcohol is sufficient to produce retrograde changes in the nerve cells, is it not reasonable to suppose that every time a man becomes intoxicated, the nerve cells undergo the same retrograde process in their structure? We can come to no other conclusion from these scientific investigations.

It is true that if the nerve cell is not too thoroughly poisoned, it will rebuild itself, and in time present a normal appearance, but no one can argue that this is beneficial to the nerve cell; on the contrary, common sense and reason both tell us that it is positively detrimental. Evidence is becoming more and more clear and emphatic that alcohol at all times, and in all

The Leguminous Seeds.

THE leguminous seeds, or legumes, are those foods better known as peas, beans, and lentils. They are usually served as vegetables, but are very different in their composition, as they contain in their mature state a large excess of the nitrogenous element, while the ordinary vegetables are quite lacking in this important element. In their immature state the legumes are more similar to vegetables. Dried peas are found in the market in two different forms, the green, or Scotch peas, and those which have been divided and the skins removed, called split peas. There are also several varieties of lentils to be found in market. Lentils are somewhat superior to peas or beans in nutritive value, but people usually dislike their taste until they have become used to them.

The different varieties of beans vary but little as to nutritive value. The Lima bean is more delicate in flavor, and is generally looked upon with most favor. The Chinese and Japanese make large use of the leguminous foods. They have a kind of bean known as *soja*, which is almost entirely composed of nitrogenous material. Peas and beans contain caseine, which is similar in its characteristics to the caseine of milk. The Chinese take advantage of this fact, and manufacture a kind of cheese from them.

The legumes are all extensively used in India, China, Japan, and other Eastern countries. Combined with rice, which is used as a staple article of diet in these countries, and which contains an excess of the carbonaceous element, they form an excellent food. In England, peas are largely used by persons who are in training as athletes, because they are considered to be superior strength producers.

Although these seeds are in themselves such nutritious food, they are in this country commonly prepared in some manner which renders them indigestible. Beans, especially, are used in connection with a large amount of fat, and are not, in general, properly cooked. Peas and beans are covered with a tough skin, and require a prolonged cooking, in order to soften them. If, in cooking, this skin is left intact, and not broken afterward by careful mastication, the legume may pass through the digestive tract without being acted upon by the digestive fluids. Even prolonged cooking will not render the skin digestible. It is best that we prepare these seeds in such a manner that the skins may be rejected. When used with the skins a large percentage of the nutritive material is wasted, since it is impossible for the digestive processes to free it from the skins.

In preparing them for cooking, it is generally best to soak them over night. The soaking aids the process of cooking, and to some extent does away with the strong flavor which to some people is very disagreeable. Soft water is best for cooking all dried seeds. If dry peas or beans are put into hard, boiling water, they will not soften, because the mineral element of the water acts upon the caseine to harden it. As to the quantity needed, much depends upon the degree of heat used, but in general two quarts of soft water will be quite sufficient for one pint of seeds.

Mashed Peas.— Cook one quart of dried Scotch peas until tender, simmering slowly at the last so that the water will be nearly or quite evaporated. Then rub them through a colander, or vegetable press. Add to the sifted peas one half cup of good sweet cream, and salt if desired. Pour into a granite or earthen dish, and put into the oven to brown. Some prefer it browned until mealy, some prefer it rather moist. This same dish can be made with split peas by simply mashing them.

Beans may likewise be put through the same process. This is one of the most digestible forms in which they can be prepared.

Baked Beans.— Soak one quart of beans over night. Parboil until rather soft and the skins are broken. Then put into an earthen jar or a Boston bean pot; add a tablespoonful of molasses, if you like, and water enough to make them quite juicy. Bake for six hours. They should be, when done, of a reddish color, and quite juicy. If at any time during the process they become too dry, add a little hot water.

Another excellent way is to prepare the beans in the same way as above, and when tender, turn off all the water and add one half cup of sweet cream. Now place them in an earthen dish, and cover with boiling water an inch or an inch and a half deep, and bake until the water is level with the beans.

613.2

How to make Whole-Wheat Bread.

To make good bread of whole-wheat flour, three things are especially essential; good yeast, good material, and good care. Accuracy in measuring is also important. Many housekeepers fail in producing good bread, because they guess at the amount of material, and sometimes with the same quantity of liquid will use considerably more flour than at another, thus making the results very variable. With the same brand of flour, the same quantity should always be used to produce a given quantity of bread, and this amount should be carefully measured out.

Many failures in making whole-wheat bread are due to poor flour. Because flour made from the entire grain of wheat is darker in color than that made from the central starchy portions of the wheat kernel, some unscrupulous dealers take advantage of the fact, and put up so-called whole-wheat or graham flours from inferior grades of white flour and bran. Such a fraudulent article will not produce good bread. The genuine whole-wheat flour may be distinguished from a spurious article, by taking a small pinch in the mouth and chewing it for a few moments. If made from the entire grain, a small amount of gum will be produced, the same as when a wheat kernel is chewed. The best whole-wheat flour with which we are acquainted is what is called the wheat-berry flour, to be obtained of the Sanitarium Food Co., Battle Creek, Mich.

The temperature at which the bread is kept is frequently the cause of failure to produce good results.

An even, equable temperature throughout the entire process is essential. Whole-wheat flour ferments more readily and rises more quickly than does white flour, hence bread made with it needs greater care, as it is more liable to sour. Less yeast is also needed. Whole-wheat breads will be lighter if at least one third white flour be employed. When the bread is made with a sponge, this white flour is best utilized for the sponge. The length of time the whole-wheat flour will then be undergoing fermentation will be somewhat lessened and hence its liability to become sour will be decreased.

2

Graham and whole-wheat flour breads must be kneaded softer than white flour bread, and a hotter oven and a longer time will be needed for the baking.

The following recipe if carefully followed makes a nice light bread: —

WHOLE-WHEAT BREAD. — One pint milk, scalded and cooled, one quart wheat-berry flour, one pint Minnesota spring wheat flour, one-third cup of soft yeast, or one half cake compressed yeast soaked in one-third cup of cold water. Stir enough flour into the milk to make a stiff batter, put in the yeast, and let it rise until foamy. (Have the milk so warm that when the flour is put in, the batter will be of a temperature of about 70°. Wrap in a thick blanket, and keep as nearly at this temperature as possible.) When light, stir in, slowly, enough warm flour to make a soft dough. Knead for fifteen minutes, and return to the bowl (which has been washed and oiled) to rise again. When risen to double its size, form into loaves, place in separate tins, let rise again, and bake from three fourths to one and a half hours, according to size of loaf and heat of oven.

The following recipe, although not resulting in so light and flaky a loaf, may be preferred by some on account of being more quickly made: —

WHOLE-WHEAT BREAD. — Take one pint of milk scalded and cooled, two tablespoonfuls of sugar and one cup of yeast or one fourth of a cake of compressed yeast and five or six cups of whole-wheat flour. Add the sugar to the milk, then add the yeast, or if it is compressed yeast, save out a portion of the milk in which to dissolve it. After the dough has risen, stir it down, and if it is thin enough, pour it into pans; if not thin enough to pour, knead it into loaves. Allow this to rise, and then bake. Graham bread may be made with the same proportions, using instead two cups of white flour and three or three and a half cups of sifted graham flour.

SELECTION AND PREPARATION OF FOOD FOR THE SICK AND HELPLESS.

Kate Lindsay, M.D.

These should be carefully revised and something should be said about our health foods. Could Mrs. Kellogg find time to look it over? No one could do it as well as she.
[illegible]

THE body is formed from what is taken in from the outside world. We have already taken into account air and water, two very important elements of the bodily supplies, for building up, heating, and disposing of bodily wastes. We have now to consider the third great source of bodily supplies, or what is known as the foods.

The foods consist of a number of more or less complex compounds, containing in varying proportions the four chief elements of the body,—oxygen, hydrogen, nitrogen, and carbon,— which are held in loose combination, admitting of being easily dissolved and broken up in the formation of tissues and the heating of the body. Mixed with these four principal elements are several minerals, earths, alkalies, and other inorganic material, as lime, iron, phosphorus, sulphur, chlorine, sodium, potassium, magnesium, etc. These elements, which enter into the human body, also help to form the inorganic world; they are found in air, water, soil, rocks, etc. Water and air are already in a form to be appropriated by the tissues, and constitute what is known as gaseous and aqueous food; but all the other food elements have to be rearranged by the vegetable world before they can be used by the animal creation in building up muscle, nerve, bone, and tissue; or they are destroyed in the process of producing the heat and force consumed in keeping this living machine in good working order.

Air and water are of fixed composition, but food substances exist in many forms and various combinations. Thus we have those foods furnished by the animal kingdom, as milk, eggs, and meat, which are really made-over vegetable matter, for the milk, eggs, and flesh are all made up of the food the animals have eaten. The plant world furnishes fruits, grains, and vegetables.

Amid this varied supply of foods, the nurse, mother, or other food provider, requires knowledge and skill to select, prepare, and administer this food so as to enable the patient's impaired digestive organs to make of it suitable material for absorption and assimilation. I have space for but a brief notice of food contamination.

Milk forms the universal food of infant humanity. The milk formed in the glands of a healthy woman or animal is a perfect food for the infant or other young mammals, each after its kind. But there are many foreign elements, as disease germs, pus, blood, etc., which may render this food more or less poisonous to the infant, even when given by its own mother. The most common disease germ taken with human milk is the tubercular bacillus, although many others, as pus, erysipelas, and other infectious organisms, may be taken into the infant's body in the same way. The milk may be impaired also by the mother's becoming overheated or excited, as from anger, fear, etc., often causing the milk to become so intensely poisonous that death has occurred in a few hours in a healthy child. Such milk has often been found swarming with living organisms called *vibriones*, which were living on its substance and poisoning it by their excretions.

Cows' milk also is often full of tubercular and other disease germs, which infect domestic animals. It is subject to impairment from the poor food, impure water, and bad stabling too often furnished, and from the excitement resulting from the abuse to which domestic animals are often subjected. Milk is always more or less infected by outside

Selection and preparation of food for the sick and Recipes P 2)

dirt, as the droppings from the body of the cow during milking, or from the hands and clothing of the milker. This dirt is often filled with disease germs, and hence the milk is unfit for use in a raw state. The water used to wash the pails and cans may also be a source of contamination, as may be the cows themselves, and the high temperature and uncleanliness of the place where the milk is kept.

So common is the contamination of cows' milk by disease germs that the only way to be sure that it is safe to use it as a food for human beings is to sterilize it by bringing it to 170° F., keeping it there for half an hour, and then cooling quickly by setting in cold water or on ice.

The knowledge and care needed to select and give a wholesome glass of milk to a child or sick person, is rather overwhelming; yet when we consider that milk has been the avenue through which many epidemics of typhoid fever, scarlet fever, cholera, and last but not least, tuberculosis, — that great white plague which kills twenty-five per cent of civilized humanity, — have been propagated, we find it will pay to study carefully how to get this useful food in a form in which it will be free from all disease-producing germs, as well as how to keep it from souring and developing the germs and poisons which result from decaying animal matter.

Healthy mother's milk and milk from healthy animals well kept and properly fed, the most scrupulous cleanliness being observed about milking and in the care of the cans or whatever vessels are to receive and hold it, is the proper diet for babies. Also have a clean, cool place, well ventilated, in which to keep the milk, or better still, set it on ice or in cold water.

Milk to be used by infants or the sick should be perfectly sweet, as the least taint or sourness may cost a life, by setting up a fermentation in the stomach, which may be weak from disease, and unable to resist the poisons formed from the spoiled food in the digestive organs. Eggs used by the sick should be those obtained from healthy, well-kept, and well-fed chickens, with no suspicion of staleness. The flesh of animals is still considered a necessary food by the great majority of civilized humanity, even among the most advanced and Christianized people. Most medical men are also of the same opinion, although they are compelled to admit that the many experiments of vegetarians in the past, and especially in the present century, have proved that life, with a good degree of health and strength, a fine physical development, as well as superior mental ability and moral strength of character, can be maintained by a strictly vegetarian dietary.

In looking over a recent work on hygiene, I found a list of some nineteen different diseases for which the meat inspectors are instructed to examine the flesh of animals to be used as food, both those which are about to be slaughtered and those which have already been killed. This included nine different diseases of cattle, at least eight of which are known to be germ disorders, and three of these — tuberculosis, anthrax, and actinomycosis — are directly infectious to man, and are often acquired from the diseased flesh which so many epicures consume; six more are germ and parasitic diseases which affect mutton; and four others are found in the hog, conspicuous among which are the minute larvæ of the tapeworm and trichina, lying hidden away in the ham and spare-rib, so tender and toothsome, waiting for some one to eat the flesh and liberate them from their prison. As soon as liberated, they at once set

Selection and preparation of food for the sick and helpless. P3

to work, the trichina larvæ boring their way into the muscles of the one who eats the pork, and the head of the tapeworm fastening itself to the mucous lining of the intestines. Then begins the marvelous reproduction of worms, which keep passing off and being renewed indefinitely.

Besides the danger from diseased meat, there is the danger from spoiled meat. Even when the meat is cooled quickly on the outside, it may spoil from the animal heat retained in the deeper tissues. This is often the source of wholesale poisoning, especially in the eating of partially spoiled canned flesh and sausage. Fish and fowl are liable to be diseased, and the savory oyster, so much vaunted as a dainty for the sick, has been proven to be the cause of serious epidemics of typhoid fever.

Truly, as the nurse must choose the patient's food as well as prepare it for him, it would seem as if she must look elsewhere for a safe sick-room diet than to the animal creation, where the chances are that she will find dangerous disease germs and poisons due to decaying flesh or troublesome parasites, which will only increase the discomfort of the already diseased and suffering patient.

This question of proper diet is a very important one. What food to select, how to prepare it, when to give it, and when to withhold it, for the best interest of the sick and suffering, science has not yet told us satisfactorily, but the light she is shedding to-day on the diet question leads more and more toward confirming and establishing the healthfulness of the original Edenic dietary, which was "every herb bearing seed."

The danger of poisoning from good, well-kept grains, vegetables, and fruits is very small indeed, for even when decaying, they do not produce those deadly poisons produced by spoiling flesh. They give rise to comparatively few diseases. Disease germs produced in vegetable culture fluids are much less dangerous and deadly than those formed in animal broth cultures. It is much easier to distinguish and reject unsound vegetables than it is animal food. The earth yields a great variety of foods from which we may choose. Thus in the grains, we have gluten in some, as whole wheat, barley, etc.; others are rich in starch, as rice and corn; all of them contain oil and the earthy and mineral salts; so there need be no fear that the patient will not be well nourished, if his diet is wisely and carefully selected from this class of foods. The gluten and vegetable albumins supply the nitrogenous matter for tissue building, and the starch and oils give the heat- and force-forming elements. The fruits supply sugar, and also the vegetable acids needed to keep the patient's liver and bowels active. Whatever kind of food is prescribed by the physician, the nurse should see that it is of the best quality and perfectly fresh.

Milk is very often the only food which can be taken and retained by the patient, especially by children. The nurse should see that the supply is from a healthy, cleanly dairy, and that it is properly sterilized. This is best done in a steam sterilizer, but a double boiler will answer, or a bottle or clean fruit can may be set inside another vessel containing hot water, as an ordinary cast metal or granite-ware stew kettle. It is usually best to put something, as two small sticks, in the bottom of the kettle to set the inner vessel on, to keep the bottom from getting too hot. After sterilizing, the bottles should be stoppered with clean corks or the cans covered with clean covers, and set away in a cool place until needed for use. Milk can be taken either hot or cold, and may be used in the form of kumyss, or it may be peptonized or malted. In the last two processes it is partially digested.

Nursing bottles require special care. Many a little one dies from the effect of taking into the system the germs cultivated in the sewer-like, filthy tube through which all the milk passes before it reaches the digestive organs. A nipple is all that is needed on the nursing bottle, and that should be frequently turned inside out and brushed and boiled, and the bottle as well. No milk should be allowed to remain in the bottle from one meal to another, but it should be prepared fresh every time. More will be said on this subject in the future.

Eggs are much used as an article of diet for both sick and well. They should be fresh and kept in a cool, dry place. They may be used for the sick in many ways, as beaten up raw with cream and sugar, poached soft, boiled so as to crumble, or curdled by putting the eggs unbroken into boiling water and setting the vessel off from the fire for fifteen or twenty minutes, keeping it covered. This requires quite a quantity of water, which must be increased in the proportion of a teacupful to each egg used. Eggs may be baked, or beaten up and made into plain custard, or the white may be beaten up alone into a stiff froth with a little lemon juice. Freshness and careful preparation are the essentials in an egg dietary.

If meat be selected, the first essential is that it be the flesh of a healthy animal which had been killed quickly when in an unexcited state, well bled, the viscera removed at once, the carcass quickly cooled, and care taken afterward to keep the meat on ice so as to prevent putrefaction. Spoiled meat often contains deadly poison.

1

DIET FOR THE SICK.-- (1589 a., 1590, 1591 a.)

Malted Milk.— This is a valuable preparation of milk containing malt and maltose produced by the action of malt upon the starch. It is highly nourishing, and differs from ordinary milk in that it does not form hard curds in the stomach and is adapted to many adults and children who cannot use cows' milk.

Malted Gluten.— This preparation, devised by the writer, has been found useful in cases of invalids who require highly nourishing and digestible food, capable of producing and increasing both blood and fat, but who are unable to digest starch, and to whom the use of milk and a meat diet are objectionable. It serves an admirable purpose for this class of patients, and has proven of very great service in their management. It is manufactured by the Modern Medicine Co., Battle Creek, Mich.

Kumyzoon.— This is a substitute for kumyss devised by the author, and possesses the following advantages over kumyss : —

1. It is made of milk which is thoroughly sterilized by heating at a temperature above the boiling point of water.

2. It is made without the addition of cane sugar, hence is practically free from alcohol and acetic acid, which are present in considerable quantities in ordinary kumyss, and is also free from cane sugar.

3. The lactic acid fermentation is induced by means of a special ferment, which is the result of long-continued investigation and experimentation, and which is free from putrefactive and other ferments found in compressed yeast.

4. Being a product of known elements, subject to known conditions by scientific methods, it is a definite and known product, and is of uniform flavor and composition.

5. It will keep for many months. It may, in fact, almost be said to keep indefinitely.

6. It does not require a tap for its use. The cork of the bottle is withdrawn by an ordinary corkscrew ; then by restoring the cork and shaking the contents and pouring into a glass, the same effervescing beverage is obtained which is represented in the very best specimens of kumyss in which the most fortunate results have been obtained.

Its pure acid flavor unmixed with any nauseating decomposition, is appetizing and refreshing. Its rich, creamy consistency satisfies without cloying. It allays irritation in the stomach, promotes gastric digestion in cases of apepsia, and seems to be more readily assimilated than any other food with which we are acquainted.

Manufactured by the Sanitarium Food Company, Battle Creek, Mich.

THE NUTRITIVE ENEMA.-- 1596, a.

GRANOLA.--1632.

GRANOSE.-- "

CARAMEL CEREAL.--1633.

ZWEIBACH.--1633 a.

BROMOSE.--1634, a.

NUT MEAL, NUT BUTTER, ALMOND MEAL.--1634, b.

Nutritive Enemata.— Life may be maintained by means of the nutritive enema for several weeks, if need be, possibly for a longer time, but it is essential that the proper food should be administered, and that it should be given in sufficient quantity. The popular idea that beef tea or other meat preparations are best suited for this purpose is an error. These substances contain very little real nutritive material, and cannot be relied upon to sustain the vital forces, although they are to some degree stimulative, and on this account produce a deceptive appearance of benefit. If the patient depends wholly upon the nutritive enema for sustenance, food should be given in this way about once in four hours, or five times a day, one feeding being omitted during the night. A copious warm-water enema should be administered twice a day, to remove the unabsorbed food. This enema should be given at least an hour before a feeding, to give opportunity for absorption of any portion of the water which has not been discharged.

In our experience we have found the following preparations best suited to sustain life by rectal feeding : —

1. *Bromose and Egg.*— Dissolve two heaping tablespoonfuls of bromose in two ounces of water. Mix with a beaten egg and a half teaspoonful of salt, and add water sufficient to make eight or ten ounces. Mix well and administer with a suitable syringe, at one feeding. Repeat five times in twenty-four hours, at intervals of four hours. This is the best material for rectal alimentation with which we are acquainted. Bromose may be obtained from the Modern Medicine Co., Battle Creek, Mich.

2. *Egg Enema.* — To two well-beaten eggs add half a teaspoonful of common salt, and water enough to make twelve ounces after thorough mixing. This quantity is sufficient for one feeding. Use five times a day, at intervals of four hours. This preparation is less valuable than the preceding, but may be used in an emergency.

Granola.— This preparation is composed of the most nutritious and easily digested grains, from which all foreign and indigestible substances have been removed. In the manufacture, the cereals are subjected to processes whereby the starch is partially digested and prepared for immediate digestion and assimilation.

Granola requires no cooking. It is used with milk, cream, or liquid food of any kind. It makes most delicious porridge, mush, pie-crust, and desserts, and is vastly superior to bread-crumbs for all purposes for which the latter are used.

Specially suited to cases in which the stomach requires well disintegrated foods, as in cases of dilatation, for children in whom the teething process has begun, and for elderly persons and travelers who desire to carry the largest amount of nutriment in the smallest bulk.

Granose.— This is one of our most recently perfected foods, and is perhaps the best suited of any for general use. Prepared from the choicest wheat, it contains the whole grain. Subjected to processes of cerealine digestion, cooking, roasting, steaming, and disintegration, it is prepared for immediate use, digestion, and assimilation. It is *palatable, crisp, delicious*. It is relished and retained when all other foods are rejected. It may be used in soups, with milk or cream, or in numberless combinations with fruit and eggs.

Especially valuable in cases of chronic constipation, which are almost invariably cured, or at least almost wholly relieved, by its continuous use. In acid dyspepsia, and, in fact, in most forms of indigestion, granose is almost a panacea. Like bread, it combines well with all other articles of food, and is exceedingly appetizing, its form, that of large flakes, appealing to the eye as strongly as does its nutty, crisp, and delicate flavor to the sense of taste.

Caramel-Cereal.— This is a wholesome substitute for tea and coffee. The poetic reference of Coleridge, "The cup that cheers, but not inebriates," has been proven by experience to be misapplied to tea and coffee, but may be properly used in relation to Caramel-Cereal. The well-known effects of tea and coffee in provoking indigestion and special nervous disorders have created a demand for a wholesome substitute.

Zwieback.— This is simply twice-baked bread. By exposure in an oven of moderate heat, the slices of bread are slowly baked until the whole thickness of the slice has acquired a brown color and the crispness and sweetness of the crust of a well-baked loaf. It is one of the most nutritious, palatable, and digestible of foods. Used with milk, cream, or fruit juice, it is a real delicacy. It is both nourishing and easy of digestion. Zwieback is one of the characteristic features of the diet at Carlsbad, the famous Bohemian watering-place.

Bromose.— Are you thin? Have you hollow cheeks, hollow eyes, and a general emaciated appearance? Would you like to be fat? We will tell you how: Eat Bromose!

Bromose, an exceedingly palatable food preparation, consists of cereals and nuts, in which the starch is completely digested, the nuts perfectly cooked, and their fat emulsified. It is thus ready for immediate assimilation. It is the most easily digested and most fattening of all foods, and at the same time rich in proteids, and hence unequaled as a tissue-builder.

Bromose makes fat and blood more rapidly than any other food. It is the food par excellence for blood, brain, and nerves. Invalids whose troubles are due to the fact that they cannot digest the starch of cereals and vegetables, find in Bromose a panacea. Bromose is rich in salts, as well as proteids and food elements. It is excellent for weak, emaciated invalids, and feeble children.

Nut Meal.— This preparation is made from carefully selected and prepared nuts. It is one of the most nourishing and digestible of all the food products of the vegetable kingdom. It is especially adapted for patients who have difficulty in digesting starch, and for those who need to make a rapid gain in flesh. It agrees well with the most delicate stomachs, and will often be digested when the stomach will tolerate nothing else.

Nut meal may be eaten dry, or combined with other foods, or mixed with a little hot water, when, with the addition of a little salt, it makes a delicious soup or purée.

Nut Butter.— A capital substitute for animal fats of all sorts in the seasoning or shortening of foods, in the preparation of gravies, sauces, etc. Thoroughly cooked and emulsified, so it dissolves readily in water; has a rich, nutty flavor; is exceedingly palatable and digestible, keeps well, is thoroughly sterilized, and free from all objections which can be urged against animal fats. It gives a meaty flavor to soups.

Almond Meal.— This is simply a fine meal prepared from the choicest blanched almonds, especially designed for diabetics and invalids who cannot digest starch. It is highly nutritious, exceedingly delicate and palatable, and an admirable food for those who need to make a gain in flesh.

RECIPES.-- (New Edition of H.H.B. ; take everything under this head on pages 737, 8, 9, 740, 1, 2, 3,4,.)

Ask Mrs.Kellogg for a half dozen recipes for simple unfermented bread, ~~a half dozen recipes for~~

USEFUL DIETETIC RECIPES.

Milk and Lime-Water.—In many cases in which milk is indicated as an important article of diet, indeed, as the most important of all foods, as in young infants, it cannot be taken without distress on account of the large, tough curds which it forms in the stomach. For cases of this sort, ordinary cow's milk may be mixed with lime-water in the proportion of a large teaspoonful of lime-water to a tumblerful of milk. If the difficulty still continues, the lime-water may be used in the proportion of one part to two of milk. Barley-water will in most cases answer as well as lime-water.

Bran Tea.—Soak a teacupful of bran in cold water over night in a cool place. Simmer for half an hour, and strain through a cloth. A soothing drink, said to encourage activity of the bowels. We have not much confidence in its laxative properties. It is a good lotion for irritated surfaces.

Acorn Coffee.—Select plump, round acorns. Shell, and brown in an oven. Grind in a coffee-mill, and use as ordinary coffee. A good drink for children suffering with diarrhea, on account of the tannin which it contains. It is also recommended for scrofulous persons.

Water Gruel.—Over a dessert-spoonful of finely ground oatmeal, mixed with a tablespoonful of cold water, pour a pint of boiling water; let it settle two or three minutes, then pour off the water carefully, leaving the coarser part of the meal. Boil ten or fifteen minutes, stirring frequently.

Milk Gruel.—Into a pint of scalding milk stir two tablespoonfuls of fine oatmeal. Add a pint of boiling water and boil until the meal is thoroughly cooked.

Oatmeal Gruel.—Stir two tablespoonfuls of coarse oatmeal into a quart of boiling water, and let it simmer at least two hours. Strain if preferred.

Rice Gruel.—Soak two tablespoonfuls of fine rice for half an hour in cold water. Pour off the water; add a pint of milk and let it simmer until the rice is tender. Press through a sieve and then dilute with milk. Heat again for a few moments; pour off to cool, and flavor with a little salt or sugar.

Milk Porridge.—Place over the fire equal parts of milk and water. Just before it boils, add a small quantity (a tablespoonful to a pint of water) of graham flour or corn meal, previously mixed with water, and boil a minute longer.

Rice and Apple.—Stew two or three large, ripe apples to a pulp and sweeten with a little white sugar. Then boil a half teacupful of rice in milk until it is quite tender. Put the rice round a plate with the apples in the center and serve. A dish which most invalids, unless bad dyspeptics, will readily digest. Excellent for fever convalescents.

Rice Blanc-Mange.—Heat one quart of milk to near boiling; then stir into it one-fourth of a pound of finely ground rice previously mixed to a smooth batter with a little milk. Add two spoonfuls of white sugar and let it boil until thick enough to mold, stirring it all the time. Flavor, while boiling, with a little lemon or pine-apple. Serve cold.

Arrow-Root Blanc-Mange.— Bring a pint of milk to boiling point, add a batter made by mixing two tablespoonfuls of arrow-root with a little milk, and let it boil. Sweeten and flavor to the taste, stirring assiduously until it thickens sufficiently to mold. Corn-starch blanc-mange may be made by this same recipe by using the above proportion of corn-starch instead of arrow-root.

Egg-Nog.—Beat one egg and a teaspoonful of refined sugar to a stiff froth; add a teaspoonful of lemon-juice; pour in a glass, and fill up with water.

White of Egg and Milk.—The white of an egg beaten to a stiff froth and stirred very quickly into a glass of milk is a very nourishing food for persons whose digestion is weak, also for children who cannot digest clear milk. The white of egg has a tendency to prevent the formation of hard curds in the stomach.

White of Egg.—Stir the white of an egg into a tumblerful of cool water, or water warm as it can be without coagulating the egg. Give to infants suffering from extreme disorder of digestion and unable to take milk. This simple mixture has saved many an infant's life.

Beef Tea.—For every quart of beef tea desired, use one pound of fresh beef from which all fat, bones, and sinews, have been carefully removed. Cut the beef into pieces a quarter of an inch square, or grind in a sausage-grinder, and soak over night in a small quantity of water (a pint will do). Take the beef out and let it simmer gently in a larger quantity of water for two or three hours, replacing from time to time the water lost by evaporation. Afterward pour together the boiling liquor and the cold liquid in which the beef was soaked.

Beef tea is not a food; it is practically a solution of ptomaines,—the poisonous products of tissue waste. Its value has been enormously overestimated. The late Dr. Austin Flint remarked that many invalids had been starved to death on beef tea. Vegetable broths are in every way preferable. Avoid beef tea, especially in fevers and kidney diseases.

Flaxseed Tea.—Take an ounce of whole flaxseed, half an ounce of crushed licorice root, an ounce of refined sugar, and four tablespoonfuls of lemon juice. Pour over these ingredients a quart of boiling water; let this stand near the fire for four hours, and then strain off the liquid. The flaxseed should not be crushed, as the mucilage is in the outer part of the kernel and if bruised the boiling water will extract the oil of the seed and render the decoction nauseous. The tea should be made fresh daily.

Barley-Water.—Take half a teacupful of good pearl barley. First wash it thoroughly; then boil five or ten minutes in fresh water. Drain off this water and pour on two quarts of boiling water and boil down to one quart. Flavor if desired with a little lemon or sugar. Thin to required consistency with boiling water.

Currant-Jelly Water.—A tablespoonful of currant jelly stirred into a glass of cold water makes a pleasant beverage for fever patients.

Apple Water.—Wipe two or three ripe, tart apples, and slice, without paring, into a dish and pour over them a quart of scalding water. Let stand until cool; then turn off water and sweeten.

Toast Water.—Brown a slice of stale bread or crust thoroughly, but do not allow it to blacken or burn. Break the toast into small pieces and put into an earthen dish or jug; pour over the pieces a quart of boiling water; cover the dish tightly, and let the mixture remain until cold. When strained it will be ready for use.

Lemonade.—Mix the slices and the juice of two lemons with three spoonfuls of refined sugar and add a pint of cold or iced water.

Hot Lemonade.—Take two thin slices and the juice of one lemon; mix with it two teaspoonfuls of white granulated sugar, and add one half pint of boiling water. A very useful drink for a person when exhausted. A splendid substitute for tea and coffee.

Sago Jelly.—Simmer gently in a pint of water two tablespoonfuls of sago until it thickens, frequently stirring. A little sugar may be added if desired.

Bread Jelly.—Pour boiling water over bread crumbs; place the mixture on the fire and let it boil till it is perfectly smooth. Take it off, and after pouring off the water, flavor with something agreeable, as a little raspberry or currant jelly water. Pour into a mold until required for use.

Tapioca Jelly.—Take two tablespoonfuls of tapioca and one pint of water; let it simmer until it becomes thick like jelly. A little lemon juice and sugar may be added.

Gum-Arabic Water.—Put an ounce of choice gum arabic into a jar with two ounces of refined sugar and a pint of water. Place the jar in a sauce-pan of warm water and stir until dissolved. Add a little lemon to flavor. This is a good drink for consumptives.

A superior quality of gluten biscuit is manufactured by the Sanitarium Health Food Co., Battle Creek, Mich., from a formula furnished by the author. They are found to be of great service in the treatment of diabetics.

Granola Mush.— Granola, a cooked preparation of wheat and oats, manufactured by the Sanitarium Health Food Co., makes a most appetizing and quickly prepared breakfast dish. Into a quart of boiling water sprinkle a pint of granola. Cook for two or three minutes, and serve hot with cream.

Bran Jelly.— Select some clean wheat bran, sprinkle it slowly into boiling water as for graham mush, stirring briskly meanwhile with a wooden spoon, until the whole is about the consistency of thick gruel. Cook slowly in a double boiler for two hours. Strain through a fine wire sieve placed over the top of a basin. When strained, reheat to boiling. Then stir into it a spoonful or so of sifted graham flour, rubbed smooth in a little cold water. Boil up once; turn into molds previously wet in cold water, and when cool, serve with fruit juice.

Browned Rice.— Spread a cupful of rice on a shallow baking tin, and put into a moderately hot oven to brown. It will need to be stirred frequently to prevent burning and to secure a uniformity of color. Each rice kernel, when sufficiently browned, should be of a yellowish brown, about the color of ripened wheat. Steam in a dish suitable for serving, over a kettle of boiling water, using two cups of water for each cup of browned rice. When properly cooked, each kernel will be separate, dry, and mealy. Rice prepared in this manner is undoubtedly more digestible than when cooked without browning.

Barley Gruel.— Wash three heaping teaspoonfuls of pearl barley, dropping it into a pint of boiling water, and parboil five minutes. Pour this water off and add a quart of fresh boiling water. Let it simmer gently for three hours. Strain, season, and serve. A small piece of lemon rind added to the gruel a half hour before it is done, gives it a very agreeable flavor. Equal quantities of milk and barley gruel make a very nourishing drink; the milk, however, should not be added to the gruel until needed, as in a warm atmosphere it undergoes quite rapid change, and is likely to ferment.

Gluten Gruel.— Stir two and one half tablespoonfuls of the wheat gluten prepared by the Sanitarium Health Food Co., Battle Creek, Mich., into a pint of boiling milk; boil until thickened, when it is ready to serve.

Gluten Gruel No. 2.— Into a pint of boiling water stir three heaping tablespoonfuls of prepared gluten. Boil until thickened, and add a half cup of thin cream.

Gluten Cream.— Heat a pint of thin cream to boiling, and stir into it three tablespoonfuls of wheat gluten. When thickened, it is ready to serve.

Gluten Meal Gruel.— Into a cup and a half of boiling water stir four tablespoonfuls of gluten meal (prepared by the Sanitarium Health Food Co.), let it boil for a moment, add six tablespoonfuls of rather thin sweet cream, and serve.

Graham Gruel.— Heat three cups of water in the inner dish of a double boiler, and when boiling vigorously, stir into it carefully, a little at a time, so as not to check the boiling, one scant cup of graham flour which has been rubbed perfectly smooth in a cup of warm, not hot, water. Stir until thickened, then place in the outer boiler and cook for an hour or longer. When done, strain if necessary, season with salt if desired, and a half cup of sweet cream.

Graham Grits Gruel.— Cook three heaping tablespoonfuls of graham grits in a quart of boiling water, in a double boiler, for three hours. Turn through a soup strainer to remove any lumps, season and serve. Well-cooked graham grits may be made into gruel by thinning with water or milk, straining, and seasoning as above.

Indian Meal Gruel.— Make a thin paste of one teaspoonful of flour, two tablespoonfuls of best cornmeal, and a little water. Stir this into a quart of boiling water, or milk and water in equal proportions, as preferred. Boil until the meal has set, stirring constantly; then turn into a double boiler and cook for an hour and a half or two hours. Season with salt, and strain. If too thick, thin with a little additional liquid.

Milk Porridge.— Take one pint of milk and the same quantity of water, and heat to boiling. Stir in two heaping tablespoonfuls of cornmeal or graham grits, boil, stirring continuously, until the meal has set, then turn into a double boiler and cook for two hours longer. Season with salt, and a tablespoonful of sweet cream if allowed.

Oatmeal Gruel.— Into one quart of boiling water stir two heaping tablespoonfuls of fine oatmeal; let it boil until it thickens, stirring all the time; then turn into a double boiler and cook for three and a half or four hours. Strain before serving. A little cream may also be added, unless contra-indicated by the patient's condition.

Oatmeal Gruel No. 2.— Pound one half cup of coarse oatmeal until it is mealy. The easiest way to do this is to tie the oatmeal in a coarse cloth and pound it with a wooden mallet. Put it in a pint bowl, and fill the bowl with cold water. Stir briskly for a few moments until the water is white, then allow the meal to settle. Pour off the water, being careful to get none of the sediment. Fill the bowl a second time with cold water, stir thoroughly, let settle, and pour off the water as before. Do this the third time. Boil the liquid one half hour, strain and serve hot. If very thick, a little milk or cream may be added.

Peptonized Gluten Gruel.— Prepare the gruel as directed for Gluten Gruel No. 1. Strain if necessary, cool to lukewarm, and turn it into a pitcher, which place in a dish containing hot water even in depth with the gruel in the pitcher; add the peptonizing fluid or powder, stir well, and let it stand in the hot water bath for ten minutes. The temperature must not be allowed to rise over 130°. Put into a clean dish and serve at once, or place on ice till needed. Other well-cooked gruels may be peptonized in the same way.

Rice Water.— Wash half a cup of rice very thoroughly in several waters. Put it into a saucepan with three cups of cold water and boil for half an hour. Strain off the rice water, season with salt if desired, and serve.

Gluten Meal Custard.— Beat together thoroughly, one pint of rich milk, one egg, and four tablespoonfuls of gluten meal. Add a little salt if desired, and cook with the dish set in another containing boiling water, until the custard has set. Or, turn the custard into cups, which place in a dripping-pan partly filled with hot water, and cook in a moderate oven until the custard is set.

Gluten Custard.— Into a quart of boiling milk stir four tablespoonfuls of wheat gluten moistened with a little of the milk, which may be reserved for the purpose. Allow it to cook until thickened. Cool to lukewarm temperature, and add three well-beaten eggs, and a trifle of salt, if desired. Turn into cups, and steam over a kettle of boiling water until the custard is set.

Currantade. — Mash thoroughly a pint of ripe red currents, and one half the quantity of red raspberries; add sugar to sweeten and two quarts of cold water. Stir, strain, cool on ice, and serve.

Crust Coffee. — Brown slices of graham bread in a slow oven until very dark in color. Break in pieces and roll fine with a rolling pin. A quantity of this material may be prepared at one time and stored in glass fruit cans for use. When needed, pour a cupful of actively boiling water over a dessertspoonful of the prepared crumbs, let it steep for a few minutes, then strain and serve.

Egg Lemonade. — Beat the white of an egg to a stiff froth, then mix with it the juice of a small lemon, and one tablespoonful of sugar. Add a half pint of cold water. Or, beat together with an egg-beater a tablespoonful of lemon juice, a teaspoonful of sugar, the white of an egg, and a cup of cold water, until thoroughly mingled, then serve at once.

Hot Lemonade. — Put in a glass a thin slice of lemon and the juice of half a small lemon, being careful to remove all seeds; mix with it one dessertspoonful of white sugar, and fill the glass with boiling water. Or, remove the peel of the lemon in very thin parings, turn one pint of boiling water over them, letting it stand for a few moments covered. Remove the peel, add the juice of a lemon and one tablespoonful of sugar, and serve.

Orangeade. — Rub lightly two ounces of lump sugar on the rind of two nice fresh oranges, to extract the flavor; put this sugar into a pitcher, to which add the juice expressed from the oranges, and that from one lemon. Pour over all one pint of cold water, stir thoroughly, and serve.

Granose Shortcake. — Cover the bottom of a shallow pudding dish with a thin layer of granose flakes, add a layer of fresh strawberries, chopped and slightly sweetened, then a second layer of granose. Fill the dish thus with alternate layers of granose and berries. Set away in a cool place for an hour, when it will be ready to serve. The juice of the berries should permeate the entire mass, but should not render it too wet and soggy. Cut in squares. No dressing is required. Raspberries and other small fruits may be utilized in the same manner.

Boiled Peanuts. — Shell the nuts and blanch by pouring over them boiling water. After standing a few minutes, the skins can be easily rubbed off. Add to a pint of the blanched nuts about two quarts of water, put them into a bean pot; heat to boiling, then place in a slow oven and cook for nine or ten hours. When done, they should be soft, mealy, and rich with juice. No seasoning except a little salt will be required.

Vegetable Broth. — Put a cupful of well-washed white beans into a quart of cold water in a double boiler, and cook slowly until but a cupful of the liquor remains. Strain off the broth, add salt, and serve hot. If preferred, a few grains of powdered thyme may be added as flavoring.

DIET LISTS.-- (Copy these from H.H.B.) See p. 161

Pythagoras
on the
Ethics of Diet

By

DR. JOHN HARVEY
KELLOGG

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By DR. JOHN HARVEY KELLOGG

- Biologic Living
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- Meats Encourage Intestinal Putrefaction
- Extracts from the Packers' Encyclopedia
- Fletcherizing the Oyster
- Should an Athlete Eat Meat?
- Pythagoras on the Ethics of Diet

HEALTH EXTENSION BUREAU

Battle Creek, Mich., U.S.A.

Pythagoras on the Ethics of Diet

PYTHAGORAS, the founder of Greek philosophy, was born in the early part of the sixth century, B. C. (586), on the Island of Samos, from which he was driven by the tyrant Polycrates. He and his followers formed a colony at Crotona, in southern Italy, which seems to have been a model health city, where the rules of biologic living were established conventions.

The philosophy of Pythagoras recognized the blood brotherhood of living creatures and prohibited the taking of life, and hence of eating flesh. Pythagoras and his followers, among whom was Milo, the Greek athlete, dressed in white clothing, and maintained the highest standards in manners and morals. Their virtues were, naturally, a living condemnation of the conduct of most of their contemporaries, who ultimately, by persecutions drove Pythagoras into exile, and one night gathered in a mob and fell upon and massacred the remnant of his devoted disciples, who were gathered in the house of Milo.

The following poetical description of the ethical teaching of this great thinker on the subject of diet, was written by the famous Latin poet Ovid, who lived shortly before the Christian Era, and was translated from his "Metamorphoses," by the English poet, Dryden:

He first the taste of flesh from tables drove,
And argued well, if arguments could move
O mortals, from your fellows' blood abstain,
Nor taint your bodies with a food profane;
While corn and pulse by Nature are bestowed,
And planted orchards bend their willing load;
While labored gardens wholesome herbs produce,
And teeming vines afford their generous juice;
Nor tardier fruits of cruder kind are lost,
But tamed with fire, or mellowed by the frost;
While earth not only can your needs supply,
But, lavish of her store, provides for luxury;
A guiltless feast administers with ease,
And without blood is prodigal to please.
Wild beasts their maws with their slain brethren fill;
And yet not all, for some refuse to kill.
Sheep, goats, and oxen, and the nobler steed,
On browse, and corn, and flowery meadows feed.
Bears, tigers, wolves, the lion's angry brood,
Whom Heaven indued with principles of blood,
He wisely sundered from the rest, to yell

In forest, and in lonely caves to dwell;
Where stronger beasts oppress the weak by
night,
And all in prey and purple feasts delight.

Oh, impious use! to Nature's laws opposed,
Where bowels are in other bowels closed;
Where, fattened by their fellows' fat, they
thrive;
Maintained by murder and by death, they live.
'Tis then for naught that mother earth provides
The stores of all she shows, and all she hides,
If men with fleshy morsels must be fed,
And chaw with bloody teeth the breathing
bread;
What else is this but to devour our guests,
And barb'rously renew Cyclopean feasts?
We, by destroying life, our life sustain,
And gorge the ungodly maw with meats ob-
scene.

Not so the golden age, who fed on fruit,
Nor durst with bloody meals their mouths
pollute.
Then birds in airy space might safely move,
And timorous hares on heaths securely rove;
Nor needed fish the guileful hooks to fear,
For all was peaceful; and that peace sincere.
Whoever was the wretch (and cursed be he)
That envied first our food's simplicity,
The essay of bloody feasts on brutes began,
And after forged the sword to murder man—
Had he the sharpened steel alone employed
On beasts of prey that other beasts destroyed,
Or man invaded with their fangs and paws,
This had been justified by Nature's laws

And self-defense: but who did feasts begin
Of flesh, he stretched necessity to sin.
To kill man-killers, man has lawful power,
But not the extended license to devour.

Ill habits gather by unseen degrees;
As brooks make rivers, rivers run to seas.
The sow, with her broad snout, for rooting up
The intrusted seed, was judged to spoil the crop,
And intercept the sweating farmer's hope:
The covetous churl, of unforgiving kind,
The offender to the bloody priest resigned:
Her hunger was no plea; for that she died.
The goat came next in order to be tried:
The goat had cropped the tendrils of the vine:
In vengeance laity and clergy join,
Where one has lost his profit, one his wine.
Here was at least some shadow of offense;
The sheep was sacrificed on no pretense
But meek and unresisting innocence.
A patient, useful creature, born to bear
The warm and woolly fleece that clothed her
murderer;
And daily to give down the milk she bred,
A tribute for the grass on which she fed.
Living, both food and raiment she supplies,
And is of least advantage when she dies.

How did the toiling ox his death deserve,
A downright simple drudge, and born to serve?
O tyrant! with what justice canst thou hope
The promise of the year, a generous crop,
When thou destroy'st thy laboring steer, who
tilled
And ploughed with pains thy else ungrateful
field?

From his yet reeking neck to draw the yoke.
That neck with which the surly clods he broke;
And to the hatchet yield thy husbandman,
Who finished autumn, and the spring began.

Nor this alone! but Heaven itself to bribe,
We to the gods our impious acts ascribe:
First recompense with death their creatures' toil;
Then call the blest above to share the spoil:
The fairest victim must the powers appease,
(So fatal 'tis sometimes, too much to please!)
A purple fillet his broad brows adorns,
With flowery garlands crowned, and gilded horns;
He hears the murderous prayer the priest prefers,
But understands not 'tis his doom he hears;
Beholds the meal betwixt his temples cast
(The fruit and product of his labors past);
And in the water views perhaps the knife,
Uplifted to deprive him of his life;
Then broken up alive, his entrails sees
Torn out, for priests to inspect the gods' decrees.

From whence, O mortal man, this gust of blood
Have you derived, and interdicted food?
Be taught by me this dire delight to shun,
Warned by my precepts, by my practice won;
And when you eat the well-deserving beast,
Think on the laborer of your field you feast!

* * *

Ill customs by degrees to habits rise;
Ill habits soon become exalted vice.
What more advance can mortals make in sin,
So near perfection who with blood begin?

Deaf to the calf that lies beneath the knife,
Looks up, and from her butcher begs her life;
Deaf to the harmless kid, that ere he dies,
All methods to procure thy mercy tries
And imitates in vain thy children's cries?
Where will he stop who feeds with household
bread,
Then eats the poultry which before he fed?
Let plough thy steers, that when they lose their
breath,
To nature, not to thee, they may impute their
death.
Let goats for food their loaded udders lend,
And sheep from winter cold thy sides defend;
But neither springs, nor nets, nor snares employ,
And be no more ingenious to destroy
Free as in air let birds on earth remain,
Nor let insidious glue their wings constrain;
Nor opening hounds the trembling stag affright,
Nor purple feathers intercept his flight;
Nor hooks concealed in baits for fish prepare,
Nor lines to heave them twinkling up in air.

Take not away the life you cannot give;
For all things have an equal right to live;
Kill noxious creatures, where 'tis sin to save;
'Tis only just prerogative we have:
But nourish life with vegetable food,
And shun the sacrilegious taste of blood.

GOOD HEALTH EXTENSION BUREAU

Battle Creek, Mich., U.S.A.

THE DIETETIC VALUE OF SUGAR.

BY J. H. KELLOGG, M. D.,

Battle Creek, Mich.

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RECENTLY several subscribers have asked for an opinion as to the dietetic properties of sugar. As to whether sugar is a food is a question which has never been raised among persons acquainted with the chemistry of foods and scientific dietetics; but Claude Bernard proved long ago by careful experiments that sugar alone is not a food, and that an animal fed exclusively upon sugar soon loses its strength and vigor, and dies of starvation. Sugar is one of the constituents of a perfect food, but must be associated with the other elements found in food — at least with the nitrogenous — to render it capable of sustaining life.

The love of sweet substances is unquestionably a really natural instinct, since saccharine flavors abound in those food substances which constitute the most natural diet for the human family; and if our diet were wholly composed of natural foods, there would be no occasion for writing this article, for no natural food contains so great an excess of sugar as to be capable of producing harmful effects when eaten by a healthy person. When, however, sugar is separated from its natural association with other food elements, and presented in concentrated form, as that made from the ordinary cane sugar, it becomes capable of producing injurious effects of a very decided character. The following are the chief injurious results which may arise from the excessive consumption of sugar in its concentrated form: —

1. *Acid Dyspepsia.* — Acidity, or sour stomach, is a very common result of the use of sugar in its ordinary form, or in

the form of candy, sweetmeats, etc. Under the action of certain germs, sugar is converted first into alcohol and carbonic acid gas, and later the alcohol is decomposed into acetic acid and water or vinegar. It is in this way that vinegar is made from cider, wine, and other sweet liquids. When taken into the stomach, sugar undergoes this same change. The first symptoms of this form of fermentation in the stomach are eructations of gas and distention of the stomach due to the alcoholic fermentation. Sometimes months or years may elapse without the appearance of other symptoms, but sooner or later the stomach will become sufficiently disabled from frequent distention and the over-stretching of its muscles, to prevent the prompt discharge of its contents; and the longer retention of the food substances within the stomach will give opportunity for the acetous, or acid-forming, fermentation, the symptoms of which are soreness and burning at the pit of the stomach, and sometimes vomiting or regurgitation of sour liquids.

2. *Catarrh of the Stomach.*— In its concentrated form, sugar gives rise to an excessive formation of mucus in the stomach. By constant repetition this may in time become a habit, and then catarrh of the stomach will be established. The irritation of the mucous membrane by the products resulting from the fermentation of sugar is also provocative of catarrh. The free use of sugar is unquestionably one of the most common causes of gastric catarrh. Some of the worst cases of this disease with which the writer has ever met have been from this source. In one well-marked case the lady had been in the habit of eating a three-pound box of highly flavored candy regularly every week.

3. *Indigestion of Starch.*— Physiologists have demonstrated the interesting fact that in order that the ptyalin, or starch ferment, should continue its work of converting the starch into sugar, it is necessary that the sugar resulting from the action of the ptyalin should be absorbed as rapidly as formed. When absorption does not take place with sufficient rapidity, and the sugar in solution is allowed to accumulate, the action of the ptyalin ceases. The same principles apply to the action of the other ferments — pepsin, pancreatin, etc. It thus appears

that when sugar is taken with starchy foods, its effect is to interfere with their digestion, as it will at once render the mixture so highly saccharine that the ptyalin will not act upon the sugar as efficiently as it would otherwise do. Cane sugar cannot be absorbed as such, but must be digested. It is converted by the action of the intestinal juice into grape or malt sugar, which prepares it for absorption; but this action does not take place until after it enters the intestine, consequently cane sugar is neither absorbed nor digested in the stomach; and so long as the food substances remain in the stomach, it is also present, interfering with starch digestion. Further interference with digestion is occasioned by the fermentation of the sugar, which, under the influence of the germs which are always present in the stomach, may ferment, although it does not digest; and the fermentation thus started may extend to other of the food substances, vitiating the products of digestion, and interfering with the whole digestive process.

4. *Disturbance of the Liver Functions.*—A condition commonly known in this country as torpid liver, called by the French, "hepatism," is very generally present in persons who consume sugar in large quantities. The condition is characterized by general disturbance of all the functions of the liver, which are so numerous that we can do little more than barely mention them here. They may be briefly stated, together with the effects of sugar upon the several processes, as follows:—

(1) *Bile Making.*—Bile produced by the liver contains a considerable amount of waste substances, or dregs of the body, some of which are exceedingly poisonous in character, so that when retained in sufficient quantities, a state of poisoning results. This condition is not indicated by jaundice, but by a dingy appearance of the skin, dullness of the white portion of the eye, specks before the eyes, metallic taste in the mouth, and when extreme, by light or clay-colored stools, or fæcal discharges, and a very dark color of the urine. Sometimes, however, jaundice results from catarrh of the biliary passages, what is known as infectious jaundice. This always begins with catarrh of the stomach. From the stomach the catarrhal inflammation extends to the upper portion of the small

intestine, or the duodenum, from which it extends to the liver itself through the ducts which convey the bile from the intestine. When this catarrhal process becomes intense enough to cause closure of a biliary passage of considerable size, a sufficient amount of bile will be absorbed into the system to make the skin and the white of the eye saffron or yellow colored, and the patient is said to have jaundice. This sort of jaundice is different from the jaundice produced by gallstones. In the latter form of the disease the occurrence of jaundice is sudden, and is accompanied by severe pain, or hepatic colic, due to the passage of a gallstone. When the stone has passed from the gall duct, the bile flows again, and the jaundice disappears. Infectious jaundice is preceded by catarrh of the stomach, and often by a dull pain beneath the ribs of the right side in the region of the duodenum. It is also characterized by chills occurring daily or irregularly, accompanied by fever. These chills often continue for several months and are usually attributed to malaria. The excessive use of sugar is a very common cause of this disease.

(2) *Sugar-Making and -Regulating Function.*— One of the most curious functions of the liver is its sugar-making and -regulating function. All the sugar and starch taken as food after digestion and absorption, are carried to the liver by the portal vein. Only a very small portion is allowed to pass through the liver, the greater part being stored up in the liver cells by convertion into a form of starch known as glycogen. This glycogen is subsequently, in the intervals between meals, slowly digested by means of a ferment derived from the blood corpuscles, and thus converted into sugar again. By this arrangement the sugar is thrown out of the body regularly and in small amounts, instead of being thrown into the blood in great quantities as rapidly as it is digested. This regulation of the supply of sugar is of great importance, for the reason that sugar is chiefly used in the body for the production of force and heat, the demand for which is more or less regular, as in the case of the furnace or locomotive.

This function of the liver may be compared to the automatic stoking, or fuel-feeding arrangement, sometimes connected with large boilers.

When sugar is used in large quantities, as is likely to be the case when it is taken in its free form, so great a quantity is sometimes carried to the liver that it is unable to retain as large a portion as is necessary, and more than the usual amount escapes into the blood. The blood normally contains only two or three parts of sugar in one thousand parts of blood. When the sugar rises above three parts in one thousand, the kidneys, which are always on the alert to regulate the condition of the blood, take alarm, and, seizing upon the excess of sugar, throw it out of the body in the urine, so as to protect the blood corpuscles and other delicate tissues of the body from the injurious effects certain to follow an excess of sugar in the blood. When sugar is thus present in the urine, the case is said to be one of diabetes. It is a well-recognized fact that this disease is more frequently produced by an excessive use of sugar, or saccharine substances, than by any other cause. The liver apparently becomes exhausted in its effort to retain the excessive amount of sugar taken in, and lets a portion slip through; and as the disease advances, a larger and larger quantity of the sugar eaten passes through in this manner, and thus the amount of sugar in the urine increases from a few grains per diem at the outset to several ounces, or, as the writer has sometimes seen, nearly a pound.

(3) *The destruction of ptomaines and poisons of animal or vegetable origin, the conversion of tissue poisons into less dangerous forms, the retention of mineral poisons*,— in other words, the protection of the body against poisoning. These are very important and interesting functions of the liver. When a man takes alcohol, a part of it is taken into the liver, which destroys what it can of the poisonous substance, allowing only a portion to escape into the body. The same is true of nicotine, strychnia, and other poisons. Poisons are constantly produced in the alimentary canal which the healthy liver is able to destroy, wholly or in part, thus protecting the body against their injurious effects. Poisons produced by the tissues as the result of tissue activity, are, by the action of the liver, converted into less poisonous substances, and prepared for elimination through the kidneys. When the liver becomes disabled as the result of excessive consumption of sugar, so

that it is no longer able to perform these important and delicate functions efficiently, systemic poisoning appears as the result of the accumulations of the tissue poisons and the absorption of those formed in the alimentary canal by decomposition of the food under the action of germs. This poison is increased when the liver is in a state of disease, for the reason that the bile is an antiseptic. When it becomes vitiated or diminished in quantity, its antiseptic power is lacking, and the intestinal contents, specially those of the colon, undergo decomposition to an unusual extent by throwing into the blood great quantities of intensely poisonous substances. It is the presence of these poisons which gives to the fæcal discharges of persons suffering from diseased liver an unusually intense and loathsome odor.

Persons whose livers have been disabled by the excessive use of sugar or otherwise, are much more subject to injury from alcohol, tobacco, and other poisons which may be taken into the body, than are those who are in a normal state. For this reason, cheese, oysters, meat, and other foods especially likely to contain poisonous substances, or to encourage their development within the body, may be injurious in such cases. Meat was formerly recommended as the principal article of diet for patients suffering from diabetes, but the more critical observations made of this disease in recent times have shown that systemic poisoning and death are very likely to result from a diet largely composed of meat in the cases of those suffering from this disorder, which fact is doubtless due to the disabled condition of the liver.

(4) *Blood Functions of the Liver.*— Before birth, the liver is active in the production of blood corpuscles; after birth, it is supposed to be a grave of the blood corpuscles, being one of the organs in which corpuscles are destroyed when they become old and incapable of further usefulness. This delicate function, as others in which the liver is concerned, must be seriously interfered with by the excessive use of sugar or other foods which impair the integrity of this important organ.

(5) *Excessive Fat Production.*—All the sugar used as food must be utilized in the body in one of three ways,—for heat

production, for force production, or for the production of fat. When a larger amount of sugar is taken than can be utilized in connection with the other elements of food in heat or force production, if not eliminated by the kidneys as sugar, it may be deposited as fat; thus the use of sugar tends to obesity. An excessive accumulation of fat gives rise to many inconveniences. Its accumulation in the chest and abdomen causes shortness of breath by diminishing the capacity of the chest. It sometimes accumulates about the heart, overburdening this organ so that it cannot perform its functions properly. Its general accumulation throughout the body imposes a burden upon the muscles which may be so exhausting as to seriously interfere with a person's usefulness. The condition of a man obliged to carry another man of half his own weight or of equal weight upon his shoulders continually, wherever he went, would be indeed pitiable; but it is not an uncommon thing to find very fleshy persons weighing fifty per cent more than they should, or even twice their natural weight. There is no substance more capable of producing a rapid accumulation of fat than is sugar.

Accumulation of fat in the body also induces a tendency to fatty degeneration,—a diseased process in which the normal tissues are replaced by fat. This is particularly liable to take place in the muscles, which thus lose their strength, and in the walls of the blood vessels, which may become so weakened as to rupture, causing apoplexy of the brain or of some other part of the body, with resulting paralysis or other form of disablement.

In conclusion, it should be noted that the sugar of commerce is doubtless in some way physiologically different from the saccharine element as it naturally exists in sweet fruits. The writer has been convinced of this by observing the fact that persons who are unable to eat sour fruits sweetened with sugar without suffering from acid dyspepsia, arising from fermentation of the sugar, are able to eat such fruits as sweet apples, figs, etc., with impunity. We have, in the use of sugar, an excellent illustration of a principle which is very wide in its application; namely, that in departing from the simple ways of nature we always incur a risk of injury. As we hvae often remarked in the last twenty years, the only apology for the use of sugar in its ordinary state is the gratification of an abnormal or exaggerated taste. We can well dispense with this element altogether. The acidity of acid fruits may be modified by a suitable admixture of sweet fruits. Certainly, the addition of sugar to starchy foods, as cakes and other sweet pastries, and to grains, is not only wholly unnecessary, but physiologically inexcusable, since starch itself is by the process of digestion converted into sugar; so that, in adding sugar to starch or starchy foods, we are practically adding sugar to sugar, the sugar constituting not only a redundancy, but interfering with the digestion of the starchy foods, as previously pointed out. The less sugar taken in its free state, the better for digestion.

616.861

VALUABLE TESTIMONY.

FRIDTJOF NANSEN, the celebrated Arctic explorer, in his new book "The First Crossing of Greenland," makes statements that completely set at naught the idea so many people have that while the use of intoxicating liquors may, as a general thing, be hurtful, they are yet very helpful, even essential to persons exposed by their occupations to cold weather and to travelers in cold countries.

Referring to the Greeley expedition of a few years ago, he says:

When one reads, for instance, how the plucky Sergeant Rice, famished, frozen, and tired to death, imagines he can save himself by a dose of rum, to which he has even added ammonia, the very worst thing he could have hit upon, and then dies shortly afterward in the arms of his friend Frederick—who is meantime stripping himself of his own clothes, down to his very shirt, in his attempts to thaw his comrade's stiffening limbs—one cannot but be moved to the heart at the thought of so much energy, courage, and noble self-sacrifice being thus uselessly thrown away. The melancholy debauches which the men on this expedition were guilty of, when driven to excess by their inhospitable surroundings, and the continual imminence of death and destruction, I will not touch upon. Besides reducing the power of endurance, and exercising a directly injurious influence by lowering the temperature of the body and weakening the activity of the digestive organs, alcohol also destroys energy and lessens the spirit of enterprise, and this not least when men, like those under Greeley, are perishing of starvation and exhaustion.

In confirmation of this condemnation of the use of alcoholic liquors on Arctic expeditions, Dr. Nansen says:

My experience leads me to take a decided stand against the use of stimulants and narcotics of all kinds. It must be a sound principle at all times that one should live in as natural and simple a way as possible, and especially must this be the case when the life is a life of severe exertion in an extremely cold climate. The idea that one gains by stimulating body and mind by artificial means; betrays, in my opinion, not only ignorance of the simplest physiological laws, but also a want of experience, or pershaps a want of capacity to learn from experience by observation. It seems, indeed, quite simple and obvious that one can get nothing in this life without paying for it one way or another, and that artificial stimulants, even if they had not the directly injurious effects which they undoubtedly have, can produce nothing but a temporary excitement followed by a corresponding reaction. Stimulants, with the exception of chocolate, which is mild in its effect, and at the same time nourishing, bring practically no nutritive substance into the body, and the energy which one obtains in anticipation by their use at one moment must be paid for by a corresponding exhaustion at the next. It may, no doubt, be advanced that there are occasions when a momentary supply of energy is necessary, but to this I would answer that I cannot imagine such a state of things to arise in the course of a protracted sledge-expedition, when, on the contrary, as regular and steady work as possible is generally the main thing to be aimed at.

Lieutenant Peary's experience agrees with this. He says:

I would not have liquors served as part of Arctic rations; they are worse than a nuisance, except in very limited quantities on special occasions.

When the mercury is 40, 50, even 60 degrees below zero day after day, it sometimes takes two or three hours to get water to the boiling point. If a man reaches the point of exhaustion, two or three hours cannot be given up to making tea or coffee—a little brandy does the rallying work. If I could have hot tea or coffee on tap in the Arctic regions, I should have no use for any stimulants at all.

I am not a physician, and do not care to speak about physiological effects; but when one is in the work he comes to conclusions from experience, and these are the conclusions I have reached.

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387

Twenty

~~Forty~~ Scientific Arguments against ~~the~~ Alcohol ~~Habit.~~

1.—Alcohol is a Chemical Agent.— It is colorless when pure, and very inflammable, burning with a pale blue flame. It is closely allied to such chemical compounds as naphtha, turpentine, benzine, fusel-oil, kerosene, and burning fluid. It is seldom found pure, usually containing from two to fifty per cent. of water, besides various impurities, chief among which is *fusel-oil*, another variety of alcohol.— When in a pure state

The active chemical properties possessed by alcohol render it not only unfit for introduction into the body, but actually dangerous.

2. —Alcohol Comes of a Bad Family.— "A man is known by the company he keeps." This adage is equally as applicable to some other things as to men. It holds good respecting alcohol, at least.

There are numerous alcohols, fusil-oil, the constituent of bad whiskey, is one; naptha, or wood spirit, is another; C...... acid and creosote are chemical substances which are closely related to alcohol.

carbolic

3 — ~~5~~.—Alcohol is a Poison to Plants.—Vital properties are pretty much the same in a general way, whether manifested by a mushroom or a man; and any substance which will destroy the life of a plant is not likely to be wholesome for human beings. If a plant be watered with a solution of alcohol, its leaves soon wither, turn yellow, and the plant dies, even when the proportion of alcohol is so small as one part in one thousand parts of water.

4 — ~~7~~.—Alcohol is a Poison to all Animals.—A tadpole dropped into a vessel containing alcohol dies in a minute. Leeches and other small animals succumb in like manner.

31 353

¶ A French physician administered alcohol in the form of brandy and absynthia to fowls. The animals took kindly to the use of stimulants and soon became so addicted to them that it was necessary to limit them to a daily allowance. In two months absynthia drinking killed the strongest cocks; the brandy-drinking fowls lived four months and a half; while the wine drinkers held out three months longer. But all finally died a drunkard's death. The late Professor Dujardin-Beaumetz, one of the leading physicians of the world, in experiments upon pigs, found its effect to be uniformly that of a poison.

5 **8.— Alcohol is a Poison to Human Beings.**— Notwithstanding the apparent impunity with which diluted alcohol in the form of various liquors may be taken, pure alcohol is rapidly

Out

6 **11.— Alcohol ~~as~~ a Narcotic.**— Alcohol is exciting in its first effects; but like most other substances of similar nature, its secondary and more prominent effect is narcotizing. It benumbs the sensibilities. If a man is exhausted, it relieves the feeling of fatigue by obtunding his senses, not by replenishing his wasted energy. Persons who have died from the effects of an overdose of alcohol, present all the indications of narcotic poisoning.

7 ~~**12. Alcohol as an Anæsthetic.**~~— A tablespoonful of strong alcohol held in the mouth for two or three minutes, will obtund the sense of taste so as to render a person unable to determine between sweet and sour, saline and bitter. If taken in sufficient quantity, it will relieve the sense of pain sufficiently to enable a surgeon to perform an operation with little or no suffering on the part of the patient.

Ether and Chloroform are made from alcohol.

13.— Alcohol ~~as~~ a Food.— The aristocratic toper who wishes to give an air of respectability to his vice, will claim that alcohol is a food. He will cite, in proof, instances in which persons have lived for weeks by the aid of no other nutriment, taking nothing but alcohol and water. This semblance of argument scarcely needs exposure; for the most that can be claimed is that it proves merely that persons have lived several weeks while taking only alcohol and water. The fact that individuals have in several instances

not

384

Lager-Beer ~~as~~ Food.—After such repeated refutations of the idea, it is strange that people should still cling to the notion that lager-beer is nourishing. If a man has lost his appetite, and seems to be failing in strength, or losing weight, his next-door neighbor advises him to drink daily a few glasses of lager-beer. If a nursing mother has insufficient food for her infant, wise old ladies prescribe larger-beer or ale.

Although it is being constantly reiterated in the ears of the people that alcohol is not food, and that beer and ale are only dirty mixtures of alcohol and water, still they refuse to believe that these pernicious beverages cannot, in some way, impart nourishment and strength. Perhaps the testimony of one of the greatest of European savants will correct the opinions of a few.

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~~Said~~ Prof. Baron Liebig, a German chemist of great renown, "We can prove with mathematical certainty that as much flour or meal as would lie on the point of a table-knife is more nutritious than five measures [ten quarts] of the best Bavarian beer." Powerful nutriment, indeed!

of determining the influence of alcohol upon these various senses, and upon the mental activity, ~~it was found~~ showed that the lenghh of time required was more than doubled, as the result of taking two ounces of whisky. This clearly shows~~, beyond doubt,~~ the paralyzing influence of alcohol upon the brain and nerves.

32

been known to live from thirty to sixty days while taking only water, shows conclusively that those persons who lived a shorter time on brandy and water, lived in spite of the alcohol instead of by the aid of it.

14.—Alcohol is Not a Beverage in a Physiological Sense.—Water is the *only drink;* that is, the only liquid capable of supplying the demand of the system for fluid. The various beverages in common use are of value only to the extent that they contain water, the universal solvent. Alcohol, then, is neither food nor drink. It satisfies the craving for food, but does not replenish the tissues. Although a liquid, instead of supplying the needs of the system for liquid food, it creates a demand and a necessity for more.

8. ALCOHOLIC DEGENERATION.- The degeneration of the muscles, heart, brain, nerves, liver, kidneys, and in fact all organs of the body, is ~~are~~ induced by the habitual use of alcohol. Dr. Carpenter is authority for the assertion that the changes in the corpuscles and in the fibrin of the blood take place when *not more than one part of alcohol to five hundred of blood is employed.* Thus it will be seen that the very weakest wines are unsafe, since none of them contain less than from three to five per cent. Even small beer would be capable of doing mischief in this way.

9.—The Drunkard's Brain.—The brain when healthy is so soft that it would not retain its shape but for the skull. The sharpest knife is required to cut it without mangling its structure. It is necessary to immerse the organ in alcohol for weeks or months in order to harden it, when a careful examination is essential. A drunkard's brain presents a marked contrast. It is already hardened, ~~—pickled almost. In the dissecting room, it affords rare pleasure to a medical student to secure the desiccated brain of an old toper~~. A celebrated anatomist declared that he could tell a drunkard's brain in the dark, by the sense of touch alone. A London physician reported a case in which he found, upon a *post-mortem* examination, so strong an odor of alcohol emanating from the brain, that he applied a match to it, when it burst into a flame.

33

10 ~~24~~.—**The Drunkard's Stomach.**—A microscopical examination of the lining membrane of the stomach shows it to be traversed by a dense network of blood-vessels, which are wholly invisible so long as the organ remains in a healthy condition. Little pockets are also found in which are located the peptic glands which form the gastric juice, the essential agent in the process of stomach digestion. In the small intestine below the stomach we have a similar arrangement of blood-vessels and glands.

In the well-known case of Alexis St. Martin, who suffered from a gun-shot wound which carried away a considerable portion of the abdominal wall and penetrated his stomach, leaving an opening ~~o~~fter healing, Dr. Beaumont made some most interesting experiments regarding the effects of alcohol upon the stomach, with the following results:—

Stomach of a Moderate Drinker.—The effect of alcohol, as well as of ~~mustard, pepper, pepper-sauce, spices, and~~ condiments, is to produce a state of excitement and irritation in the stomach, the result of which, when frequently repeated, is permanent congestion, and ~~is the cause of~~ numerous forms of dyspepsia. But alcohol does more than simply irritate the stomach. By its antiseptic influence it prevents the digestion of the food, and by its chemical properties it destroys the activity of the gastric juice, and so does triple mischief.

Stomach of a Hard Drinker.—In the hard drinker the blood-vessels are dilated, as in the case of the moderate drinker, and in addition small ulcers are seen scattered over the diseased surface. The stomach of an old toper may be in an ulcerated condition without his being conscious of the fact, as the nerves of the stomach are so paralyzed by alcohol that their normal sensibility is quite lost.

The Stomach in Delirium Tremens.—In a person suffering with ~~what is generally known as "~~delirium tremens,~~"~~ or acute alcoholism, the mucous lining of the stomach is in a state of intense inflammation, so that its functions are wholly suspended. Dr. Beaumont observed on one occasion, when Alexis St. Martin had been

Several years ago, the writer made an experiemnt for the purpose of determining the influence of alcohol upon digestion, in the following manner:

A young man was given a test meal consisting of an ounce and a half of bread and two ounces of water. At the end of one hour, the digesting food was removed from the stomach, and ~~carefully examined.~~ The amount of digestion ~~was~~ carefully noted. The experiment was repeated upon the same young man, two ounces of water being replaced by an equal quantity of claret, when it was found that the amount of digestive work was reduced to one-third of the former amount. Repeating the experiment, replacing two ounces of water by an equal quantity of brandy, the digestive work accomplished was found to be less than one-eighth the normal amount, the stomach being almost completely paralyzed.

drinking heavily for a few days, that, although his stomach was in a state of inflammation and ulceration, he was unconscious of pain and felt no inconvenience, only suffering from a severe headache. Post-mortem examinations of persons who have died of delirium tremens usually disclose the stomach black with mortification.

// **25. — Drunkard's Dyspepsia.** — A drunkard is certain to become a dyspeptic. Alcohol tans the stomach, rendering it inactive, and causing atrophy of the glands which form the gastric juice, thus diminishing The supply of this digestive fluid ~~is thus diminished~~. Alcohol precipitates the pepsin from the gastric juice, and so renders useless that which is secreted. Digestion cannot progress while alcohol is in the stomach, ~~being~~ hence it is delayed until the poison can be absorbed.

The Effects of Alcohol on Digestion. — Prof. Kochlakoff, of St. Petersburg, ~~recently~~ has experimented on five healthy persons, aged from twenty to twenty-four years, with reference to the effects of alcohol upon digestion. Ten minutes before each meal, each person was given about three ounces of alcoholic liquor, containing from five to fifty per cent of alcohol, which is about the proportion found in ordinary liquors. The following results were obtained:—

"1. Under the influence of alcohol, the acidity of the gastric juice, and the quantity of hydrochloric acid, as well as the digestive power of the gastric juice, are diminished.

"2. This enfeebling of the digestion is especially pronounced in persons unaccustomed to the use of alcohol."

Dr. Figg, of Edinburg, made the following experiments, to test the effect of alcohol upon digestion: He fed two dogs equal quantities of roast mutton. He then administered to one dog, by passing a tube into the stomach, ~~an~~ one and one-fourth ounces ~~and a quarter~~ of alcohol. After five hours, both dogs were killed and examined. The one which had taken no alcohol was found to have digested ~~his~~ the meal entirely, whereas digestion had scarcely begun in the animal to which alcohol had been administered.

35

388

12 ~~26.~~ — **Alcoholic Insanity.** — The condition of a man under the influence of liquor is precisely that of an insane man, as regards his mind. When getting drunk is frequently repeated, the condition of the mind induced by drink may become permanent, making the individual a fit subject for an insane asylum.

Intemperance, more than any other cause, fills our lunatic and idiotic asylums. According to the statistics of insanity in France, thirty-four per cent. of the cases of lunacy among males ~~were~~ are due to intemperance. One half of the inmates of the Dublin insane asylum owe their disease to the use of liquor. Lord Shaftesbury, chairman of the English Commission on Lunacy, in his report to Parliament, stated that six out of every ten lunatics in the asylums were made such by alcohol.

13 ~~27.~~ — **A Drunkard's Liver.** — The appearance of a drunkard's liver is charateristic. "Hob-nailed liver" is another name for the diseased organ as found in spirit-drinkers. It is shrunken, hard, and almost totally useless, benumbed alike to pain and to proper sensibility. Externally it looks like the hob-nailed sole of an English cartman's shoe, from which resemblance it received its name.

This kind of liver is found in those who have freely indulged in drink for several years. The livers of more moderate drinkers are found filled with fat.

These derangements of the liver give rise to numerous other disturbances, of which abdominal dropsy is one common form.

Diabetes, a very fatal malady, especially in spirit-drinkers, is a peculiar disease which is generally caused by some of these derangements of the liver.

Fatty liver, in which the organ sometimes becomes enormously enlarged and changed to fat, and nutmeg degeneration, in which it comes to resemble the smooth surface of a half-grated nutmeg, are also among the common effects of alcohol upon habitual users of the poison.

A 36.

Some years ago, the writer made a series of experiments for the purpose of determining the influence of alcohol upon the muscular strength. The combined strength of all the different groups of muscles in the body was found txxxx , in the case of a healthy young man, to be 4881 pounds. The young man was given two ounces of brandy, and in two hours the test was repeated, when his strength was found to be only 3385, a loss of more than one-third. A notable diminution in strength was still present ten hours after the administration of the brandy.

36

389

14 **31. — Alcoholic Consumption.** — ~~Dr.~~ Richardson points out the fact that alcohol, instead of preventing, actually produces consumption, and that of a most fatal type. He states that a person suffering from alcoholic phthisis shows no improvement under treatment. The disease, steadily, surely, and usually quite rapidly, progresses to a fatal termination.

15 **32. — Alcohol vs. Strength.** — The laborer, the traveler, and the soldier use alcohol under the delusion that it strengthens. When fatigued, the laborer takes a glass of grog and *feels* better, or thinks he does. He imagines himself stronger. His increased strength, however, is wholly a matter of the imagination.

The use of alcohol makes a man *feel* stronger —makes him believe that he can do more work, endure more fatigue and hardship, and withstand a greater degree of cold than he could without it ; but when an actual trial is made, it soon becomes apparent that the ability is lacking. Numerous experiments have shown that alcohol decreases muscular strength. Says Dr. Brinton, "The smallest quantity takes somewhat from the strength of the muscles." Says Dr. Edmunds, of London, "A stimulant is that which gets strength out of a man."

37 390

16 **35.—Alcohol vs. Animal Heat.**—The sensation of warmth produced by taking a glass of wine or brandy is delusive. The circulation is unbalanced, and for a few moments there is a seeming increase of heat; but the thermometer shows that the temperature is lessened. Says Dr. Parkes, the eminent English sanitarian, "All observers condemn the use of spirits, and even of wine or beer, as a preventive against cold." The names of Dr. King, Dr. Kane, Captain Kennedy, and Dr. Hayes, may be cited as holding to this opinion. In the last expedition in search of Sir John Franklin, the whole crew were teetotalers.

Prof. Miller states that the Russian military authorities "interdict its use absolutely in the army *when troops are about to move under extreme cold*, part of the duty of the corporals being to smell carefully the breath of each man on the morning parade, and to turn back from the march those who have indulged in spirits, it having been found that such men are peculiarly subject to be frost-bitten and otherwise injured."

Dr. Carpenter is authority for the statement that the Hudson's Bay Company have for many years entirely excluded spirits from the fur countries to the North, over which they have exclusive control, "to the great improvement," as Sir John Richardson states, "of the health and morals of their Canadian servants, and of the Indian tribes."

17 **38.—Alcohol vs. Longevity.**—It is very easy to prove that the influence of alcohol, as of every other poison, is to shorten life. Dr. Willard Parker, of New York, shows from statistics that for every ten temperate persons who die between the ages of twenty-one and thirty, fifty-one intemperate persons die. Thus it appears that the mortality of liquor-users is *five hundred per cent. greater* than that of temperate persons. These statements were based on the tables used by life-insurance companies.

38

18. ALCOHOL NOT A STIMULANT.- The popular idea that alcohol is a stimulant is doubtless the chief occasion for its use as a remedy by physicians. But modern researches have shown that alcohol cannot in any proper sense be regarded as a stimulant. It lessens vital activity in all diseases. The giving of alcohol to weak and fainting persons is a most pernicious and injurious practice, As the drug serves to still further depress and weaken the vital forces. The feeling of increased strength imparted by alcohol is deceptive, as we have elsewhere shown. This is true in relation to both mental and muscular effect.

Notwithstanding the constant protest of both moderate and immoderate drinkers that alcohol does not harm them, that it is a necessary stimulus, a preventive of fevers, colds, consumption, etc., and the assertion of certain scientists that it is a conservative agent, preventing waste and so prolonging life, the distinguished English actuary, Mr. Neison, has shown from statistical

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19. EFFECTS OF MODERATE DRINKING.—

It is quite useless for moderate drinkers to suppose that by using alcohol in small quantities they escape its evil effects. It is a poison in all doses. As Dr. Smith says, "In whatever dose, the direction of the action of the alcohol must be the same."

Says Dr. Chambers, "The action of frequent divided drams is to produce the *greatest amount of harm* of which alcohol is capable, with the least amount of good."

The effect of the constant action of a small quantity of the poison is far greater than that of excessive, but only occasional, quantities. Hence the habitual moderate drinker, even of wine, beer, or hard cider, is much more subject to chronic nervous disorders and degenerations of various sorts, than the man who goes on a spree once in two or three months.

20. **ALCOHOLIC HEREDITY.**—Dr. S. G. Howe attributed one half of the cases of idiocy in the State of Massachusetts, U. S. A., to intemperance, and he is sustained in his opinion by the most reliable authorities. Dr. Howe states that there were seven idiots in one family where both parents were drunkards. One half of the idiots in England are of drunken parentage, and the same is true of Sweden, and probably of most European countries. It is said that in St. Petersburg most of the idiots come of drunken parents.

~~AO.~~

~~21. Alcohol and Insanity. — (21-...)~~

Proportion of Alcohol in Various Regions. — Phys/75

40 full head 394

SCIENCE VERSES TOBACCO.- A volume might be written respecting the evil consequences of the use of tobacco. In the following paragraphs we have endeavored to sum up the chief facts with reference to the use of tobacco, and trust that the arguments presented will be found sufficiently cogitant to convince the most sceptical regarding the pernicious character of this poisonous and disease-producing drug.

1.—The Custom is a Barbarous One.—This statement is true, both as regards its character and its origin. In the month of November, 1492, when Columbus discovered the island of Cuba, he sent two sailors to explore it, who reported, when they returned, among many other strange and curious discoveries, that the natives carried with them lighted fire-brands, and puffed smoke from their mouths and noses, which they supposed to be the way the savages had of perfuming themselves. They afterward declared that they "saw the naked savages twist large leaves together, and smoke like devils."

2.—It is a Deadly Poison.—The active principle of tobacco, that is, that to which its narcotic and poisonous properties are due, is *nicotine*, a heavy, oily substance which may be separated from the dried leaf of the plant by distillation or infusion. The proportion of nicotine varies from two to eight per cent, Kentucky and Virginia tobacco usually containing six or seven per cent. A pound of tobacco contains, on an average, three hundred and eighty grains of this deadly poison, of which one tenth of a grain will kill a dog in three minutes. A case is on record in which a man was killed in thirty seconds, by this poison.

The poison contained in a single pound of tobacco is sufficient to kill three hundred men, if taken in such a way as to secure its full effect. A single cigar contains poison enough to extinguish two human lives, if taken at once.

41

399

3. Effects of Tobacco on the Blood.—When taken in any form, tobacco very readily finds its way into the blood, and, according to ~~Dr.~~ B. W. Richardson, it produces in the vital fluid very serious changes. He describes these in the following graphic words:—

"On the blood, the prolonged inhalation of tobacco produces changes which are very marked in character. The fluid is thinner than is natural, and in extreme cases paler. In some instances the deficient color of the blood is communicated to the body altogether, rendering the external surface yellowish-white and puffy."

The use of tobacco also tends to destroy both the red and the white blood corpuscles.

4. Smokers' Sore Throat.—The redness and dryness of the mucous lining of the mouth and throat so common with smokers, is the result of the direct irritation of the hot fumes of the poisonous weed, which are drawn in through the pipe or cigar. This cause of chronic disease of the throat is so very common that "smokers' sore throat" has come to be recognized as a distinct malady. Some smokers pretend to smoke for the cure of throat difficulties; but the excuse is a mere pretense in most cases. Tobacco never cures sore throat.

5. Smokers' Heart.—The effect of tobacco upon the heart is indicated by the pulse, which is a most accurate index to the condition of the heart. The pulse of a tobacco-user says, in terms as plain as any words could, that his heart is partly paralyzed, that its force and vigor are diminished, that it is, in fact, poisoned. Medical statistics show that about one in every four smokers has this condition. There is good evidence for believing that not only functional but organic disease of the heart may be occasioned by the use of tobacco.

6. Smokers' Cancer.—There is no chance to doubt that tobacco-using is often a cause of this terrible disease. All eminent surgeons testify that they frequently meet cases of cancer of the lip and tongue which have been occasioned by smoking. In the great hospitals of this country and Europe, we have seen many cases of smokers' cancer, besides a number which we have met in our own practice.

7. Tobacco-Users' Dyspepsia. — Tobacco is a narcotic. The effect of narcotics generally is to lessen the secretion of gastric juice, and to decrease the activity of the stomach. Tobacco does this in a very marked degree. A man who is hungry may appease his desire for food by using tobacco, if he is accustomed to it, or by the employment of some other narcotic. The desire is appeased, although the need still exists. It is through this same paralyzing influence that tobacco impairs digestion.

In certain cases in which an excessive amount of gastric juice is ~~fxxxx~~ furnished in the stomach, the use of tobacco gives temporary relief, but only at the expense of producing ultimately a still more intractible form of gastric disturbance.

LOATHSOME DISEASES FROM CIGAR SMOKING.- A celebrated European specialist has recently called attention to the fact that consumption is becoming exceedingly prevalent among cigar smokers. The reason for this is evident. The fact that persons of feeble or diseased constitution are frequently employed in the manufacture of cigars, coupled with the enforced confinement in a close and foul atmosphere, renders this class of laborers especially liable to consumption. It is not an uncommon thing to see two or three ~~loud~~ consumptives in a single cigar factory. Of course the mouth and lips are constantly soiled with the expectorated matter, and when the cigar-maker puts on the finishing touch to the cigar, by moistening it with his lips, he infects it, and the man who smokes the cigar thereby becomes ~~vaccinated~~ infected with the disease.

There is conclusive evidence for the belief that syphilis and other loathsome ~~dixxxx~~ blood ~~dixxxxxx~~ disorders are not infrequently communicated through the medium of the cigar, which becomes infected from the hands and lips of cigar-makers suffering from these maladies.

TOBACCO AND BRIGHT'S DISEASE.-- Recent researches have shown that tobacco-smoking is a very common cause of Bright's disease. Examination ~~ofxxxxxxxxxxxx~~ of the urine of smokers shows albumen to be present in quite a large proportion of cases. Excessive smoking will cause the appearance of albumen in the urine even in healthy persons. The cause of this is the irritating effect of the nicotine of the tobacco on the kidneys.

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9. — Tobacco Paralysis. — In the last thirty years there has been a great increase in the frequency of the occurrence of a peculiar form of paralysis which seems to affect especially the nerves that supply the muscles, causing gradual wasting and loss of muscular power, which is fairly attributable to the increasing use of tobacco, as it most often occurs in tobacco-users.

A form of progressive paralysis of the optic nerve, causing "tobacco amaurosis," or blindness, is well recognized by oculists. These cases generally recover when tobacco is discontinued, but will not get well so long as it is used.

Tobacco-blindness is very common in Ireland, ~~where very strong tobacco is used.~~ It is caused both by smoking and chewing.

Color-blindness, an affection which is increasing to an alarming extent, especially in Belgium and Germany~~, where smoking is more extensively practiced even than in this country,~~ has been found to be largely attributable to the use of tobacco. This fact was first made known by an eminent Belgian physician who made extensive investigations upon the subject at the request of the Belgian Government.

11. ~~10.~~ **The Tobacco Legacy.** — There is no vice or habit to which men are addicted, the results of which are more certainly transmitted to posterity than are those of tobacco-using. A vigorous man may use tobacco all his life, and be able to convince himself all the time that he is receiving no injury; but the children of that man, who ought to inherit from him a vigorous constitution and high health, are robbed of their rightful patrimony ~~instead~~, and enter upon life with a weakly vital organism, with a system predisposed to disease and destined to premature decay.

The above arguments apply to every form in which ~~it~~ tobacco is ~~used~~ employed, smoking, chewing, snuff dipping, and cigarette smoking. The last is, if possible, the worst of all forms of tobacco using.

~~# p 193.~~

~~(To follow tobacco)~~

TEA AND COFFEE ~~THE CAUSE OF DISEASE.~~- Within the last twenty-five years the fact that tea and coffee are slow poisons which undermine the constitution, destroy the digestion, produce nervousness, sleeplessness, and various ~~[x]~~ peculiar nervous disorders, has been gradually forcing itself upon the medical profession. Not a few non-medically educated persons have made the same discovery. We have room for only a few of the many facts which clearly demonstrate the ~~[x]~~ unwholesome character of these common beverages.

That the use of tea and coffee is a common cause of dyspepsia is an observation made by all experienced physicians. At ~~the last~~ a meeting of the British Medical Association, an eminent physician from Australia testified that dyspepsia from the use of tea and coffee is very common in that country. Sir William Robert has shown that both tea and coffee, even in small proportions, prevent the action of saliva upon starch, thus producing one of the most common forms of indigestion. The writer has demonstrated the correctness of these observations, both by experiment and clinically, having recorded a great number of cases in which grave disorders of digestion were evidently due to the use of tea and coffee.

It is well known that tea tasters invariably break down and have to give up their profession after following it for a few years. The same is true of coffee tasters. A young man called upon the author a few months ago (1895) who had for many years followed the profession of a coffee taster, being an expert in this line and commanding a very high salary for his services, but ~~He~~ had~~, however,~~ been obliged to discontinue the business, He ~~and~~ stated that a few sips of coffee gave him a violent headache, produced nausea and vomiting, and serious nervous disturbance. Numerous such cases have been observed. Several cases of insanity from the use of tea have been reported. In these cases, of course, tea had been used to a great extent. Nevertheless there are to be found tea sots in every great charitable institution, who exhibit many symptoms of mental and moral disturbance.

The eminent Dr. Bock, of Leipsic, writes as follows respecting the influence of tea and coffee on character :—

"The nervousness and peevishness of our times are chiefly attributable to tea and coffee ; the digestive organs of confirmed coffee-drinkers are in a state of chronic derangement, which reacts on the brain, producing fretful and lachrymose moods. Fine ladies addicted to strong coffee have a characteristic temper, which I might describe as a mania for acting the persecuted saint. Chocolate is neutral in its psychic effects, and is really the most harmless of our fashionable drinks. The snappish, petulant humor of the Chinese can certainly be ascribed to their immoderate fondness for tea."

Tea-Drinkers' Disorder.—That there is a distinct class of symptoms characteristic of the effects of alcohol, of tobacco, of absinthe, and of opium, has long been generally recognized ; it is only recently, however, that the morbid effects of tea have been sufficiently well studied by eminent physicians to secure the recognition of the fact that tea and coffee, as well as the other poisons mentioned, produce such a distinct class

DEATH FROM TEA-DRINKING.— The *British Medical Journal* recently reported the death of a boy from drinking hot tea. The tea had been left in the oven some time, so that it had become a strong decoction. Everybody ought to know that tea is a poison, and that the only reason why the ordinary use of tea does not produce poisonous symptoms is that the dose in which it is usually taken is not sufficient, although the exhilaration and wakefulness produced by its use are really as much evidence of poisonous effects as the more pronounced symptoms, which follow the swallowing of a larger dose. Tea, coffee, tobacco, and the various alcoholic drinks, are all poisons, each producing its own characteristic effects, and are alike damaging when used for any considerable length of time, even in small doses, and are alike capable of producing death when used in large doses.

COFFEE ~~VERSUS~~ DIGESTION.—Prof. Schutz-Schutzenstein, an eminent German scientist, has recently completed some interesting experiments in relation to the effect of tea and coffee on gastric digestion. He found that an artificial gastric juice was able, in eight hours to digest 94 per cent. of coagulated egg albumen. When tea was added, other conditions remaining the same, only 66 per cent, or about two thirds as much of the albumen was digested ; and when a decoction of coffee was mixed with the digesting albumen, only 61 per cent, or less than two-thirds of the albumen, was digested

COFFEE FOR INEBRIATES. — The establishment of coffee houses in place of saloons, is by some regarded as one of the most important means of antagonizing inebriety. We have always been opposed to the plan of curing one evil by the substitution of another; for although the coffee drunkard may be somewhat less of a menace to the public peace, and less of a nuisance to his family, he is nevertheless a sinner against nature, and in a way to become an opium slave or a victim to some other form of narcotism.

Recent observations by Czarkowski, ~~according to Wratch,~~ a Russian physician, show that drunkards, of all classes, are the least able to bear the use of coffee. As is well known, coffee contains the active principle of caffein, a vegetable alkaloid possessing very marked properties as a cerebral excitant. The authority referred to takes very strong ground upon the subject, declaring that in persons addicted to the use of alcohol, caffein is strictly contra-indicated. He observed that as a result of the use of caffein in medicinal doses, violent cerebral agitation appeared, giving place to the reverse condition, one of extreme sadness as soon as the caffein was withdrawn. In one case, there was not only extreme cerebral agitation, but also fright, followed by a loss of consciousness, which lasted several hours. In still another case, a most violent delirium, in which the patient manifested decidedly destructive tendences, was induced by caffein.

i

Tea Drinker's Disorder.--One of the most positive evidences of injury resulting from the use of tea is to be found in the symptoms presented by persons who follow the profession of tea or coffee tasting. A professional coffee taster, who was under the ~~professional~~ care of the writer some time ago, had become so shattered nervously that he could not take even a few sips of coffee without suffering fromnausea and other most disagreeable symptoms.

Other symptoms which have been noted in these cases as well as ~~in~~ in cases of persons who are addicted to the free use of tea or coffee, are the following: Nervous tremor, nervous exhaustion, morbid fears, ~~great~~ disorders of digestion, headache, vertigo, specks before the eyes, sudden flashes of light, ringing in the ears, sleeplessness, heaviness at the stomach, twitching of the muscles, an unsteady gait, and great depression of spirits. ~~Nervous headache, bilious headache, and other nervous symptoms in women have frequently been traced to the use of tea.~~ The comfortable and exhilarating sensations arising from the use of tea are an evidence of its poisonous properties. It destroys the sense of fatigue not by resting the weary muscles, but by benumbing the nerves, so they are no longer able to express the natural condition of the body. Exercise taken under the influence of tea, gives rise to greater exhaustion afterwards. The writer has learned of several cases of tea-drunkenness. In one case, two ~~young ladies~~ were arrested in Boston for being drunk and disorderly. The evidence showed they had taken no liquor, but had acquired the habit of tea chewing. ~~Ladies~~ of certain classes in Paris have recently adopted the practice of smoking tea in the form of cigarettes. ~~Dr. Roberts has shown that~~ tea, even in a small quantity, prevents the digestion of starch in the stomach, and ~~it~~ also interferes with the digestion of albumen, so digestion is seriously interfered with by ~~the~~ use ~~of tea~~.

An excellent substitute for both tea and coffee is to be found in

MEDICAL FACTS RELATING TO REA AND COFFEE.- The excessive use of tea and coffee as a beverage, and the general ignorance which prevails respecting the harmfulbess of these substances, justifies

Extracts on p ~~201~~, 107 relating to tea and coffee. Add Roberts experiments

Intoxication from the Use of Tea. — A scientific physician of our acquaintance ~~recently~~ related to us the circumstances of an epidemic of tea-drunkenness, which came to his attention a number of years ago. At that time he had medical charge of the employees of a large manufacturing establishment in which forty or fifty young women were employed. It was observed by the managers that the young women were growing thin and haggard, and after a while they began to drop out from their work, sometimes several at a time, and were likely at any time to be seized with strange nervous symptoms, usually hysterical in character, sometimes amounting to insanity. An investigation of the matter showed that these young women had acquired the habit of tea-chewing while engaged in their work. The practice had become almost universal among them, and the evil effects were as universal as the practice. A number of cases of acute mania occurred among the young women before the practice was checked, which was only accomplished by stationing detectives at the door of the factory, and searching each person who entered. Quantities of the intoxicating drug were frequently thus found concealed. Another physician recently mentioned a case of genuine delirium tremens resulting from the use of tea, which came under his observation nearly fifty years ago. The patient gave all the characteristic symptoms, seeing all sorts of animal forms, and other shapes which are described by the victim of *mania a potu*.

cereal coffee made by roasting grain. Caramel and malt cereal substitutes for coffee may be obtained from the ~~Sanitas~~ F od Company, Battle Creek, Mich. This is an excellent substitute for ~~xxxxx tea~~ and coffee which may be used without harmful effects. The fact that tea will render a weary p rson sleepless is an ther evidence of its pernicious character. The tired mother or the anxious student who goads the weary brain with a cup of tea, thereby rendering it possible to ~~take~~ time ~~from~~ sleep, is making a double draft upon the vital capital which must ~~be~~ repaid with interest at some future time.

A cup of very strong tea possesses as strong intoxicating properties as an equal quantity of lager beer.

Other p ison habits.--Opium, cocaine, chloral, hashish, arsenic, and various other poisons, po sess a certain fasc nating charm which renders their use when on ce begun almost a necessity to the poor victim who has fallen into the ~~poison~~ habit. Probably the most common of all causes of these poison habits, with the exception of the arsenic habit, which is confined to hysteria, is the careless use of narcotic drugs by physicians for the relief of pain. Some physicians prescribe opium in some form for every ache or pain which they encounter in their practice.

If they find a patient suffering pain, whether from an acute attack of colic, a chronic neuralgia, a face-ache from a decayed tooth, a back-ache from some uterine disease, or a fractured limb, an opiate is at once prescribed, and often before ascertaining what may be the patient's condition.

All ~~of~~ these drugs are extremely pernicious in their effects upon the body, and their discontinuance generally requires not only much fortitude on the part of the patient, but ~~much~~ firmness and skill on the part of the physician. A cure can be effected in every case, however, in which the patient really desires to be rescued from his habit. We ~~have~~ found the best plan to be the rapid withdrawal of the drug. The quantity used is reduced one-half each day for two or three days, and then dropped altogether. By means of warm baths, hot and cold sponging of the spine, rest in bed,applications of electricity amd massage, and various other palliative measures, the patient is generally relieved to such a degree that suffering is not uncontrolable, and in a week, or even less time, the normal condition is so far restored that the patient may be said to be entirely comfortable.

-ASH

ACID FOODS

Excess of Acid in One Ounce and in 100 Calorie Portions of Common Foodstuffs

	100 Cals. (a)	Ozs. (b)
Barley, pearled	2.9	2.9
Beefsteak, porterhouse	4.0	3.0
Beefsteak, round, lean	6.8	3.0
Beef, round, free from fat	10.0	4.1
Beef, dried	8.3	4.1
Beef juice	9.8	0.7
Beef, kidney	7.4	2.4
Beef, liver	7.9	2.9
Bread, white	2.7	2.0
Bread, whole wheat	3.0	2.1
Buckwheat flour	2.0	2.0
Cheese, cheddar	1.2	1.5
Chicken	10.0	3.0
Codfish, salted	12.0	3.5
Corn, green	1.8	0.5
Cornmeal	1.5	1.5
Crackers, soda	2.0	2.5
Eggs, whole	7.5	3.1
Egg white	9.5	1.4
Egg yolk	7.0	7.0
Flour, entire wheat	3.3	3.3
Flour, wheat, patent	2.7	2.7
Fish, black	10.8	2.7

	100 Cals. (a)	Ozs. (b)
Haddock	12.0	2.4
Halibut steak	7.8	2.7
Ham, lean	5.5	3.7
Herring, smoked	6.3	2.7
Lamb	3.3	2.7
Lentils	1.5	1.5
Oatmeal	3.0	3.3
Oysters	30.0	4.3
Peanuts	0.7	0.1
Pork	4.0	2.8
Pork, sausage	1.4	1.8
Pork, tenderloin	4.9	2.7
Rice	2.7	2.7
Salmon	5.4	3.2
Sausage, bologna	4.0	2.6
Sardines	4.2	3.2
Shredded wheat	3.3	3.3
Trout	5.4	2.6
Turkey	3.6	3.0
Veal	6.7	3.0
Walnuts, California	1.1	2.2
Wheat, cracked (Branola)	3.3	3.3
Whitefish	7.7	3.3

a. Excess of acids in 100 calories.

b. Excess of acids in one ounce.

-ASH

BASIC OR ALKALINE FOODS

Excess of Alkali in One Ounce and in 100 Calorie Portions of Common Foodstuffs

	100 Cals. (a)	Ozs. (b)
Almonds	1.8	3.3
Apples, fresh	6.0	1.0
Apricots, fresh	11.0	1.8
Asparagus	3.6	0.2
Bananas	5.6	1.5
Beans, dried	5.0	5.0
Beans, lima, canned	12.0	2.7
Beans, lima, dried	12.0	12.0
Beans, lima, fresh	11.6	4.0
Beans, string, canned	13.0	0.8
Beans, string, fresh	12.9	1.5
Beans, soy	12.0	12.0
Beets	23.6	0.3
Buttermilk	6.1	0.6
Cabbage	18.0	1.6
Carrots	23.9	3.0
Cauliflower	17.5	1.5
Celery	42.1	2.2
Chard	41.1	4.5
Cherries, fresh	7.8	1.7
Chestnuts, dried	3.2	3.5
Chestnuts, fresh	3.1	2.0
Coconuts	1.2	0.2
Cranberries*	3.7	0.3
Cream	0.3	0.2
Cucumbers	45.5	2.2
Currants, Zante	1.8	1.6
Dates	3.2	3.2
Figs, dried	32.2	29.4
Grapes	2.8	0.8
Grape juice	4.0	1.1
Garbanzos	8.0	8.0
Lemon	12.3	1.5
Lemon juice	10.7	1.2
Lettuce	38.6	2.1
Milk, condensed, sweetened	1.4	1.2

	100 Cals. (a)	Ozs. (b)
Milk, condensed, unsweetened	2.7	2.3
Milk, skimmed	5.0	0.5
Milk, whole	2.6	0.5
Molasses	20.8	1.7
Mushrooms	9.0	1.1
Muskmelons	18.8	2.1
Olives	18.9	16.0
Onions	3.1	0.4
Oranges	10.9	1.6
Orange juice	14.3	1.7
Parsnips	18.1	3.3
Peaches, canned	10.0	1.3
Peaches, fresh	12.2	1.4
Pears, canned	6.37	2.3
Pears, fresh	5.6	1.0
Peas, canned	1.5	0.2
Peas, dried	1.4	1.4
Peas, green	1.3	0.4
Pineapple	15.7	1.9
Plums*	7.3	1.8
Potatoes	8.6	2.1
Potato chips	3.9	6.5
Potatoes, sweet	5.4	1.8
Prunes, ~~dried~~*	8.0	6.6
Pumpkins	5.7	0.4
Radishes	9.8	0.8
Raisins	6.9	6.9
Raspberry juice	13.0	1.4
Rhubarb*	37.4	2.5
Rutabagas	29.8	3.5
Spinach	113.0	7.6
Squash	6.1	0.8
Tomatoes, fresh	24.5	1.6
Turnips	6.8	0.7
Watermelon	8.9	0.3

a. Excess of alkali or base in 100 calories.
b. Excess of alkali or base in one ounce.

*These foods contain unoxidizable acids and cannot be included in an alkaline or basic diet.

organic

WHAT IS A CALORIE?

A calorie is the amount of heat required to raise one kilogram of water one degree centigrade in temperature or four pounds one degree.

A food *portion* is 100 calories, that is, an amount of food which would, if burned, produce 100 calories of heat.

A *serving* is usually not more than one portion, but often less. The number of calories in an ordinary serving of food is shown in a table of food values in this booklet. In the case of mixed dishes it is of course necessary to determine the calorie content by calculation from the formula or recipe.

HOW MUCH SHOULD AN AVERAGE PERSON EAT?

	Calories
Average active man	2,500
Sedentary man	2,300
Hard working man	4,000
Average woman, housekeeper	2,200
Sedentary woman, teacher, typist	2,000
Nursing or expectant mother	2,500
Child two years old	1,000
Child of ten years	1,500
Boys and girls, 14-16	2,000

SIMPLE FORMULA FOR CALCULATING THE DAILY RATION FROM THE BODY WEIGHT

If the person's weight is approximately normal for his height (See Table), his daily ration may be determined by the following simple formula, which will give ⅓ gram (1⅓ calories) of protein per pound of body weight, an amount now generally conceded to be ample to meet physiologic requirements:

Protein, multiply body weight by 1⅓
Fat, multiply protein calories by ~~4~~
Carbohydrates, multiply fat calories by 2
Example: Body weight 150 pounds

Protein	(150 x 1⅓)	200 calories
Fat	(200 x 4)	800 calories
Carbohydrates	(800 x 2)	1,600 calories
Total		2,600 calories

For persons of average weight, the food requirement may be determined by multiplying the body weight in pounds by the number of calories which careful laboratory research has shown to be requisite, as follows for different ages:

Age	Calories per pound	Age	Calories per pound
Birth to 1 month	30	6 years	34–35
2 months	40	7 years	32–34
3 months	41	8–9 years	30–35
4–6 months	43	10–12 years	28–32
7–9 months	40	12–13 years	25–30
1–2 years	40	14–17 years	20–25
3–4 years	37–40	Adults	16–20
5 years	35–37		

To Balance the Diet for Iron

More than half the people of the United States are suffering from anemia. A sufficient cause for this condition is found in the fact that the average American diet is deficient in iron. The body loses daily of its precious store of 43 grains of iron, 250 thousandths of a grain (¼ gr.). At least this amount must be supplied by the daily food. In cases of anemia, the daily intake of iron should be very greatly increased to insure a rapid gain.

By the use of the table "The Iron Content of Foods" (see other side of sheet) the daily bill of fare may easily be balanced so as to insure any desired amount of iron. Proceed as follows:

1. Determine the amount of food, that is, the number of calories required. To do this, multiply the normal weight by 16. If a person's proper normal weight (that is, the weight for one of his height) is 150, his day's ration would be 2400 calories ($150 \times 16 = 2400$). (For normal weights, see table.) A person who is underweight should take more than the standard number of calories, and one who is overweight less.

2. Select from the table foods sufficient for three satisfactory meals, breakfast, dinner and supper, setting them down in a column and opposite, in separate columns, place the number of calories and the amount of iron contained in each portion selected, as in the following example:

	Ounces	Calories	Iron
Graham bread	5	370	55
Oatmeal	1 (dry)	113	17
Milk	24	480	24
Strawberries	4	44	12
Apples	5	90	5
Dates	3	300	48
Lentils	1	100	38
Potatoes	4	96	24
String beans	4	44	20
Spinach	4	64	56
Tomatoes	4	24	8
Cucumbers	2	10	4
Lettuce	2	12	6
Butter	3	654	3
		2401	320

In making up the list of foods from which the day's bills of fare, breakfast, dinner and supper are to be prepared, as many as possible are chosen from the food groups which are richest in iron. The foods in each group are arranged in order, according to their iron content.

Where care is taken to select the foods which contain the most iron, there will be no difficulty in arranging bills of fare which adequately meet the normal needs of the body.

In cases of anemia, in which it is desirable to very greatly increase the normal daily requirement, any required amount of iron may be easily made available by including in the bill of fare selections from the list of Battle Creek health foods rich in iron, and especially by the free use of SAVITA, SAL-SAVITA and FOOD-FERRIN. SAVITA and SAL-SAVITA are not only rich in iron but also extraordinarily rich in vitamin B, and hence may with great profit be added to the regular bill of fare of each member of the family, and especially growing children. FOOD-FERRIN renders extraordinary service in cases of anemia.

A little study of the table will readily show how greatly lacking in iron is the ordinary bill of fare, to say nothing of its other grave deficiencies. This is well illustrated in the following day's bill of fare, also selected from the table.

A Day's Ration Deficient in Iron

	Ounces	Calories	Iron
White bread	5	75	5
Rice	1	100	4
Milk	24	480	24
Cantaloup	8	88	8
Apples	5	90	5
Grapefruit	8	120	8
Trout	4	108	12
Potatoes	4	96	24
Tomato	4	24	8
Cauliflower	4	36	12
Eggplant	2	16	4
Green corn	3	87	9
Eggs	3 (2)	126	39
Cucumber	2	10	4
Lettuce	2	12	6
Cane sugar	2	200	0
Cream	2	110	2
Butter	3	654	3
		2432	177

Although the above day's bill of fare, or ration, supplies an ample amount of energy, the calorie content being adequate, the iron content is only two-thirds the amount required to make good the daily losses of an adult; yet many thousands of persons are subsisting upon a diet containing a still smaller amount of food iron. For example, a growing child fed upon bread and milk receives scarcely more than one-third the amount of iron which he requires, as both milk and white bread are very deficient in iron.

Savita, Sal-Savita and Food-Iron are precious resources for making good the iron deficiency of foods, and thus building up and maintaining a high quality of blood, rich in the hemoglobin that is necessary for good health and stamina, and high resistance to disease.

Foodstuffs which contain from 25 percent to 500 percent more food iron than beef or lean steak. Blood-building Foods

Foods Rich in Food Iron

	Thousandths of one grain of iron per oz.
Savita	1.185
Gluten, pure	.149
Gluten, 40 per cent	.060
Romaine	.052
Egg yolk	.038
Lentils, dried	.038
Wheat bran	.034
Molasses	.032
Beans, lima, dried	.031
Dock greens	.028
Red root greens	.028
Beans, soy	.025
Peas, dry	.025
Protose	.025
Egg (one)	.024
Egg yolk (one)	.023
Wheat, entire	.022
Mustard greens	.021
Malted nuts	.019
Hazelnuts	.018
Almonds	.017

stet

Foods Moderately Rich in Food Iron

	Thousandths of one grain of iron per oz.
Beef, lean	.017
Nuttolene	.017
Oatmeal	.017
Flour, graham	.016
Spinach	.016
Brose (Oatmeal, cornmeal, bran)	.014
Boston brown bread	.013
Corn, whole	.013
Corn, sweet, dried	.013
Dates	.013
Eggs	.013
Figs, dried	.013
Meat, tenderloin	.013
Olives	.013
Prunes	.013
Dandelion greens	.012
Maple syrup	.012
Pecans	.011
Endive	.011
Graham bread	.011
Zante currants	.011
Whole wheat flour	.011
Chard	.010
Beef, medium fat	.010
Flour, entire rye	.010
Turnip tops	.010
Raisins	.009
Walnuts	.009
Brown rice	.009
Malt sugar	.007
Molasses	.007

The Iron Content of Foods

The accompanying figures indicate the number of thousandths grains of iron in one ounce of food. The body requires daily at least one-fourth (250 thousandths) of a grain. The white figures on black ground indicate the average for each group. (See last section.)

LEGUMES

31

	Calories	Iron		Calories	Iron
Lentils	100	38	Beans	100	31
Garbanzos	100	31	Peas	101	25

WHOLE GRAIN CEREALS

23

	Calories	Iron		Calories	Iron
Rye bran	85	61	Oatmeal	113	17
Wheat bran	70	34	Corn (dried)	109	13
Wheat	100	22	Graham bread	74	11
Rye	100	18	Rice (brown)	100	9

GREENS

14

	Calories	Iron		Calories	Iron
Dock	17	28	Chard	11	11
Red root	17	28	Turnip tops	17	10
Mustard	17	21	Cabbage	9	5
Spinach (cooked)	16	14	Brussels sprouts	6	5
Dandelion	17	12	Lettuce	6	3

NUTS AND DRIED FRUITS

12

	Calories	Iron		Calories	Iron
Hazel nuts	95	18	Pecans	208	11
Almonds	183	17	Zante currants	90	11
Dates	100	16	Raisins	90	9
Figs (dried)	90	13	Walnuts	200	9
Prunes	86	13	Peanuts	155	9
Hickory nuts	202	13	Chestnuts	114	5

MEATS AND EGGS

8

	Calories	Iron		Calories	Iron
Oysters	14	21	Pork chop	96	11
Chicken	31	14	Mutton	96	10
Steak (round)	54	13	Trout	27	3
Eggs	42	13	Herring	40	3
Liver	36	13	Halibut	29	3
Tenderloin	81	11	Codfish	20	2

DENATURED CEREALS

4

	Calories	Iron		Calories	Iron
Pearled barley	100	9	Hominy	100	4
Wheat flour (fine)	100	7	Corn flakes	100	4
White bread	75	5	Polished rice	100	4
Macaroni	102	5	Rice flakes	100	4
Corn bread	74	4	Cornstarch	102	0

FRESH VEGETABLES

3.7

	Calories	Iron		Calories	Iron
Green peas	21	7	Kohl-rabi	9	3
Potatoes	24	6	Parsnips	18	3
Carrots	13	6	Onions	14	3
Asparagus	6	6	Cucumber	5	2
String beans	11	5	Turnips	11	2
Green corn	29	3	Sweet potato	35	2
Beets	13	3	Eggplant	8	2
Cauliflower	9	3	Tomato	6	2
Pumpkin		3	Celery		2

FRESH FRUITS

2

	Calories	Iron		Calories	Iron
Blueberries	21	4	Plums	24	2
Strawberries	11	3	Grapes	27	1
Bananas	28	3	Pears	18	1
Blackberries	17	3	Grapefruit	15	1
Raspberries	19	3	Cantaloup	11	1
Cranberries	13	3	Apples	18	1
Cherries	22	2	Peaches	12	1
Currants	16	2	Oranges	15	1

DAIRY PRODUCTS

2

	Calories	Iron		Calories	Iron
Cheese	125	6	Butter	218	1
Cottage cheese	31	4	Cream	55	1
Milk	20	1	Buttermilk	10	1

Battle Creek Health Foods Rich in Iron

50

	Calories	Iron		Calories	Iron		Calories	Iron
80% Gluten Bis.	100	150	40% Gluten meal	100	60	Malt Sugar	104	22
Soy Bis.	100	70	Fig bran	50	34	Malted Nuts	150	19
40% Gluten Bis.	100	60	Protose	70	25	Malt Honey	86	17

Savita 500 **Food-Ferrin 750** **Sal-Savita 735**

BONE BUILDING FOODS

Foods Rich in Food Lime

	Grains of lime per oz.
Cheese	5.70
Yogurt cheese	4.28
Cottage cheese	4.18
Red root	3.24
Mustard greens	3.01
Linseed meal	2.53
Turnip tops	2.13
Soy beans	2.00
Lamb's quarters	1.90
Condensed milk	1.84
Hazelnuts	1.76
Cottonseed meal	1.62
Almonds	1.46
Molasses	1.30
Milk, sheep's	1.27
Mountain spinach	1.27
Savita	1.21
Watercress	1.15
Pure gluten	1.03
Dock greens	1.03
Figs, dry	0.99
Beans	0.98
Chard	0.92

	Grains of lime per oz.
Savita	1.23
Milk, camel's	0.88
Purslane	0.88
Egg yolk	0.84
Boston brown bread	0.79
Milk, goat's	0.78
Sour milk	0.75
Cauliflower	0.75
Milk, skimmed	0.75
Olives, Ripe	0.75
Bran, wheat	0.74
Milk, whole	0.74
Egg, one	0.71
Lentils, dry	0.66
Maple syrup	0.66
Cabbage greens	0.65
Buttermilk	0.64
Dandelion greens	0.64
Endive	0.64
Cow peas	0.61
New Zealand spinach	0.48
Wheat germ	0.44
Spinach	0.41

8

The Digestive Time Table

Four hours from the time the breakfast is eaten the unused residue has reached the ileocecal valve. The reflex peristalsis set up by taking dinner pushes the residue through the valve and by the middle of the afternoon, it reaches the transverse colon. The gastrocolic or eating reflex caused by eating supper, gives the residue a vigorous push forward which should bring it to the lower colon ready for evacuation before retiring instead of being left to ferment and decay in the colon for two days or more, thus, uselessly burdening the body with noxious products, and causing colitis, hemorrhoids and many local and general inconveniences.

Savages, healthy children and athletes move their bowels three times a day or oftener. The large apes evacuate four to six times daily. One bowel movement daily is chronic constipation and involves retention of putrefying wastes fifty or sixty hours or more (Hurst) and the accumulation in the colon of the residues of half a dozen meals or even ten to twelve, instead of two or three, the normal order.

Many persons are able to establish the three-a-day elimination rhythm by simply giving the bowels a chance to move by visiting the toilet regularly soon after each meal and on going to bed and on rising. Not infrequently, a fourth evacuation is advantageously secured.

DIGESTIBILITY OF FOODSTUFFS AND TIME REQUIRED FOR THEIR DIGESTION

bulkage

Both the digestibility of foodstuffs and the time required for their digestion depend much upon the condition and the manner in which they are eaten and the quantity of material taken at one time. The amount ~~of material~~ absorbed from the digested food depends largely upon the amount of cellulose or ~~roughage~~ present. ~~Indigestible material~~ hastens the foodstuffs along the alimentary tract and thus lessens the amount absorbed. The amount of food ~~material~~ lost in this manner, however, is of little consequence compared with the importance of the prompt dismissal of unusable food residues, for the accomplishment of which a considerable amount of ~~roughage~~ is highly essential. Even in the case of foods which contain considerable cellulose, such as legumes, nuts and some fruits, digestion and absorption ~~are~~ satisfactorily performed provided the foodstuffs are thoroughly chewed ~~or well~~ comminuted ~~before~~ being eaten.

bulkage

Bulkage

The following table shows the degree of digestibility of various foodstuffs as determined by various authorities (Tibbles):

Source of Nutriment	Protein Digested Per cent.	Protein ~~Calories~~ Per ounce	Carbohydrate Digested Per cent.	Carbohydrate ~~Calories~~ Per ounce	Fat Digested Per cent.	Fat ~~Calories~~ Per ounce
Foods in mixed diet	92	114.00	97	114	95	253.0
Animal foods in mixed diet	97	121.00	98	108	95	253.0
Vegetable foods in mixed diet	84	90.00	97	114	90	237.5
Meat and fish	97	121.25	98	108	95	252.5
Eggs	97	123.75	98	108	95	255.6
Milk, cheese and other dairy products	97	121.25	98	108	95	250.0
Cereals & sugar	85	109.37	98	116	90	237.5
Legumes, dried	78	97.00	97	115	90	237.5
Fruits	85	95.00	90	102	90	237.5
Vegetables	83	88.00	95	113	90	237.5

The Time Required for Gastric Digestion.

Within recent years numerous observers have renewed the study of the time required for gastric digestion by the aid of modern methods of research. The following table (Tibbles) shows the results of the most recent and reliable investigations:

Kind of Food	Quantity of Food	Time in which the Food left the Stomach
Beef	3½ ounces of raw beef	2 hours
	" of half-boiled beef	2½ "
	" of boiled beef	3 "
	" of half-roasted beef	3 "
	" of roasted beef	4 "
Mutton	3½ " of raw mutton	2 "
	" of half-boiled mutton	2½ "
	" of boiled mutton	3 "
	" of half-roasted mutton	3 "
	" of roasted mutton	4 "
Veal	3½ " of raw veal	2½ "
	" of boiled veal	3¾ "
	" of roasted veal	5 "
Pork	3½ " of raw pork	3 "
	" of boiled pork	4½ "
	" of roast pork	6 "
Sweetbread	9½ " of cooked sweetbread	2¾ "
Chicken	8¼ " of cooked chicken	3 to 4 hours
Ham	6 " of boiled ham	3 to 4 "
Tongue	9 " of smoked tongue	4 to 5 "
Goose	9 " of roast goose	4 to 5 "
Fish	7½ " of salt fish	4 "
	7½ " of fresh fish	2½ "
Oysters	10 raw oysters	2½ to 3 "
Eggs	2 lightly boiled eggs	1¾ "
	2 raw eggs	2¼ "
	2 poached eggs + 5 grammes of butter	2½ "
	2 hard-boiled eggs	3 "
	2 eggs in omelet	3 "
Milk	½ pint of raw milk	4 "
	" of boiled milk	3 "
	1 " of raw milk	3½ "
	1 " of skimmed milk	3½ "
	1 " of sour milk	3 "
	1 " of boiled milk	4 "
Bread	2½ ounces of white bread	2 "
	5⅓ " of white bread	3 "
	5⅓ " of brown bread	4 "
Rice	5½ " of boiled rice	3½ "
Barley	2½ " " barley	3½ "
Tapioca	1⅔ " " tapioca	2¾ "
Lentils	5⅓ " " lentils, mashed	4 "
Dried peas	7½ " " peas or beans	4½ "
French beans	7½ " " beans	4½ "
Potatoes	5⅓ " " potato	2 to 2½ "
Carrots	5⅓ " " carrots	3½ "
Cabbage	5⅓ " " cabbage	4 "
Cauliflower	5⅓ " " cauliflower	2¼ to 3 "
Spinach	5⅓ " " spinach	3 "
Radishes	5⅓ " of raw radishes	4 "
Apples	5⅓ " of ripe apples	3¼ "
	5⅓ " of unripe apples	4 to 6 "
Cherries	3½ " of ripe cherries	2 to 3 "

In the use of the above table, it should be remembered that the times given relate wholly to gastric digestion. The time required for the total digestion and absorption of the average meal and the transmission of the indigestible residues into the colon, is eight hours. The digestibility of foodstuffs and the time required for digestion are now known to be of much less importance than formerly supposed. Some of the most unwholesome foods are digested the most quickly. That the bill of fare shall be sufficient in amount and properly balanced and of such character as to maintain a normal non-putrefactive flora in the intestine are the matters of primary consequence.

The Nephropathic Effect in Man of a Diet High in Beef Muscle and Liver

BY

L. H. NEWBURGH
PROFESSOR OF MEDICINE

MARK FALCON-LESSES

AND

MARGARET W. JOHNSTON
ANN ARBOR, MICH.

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THE NEPHROPATHIC EFFECT IN MAN OF A DIET HIGH IN BEEF MUSCLE AND LIVER.*

BY L. H. NEWBURGH,
PROFESSOR OF MEDICINE,
MARK FALCON-LESSES,
AND
MARGARET W. JOHNSTON,
ANN ARBOR, MICH.

(From the Department of Internal Medicine, Medical School, University of Michigan)

IN a recent publication[1] we showed that rats that lived on diets high in animal tissues (muscle and liver) gradually developed chronic sclerosing kidney disease. While it is generally believed that such results have a bearing on disease in man, any conclusions regarding him formed on the basis of such indirect evidence, are open to doubt. It is accordingly highly desirable to record the response to diets of this type in man himself.

We have had the opportunity of obtaining this information. The subject, a member of the laboratory staff, was an apparently normal man, aged thirty-two years.

During a preliminary period of thirty-five days he took a diet containing less than 100 gm. of protein daily, of which roughly 50 gm. were of animal origin.

During this time several careful physical examinations revealed no abnormalities. The blood pressure in the basal state was 110 mm. systolic and 80 mm. diastolic. The nonprotein nitrogen of the blood was 31 mg. per cent. Three untimed fresh specimens of urine were tested for albumin by boiling and acidulating, with negative results; and for casts, of which a few were seen in one sample but none were noted in the two other specimens.

Addis[2] has shown that a few casts are usually present in the urine of normal persons and has emphasized the desirability of recording

* The expenses of this investigation were defrayed in part by a fund for the study of nutrition created by Mr. W. K. Kellogg of the Kellogg Corn Flake Company, Battle Creek, Michigan.

the number of casts voided in a unit of time as a criterion of the state of the kidneys. Three specimens were examined according to Addis' method. The subject saved all the urine from bedtime until 8 o'clock the next morning. None of the specimens contained enough albumin to be detectable by the usual clinical methods. The cast counts were respectively 49, 48 and 52 per hour. The urines were acid. Addis made 82 examinations of the night urines collected for twelve hours by 74 medical students. No casts were seen in 29 instances. The highest count gave 356 casts per hour and the average for the whole series was 87 casts per hour.

During the next six months, from April 10 to October 21, 1928, our subject received a diet specially prepared for him under the direction of Miss M. M. Harrington. Its composition according to the figures found in the standard food tables was as follows:

Protein	338 gm.
Fat	271 gm.
Carbohydrate	96 gm.

The calory value was 4177. Of the protein, 327 gm. were of animal origin and were contained in the following foods:

	Amount eaten.	Protein.
Fresh beef liver	about 400 gm.	80 gm.
Fresh veal round	about 300 gm.	60 gm.
Fresh beef tenderloin	about 700 gm.	164 gm.
Dried beef	about 100 gm.	33 gm.
		337 gm.

About one-quarter of the protein was contained in the liver.

In addition to these meats, the diet contained an adequate supply of vitamins and inorganic constituents in the form of butter, green vegetables and citrus fruits. Only 31 per cent of the calories of the diet were contained in the animal protein.

This diet caused no subjective disturbances. The retinæ remained normal. Of special interest is the fact that the blood pressure was unaffected by the diet.

The urine was examined twenty-five times during these six months. Albumin made its appearance for the first time after the subject had been on the diet for six weeks. Henceforth there was a gradual increase in the cloud caused by boiling and acidulating the filtered urine. However, the albuminuria was not great enough to permit its measurement by the sulphosalicylic acid method[3] until the sixth month, when the subject was excreting 2 to 4 mg. of protein per hour.

The cast counts are contained in Table I. It will be seen that the counts during the first seven weeks (April 17 to June 5) were within the normal range based on Addis' experience. After that, the counts were definitely in the pathologic field. During the former period the highest count was 413 and the average of the seven counts was 216. Whereas during the final six weeks, the highest count was 3540 and the average of the ten counts was 1283, which is fifteen times the average obtained by Addis in controls.

TABLE I.—INCREASE IN CYLINDRURIA FROM HIGH MEAT DIET.

Date.	Casts per hour.	Date.	Casts per hour.
April 17	177	July 11	1109
April 19	84	July 11	1735
May 9	232	July 19	1856
May 17	104	September 9	400
May 23	413	September 12	1895
May 29	360	October 1	0
June 5	142	October 8	952
June 12	1053	October 10	2048
June 19	1083	October 11	3540
June 26	601	October 17	0
June 29	1680	October 20	1500
July 10	974	October 22	2500

In addition, a change in the appearance of the casts took place as time went on. In the early weeks they were hyalin. Gradually more and more granular casts were seen. During the last weeks some of the casts were cellular and the hyalin variety was in the minority.

The urines were always acid, with a pH that was close to 5. The specific gravity varied from 1022 to 1027.

In order to make certain that the counts were not influenced by the desire of the observer, the following procedure was carried out during the last month. An associate prepared the urine from the subject and from himself and other controls, in the absence of the observer. The latter then made counts of specimens whose identity were unknown to him. In the urines of the controls he found 0, 20, 30, 197 and 213* casts per hour.

The high meat diet was discontinued on October 22. Thereafter the subject followed his own choice. He avoided meat and preferred carbohydrate. The urine examinations made after the change in diet are recorded in Table II. Recovery was complete in ten days.

The evidence reported makes it clear that a diet of which 31 per cent of the energy was contained in beef proteins caused a slowly increasing albuminuria and cylindruria† in our human subject. The continued excretion of these urinary abnormalities in note-

* From an individual who was suffering from acute rhinitis at the time.

† In this connection, it is interesting to note that a chronic nephritic under our care at this time, with hypertension, nitrogen retention, retinitis and inability to raise the specific gravity of the urine above 1012, had an hourly excretion rate of only 5 mg. albumin and 5000 casts.

worthy amounts indicates that the kidneys were being harmed by the diet.

TABLE II.—RECOVERY FROM HIGH MEAT DIET.

Date.	Albumin.	Casts.	Reaction.
October 24	Trace	1778	Acid
October 26	V.S.T.	980	Acid
October 27	S.P.T.	690	Acid
October 28	S.T.	140	Acid
November 2	0	0	Acid

When comparison is made between man and the white rat it must be remembered that the life span of the former is twenty times that of the latter and, therefore, six months in the life of a man corresponds to less than two weeks in that of the rat.

We have fed a group of 7 rats a diet 33 per cent of whose calories were contained in the proteins of beef muscle. The urines were examined for the first time when the animals had been taking this diet for more than one month. There was no increase over the usual trivial albuminuria found in normal rats. No casts were seen in 6 of the specimens. The seventh contained a few. Our experience with a similar type of diet, except that beef liver replaced the beef muscle, was the same.

A diet capable of producing a pathologic urine in a man was without detectable effect on the urine of the white rat. The kidneys of a man appear to be more easily injured than are those of the white rat by diets high in animal tissues.

TABLE III.—TOTAL URINE NITROGEN AND SOME OF ITS FRACTIONS FOR TWENTY-FOUR-HOUR PERIODS WHILE SUBJECT WAS EATING HIGH MEAT DIET.

Date.	Total N.	Uric acid.	Amino-acid N.	Creatinin.
July 24	57.0	1.16	0.48	2.54
July 25	57.5	1.84	0.43	2.37
July 26	60.5	1.91	0.46	2.80
August 13	54.2	1.77	0.43	2.98
August 14	51.5	2.46	0.37	2.72
August 15	55.0	1.99	0.44	2.70
October 15	45.3	1.54	0.44	2.19
October 18	54.9	1.97	0.57	2.50

Total N determined by Kjeldahl method.
Uric acid by Morris and McLeod method.
Amino acid N and creatinin by Folin methods.

There are in the literature a number of papers purporting to prove that an exclusive meat diet is not harmful to the kidneys of man. These reports, as a rule, deal with the life of the Eskimos and are stated in such general terms that they are of questionable scientific value.

Recently, however, Thomas[4] succeeded in gathering some concrete information regarding 142 middle-aged Greenland Eskimos who had always lived on a carnivorous diet. He found albuminuria in 12 persons (8.5 per cent), excluding those that had pyuria; 9 (6 per cent) had hypertension. From these figures, he draws the surprising conclusion that "There is no unusual prevalence of vascular or renal disease" among these people. The examination of 16,662 men, policyholders of the Metropolitan Life Insurance Company,[5] revealed definite albuminuria in only 2.5 per cent of the group. The rate for men between the ages of forty-five to fifty-four years was 2.5 per cent; only 0.9 per cent showed a marked amount of albumin.

TABLE IV.—NITROGEN VALUES IN THE BLOOD DURING HIGH MEAT PERIOD.

Date.	N.P.N., mg. per cent.	Urea N., mg. per cent.	Uric acid, mg. per cent.	Amino-acid N., mg. per cent.
July 25	55.8	34.4	3.23	6.7
August 14	49.3	31.8	3.10	6.55
October 17	42.9	24.6	2.06	6.29
October 22	49.2	32.4	2.87	6.66
TWENTY-FOUR HOURS AFTER RETURN TO NORMAL DIET.				
October 23	35.4	16.8	2.45	6.8

All determinations except uric acid by Folin methods: uric acid by Morris and McLeod method.

The blood samples were taken before breakfast in the morning. The subject had a meat sandwich at bedtime.

Furthermore, it should be pointed out that the response of the Eskimos to their diet does not necessarily furnish a measure of the effect of a similar diet upon men living in the temperate zone. The present Eskimos are presumably the product of adaptation, working through many generations, to the only possible food supply. The history of the white race has been different.

Recently, Lieb[6] has reported the failure to obtain evidence of renal impairment in the case of two arctic explorers who lived for twelve months on an "exclusive meat diet." The average composition of this diet was, in fact, such that 80 per cent of its energy was in the form of fat. Only 100 to 140 gm. of protein were eaten daily. To enhance the fat content of the meat, these subjects partook freely of suet and bone marrow. The persistent ketonuria[7] emphasizes that the chief characteristic of this diet was its abnormally high content in fat. It is important to draw a distinction between the connotation of the word "meat" as ordinarily understood, and that given it by these writers. Since the protein content of this diet is not far different from that habitually eaten by large classes of our population, one would scarcely expect to find marked evidence of kidney disease in the period of one year. Those who suspect that the discovery of chronic nephritis in middle life is evidence that such a diet is harmful, believe that a great many years have been required to produce a recognizable injury. On the other hand, had these observers attempted to count the urinary casts, some evidence of abnormality might have been found.

In contrast to the negative character of the observations of Lieb and Tolstoi is the fact that our subject voided an abnormal urine within a few months after he had begun to live on a diet about half of which consisted of meat in the ordinary sense of the word.

Summary and Conclusions. A human subject, whose urine contained no albumin and less than the average number of casts found in normal men by Addis, lived for six months on a diet in which one-third of the calories were contained in beef proteins. As a result, he developed a significant albuminuria and a twenty-fold increase in casts.

Our earlier work has shown that it takes a longer time, relatively, to produce abnormal urine in the white rat by similar diets. Hence results obtained by means of the rat in this field are directly transferable to man.

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STUDIES IN

THE DIET OF THE KOREAN PEOPLE

By J. D. VanBuskirk, M.D.

Severance Union Medical College,

Research Department,

Seoul, Korea.

Article Number 14.

STUDIES IN THE DIET OF THE KOREAN PEOPLE.*

J. D. VANBUSKIRK, M.D.

Great progress has been made in the study of dietetics and nutrition in the homelands, and this has proven of great practical value. The diet of the Oriental peoples is so different, that we who are here ought to supplement the work of those in the West. A great diet experiment is being carried on by the millions of the Orient, whole races are affected by the results; and we ought to learn many things from careful studies in these diets and their effects upon the people, effects upon their physical and mental efficiency. And we ought to be able to help them in very vital ways after our studies.

This paper is only a report of preliminary investigations as to the amounts and kinds of food eaten by the Koreans, and an attempt to estimate its nutritional value. It is, frankly, only a beginning; further studies are necessary to find its effects upon their physiological processes, the physical and psychical efficiency of the race.

The author has been especially dependent upon Oshima's "Digest of Japanese Investigations on the Nutrition of Man"; Atwater and Bryant's "American Food Materials"; Gephart and Lusk's "Analysis and Cost of Ready-to-serve Food"; McCay's "The Protein Element in Nutrition" and other memoirs from the Government of India; and McCollum's "Newer Knowledge of Nutrition." He has also made use of the ordinary textbooks and the current magazines as available.

KOREAN METHODS OF PREPARING FOODS.

Cereals.

Rice (*pap*) is cooked in a kettle with enough water to cover it, over a quick fire of brush or straw; it is allowed to stand covered for a time after boiling, so the process is mainly one of steaming. It absorbs about twice its weight of water, so that cooked rice is considered equal to about 1/3 its weight of dry rice. Millet is often mixed with rice and cooked as above.

Barley (*pori-pap*) is cooked in the same way, but takes so much more fuel that the Koreans say it is no cheaper than pure rice.

Millet (*cho-pap*) is cooked the same way. The whole grain is used, so it contains more "fat-soluble vitamine" (this may in part account for the larger size of the northern Koreans).

* Severance Union Medical College, Research Dept., Art. No. 14.

Rice and Peas or Beans (*pat-pap* or *kong-pap*) are often mixed, usually not more than 1/3 peas or beans; it takes longer cooking and in the ordinary Korean home the peas and beans are not well-cooked. The mixture is not so easily digested as pure rice, but it is quite a satisfactory food if well-cooked. Soy beans are sometimes used in this mixture, though none of the samples analyzed contained them.

Gruels (*chook* or *mi-um*) are often made of rice and barley. '*Mi-um*' is thinner and is a common food for the sick and is given to infants.

Steamed Bread (*dawk*) is made by taking hulled glutinous rice tied up in a bag and soaked in water for a time, then steamed over boiling water—or rice flour may be made into a dough and steamed, this is easier but not quite so good—it takes from ½ to 1 hour steaming and is generally allowed to stand over the hot water for another half hour or so. After this, it is taken out and kneaded on a flat stone or heavy slab of wood and beaten with a heavy mallet; it is then made into cakes—dumplings—and eaten; it is quite tough and very apt to cause indigestion; it is not ordinarily eaten at regular meals but is prominent at feasts.

Dumplings (*wul-pyung*) are made of wheat flour, often rolled out and chopped meat then folded into the dumplings; they are then cooked in a soup. They are eaten at feasts.

Vermicelli (*kook-soo*) is made from buckwheat generally, though a poorer quality is made from wheat flour. The dough is forced through holes in the bottom of a press and the strings are allowed to fall into boiling water; after cooking they are scooped out of the water; the vermicelli is generally served in a soup, either meat or vegetable.

Bean and Pea Foods.

Bean Curd (*tu-bu*) is the equivalent of the Japanese 'tofu.' It is made by grinding soy beans after they have been soaked and cooked, a large amount of water is used to grind them; the liquid is then strained through a cloth and to the liquid is added 'concentrated mother liquid' from sea-water to precipitate the proteins, the liquid part is decanted off and the curd is pressed into cakes, very tender and soft—this is the '*tu-bu*.' The bean residue is also sometimes eaten, it is called '*pi-chi*.' The bean curd is not generally eaten without further preparation: it is commonly added to soups and stews, and often made into omelets with eggs; another palatable food is made by cooking the bean curd for a short time in bean sauce (*chang*) and serving this with sesame oil, pepper and onions, it is called '*tu-bu-*

cho-rim'; bean curd may be eaten without further cooking, served in sauce.

Pea Curd (*mook*) is similar in composition but quite different in preparation. Peas are soaked in water till the hulls can easily be removed, they are then ground in a mill with water to keep all wet and liquid, the suspension is strained through a coarse sieve, the liquid then stands to allow the fine particles to settle, the supernatant liquid is decanted off and thrown away, the sediment is collected and boiled for a time, this coagulates the protein, and when cool it is a jellylike mass. It is generally cut up and served with bean sauce and red pepper sesame seed. The pea residue is also eaten and is called '*pi-chi*,' like the bean residue.

Bean Sauce (*kan-chang*) is somewhat like the Japanese '*sho-yu*' but is much more salt and not sweetened. Soy beans are thoroughly boiled, then mashed and made into cakes and partially dried, the cakes are stored for months and allowed to mold and slowly ferment; when ripe they are broken up and soaked in salt water for a long time, then strained (the solid part left is dried and is also used as a condiment), the liquid is boiled and the coagulated scum is removed frequently; when sufficiently concentrated, the liquid sauce is cooled and stored. This is the indispensable condiment for Koreans.

Another bean sauce (*ko-cho-chang*) is made by taking about equal parts of the bean cakes, after fermenting, and rice and salt, with a large amount of red pepper; this is soaked in a small amount of water till ripe. This too is very important as a condiment.

"*Kong-cha-ban*" is made by boiling beans in the bean sauce; they do not swell, but are hard, brittle and very salt. Sugar and sesame oil may be added when serving them.

Sprouted Beans (*kong-na-mul*) are very common; the beans are soaked in water and allowed to sprout; when the sprouts are quite long, both beans and sprouts are boiled and served—sauce is generally added.

Pea Pancakes (*nok-tu-chun-pyun*) are made by soaking the peas in water for 12 to 24 hours to soften and remove the hulls, they are then ground up while wet, and the pasty mass is the batter; salt is added and often thin slices of vegetables are put in; it is fried like pancakes. Flour may be added to the pea batter.

Soups and Stews (*kook* or *chi-jim*), a variety of vegetables are boiled and flavored to suit, with bean sauce and red pepper, a small piece of meat or fish is commonly added for flavor. Turnips, carrots, cabbage and onions are the common vegetables used. Bean curd is often added to these soups. The amount of meat in these soups is generally quite small. Meat soups are common though fish, beef, pork and poultry are used. Vegetables are added to the meat soups too. '*Chi-jim*' corresponds more to a stew, more food and less water.

'*Kim-chi*' is somewhat similar to "sauer-kraut." Cabbage is washed and cut up and put into jars with salt and allowed to ferment. Red pepper is always added in large amounts, and often ginger, shrimp and fish for flavor. Bean sauce is sometimes added when served. '*Kim-chi*' or one of its substitutes is the essential relish at all Korean meals. Turnips are often salted down in the same way as cabbage; this is called "*ka-ktu-ki*."

'*Chang-et-chi*' is made by soaking turnips, onions, cucumbers, cabbage, etc., in bean sauce until ripe; it is a '*kim-chi*' substitute.

'*Tong-chim*' is made by soaking turnips in water until they began to ferment; add red pepper and onions; when ripe take out the turnips and slice them, and serve in the water in which they were fermented.

Greens are quite common foods. Many kinds of leaves are used so.

Potatoes are used in place of rice in some mountainous districts, but are not ordinarily of much importance in the diet of Koreans.

Sweet Potatoes are coming into use, boiled and baked.

CHESTNUTS and NUTS are eaten as such, the chestnuts commonly roasted.

DATES are often added to other foods, e.g., mixed with dough and made into bread.

Animal Foods.

EGGS are eaten raw and boiled, generally hard-boiled. But OMELETS (*Chi-kai*) are more common. Vegetable slices, or minced meat, or small pieces of bean curd are mixed with the eggs; this is then cooked in a small dish over the rice. Red pepper is sprinkled over the top when served.

BEEF is often served in soups or stews, but there are common methods besides these. '*Chang-cho-rim*' is made by boiling beef in water for a time, then boiling it in bean sauce—the bean sauce may be added to the water. Sesame oil is generally sprinkled over the meat when served. '*Naw-bui-an-i*' is small pieces of beef broiled over a charcoal fire, and sprinkled with sugar, red pepper and sesame seeds when served. '*Koi-ki-san-suck*' is made by taking small slices of beef and piercing each slice with a spit, alternating pieces of meat with onions or other vegetable, then when the spit is full, it is broiled

Fish, Fresh.	Fish, Dry and Salt.	Beef and Pork.	Eggs.	Fruits.	Miscellaneous.	Total Bulk of Foods.	Water.	Animal Protein.	Total Protein.	Lipins.	Carbohydrates.	Total Calories.	Fat-sol. vitamine.	Number.
11	1		2		32	2914	723	11	91	20	412	2253	AA	8
43	14	17				2371	926	26	87	14	376	2030	AA	9
9			89		47	1852	913	14	76	10	360	1846	AA	10
173						3240	491	35	130	25	508	2856	AA	11
4		32			185	2503	480	34	99	19	402	2338	AA	12
42		13			5	2192	910	21	86	15	377	2066	A	13
64	6	27				3158	863	28	103	23	537	2837	AA	14
	3				63	3511	1523	6	99	11	697	3359	AA	15
39	18					2906	955	23	103	18	470	2515	AAA	16
1	2	8				2486	540	6	74	10	453	2256	A	17
6	18				10	2970	982	7	91	16	476	2473	A	18
66	3	5				1695	848	17	71	6	348	1774	A	19
1		2	8		3	2956	519	6	89	11	554	2740	AA	20
8		9			4	3241	562	10	95	13	568	2839	A	21
47	7	26			22	3022	1157	20	91	21	432	2343	A	22
34	10			9	29	2366	985	18	85	13	403	2162	A	23
21	16	14			12	2600	454	18	85	12	515	2610	A	24
30	40	3		11	47	2437	818	24	69	15	412	2211	A	25
	11	17		5	16	2607		13	94	19	406	2227	AA	26
20	15		2		11	2355	403	13	81	12	434	2223	AA	27
12	25	5			73	2248	565	13	78	9	444	2226	A	28
16	20	1			71	2522	601	21	88	18	434	2299	AA	29
12	8				28	2529	758	8	93	9	522	2608	AA	30
								16	89	15	454	2366		

Fat soluble vitamine. A=poor. AA=questionable, AAA=probably good.

As for inorganic salts, no analyses have been made, but it would seem probable that there is no marked deficiency, the vegetable and leafy foods forming a good part of the diet. It is important that determinations be made to see as to the sufficiency of these substances. The presumption is that there is no deficiency in the "water-soluble vitamine," no cases of beriberi occurring among those reporting, or others eating the same diets. An inspection of the lists leads one to infer that, at best, the amount of the "fat-soluble vitamine" is questionable as to its sufficiency, and in many cases is clearly deficient. Basing the estimates upon the reports of McCollum, and Osborne and Mendel, and others, as to the foods that contain "fat-soluble vitamine," the table shows an attempt to estimate the probable content of the diet in this important substance.

Nitrogen of Urine and Protein of Diet.

It has not been possible so far in these investigations to get urinalyses and diet reports at exactly the same times, but the analyses reported here were all of the men on their ordinary diet, the same as that reported by them. So, while there is considerable variation in the amount of N in the urine and it often differs from that reported in the diet of the individual, the averages seem to be fairly comparable. The Nitrogen of the urine accounts for about seventy-five per cent of that of the diet, when the averages are taken. Taking account of the amounts of animal protein and the bulk of the diets, the amount of probable Nitrogen absorption was estimated; this was done independently and compared with the urinary nitrogen afterward. If we follow McCay in estimating 1 gram of absorbed N eliminated in the feces, the agreement is nearly exact—11.86 and 12 grams.

Nitrogen of Urine and Protein of Diet.

Diet No.	Total Cal.	Total Protein	Animal Protein	Estimated N Absorption	N of Urine	Protein Equivalent
9	2,080	86.9	33.4	12.1	8.346	52.1
10	1,846	66.9	8.6	8.8	12.368	77.3
11	2,856	130.6	58.5	17.6	8.243	51.5
12	2,338	99.3	42.9	14.0	10.931	68.3
13	2,066	86.4	15.6	12.0	8.650	54.6
15	3,359	99.5	8.2	13.3	12.663	79.1
16	2,514	102.8	28.1	11.5	11.631	72.6
17	2,256	73.9	7.0	9.0	6.361	39.7
23	2,162	85.0	22.7	12.0	14.881	93.2
24	2,610	89.6	19.1	11.8	13.582	84.8
25	2,211	69.7	17.0	10.0	10.584	66.1
28	2,226	78.4	13.1	10.8	12.080	75.5
Ave.	2,377	89.0	22.8	12.0	10.860	67.9

Average Nitrogen of Urine—76% of Average Nitrogen of Diet.

Discussion.

The young men furnishing these diet lists were all in good health apparently, their body weights averaged about 55 kilograms. Their diets furnished about 43 Calories per kilo of body weight, this agrees very closely with the standard estimates of food requirements for men at their age and occupations, and would seem to be sufficient, in spite of the loss due to bulk and poor absorption.

Their diets furnished about 90 grams of protein a day (14.4 N). This is about 1.6 grams of protein per kilo of body weight. But the N equivalent of only 1.2 grams is found in the urine. However, even the latter amount would be the equivalent of over 80 grams protein a day for a man of 70 kilos. This is more than is considered necessary by advocates of a low-protein diet, for such occupations and body weight, but it is less than the older accepted standards. It would be easy to say that the reduction in available protein is the cause of the low efficiency of the Korean people—it may be a factor but it appears more probable that if a deficiency of protein is a factor at all, it is rather a poor quality of protein than an inadequate amount. Tests as to the relative efficiency of Koreans and Westerners have never been made, but there can be little doubt as to the fact of their being less efficient. Climate, religions, social and political conditions have undoubtedly been factors in this low efficiency. It is clear that the "high-protein-diet" Occidentals are more vigorous than the "low-protein-diet" Orientals. The 'specific dynamic action' of protein is well known, and we can reason that lowering the available amount of protein results in a slower rate of metabolism and less vigor and lower efficiency. But improving the quality of the protein and reducing the bulk of the food might correct this without any increase in the amount of protein. McCollum especially emphasizes the value of milk and the ill-effects of its limited use. This is not only due to the "fat-soluble A" but to the superior quality of milk proteins. There is clearly a deficiency in the amount of "fat-soluble vitamine" in the Korean diet, and this must have a great effect upon the people. Huntington and others have shown quite conclusively the great effects of climate upon races, and applying such findings to Korea indicates a marked reduction in the efficiency of the Korean people on this account, as the author has shown in another paper. It seems clear to the author that dietetic deficiencies are important factors in the low efficiency of the Korean people, but he is not ready to attribute it to the low protein content of the diet. Fuller and more careful investigations are necessary before any attempt can be made to assess the effects of the various factors.

Only two of the dormitories reporting were under the observation of our staff, those furnishing lists 5, 6 and 7. The girls in one of the dormitories were not in the best physical condition, and there was an appalling amount of tuberculosis developing among them; overcrowding and poor heating are causative factors, but it seems that diet deficiencies were also important causes. The other dormitory had been on a similar diet but better housed; here, too, tuberculosis was frequently developing. The diet was improved along lines suggested, and this is given in list seven. This too was further improved afterward. No case of tuberculosis has developed in this dormitory in four years, so far as we can find out. In nurses dormitory—not included in these reports—there was a great deal of sickness and many breakdowns. The diet as reported showed a deficiency in fuel value and in all elements. The addition of meat, fish and bean products to the diet resulted in such improved health that the saving in the care of the sick and in the increased service of the student nurses more than paid the extra cost of the additional food.

The small number of cases of beriberi in Korea is easily explained by the amount of vegetables and leafy foods eaten; and the crude methods of hulling rice in common use, as well as by the use of millet and barley as whole grains. Scurvy is prevented in the same way. But the small stature of the people lends support to the view already expressed that there is a deficiency of "fat-soluble-vitamine." The diet lists reported include few things that have been shown to have an abundance of this essential. Eggs seem to furnish more than any other food in most of the lists; some have good amounts of leafy foods; but it seems improbable that these would furnish an ample supply.

Summary.

Thirty diet lists of at least a month each are here reported.

The Koreans are mainly vegetarians in diet; rice is the great staple, supplemented by millet, barley, peas and beans. These food-stuffs furnish about 80% of the caloric value. Roots, tubers and leaves are important items in the diet.

Fish is the most common animal food; beef, pork, poultry and eggs are eaten according to financial ability, but never in great amounts—except along the seaboard where sea food is eaten.

Milk and butter are not used to any considerable extent.

The caloric value of the diets reported averages about 2,400 Calories. This is probably sufficient for people of the occupation and physique reporting, practically all being students. But the bulk of the diet interferes with digestion and absorption, and apparently results in great frequency of gastric dilatation.

The diets reported about 90 grams of protein a day, but only about 75% seems to be utilized; the urines analyzed contained an average of about 11 grams total Nitrogen.

The diets reported contained about 15 grams of lipins a day.

The anti-beriberi and anti-scorbutic vitamines seem to be supplied in sufficient amounts. But there seems to be a deficiency of the "fat-soluble-vitamine" resulting in underdevelopment and lowered efficiency.

THE

PHYSICAL EFFECTS OF ALCOHOL AND TOBACCO.

A Lecture delivered at the Lake Bluff Temperance Convocation, August 18, 1882.

By DR. J. H. KELLOGG.

The lecturer was introduced by Hon. Geo. Woodford, who spoke as follows:—

LADIES AND GENTLEMEN: It is my privilege, as it is my great pleasure, to introduce to this audience a gentleman who, in the world of science in his State, stands at the head of the list in his particular department. We have been very fortunate in securing him for this evening, to lecture on that phase of the temperance question in which he is a specialist. I take great pleasure in introducing Dr. J. H. Kellogg, Superintendent and Resident Physician of the Battle Creek Sanitarium, and Member of the Michigan State Board of Health.

LADIES AND GENTLEMEN: When I received an invitation to attend your camp-meeting, I thought at first that it would be impossible for me to come. The large number of sick people at the Sanitarium requiring constant care and attention make my duties so onerous at home that it is almost impossible for me to leave. But when I thought the matter over, it seemed to me that I could not afford to miss the opportunity of attending for the first time in my life a temperance camp-meeting, and at last I reluctantly consented to come,—reluctantly in one sense, but joyfully in another; and my only regret this evening is that, through a pressure of other duties, I have not been able to better prepare myself for this occasion.

I propose to describe and illustrate to you to-night the physical effects of alcohol and tobacco upon the human system. I shall confine myself to the physical effects of these poisons, and shall leave to others to dwell upon the moral aspects of the question. I shall endeavor to express what I have to say upon this question in language so simple and untechnical that the smallest child in this audience can understand every word, and I shall endeavor to illustrate my lecture with experiments that any one can repeat at home with very slight trouble or expense.

In the first place, before we can know the effects of alcohol or tobacco on the human body, we must understand what the body is; we must know what is the structure of its organs and what their functions and mutual relations, before we can properly comprehend the changes and disturbances that alcohol will work in this complicated machine. When we examine the human body with the naked eye, we obtain only the most superficial idea possible of its wonderful structure. It is only by the aid of the microscope that it is revealed to us as the most complicated and delicate mechanism possible to imagine. But before we can understand the workings of this human machine, we must know something about the lower forms of life. Man stands at the top of the scale of animal existence. Away down at the other end of the scale we find little creatures that sustain a wonderful relation to human beings.

Suppose you take a walk with me this summer afternoon out into the country. Here is a stagnant pool by the wayside, covered with a green scum. In the mud that lies on the bottom near the water's edge, is a peculiar slimy substance. Suppose we gather a little of that slime, loathsome as it may seem, and take it home to our laboratory. Then we will take a small portion, as much, perhaps, as you can put on the point of a pin; place it on a slip of glass, and put it under a microscope. If now we look through the eye-piece of the instrument, we will find a most wonderful panorama spread out before our eyes. In the field of the microscope will be seen a number of curious little creatures which represent the lowest orders of life. Among these primitive forms of existence will be found one more curious than all the rest, which the biologists have termed *Amœba*. Perhaps I cannot give you a better idea of the relation which the parts of the body sustain to one another than by describing the *Amœba*. I was just about to describe its form, but the fact is it has no definite form. At one moment it is round, at another, long; next it has a serrated outline, and then it goes through a variety of gyrations, and ends up with a shape that is simply indescribable. We will suppose for the moment that it is round. Inside of it appears another round body, its nucleus, and within this a dot, the nucleolus. The *Amœba* is jelly-like in character, and is perfectly transparent and structureless, but it has the ability to put itself through a great variety of evolutions. No gymnast can equal it in dexterity and agility. This little creature has no eyes, no brain, no stomach, no mouth, no limbs, nor in fact any of the organs of the human body, and yet it can perform almost all the functions of that highly organized piece of machinery. It has the ability to manufacture a stomach or a mouth out of any part of its body at any time it wishes to do so. It is interesting to watch how one of these creatures eats. Suppose here is an *Amœba*, and here a microscopical particle of food. It has no mouth, so how is it going to eat? If we watch the *Amœba* a moment, it will answer the question for us; it simply makes a mouth on the spot. It projects a little lip out on one side of the particle of food, and another little lip on the other side, and by and by these two lips come together, and the particle is inside instead of outside. The *Amœba* retains the particle of food for a time until it has extracted all the nourishment, and then throws it out again. Perhaps it wishes to travel from one place to another. Although it has no limbs to carry it about, it can move from place to place at will. It performs the process of locomotion just as an angle-worm would. It stretches itself out as long and thin as possible, attaches the front end, and draws up the rear, and by this process of pushing and pulling finally arrives at its destination.

The one important thing that I wish to call your attention to is that the human body is nothing more than a combination of these little creatures; it is simply a community of little creatures. If we take a drop of human blood, and place it in the field of the microscope, we will find in it little creatures that exactly resemble the *Amœba*. You cannot tell them apart save that those in the blood are a little smaller than the ones we found on the bottom of the stagnant pool. In every drop of blood there are thousands of them. Suppose here is a microscopical field, and as we look at it, we find here and there a round *Amœba*, and here is one that is traveling, and there is one trying to get around a morsel of food. In addition to these we find a great many others, smaller than these, that are red in color. They are all of the same size, and all of the same shape. These are called red blood-corpuscles, and the *Amœbæ* in the blood are white blood-corpuscles. We are able to see how that these blood-corpuscles are in reality little living creatures, as independent of one another as the fishes that swim in the water, or the birds that fly in the air. But what are they for? It is important that we should understand what they do to the body, in order that we may appreciate what will happen if by some means they should be destroyed. We shall see presently. Suppose we leave our drop of blood for a moment, and examine the brain. We will find it made up of just such little creatures as the white blood-corpuscles. The liver also will be found to be made up of little cells. If you go through the whole body, you will find that it is made up of just such bodies. The human body might aptly be compared to a nation of people divided up into communities. Some have one part to perform, and some another, some are blacksmiths, some carpenters, some editors, etc., but all work in harmony. Those in the liver work at the business of making bile and can do nothing else; other little creatures in the salivary glands can do nothing but make saliva.

There are other little cells that live in certain parts of the brain, and send out little fingers to all parts of the body. Some of the brain-cells have no fingers at all, and are called apolar; others have one finger, and are called unipolar; some have three, and are called tri-polar; and so on. These little cells run their long, slender fingers to every part of the body, some of them clear down to the ends of the toes; and it is these fingers that form the nerve fibres. A number of them are gathered together, a sheath is placed around them, and they altogether make up a nerve. These nerves start out from the brain, and ramify all through the body. In this way these little creatures in the brain are made acquainted with what happens in every part of the body. If you stick a pin into your finger, the cells in the brain feel it by means of their long fingers, the ends of which, situated in the finger, are injured by the pin. If you cut the nerve in two that leads to the finger, you can cut or burn the finger, and the little brain-cells will know nothing about it, because you have cut off the means by which they receive their information. Some of these nerves run down to the heart, and about once a second the brain-cells send down an impulse to the heart which makes it beat. They order the heart to beat, and it beats. When it is necessary for a muscle to move, they send down word to that particular muscle, and it moves at once. When food is placed in the stomach, the little creatures in the brain which have charge of the stomach say to it, Digest, and it begins its work. So the cells in the brain which govern the liver say to the little creatures which dwell in that portion of the body, Make bile, and they obey orders, each doing its allotted work.

Suppose we turn again to our microscope. Here is a drop of blood magnified about 250,000 times. We find in it, as I said before, two kinds of cells; the white and the red blood-corpuscles. There are about 400 of the latter to one of the former. We have plenty of time to examine them; for blood, if kept under favorable circumstances, will live about six weeks outside the body. It is a curious fact that even after the body dies, these little cells which go to make it up, will live on for some time longer. I took out a turtle's heart the other day, and it went on beating for several hours after the turtle itself was dead. If you cut off the spur of a rooster, and graft it into his comb, it will grow there as well as in its proper place.

It is quite a common thing now-a-days, when a man has his scalp torn off, to graft on pieces of skin from peoples' bodies until the torn scalp is completely patched up. Some time ago a young lady whose scalp was torn off by a piece of machinery, had the surgeon take pieces of skin furnished by her friends and graft onto her head, and it is said that when the hair grew out, it was black, and brown, and red, and all sorts of colors; but I won't vouch for the truth of that part of the story. But to return to our drop of blood, if we examine it carefully we will find a number of small specks which will be found by repeated observation to grow in size from day to day until finally they come to be white blood-corpuscles. After several weeks, these white corpuscles grow old and infirm, change color, and become red blood-corpuscles. It starts as a speck, becomes a white blood-corpuscle, and then shrivels up and becomes a red blood-corpuscle. This change is taking place all the time. Thousands of these creatures are dying with every breath, with every heart beat. There is a funeral going on in the body all the time, and it is part of the business of the little creatures which make up the liver, to dispose of the carcasses of these dead corpuscles.

If we take a frog's foot and spread it out under the microscope, we can see the blood coursing along through the veins, and we can in this way watch the corpuscles, and see what they are doing. This is what they are about: whenever a muscle moves, there are particles of the body which are worn out and thrown off, resulting in the formation of carbonic acid gas; and it is the business of the red blood-corpuscles to carry these worn-out pieces of the human machinery to the lungs in the form of carbonic acid gas, which is there thrown off and exchanged for oxygen. They are, if you please, the hod-carriers of the body. If they were all to be destroyed at once, the person would die from poisoning by carbonic acid gas, because the poisonous elements would no longer be carried off.

Now let us turn our attention for a moment to the white blood-corpuscles. At the first glance, they seem to be loafers. Suppose you have here a capillary vessel one three-thousandth of an inch across. Here are the red blood-corpuscles flowing along rapidly through the middle, intent upon carrying their load of carbonic acid gas to the lungs. Along the sides we see here and there a white corpuscle loitering carelessly along. If you watch them carefully for some time, you will find what they are about. You will discover that they are looking for a place to get out; and the reason that they want to get out is that they are traveling tinkers, and are looking for a job of mending to do. Suppose a person gets a sliver in his finger, or still better, suppose that we stick a pin into the frog's foot that we have under the microscope. You will see the white corpuscles immediately begin to collect in great numbers, to repair the injury that has been done.

Now I think we have a pretty clear idea of what the vital processes are, and how they are performed, and we next direct our inquiries to discover what effect alcohol will have upon these processes when it is taken into the human system. These little creatures that we have been talking about are at work in the stomach making gastric juice, and in the liver making bile; what does alcohol do to them? Before we can answer this question intelligently, we must first know what alcohol is.

About one thousand years ago alcohol was discovered by an Arab. You know that at that time the Arabs were noted as the greatest chemists as well as the greatest mathematicians. A great misfortune that discovery was, you will perhaps say; but you must remember that at first its intoxicating properties were not known. It was considered merely as a chemical compound and a curiosity. Finally, about the sixteenth century, Paracelsus—who, by the way, was the father of medical quackery—announced the discovery that alcohol was the long-sought *elixir vitae*, in search of which the alchemists and philosophers of the middle ages had been wasting their time for hundreds of years. The fact that Paracelsus died in a bar-room should be a warning to those of our own day who would have us believe that alcohol, if not the elixir of life, at least has strong claims upon our consideration as a medicine and food.

Alcohol is not an isolated substance, but is one of a large class of similar substances known to chemists as the "alcohol series." I have here a chart upon which you will see in order the names of some of the leading members of "the alcohol family." The first is known as *Methylic Alcohol*, or wood naphtha. It is obtained by the distillation of wood, and is slightly intoxicating in character. It has a bad odor, and that is one reason why people do not drink it.

Ethylic Alcohol, or wine spirit, is the next on the list. This member of the alcohol family is the essential ingredient of spirituous liquors. It is obtained by the distillation of fermented liquids, and constitutes the intoxicating principle of all the common beverages, such as wine, beer, brandy, etc.

Next we find *Buthylic Alcohol*, a substance which is produced in the fermentation of beet root. An acid formed from this kind of alcohol is present in old cheese and rancid butter, and gives to them their peculiar flavor.

Amylic Alcohol, or fusel-oil, is the characteristic constituent of bad whisky. It is extremely intoxicating in character, and a few drops will produce as profound an effect as a large quantity of *Ethylic* alcohol, or wine spirit. It is this substance which gives to bad whisky its infuriating character. You will notice that in the list the alcohols have been arranged in the order of their intoxicating power; wood naphtha being the least, and fusel-oil the most intoxicating. Besides these substances which I have represented as belonging to the "alcohol family," there are two others which are very nearly related to the former. They are cousins or second cousins, if you please. These are Carbolic Acid and Creosote, which every one knows to be powerful caustics and poisons.

You will see in the second column here the chemical formulæ of these different substances that I have mentioned, and an inspection of these formulæ will show how closely related one is to another. You will see that they are all made up of the same three elements, carbon, hydrogen, and oxygen, and the only difference between them is in the proportion of the several elements of which they are composed. The difference between wine spirit and wood naphtha, for instance, is one atom of carbon and two of hydrogen. The only difference between common alcohol and the poisonous carbolic acid, is four atoms of carbon. Does that seem enough to form the distinction between a poison and a food?

Alcohol is not a natural product, it is always produced by fermentation. It may not be known to you that alcohol is produced in the common process of bread-making. A baker in England found that he could save the alcohol produced in the fermentation of his bread by connecting a sort of still with his oven; and by this saving he was enabled to sell his bread quite a little cheaper than his rivals. He had a large custom until the baker across the way discovered his secret, and put up a sign "bread with the rum in it," when all his customers deserted him and patronized his rival.

I have here a test for alcohol: If you drop a little of this fluid into any substance containing alcohol, there will appear a very marked greenish color. Here is a glass vessel containing alcohol. I place a little of the test into it, and there is at once a perceptible change of color. Here is a vessel containing brandy. I need not tell you that it contains alcohol for you see that the application of the test shows it at once. In the same way I will test the liquid contained in these other vessels which are whisky, ale, gin, and hard cider. You see that the green color is very deep in each one. Here is some beer. I drop in a little of the test, and you see at once a green tinge spreading through the foam that rises up in the tube, and also gathering in the bottom. This is conclusive proof that there is alcohol in beer.

I have some other things here that I propose to test. There are a number of good people in the world who would not think of touching a drop of gin or whisky, but do not have the slightest objection to taking a glass of "bitters" every morning. They will recommend you to take a little bitters for your stomach's sake. Here is a bottle of Hostetter's Stomach Bitters. I pour a little of it out into this tube and apply the test. You see how green it turns. It has almost as much alcohol in it as Scotch Whisky. Look at this sample of Jamaica Ginger. I put in only a few drops of the test, and it turns as green as the gin. It has just enough ginger in it to flavor the alcohol.

Here we have a bottle of "Temperance Bitters," or at least it is advertised as such. This is Dr. Walker's California Vinegar Bitters. The proprietor is taking an active part in the temperance work on the Pacific Coast. He is one of the most zealous advocates of temperance in California, and publishes a temperance almanac to advertise his "bitters" which he declares contain no alcohol. Let me read to you what is printed on the paper that goes around the bottle; "Dr. J. Walker's California Vegetable Vinegar Bitters, The Great Blood Purifier and Life-giving Principle. A remedy for dyspepsia, indigestion, consumption, sore eyes, stomach-ache, fits, palpitation of the heart, biliousness &c., &c., tape, pin, and other worms. No Alcohol enters into the composition of Vinegar Bitters. That curse is not offered for medicine. Nothing but invigorating and purifying herbs give them their wonderful powers to cure."

In order to determine the amount of alcohol contained in a bottle of the bitters, I had half a bottle distilled by a chemist, and in this flask you see the product of distillation. By means of the alcoholometer it has been found to contain 20 per cent of alcohol. Now we will apply the test. There is as beautiful a green as you could desire to see. I will guarantee this bottle of bitters to contain 5 per cent of alcohol.

Now let me call your attention to some of the physical properties of alcohol. It is combustible. You all know that alcohol will burn. I will touch a match to some of this Jamaica Ginger. See how it flames up. It continues to burn as I pour it from one vessel to another. In addition to this, alcohol is a *desicant*, that is, it is drying in its character. I have been using some of it as a drier. I put this piece of steak into alcohol a few days ago, and I think it would now answer very well as a tap for a boot. After a few weeks it will become so dry that I could rub it in pieces with my fingers. This egg which I hold in my hand is a representative of an animal. The complete hen is here. If you place it under the proper conditions, that is, if you simply keep it warm—you know we have artificial "mothers" now-a-days—it will develop into a full-fledged chicken. We can take the effect of alcohol upon this egg as a sample of what it will do to the human body. I break this egg into a vessel containing whisky, and you see that it turns white, and it will soon become as hard as though it had been dropped into boiling water. If the vessel had contained pure alcohol, it would become so hard in a short time that I could turn the vessel upside down without spilling out the egg. Alcohol has the same drying and hardening effect upon the body that it has upon the egg. The liver, the heart, and in fact the whole body, is made up principally of albumen and fibrine, the substances which compose the egg.

Besides its drying properties, alcohol is also an antiseptic, that is, it possesses the property of preventing decay in perishable substances. Some one may say that if alcohol prevents decay, it ought to be valuable in preventing the decay and death of the human body. In fact, a young man once told me that his grandfather had taken during his life a hogshead of Jamaica rum, and he was sure it had been the means of preserving him to a good old age. During the centennial year, while I was in Wilmington, Delaware, I heard of a man who was 117 years old on the fourth of July. I was paying a good deal of attention to the subject of hygiene just at that time, and I thought that perhaps he had lived so long because he was temperate in his habits. Upon inquiry, however, I found that he was an inveterate smoker, and that for one hundred years he had taken his toddy regularly. This was quite a disappointment, but I resolved to see him nevertheless. When I found him, I thought that whisky had not done so much for him after all. He hardly looked like a human being, he was so dried and shriveled up. He looked like one of those strange creatures that Stanley saw in Central Africa. After seeing him, I came to the conclusion that he was a human pickle. He had been pickled by the use of alcohol, and had in reality been dead for the past thirty or forty years, though his friends neglected to bury him.

It is through its antiseptic properties that alcohol interferes with the process of digestion. The process of digestion is in some respects similar to that of fermentation. If you keep meat in alcohol, it will never decay. If, therefore, you take alcohol into the stomach after each meal, you will interfere with the process of digestion that is going on there, and will in time seriously impair the digestive functions of the stomach. Alcohol also destroys the pepsine of the gastric juice.

In the next place, alcohol is volatile. Many who use whisky wish it was not, for it is this property which enables any one to detect a man who has been drinking by the odor of his breath. That is the reason why some people carry cloves over a charcoal fire; sprinkle with salt, red pepper and sesame seeds, and serve with bean sauce.

FISH are cooked in several ways; one of the most common is to boil it in water to which bean sauce has been added, and serve sprinkled with red pepper and sesame seeds (*cho-rim*). "*Am-chi*" is salt fish soaked in water, then torn to pieces and broiled over charcoal fire; sesame oil is added when serving. "*Mut-chim*" is dried fish soaked in water, then shredded, and then soaked in bean sauce; sesame oil and pepper are added, this is let stand for a short time. Fish roe (*Ran-chut*) are soaked in salt water, or preserved in brine, then boiled in clear water; add red pepper when serving.

Series 2.

This includes the reports of twenty-three young men, vigorous and healthy, getting some exercise but not laboring. They weighed the food served and the dishes after eating, as stated above, each report covers at least one month. Most of them lived in boarding houses, and a few at home, but there was little difference in the reports. There was some difference in the quality of the rice and in the variety of food served in the more expensive boarding places, but it was not enough to warrant an attempt to separate the lists according to the cost of the board.

About half of what is listed as rice in the table, was a mixture, commonly of rice and peas; some beans and millet and barley are also reported and included in the column. Our analyses of these showed such small differences in them, that no attempt was made to report them separately. Also under the head of "*kim-chi*," turnip and radish pickles have been included, as well as the cabbage "*kim-chi*." With vermicelli is included "bread soup"—a soup made with steamed bread, like dumplings; the two are as similar as American "noodles" and "dumplings."

All foods listed in these reports were "ready-to-eat." This necessitated investigation as to the methods of preparation, and analyses of the ready-to-eat foods. Our analyses were not of the foods served, but similar foods from the same or like places. The number of analyses is too few, and no calorimetric determinations were made, so the food values could only be approximated. The table shows the amount per day per person.

The rice and rice mixture averaged 1,572 grams a day, equal to about 520 grams of dry rice, peas, etc., this has a value of about 1,885 Calories, i.e., about 79% of the whole. The total caloric value of the diets averaged 2,366, ranging from 1,774 to 3,359 Calories. Protein furnished about 15% of the caloric value of the diets; an average of 89 grams a day being reported, the range being from 67 to 130. There was more animal protein than in the dormitory diets, the average being 16 grams a day, fish furnishing most of it. There was more lipin, but 14.7 grams a day is a very small amount.

Number.	Sex.	Occupation.	Season	Rice, etc.	Kimchi, etc.	Veg. Soup and Stew	Meat Soup and Stew.	Omelet	Bean Curd.	Bean Sauce	Beans, etc.	Greens	Vermicelli, etc.	Bread.	Pancakes
8	M	Stud.	Win.	1430	482	551	202	58		1		16	8		
9	M	,,	,,	1303	271	230	323	19	2	9		130			
10	M	,,	,,	1110	250	106	167	27	12	9	88	15		22	
11	M	,,	,,	1843	333	255	205		54			284			
12	M	,,	,,	1302	130	28	630	110		2	40		66	7	
13	M	,,	,,	1432		316	317	12		1		32	22		
14	M	,,	,,	1722	615	428	17	167	20		39	43		7	
15	M	Serv.	,,	2480	808	106	30	88			4	48	25		
16	M	,,	,,	1634	330	622		222	11		40	74		3	
17	M	,,	,,	1672	164	469	115				24	29			
18	M	,,	,,	1717	378	585	24			44	69	19			
19	M	,,	,,	1154	228	71	57		54	19	18	5		10	
20	M	,,	Spr.	1881	468	141	77	64	65		33	172	43	15	
21	M	,,	,,	1991	640	310	89	68	101		21	15	31	13	
22	M	Phys.	,,	1469	821	349	200		43		2	3	23	8	22
23	M	Stud.	,,	1401	309	105	325		31		48	35	38		12
24	M	,,	,,	1832	252	213	143	20	12	13	30			20	
25	M	,,	,,	1343	334	240	240		33	4	17	38	30	2	25
26	M	,,	,,	1368	213	442	90	54	145	3	81	30	116	4	
27	M	,,	,,	1443	468	93		100	53		59		38		
28	M	,,	,,	1450	333	83	21	38	30		62		114		
29	M	,,	,,	1452	445	120	8	248	60	2	38		41		
30	M	,,	,,	1752	160	207		84		62	132	82		1	
	Average														

and things of that sort in their pockets to chew on frequent occasions.

That alcohol is an irritant may be readily shown by placing a drop of it in the eye. I recently had a patient who was suffering with a disease of the eye for which I prescribed a solution of atropia to be placed in the eye. The druggist used a solution of atropia in alcohol for making the lotion, and the effect on the eye of the patient was so irritating that she came very near losing it, although the solution contained not more than ten drops of alcohol to the ounce. If, then, it is irritating on the outside, how much more dangerous must be its effect on the inside, when it comes into direct contact with those delicate little cells which do our thinking and feeling for us and perform all the work of the body. Alcohol is often called a stimulant, and so it is if we use the word in its proper sense. A stimulant is well defined by an English physician as "something that gets strength out of a man instead of putting it into him." There is a general idea that drinking liquor will make a man stronger, but that is a mistake. A whip is a stimulant to a tired horse; it makes him go faster, but it does not make him any stronger. That is precisely the effect that alcohol has upon a man. Experiments show that a man is actually weaker, that he cannot lift so much after he has taken a drink of liquor, as he could before. A man who has just had a glass of whisky feels as though he could run faster, lift more, or make a better speech than he ever did before in his life; but the fact is that both his muscular and mental powers have been impaired. The feeling of strength is apparent, not real. An eminent justice of a neighboring State, who was an inveterate smoker, told me that he always felt as though he could make a better plea just after he had smoked a cigar; but he had found by actual trial that he could not. He could not reason so closely, nor present his arguments so clearly as when he abstained from the use of tobacco. What is true of tobacco, is true of alcohol. Tobacco and whisky are twin evils.

Alcohol is a narcotic, benumbing both the physical and moral sensibilities. When a man comes home tired out with work or worry, and takes a glass of liquor, it seems to take away all the tired feeling. The man feels all at once completely rested. In reality, however, he is just as tired as he was before. The wasted tissues which cause the sense of fatigue, are not yet replenished, and the alcohol has no power to renew them, all that it does is to benumb the nerves of sensibility so that the man does not feel his weariness.

Finally, alcohol is an anæsthetic. When a man is dead drunk he does not feel anything. Before the discovery of chloroform, it was sometimes the custom to give a man whisky when about to perform an operation, and even now it is sometimes used for that purpose. I once had a patient who required an operation on both eyes. She had a serious heart trouble, so that I did not dare to give her chloroform. I gave her an ounce of brandy sling, and in a short time I was able to perform the operation without giving any pain whatever. She was not insensible, but knew what was going on all the time.

I must say a few words before I close, about this substance mentioned at the bottom of the chart, that is, tobacco. I do not carry a tobacco-box around with me, but here is a bottle of nicotine, which contains the poisonous principle that characterizes tobacco. I tried an experiment the other day with this nicotine. It was rather a cruel experiment, but it was done in the interest of science. There was a certain cat which use to prowl around the Sanitarium, giving midnight concerts. A young man caught the cat, and I administered to it one-seventh of a drop of nicotine. The cat sprang to the floor, shot across the room, and in less time than it takes me to tell it, was dead. I tried a similar experiment with a frog. You perhaps know that a frog is a very hard animal to kill. You can cut its head off, and it will go on kicking about for some time, as often as you stir it up. I took a healthy frog, and injected into its mouth one-fourteenth of a drop of the solution mentioned.

It gave one last croak, stretched out its legs in a very respectable manner, and died. I have never tried it on a man, but I know several members of the human species who have tried it upon themselves. On my way home I saw in Chicago a man who is completely paralyzed on one side, there being no feeling whatever. If you tell him to look straight ahead, and pass your hand in front of his face, he cannot see it until it has passed the center of the field of vision. That man, when I first saw him, was smoking ten cigars a day of the strongest kind. He had them made of extra strength for his especial use. The consequence of the constant and excessive use of this deadly poison had been to cause degeneration of certain parts of the brain, resulting in the terrible paralysis I have described. Now I do not mean to say that every one who uses cigars will suffer from paralysis, but this case serves to show what deadly effects may be produced by this poisonous nicotine; and if that is the effect of a large quantity, it is only fair to suppose that a smaller quantity would have an effect proportionate to the amount used. The safest way, at any rate, is not to use any at all.

Now let us inquire what effect alcohol has upon the body. We have seen that there is an affinity between man and the lower forms of life. There is also an affinity between men and trees, and between men and pumpkins, for that matter. Suppose we take a beautiful, flourishing plant, and pour alcohol upon it. It will wither away in a very short time. If we drop a tadpole into a vessel containing alcohol, it will die in a minute. I tried an experiment the other day with some minnows. First I put a minnow into a glass containing two teaspoonfuls of alcohol in a half-pint of water. In five seconds he turned over on his back, in ten seconds he began to float toward the top, and in sixty seconds he was dead. I thought that if I dropped another into a glass containing pure alcohol, he would die at once. I tried it, and the minnow lived for three minutes. I then put a minnow out on the table, and he lived for six or seven minutes. I determined that the reason for this curious result was that when the minnow was put into pure alcohol, he simply died of suffocation. In the other case, where the fluid was about the strength of small beer, the minnow became saturated with the alcohol inside as well as outside by taking it in through the gills, and thus died of alcoholic poisoning. In the first case the gills closed firmly as soon as the minnow was dropped into the alcohol, and he died because he could not breathe, just as the other one died when laid out on the table. This might be taken to show that in the case of the minnows, at least, moderate drinking is more fatal to longevity than hard drinking.

I will now call your attention to a series of plates which I have had prepared for the purpose of illustrating to the eye the baneful effects of alcohol upon the various tissues of the body; and first we will notice this Plate, which shows, greatly enlarged, the natural form of the stomach with a small portion of the duodenum attached. By the removal of a portion of the anterior wall of the stomach, the mucous membrane lining its interior is also shown. We would direct especial attention to the uniform rosy tint characteristic of the healthy state of this organ, in which digestion, one of the most important of the vital processes, is performed. A microscopical examination of the membrane shows it to be traversed by a dense net-work of blood-vessels, which are wholly invisible so long as the organ remains in a healthy condition. Little pockets are also found in which are located the peptic glands which form the gastric juice, the essential agent in the process of stomach digestion.

In the small intestine below the stomach we have a similar arrangement of blood-vessels and glands. The condition of the stomach in health and disease is better understood than that of almost any other internal organ. This is true for two reasons: First, the stomach has been studied more than any other internal organ; Second, the study of its condition has been carried on under more favorable circumstances than that of any other internal organ. The stomach is a hollow orga and physiologists and physicians have succeeded in making a permanent opening into its interior in some lower animals, through which they could watch the organ at work, and study the effects of the various substances which were introduced through the mouth of the animal, or through the artificial opening. Accident has, in several cases, made the same observation possible in human beings. One of the most notable cases was that of Alexis St. Martin, an employee of the Hudson Bay Fur Company, who, in the early part of this century, received a gun-shot wound which carried away a considerable portion of the abdominal wall, and perforated the stomach. The wound healed in such a way as to leave a permanent opening into the stomach through which the process of digestion and the effects of various substances upon the stomach and digestion could be accurately observed for many years. Dr. Beaumont kept this man in his employ, making hundreds of observations upon his stomach, the results of which were published, and are considered among the most reliable and conclusive of all the observations which have been made upon this organ. Dr. Beaumont made a careful study of the effects of alcohol upon the stomach of Alexis St. Martin, who enjoyed a remarkable degree of health and vigor even after his accident, which seemed not to have interfered in the least with his general health after his recovery, as he lived to a great age in the enjoyment of almost uninterrupted health, his death occurring only three or four years ago.

The next Plate represents the condition of the stomach of a person accustomed to use alcoholic drinks in what is termed "moderation"; as for example, a man who takes regularly his glass of grog before breakfast, or dinner, or a bowl of sling as a "night-cap." The mucous membrane of the stomach is in a state of congestion. This congested condition was observed by Dr. Beaumont in the stomach of Alexis St. Martin whenever he was allowed to take alcoholic drinks, of which he was very fond, even in a moderate quantity. The effect of alcohol, as well as that of mustard, pepper, pepper-sauce, spices, and condiments, is to produce a state of excitement and irritation in the stomach, the result of which, when frequently repeated, is permanent congestion, and is the cause of numerous forms of dyspepsia. But alcohol does more than simply irritate the stomach. By its antiseptic influence it prevents the digestion of the food, and by its chemical properties it destroys the activity of the gastric juice, and so does triple mischief.

Here we have a plate representing the actual state of things which has been found existing in the stomachs of persons accustomed to use alcoholic drinks daily in large quantities. The blood-vessels are dilated, as in the case of the moderate drinker, and in addition, large bluish patches are observed, which indicate the stagnation of the blood which is likely to result in death of the tissues and form ulcers. Ulceration of the stomach is more often the result of the use of spirituous liquors, than of any other cause.

St. Martin, who was experimented upon by Dr. Beaumont, had been addicted to the use of liquor, and sometimes broke away from the restraints imposed upon him by the doctor's experiments, and indulged his appetite for alcoholic drink. After these occasions, Dr. Beaumont always noticed that the mucous membrane of the stomach was greatly congested. Even the use of a small quantity of alcoholic drink was sufficient to produce an inflamed appearance, while greater excess caused the stomach to present a surface swollen and roughened with inflammation, with ulcers and numerous black patches of deadened tissue. Notwithstanding this terrible condition of his stomach, St. Martin was scarcely conscious of any disturbance, and thought himself as well as usual! Why was this? Because the stomach has few nerves of general sensibility, and suffers long before it remonstrates.

Some years ago we were talking on this subject before a large audience, when suddenly some accident in the back part of the audience occasioned a little disturbance for a moment. We afterward learned that a man who had previously been an habitual drinker had been so affected when he beheld a picture of the condition of his stomach when drinking, that he tipped over backward in a faint.

The next plate represents in a very faint degree the terrible condition present in the stomach of a victim of alcoholic poisoning, suffering with what is generally known as "delirium tremens," or acute alcoholism. The mucous lining of the stomach is in a state of intense inflammation, so that its functions are wholly suspended. In a case which we had under treatment a few years ago, we found our patient at our first visit suffering most intense nausea. He had been vomiting incessantly for more than two days. The smallest sip of water could not be retained upon the stomach. Great quantities of mucous were vomited, together with blood. We asked him if he had any hallucinations. "Oh! no," he replied, "only a few phantasmagora."

While malignant disease of the stomach is not produced solely by alcohol, there is no question but that it is one of the most frequent causes of cancer of this organ. This plate represents the malignant growth extending entirely around the lower portion of the stomach, and having compressed its cavity until it is narrowed less than the size of the small intestine. Sometimes it becomes closed entirely, when the person dies from suffocation.

This plate represents a number of diseased conditions produced by alcohol, all of which are exceedingly interesting in character. At A we see healthy nerve cells. In a healthy condition, nerve cells, although irregular in form, possess an exceedingly delicate and highly vitalized structure. These are the elements of the body which make up the great bulk of the brain, and the nerve centers of the spine and other parts of the body. These structures give rise, by a marvelous process not well understood, to sensation and motion, and in fact all the activities of the body.

At B are represented nerve cells in a state of fatty degeneration. The effect of alcoholic drinks is to produce atrophy, or wasting, and fatty degeneration (change to fat) of nerve cells as well as other tissues of the body. It is in this way that *locomotor ataxia, palsy,* and other incurable diseases are produced by the liquor habit.

H represents Healthy Nerve Fibres.—The blue outer portions represent the sheath of the nerve, within which are shown the delicate dotted fibres by means of which messages of sensation and volition are sent to and fro between the brain and spinal cord and other portions of the body.

At I is shown nerve fibres which have undergone fatty degeneration. This is a fair representation of the havoc made among the delicate nerve filaments by the destroying influence of alcohol. It will be observed that the nerve is shrunken, its delicate outlines are almost wholly obliterated, and the minute fibres broken and obstructed, and thus the nerve rendered wholly useless.

C represnts Healthy Blood Corpuscles.—The blood corpuscles in a state of health are wonderfully symmetrical in form, being flattened, bi-concave disks, as shown on the plate, giving the blood its red color. It will be observed that the corpuscles adhere together somewhat in groups, and are arranged in forms resembling a rouleau of coins.

D represents the Blood Corpuscles of a Habitual Smoker.—Dr. B. W. Richardson of England has made a large number of observations upon the blood of smokers, and finds that the effect of tobacco upon the blood is to destroy the symmetrical character of the corpuscles, and cause them to be shriveled and irregular in outline.

E shows the CONDITION OF THE BLOOD OF A DRUNKARD.— Whisky has an effect upon the blood-corpuscles similar to that of tobacco, and also produces an irregular distribution of the coloring of the corpuscles, giving them a somewhat mottled appearance, and in part destroying the power to perform their important function of holding and carrying oxygen.

F represents the appearance of corpuscles which have been removed from the body and subjected to the action of alcohol in such a manner that its effects could be watched under the microscope. Almost instantly after the application of the alcohol, it will be observed that the corpuscle loses its natural form, and becomes so greatly shriveled and changed in form as to wholly destroy its resemblance to human blood-corpuscles. While it is probable that when used as a beverage, alcohol does not produce quite so profound an effect upon the blood as is represented by this experiment, at least to a very great extent, there can be no doubt but that the same effect is produced in some degree before the fiery liquid has become diluted after absorption by mixture with the blood. The effects of alcohol upon the blood are produced even when diluted to the extent of one part in five hundred, according to Dr. William Carpenter, of England.

G represents an eye, the colored portion of which presents a ring known as the *arcus senilus* from the fact that it is more often present in elderly people, in consequence of the degeneration which naturally occurs in old age. The ring is occasioned by a deposit of fat which is within the upper edge of the cornea and can be seen, when present, by a careful examination of the eye. This ring is often present in persons addicted to the use of alcohol at a much earlier period than it should naturally make its appearance; and although it does not in the least injure the eye, its significance is very great, since it indicates that the deposit of fat by which it is produced, is taking place in other parts of the body, as the brain, the heart, the blood-vessels, the liver, and other important vital organs. It is a sign hung out in the drunkard's eye to warn others of the havoc which is being made within.

As seen under the microscope, nothing is more beautiful than a healthy muscular fibre as shown at J. Its delicate striping is so regular as to almost lead one to imagine it to be the work of some skillful artist.

K illustrates the FATTY DEGENERATION OF MUSCULAR FIBRES.— Here again we observe the ruin wrought by alcohol. Globules of fat of varying size have taken the place of the healthy structures, and rendered the fibre almost useless for the purpose for which it is designed. No wonder that the drunkard's muscles are weak, that he possesses no strength, that he totters and trembles, that his flesh is soft and flabby!

PLATE 8 illustrates at its upper left hand corner, one of the results of smoking, namely, cancer of the lip. That terrible form of malignant disease known as epithelioma, more often occurs upon the lip or in the mouth, as the result of smoking, than from any other cause. The figure shown is an almost perfect copy of a photograph of a man suffering with this terrible disease occasioned by smoking. Only recently one of the most prominent politicians of the country, a senator, died of this terrible disease after enduring several painful operations, all the result of smoking.

One of the signs of intemperance, which its victims put forth the most strenuous efforts to suppress, is that peculiar enlargement of the nose, with intense redness, so appropriately termed the "rum-blossom." The example given in the plate, though an extreme case, is no exaggeration, as it is a fac-simile of the "blossom" belonging to a somewhat popular politician in one of our Western cities. Like the drunkard's ring, the rum-blossom, although something of a blemish, is chiefly important in consequence of its significance, since it does not particularly interfere with the functions of the organ to which it is attached. The mode of development of the rum-blossom is interesting. It may be best explained by reference to an experiment sometimes performed by physiologists upon lower animals. A white rabbit is generally selected for the experiment, which consists in dividing a certain nerve, which in a curious manner not wholly understood, controls the circulation in the ear of the rabbit. The object of this nerve is to keep the blood-vessels of the rabbit's ear in a state of proper contraction, thereby regulating the supply of blood. The moment it is divided, the blood-vessels relax, become filled with blood, and the ear blushes. This can be readily seen in the ear of the white rabbit, from the absence of coloring matter in its skin. By the removal of a portion of the nerve, so that the divided parts will not grow together again, the condition of blushing or congestion may be made permanent in the ear. When left in this condition for a few months, it is observed that the ear becomes much larger than that of the other side, the increased supply of blood having occasioned more vigorous growth, as shown on the plate. All other parts of the rabbit's body, and of the human body as well, are supplied with nerves which regulate the circulation in each part. This is true of the face, the lungs, the stomach, the liver, the brain, and all other internal and external organs. Blushing or blanching of the face are occasioned by the influence of different emotions upon these nerves. The effect of alcohol is to paralyze these nerves, and when its frequent use occasions the almost constant paralysis and engorgement of the blood-vessels of the face and nose, more particularly the latter, it, like the rabbit's ear, grows too fast, and by this means may acquire even as enormous a development as that shown on the plate.

We must not omit the remark that persons who are strictly temperate sometimes acquire a deformity of this sort through other causes which are not well understood.

The brain in a state of health is one of the most delicate organs of the body. It is so soft and fragile that it can scarcely be cut, without being torn, by the sharpest knife. Its color has been very closely imitated by the artist. Let us now notice—

A Drunkard's Brain.—The intense red color of the drunkard's brain is produced in precisely the same way as that of the nose, namely, paralysis of the nerves which control the circulation of this part of the body. When the drunkard's face and nose are reddened, or blushing under the influence of alcohol, the brain blushes. The same may be said also of the lungs, the stomach, the liver, the kidneys, and other structures of his body. His whole physical being blushes with shame for the outrage against nature. In consequence of this intense congestion, and the fact that it receives one-fifth of all the blood in the body, the brain participates more than any other organ in the body, except the liver, in the injury wrought by the "demon drink." As before mentioned, it sometimes becomes hardened to such a degree even during life that it can be readily distinguished from a healthy brain by the sense of touch alone. Here is represented also—

A Healthy Heart.—In a state of health, the heart is almost wholly composed of muscular tissue and blood-vessels. It is, in fact, a hollow muscle, by the contraction of which the blood is propelled into the remotest corners of the vital economy, carrying in its scarlet stream the elements from which the tissues are rebuilt. The amount of work performed by this little organ is enormous. The strength which it exerts in each contraction has been variously estimated by different experimenters, one of the lowest estimates being ten pounds for each beat or pulsation. As the heart beats on the average seventy-two times a minute, a little computation will show that the work of this little organ is equivalent to lifting the enormous weight of one million, thirty-six thousand, and eight-hundred pounds, or more than five hundred tons, one foot high. The heart is frequently called upon to do a large amount of extra work, as in rapid walking, or running, lifting, or physical labor of any kind. Severe mental labor also brings an extra strain upon it, and its integrity is of the utmost consequence to the safety of the rest of the body.

The heart of the drunkard, like his nerves, muscles, and other organs, is also subject to the change known as fatty degeneration, in which the heart becomes loaded by an accumulation of fat upon its exterior, and also suffers a change of its muscular tissue to fat, such as occurs in the fatty degeneration of other muscles. This, of course, greatly weakens it, and accounts for the fact that the pulse of the habitual drinker is weak, feeble, intermittent, the large, overloaded, overworked, enfeebled, semi-paralyzed organ being unable to do the work required. The drunkard's heart cannot easily lift its five hundred tons per day, and when called upon to do a little extra work, as during extra physical or mental exertion, it frequently fails altogether and its owner is instantaneously precipitated into a drunkard's grave.

The next plate represents a number of the results of alcoholic poisoning. First we have a pair of lungs the right half of which is in a healthy condition. Its coloring, as shown on the chart, is almost exactly that of the lungs in health.

The second figure represents the left lung divided in such a way as to show the interior, the upper portion of which is represented as in an advanced stage of destruction from that form of lung disease known as drunkard's consumption. The old notion that alcohol was a preventive of consumption has been thoroughly exploded by that eminent scientist and physician, Dr. Richardson, of England, who has demonstrated that there is a peculiar form of consumption which is the direct result of the influence of alcohol upon the lungs. He states that a person suffering from alcoholic phthisis shows no improvement under treatment. The disease, steadily, surely, and usually quite rapidly, progresses to a fatal termination. The disease is most liable to attack those who seem to be almost invincible to the effects of alcohol, and who are often pointed to as examples of the harmlessness of alcoholic drinks. The disease often makes its appearance just when the drinker, alas! too late, is making up his mind that the poison is really hurting him, and is thinking of reforming.

The lower portion of the left lung shows the condition of the lung when congested from the use of alcohol.

At D is shown a HEALTHY KIDNEY.—The function of the kidneys as eliminative organs is the most important of that of any similar structure in the body. When once thoroughly diseased, recovery is seldom possible, and the victim goes steadily down to the grave.

E illustrates the ENLARGED FATTY KIDNEY OF BEER DRINKERS.—It is universally considered by physicians of large experience that the use of alcoholic drink is one of the most common causes of diseases of the kidneys. Beer-drinking is particularly productive of disease of these organs, often causing enlargement of the kidney and change of its structure to a sort of fatty tissue which is wholly incapable of the performance of the proper work of the organ. The great frequency of diseases of the kidneys among beer-drinkers has long been remarked by medical men.

F shows the ATROPHIED KIDNEY OF GIN-DRINKERS.—The effect of strong liquor, as gin, whisky, rum, or brandy, upon the kidney is somewhat different from that of beer and other liquors which contain less alcohol, causing it to shrivel, and destroying its utility.

G represents a HEALTHY LIVER.—This, the largest gland of the body, performs the most complicated function of any similar structure, and cannot suffer derangement without seriously affecting the whole vital economy. When liquor is taken into the body, it affects, first of all, the stomach, next the blood, and next comes in immediate contact with the liver. This self-sacrificing organ endeavors to save the rest of the body by absorbing the poisonous liquid much as a sponge soaks up water. On this account the effect of alcohol is soon apparent in causing derangements of this great vital organ as manifested in frequent biliousness, and finally in fatty degeneration and enlargement. Some time ago we made an examination of a case in which the liver had enlarged to such an extent, through fatty degeneration, as to nearly fill the abdominal cavity.

H represents a peculiar disease of the liver resulting from the use of alcohol, known as nut-meg degeneration. The term "nut-meg degeneration" is employed on account of the remarkable resemblance of the cut surface of the liver subject to this disease, to the smooth surface of a half-grated nut-meg.

The liver also undergoes a change known as fatty degeneration, its proper tissue being changed to fat. I represents a small bit of a fatty liver magnified many thousand times by a powerful microscope. The round white spots represent globules of fat which have taken the place of the proper liver structure, giving to the organ a whitish color, and a consistency resembling that of cheese.

Such a liver is utterly unable to do its proper work of making bile, and it is no wonder that a drinker looks bilious and feels bilious.

J shows the ATROPHIED OR HOB-NAILED LIVER OF A HARD DRINKER.—This is a fac-simile of the liver of a victim of intemperance. As may be seen by comparing its size with that of the healthy liver shown at G, it is contracted to about one-fourth the proper size. The left lobe of the liver, which constitutes nearly one-third of the healthy organ, is only represented by a little nodule, its natural form being wholly destroyed. Another peculiar feature of this disease of the liver is the appearance presented by the surface, which is covered with little elevations, giving it a striking resemblance to the sole of an English cartman's shoe, which is thickly studded with hob-nails, through which fact it is generally known as the "hob-nailed liver." It is also known as the "gin liver," since it is seldom, if ever, found except as the result of the use of strong liquors.

By the aid of a little instrument known as the opthalmoscope, the interior of the eye can be inspected with as great minuteness as that of any portion of the surface of the body. When thus examined, a healthy eye presents the appearance shown at K. The small disc in the center of the circle is the point at which the optic nerve enters the eye. At or near the center of the disc, arteries and veins are seen entering the eye and diverging in every direction.

Occulists long since discovered and published to the world the fact that *amaurosis*, a disease in which the optic nerve is seriously affected, is much more frequently the result of the use of tobacco and whisky than of any other cause. At L may be seen the appearance of such an eye, as shown by the opthalmoscope, in wide contrast with that of the healthy eye shown at K. It should also be mentioned in this connection that cataract is not infrequently the result of smoking, and numerous other diseases of the eye can be traced directly to the use of alcohol.

PLATE 10 represents the effects of alcohol and tobacco upon the pulse, as shown by an ingeneous little instrument known as the *sphygmograph*. We have examined, by means of this instrument, the pulse of persons addicted to the use of alcohol and tobacco many times, and have rarely failed to discover evidence of injury therefrom.

A shows the PULSE OF A HEALTHY PERSON.—This tracing we obtained from a strictly temperate person enjoying perfect health. The vertical lines in the tracing represent the wave produced in the arteries by the contraction of the heart. At each heart-beat the tracing needle of the instrument is thrown quickly upward, and then curves more or less irregularly downward during the interval between the pulsations. It will be noticed that the curves of the several pulsations are almost absolutely uniform, which indicates a healthy condition of the heart, and that it is able to perform its proper work.

B shows the PULSE OF A MODERATE DRINKER.—This tracing was obtained from the pulse of a person accustomed to the use of wine, just after a dinner at which he had indulged in his usual libations. In place of the strong, uniform curves seen in the tracing from a healthy pulse, we have simply a waved line, indicating in the most graphic manner the depressing effect of alcohol upon the heart, even in moderate quantities, when habitually used.

C represents the PULSE OF A DRUNKARD. This tracing was obtained from the pulse of an habitual drunkard, who was just recovering from an attack of delirium tremens. The irregular character of the tracing well represents the peculiar, nervous, jerking pulse of the weak heart laboring under the influence of intense mental excitement.

D shows the PULSE OF AN OLD TOBACCO-USER.—This tracing is from a person debilitated by the long continued use of tobacco. It indicates the unsteadiness of the action of the heart, which is one characteristic of the effects of this poisonous drug. We have found it to be one of the most frequent causes of irregular heart action, intermittent pulse, and pain in the region of the heart. It is undoubtedly a great cause of heart disease and sudden death.

E represents the pulse of a young man who had recently learned to smoke, and was suffering from the profoundly poisonous effects of nicotine upon the nerve centers of the heart. The heart was so enfeebled that the pulse was a mere flutter, as shown by the slight deviation from a straight line, of the tracing made by the sphygmograph.

The effect of tobacco upon the heart, as well as upon the brain and other organs, is now so well recognized that boys and young men are, in some countries, prohibited its use, it having been found that in districts where it was generally used by boys and young men, it was difficult to obtain the quota of sound men for the army.

We have now considered some of the principal effects of alcohol upon the body, but have by no means canvassed the whole subject. We have said nothing of the innumerable functional disturbances occasioned by alcohol and tobacco. Neither have we said anything of the terrible hereditary results of the use of this poison. Recent researches have shown that intemperance in parents is one of the most prolific causes of insanity in children. Our insane asylums are filled with the demented and maniacal progeny of tippling parents. Alcohol is a poison, intrinsically bad, without one redeeming feature, a deadly foe to the physical, mental, and moral well-being of the race.

Fasting to Relieve Obesity

In an attempt to get rid of surplus flesh by reducing the intake of food, it is highly important to avoid robbing the body of its store of protein as this must result in wasting of the muscles, weakening the heart, depreciating the blood and generally injuring the vital machinery. Carefully conducted experiments by Magnus-Levy, Beinstein, and others, have shown that if the dietary is not reduced much below twO-thirds of the actual requirement, that is, not more than one-third below the energy output, the protein of the tissues will not be attacked while the fat will be progessively consumed. It is especially important to note in arranging the dietary for a fat patient that the protein may be protected by making the diet consist almost exclusively of carbohydrates. That is, fats should be almost withdrawn from the diet. The protein intake may be kept at the minimum, and the carbohydrates should constitute the greater part of the ration.

Special Characteristics of Animal Foods.

Milk and eggs are animal foods especially adapted not only to meet the needs of young animals in general but to suit exactly the nutritive requirements of infant animals of the particular species to which the animal producing the milk or the egg belongs; that is, cow's milk is exactly suited to meet the needs of calves. Goat's milk is different and is adapted to kids. The milk of the dog or the seal is still different, and is precisely adapted to the young of these animals. A young animal may be raised on the milk of an animal of another species, but not without considerable difficulty and risk, and not infrequently the experiment is a failure. Of the 300,000 infants who die in the United States annually not less than nine-tenths are bottle-fed infants, a fact which bears eloquent testimony to the inferiority of cow's milk to human milk for human infants.

The yolk of an egg is a complete foodstuff, and is easily digestible; whereas, the white of egg in a raw state is almost totally indigestible in the alimentary canal of human beings. Eggs are poisonous to some people. Cooking, however, to a large degree lessens this toxic property of eggs.

Of the three sorts of animal foodstuffs, milk, eggs and flesh, milk is the only one that contains any appreciable amount of carbohydrates. In cow's milk about one-third of the total solids consists of lactose, or milk sugar, a wholesome carbohydrate, although one which is utilized with much greater difficulty than any other of the sugars. Cow's milk is almost totally lacking in iron, while flesh foods are equally deficient in lime. The yolk of the egg is well supplied with both lime and iron. Milk and egg yolks furnish a rich supply of vitamins. Meats are very deficient stored in the liver and kidneys, just as the lime is almost wholly
tr in vitamins for the reason that in animals the vitamins are chiefly

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vegetable foodstuffs. It will not only supply its own complete proteins, but will furnish the elements necessary to render complete the proteins of other foodstuffs to which it is added.

Eggs also are an important and competent source of complete proteins. And so we are not compelled to resort to the use of flesh foods for our essential supply of complete proteins, although it is important that care should be taken to make certain that the dietary is not deficient in this essential element. This may be accomplished even when the dietary is otherwise exclusively vegetable by the inclusion in the daily bill of fare of milk to the amount of 16 to 20 ounces. With a diet of cereals, such as corn, the addition of 10 per cent. of milk protein (Sherman) is found to be sufficient to insure perfect nutrition.

MEATS

Flesh foods are not the best nourishment for human beings and were not the food of our primitive ancestors. They are secondary or second-hand products, since all food comes originally from the vegetable kingdom, being the product of the magic chemistry of the chlorophyl grain. There is nothing necessary or desirable for human nutrition to be found in meats or flesh foods which is not found in and derived from vegetable products.

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Inter-Al

The International Scientific Food Commission which met in London, Rome and Paris during the World War was without doubt the most authoritative body which ever considered the subject of human nutrition. At its Paris meeting the question of a minimum meat ration was discussed by the commission, but it was decided to be unnecessary to fix a minimum meat ration *"in view of the fact that no absolute physiological need exists for meat, since the proteins of meat can be replaced by other proteins of animal origin, such as those contained in milk, cheese and eggs, as well as by proteins of vegetable origin."*

3

stored in the bones, leaving the lean flesh, the part commonly eaten as food, almost wholly deficient in vitamins as well as lime, two highly important food principles.

Food iron, another essential food principle, is present in meat, but in not nearly so large an amount as is generally supposed. Most of the iron contained in the body of an animal is found in its blood. In the slaughtering of an animal most of this is lost, the amount left being so small that an ounce of beefsteak contains no more iron than the same weight of garden greens such as spinach, and only half as much as is found in the same weight of certain greens, as red root or dock. Graham bread, the date, the fig, and a score of other common vegetable foodstuffs, contain as much or more iron as does meat, and iron of better quality (Sherman).

The only particular in which all animal foods are superior to most vegetable foods is in the amount and quality of the protein which they supply. The protein of milk, eggs and meat is necessarily complete protein; that is, it contains all the elements (amino acids) essential for the building of animal tissues.

Most vegetable proteins are incomplete, although there are many vegetable products, such as almonds, peanuts, soy beans, and probably many more not yet discovered which contain complete proteins.

The protein of grains and of most of the common staples which have been selected for human consumption are incomplete, and it is probable that this is the principal biologic reason why meat has come to be considered an essential part of the dietary in cases in which grains are the chief food staple. The lack of knowledge of this fact has been the principal cause of failure in some attempts to live on a diet consisting exclusively of vegetable foodstuffs. It is possible, however, to select from the vegetable kingdom a complete and satisfactory diet, as has been abundantly proven by McCollum, Hindhede and others. It must be admitted, however, that the present supply of available vegetable foodstuffs containing complete proteins is not large enough to furnish the great population of the world with a sufficiency of this essential element.

We are glad to be able to say at once, however, that it is not on this account necessary to resort to the use of flesh foods, for, as McCollum and Sherman have abundantly proven, milk is even better adapted than is meat to complement the proteins of

Rose

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The United States Department of Agriculture sends out a circular prepared by C. F. Langworthy and Caroline L. Hunt, in which we are informed that "it is of course possible to eat meat dishes less frequently (than once a day), or to *omit meat from the diet altogether, for it has been determined that all the necessary protein and energy may be obtained from other materials, if one so desires and the diet is so arranged that it remains well balanced.*"

Recent writers on nutrition* call attention to the fact that "Of late there has been a distinct reaction in the meat-eating of the wealthier classes, and one sees less meat and more vegetable habits as they progress upward in the scale of civilization, and find they need less of the stimulating qualities of animal protein; and, because, also, on account of their sedentary habits, people find that the ingestion of considerable quantities of animal protein, with the consequent increase in intestinal putrefaction, gives rise to symptoms of toxemia, which have assumed a very definite place in the pathology of disease."

"We could entirely dispense with meats without suffering any ill effects whatever," says McCollum.

The Iron of Meats.

Meats, fish, flesh, and fowl contain a considerable amount of iron, but it is of an inferior character. An ounce of lean beef contains one-fourteenth of a day's iron supply, but of medium fat beefsteak one must eat a pound and a half to get a day's iron ration. And if fish is the sole source of supply, one is obliged to eat seven and three-quarters pounds to meet his daily iron need. Such quantities of meat would burden the body with a great excess of protein, two to five times the amount needed and safe.

Blood is naturally rich in iron because of the hemoglobin, the special iron-containing element of all animal life. An ounce of blood contains exactly the amount of iron which replaces the daily loss of the body. The red color of meat is due to the blood which it contains, and this is the source of its iron content.

Look at later

14 A

BAD HABITS IN EATING

211

direction.

Errors in Diet

HYGIENE OF DIGESTION.

Probably no part of the vital economy is subjected to so much abuse as the digestive organs. The majority of people eat and drink what their fancy or tastes call for, not once taking into account any possible injury which may result to the stomach from what is put into it. The stomach is treated like a garbage box, and then is expected to do its duty, or rather to dispose of the indigestible messes imposed upon it, promptly and uncomplainingly. If it lags a little in weariness from overwork, instead of being allowed to rest like any other organ of the body when tired, it is whipped up and goaded on by stimulants in the shape of spices, mustard, pepper, and other condiments, and often even with wine, beer, ale, brandy, and other artificial means of getting out of an organ more work than it is able to do.

The importance of this subject demands serious attention. Its neglect has made the American people a nation of dyspeptics. We may therefore be justified in devoting considerable space to this topic, and going quite fully into the details of it, so that some practical benefit may be derived from its consideration.

From our study of the anatomy and physiology of digestion we have acquired a pretty good knowledge of the principles of the subject. Now let us apply these principles, and by so doing we shall be able to discover that many of the most common customs relating to eating and drinking are in direct opposition to the laws of healthy digestion. And first, as one of the most common of all dietetic errors we will mention—

Hasty Eating.—That Americans are everywhere noted for the precipitate manner in which they bolt their meals, tumbling into their stomachs indiscriminately material that is digestible and indigestible, and spending only enough time to reduce the food to a sufficient degree of fineness to allow it to be swallowed without choking,—often hardly enough for safety in that regard,—is too well known to require special confirmation. The average American eats as he works, recreates, and does everything else, in fact, on the high-pressure system. He treats his mouth like a corn-hopper, and his stomach like a garbage box.

The evils resulting from hasty eating may be enumerated as follows :—

1. From deficient mastication, the food is not properly divided, so that the digestive juices cannot gain access to its various elements.

2. By being retained in the mouth too short a time, an insufficient amount of saliva is mingled with it, so that salivary digestion cannot be properly performed. As the saliva is also a stimulus to the secretion of gastric juice, stomach digestion must necessarily be imperfect.

3. Again, the food entering the stomach in a coarse, unmasticated state, may act as a mechanical irritant to the delicate lining of the stomach, and thus occasion congestion and gastric catarrh, one of the most common disorders of the stomach, and one which is often very obstinate in its nature.

Drinking at Meals.—In addition to the evils which it occasions directly, hasty eating induces an individual to drink largely of hot or cold liquids to wash the food into the stomach. Thus, two evils are associated. Liquid of any kind, in large quantity, is prejudicial to digestion because it delays the action of the gastric juice, weakens its digestive qualities, and checks the secretion of saliva. In case the fluid is hot, if in considerable quantity, it relaxes and weakens the stomach. If it is cold, it checks digestion by cooling the contents of the stomach down to a degree at which digestion cannot proceed. Few people are aware how serious a disturbance even a small quantity of cold water, iced cream, or other cold substance, will create when taken into a stomach where food is undergoing digestion. This process cannot be carried on at a temperature less than that of the body, or about 100°. Dr. Beaumont observed that when Alexis St. Martin drank a glassful of water at the usual temperature of freshly drawn well-water, the temperature of the food undergoing digestion fell immediately to 70°, and did not regain the proper temperature for more than half an hour.

Of course the eating of very cold food must have a similar effect, making digestion very tardy and slow. If any drink at all is taken, it should be a few minutes before eating, time being allowed for absorption before digestion begins, or an hour or two afterward. If the meal is mostly composed of dry foods, a few sips of warm or moderately hot water will be beneficial rather than otherwise, taken at the beginning of the meal or at its close. An eminent European investigator, Rovighi, demonstrated that the free use of liquids at meals increased intestinal autointoxication to such a degree that the urine contained four times as much putrefaction products as when a similar meal was taken dry. Schumann obtained similar results. The best time for the free use of liquids is between two and three hours after eating and an hour before eating.

Eating too Frequently.—One of the most pernicious customs of modern society is that of frequent meals. This custom is seen in its extreme development in England more clearly than in this country, five meals a day, including lunches, being there thought none too many. The idea seems to prevail that the stomach must never be allowed to become empty under any circumstances. In this country, three meals a day is the general custom, though more are often taken. Healthy digestion requires at least five hours for its completion, and one hour for rest before another meal is taken. This makes six hours necessary for the disposal of each meal. If food is taken at shorter intervals than this, when ordinary food is eaten, the stomach must suffer disturbance sooner or later, since it will be allowed no time for rest.

Again, if a meal is taken before the preceding meal has been digested and has left the stomach, the portion remaining, from its long exposure to the influence of warmth and moisture which especially favor fermentation, is likely to undergo that change in spite of the preserving influence of the gastric juice, and thus the whole mass of food will be rendered less fit for the nutrition of the body, and the stomach will be liable to suffer injury from the acids developed.

Eating between Meals.—This is a gross breach of the requirements of good digestion. The habit many have of eating fruit, confectionery, nuts, sweetmeats, etc., between meals, is a certain cause of dyspepsia. No stomach can endure such usage. Those who indulge in this manner usually complain of little appetite, and wonder why they have no relish for their food, strangely overlooking the real cause, and utterly disregarding one of the plainest laws of nature.

This evil practice is often begun in early childhood. Indeed, it is too often cultivated by mothers and the would-be friends of little ones, who seek to gratify them by presents of confectionery and other tidbits of various sorts. Under such a regimen, it is not singular that so many thousands of children annually fall victims to stomach and intestinal diseases of various forms. In great numbers of cases, early indiscretions of this sort are the real causes of fully developed dyspepsia in later years.

Irregularity of Meals.—Another cause of this disease, which is closely related to the ones just mentioned, is irregularity respecting the time of meals. The human system seems to form habits, and to be in a great degree dependent upon the performance of its functions in accordance with the habits formed. In respect to digestion this is especially observable. If a meal is taken at a regular hour, the stomach becomes accustomed to receiving food at that hour, and is prepared for it. If meals are taken irregularly, the stomach is taken by surprise, so to speak, and is never in that state of readiness in which it should be for the prompt and perfect performance of its work. The habit which many professional and business men have of allowing their business to intrude upon their meal hours, quite frequently either wholly depriving them of a meal or obliging them to take it an hour or two later than the usual time, invariably undermines the best digestion, in time. Every individual ought to consider the hour for meals a sacred one, not to be intruded upon under any ordinary circumstances. Eating is a matter of too momentous importance to be interrupted or delayed by ordinary matters of business or convenience. The habit of regularity in eating should be cultivated early in life. Children should be taught to be regular at their meals and take nothing between meals. This rule applies to infants as well as to older children. The practice of feeding the little one every time it cries is a most serious injury to its weak digestive organs. An infant's stomach, though it needs food at more frequent intervals,—two to four hours according to its age,—requires the same regularity which is essential to the maintenance of healthy digestion in older persons.

Irregularity in eating disturbs the rythmic action of the intestine and gives rise to constipation. In infants the bowels move naturally soon after each feeding. Under physiologic conditions, this would probably be true of adults also. The enormous evils which arise from constipation and the intestinal autointoxication which results from it can scarcely be estimated.

The Proper Number of Meals.—How many meals should be taken by a person in health? The answer to this question depends somewhat upon the habits of the individual, his occupation, number of hours of labor, etc. There is good reason to believe that for a large share of those who now take three to five meals a day, two would be much better. The modern frequency of meals is due to a gradual losing sight of the true function of food and of eating, and making the gratification of the palate the chief object, instead of the nourishment of the body. It is distinctly a modern custom. That the system can be well nourished upon two meals a day is beyond controversy, seeing that not only did our vigorous forefathers require but two meals a day, but hundreds of persons in modern times have adopted the same custom without injury, and with decided benefit.

In determining the number of meals, it is important to take into consideration both the quantity and the quality of the food eaten. Liquid foods generally pass out of the stomach within fifteen to thirty minutes after they are eaten, provided the quantity is not too great and if they do not contain a considerable amount of fat. Fats of all sorts pass out of the stomach slowly. Foods which require gastric digestion are longer retained. Foods which are taken in a liquid state or which quickly become liquid in the stomach may be taken in small quantities at frequent intervals, as every two or three hours, in cases in which the stomach is unable to bear an ordinary meal.

Persons who engage in hard physical labor may generally take three meals a day without detriment, especially if care is taken to make the last meal of the day consist of simple, easily digestible food, consisting chiefly of fruits and cereals. Pastry should always be avoided at the evening meal. Persons who eat heartily at night should take a very light breakfast. Such persons will find great benefit from restricting the breakfast to fruits and cereals. The author does not recommend the "no breakfast" plan. The taking of something into the stomach in the morning is valuable as a means of promoting intestinal activity and preventing constipation. The writer has followed the two-meal plan for more than forty years with profit.

Eating when Tired.—This is one of the most certain causes of derangement of digestion, and one to which a very large number of cases of dyspepsia may be traced. The third meal of the day is almost always taken when the system is exhausted with the day's labor. The whole body is tired, the stomach as well as the rest. The

Soy Acidophilus Milk

Soy Acidophilus Milk is sold in glass bottles holding one pint each.

The product is carefully packed and will keep for weeks, even months, but is most effective when used immediately.

Making Soy Acidophilus at Home

To accommodate those who desire to economize as much as possible and for hospital and dispensary use, we have devised a plan for making acidophilus at home. We send the ingredients processed and ready to be put together as needed for use. By this means the cost may be reduced about one-half.

For further particulars address:

THE BATTLE CREEK FOOD CO.
Battle Creek, Michigan

Gal. 5

Peptic Ulcer and Chronic Duodenitis

Ulceration and other lesions of the stomach and duodenum due to infection, rarely fail to show immediate improvement when Soy Acidophilus Milk and Lacto-Dextrin are administered together.

A well-known New York surgeon who had for years suffered from duodenal ulcer, which resisted the therapeutic efforts made by many eminent physicians, finally sought relief through operation, and for this purpose visited a famous clinic. Operation was declined because of the condition of his heart, and the "Sippy" treatment recommended. This gave only very partial relief. He still suffered greatly and constantly, was weak, depressed and wholly incapacitated for work. Within 48 hours after he began taking Soy Acidophilus Milk and Lacto-Dextrin, complete relief from pain was experienced. In less than six weeks, the patient found his general condition, as well as the digestive disorder, so greatly improved that he was able to resume his practice, and after several months is still in good health.

Constipation and Colitis Are Controlled by Acidophilus Cultures

Rettger and his colleagues have shown that all forms of colitis and "irritable colon" may be successfully treated by acidophilus therapy. In the great clinical experience of the Battle Creek Sanitarium, many hundreds of cases of colitis have found relief by the use of acidophilus cultures, supplemented with Lacto-Dextrin and other physiologic means.

Rettger's results were generally temporary, lasting only so long as the cultures were taken in liberal doses, because no change was made in the dietary. More permanent results are obtained by the Battle Creek Method, which requires a definite change in dietetic and other habits, such as the disuse of tobacco as well as of alcohol, which Rettger's observations showed to be wholly inimicable to change of the intestinal flora. Restriction of the protein intake is necessary for definite and permanent results, together with continuous use of the culture and Lacto-Dextrin or lactose. The use of the putrefying fresh meats of the markets will, of course, at once cause a return of the putrefactive type of flora. ?

Insanity-Manic Depressive Type

Experienced psychiatrists are familiar with the fact that in cases of the depressed type the stools are highly putrid and in many cases there is very obstinate constipation, often the tongue is very foul and the breath malodorous. In such cases most brilliant results almost invariably follow the use of the Soy Acidophilus Milk and other means for changing the intestinal flora. As the tongue clears, the mental symptoms disappear, and it is not infrequent experience to see patients restored to mental soundness within a few weeks after having spent many months or years in institutions for the insane. In several cases treated by the use of Soy Acidophilus Milk, the results have been most gratifying, being both rapid and permanent. Improvement has been so rapid as to be almost spectacular. One institution in which these methods have been adopted, the percentage of recoveries was increased 250 per cent.

Cardo-Vascular Renal Disease and Angina Pectoris

In cases of myocarditis, arterio-sclerosis, angina pectoris essential hypertensim and renal disorders, very definite and more or less permanent results are very uniformly secured by means which suppress intestinal putrefaction and thus greatly reverse the work of the kidneys and the liver. Blood pressure and non-proteric nitrogen drop to lower levels. Especially the diastolic pressure pain attacks cease or become much less frequent and the patient experiences a remarkable rejuvenescence.

How to Use Soy Acidophilus Milk

The soy milk culture of the *Lactobacillus acidophilus* is not only a most valuable therapeutic agent but it is likewise a highly nutritious food. It looks like ordinary buttermilk and has its pleasant acid flavor. It may be taken at meals with other foods, as milk or buttermilk is used; or, if preferred, it may be taken between meals.

If the flavor is found to be objectionable, the milk may be diluted with water, dairy milk, cream, or tomato juice.

Gal. 6

The quantity of Soy Acidophilus Milk required for rapid change of the flora is a sufficient amount to flush the entire alimentary canal. Two or three pints daily will produce a change of the intestinal flora if care is taken to take with 3 to 6 ounces of Lacto-Dextrin, and to thoroughly cleanse the colon every night by means of enemas or colon irrigation.

Rettger's observations, as well as those of our own research experts, have shown that in order to effect a change of the intestinal flora, it is necessary that the intestine should be flooded with a vigorous growing and rich culture of acidophilus in quantities of at least one to two pints daily.

Although the stools show immediate improvement, the daily use of such a culture must be continued for several weeks or months to produce permanent results and after that a carefully regulated dietary must be followed, and Lacto-Dextrin should be used in sufficient quantities to prevent the gradual disappearance or loss of dominance of the *Lactobacillus acidophilus*, usually 2 to 6 ounces daily, at least sufficient to cause production of a moderate amount of intestinal gas, but not so much as to cause discomfort. For the best results, it is necessary to use the Soy Acidophilus Milk continuously, at least one-half pint, with Lacto-Dextrin. By this means a high percentage aciduric flora may be maintained (85 to 90 per cent) and putrefaction wholly suppressed. In infants, a 100 per cent aciduric flora may be maintained for months.

Lacto-Dextrin should be used with Soy Acidophilus Milk in order to develop a sufficiently vigorous growth of the protective organisms to dominate the field.

The amount of Lacto-Dextrin required for efficient action varies greatly in different persons. It is most needed in the colon and more likely to reach this part of the intestine than other sugars. Other carbohydrates which might serve as food for the *Lactobacillus acidophilus* are entirely absorbed in the small intestine. The amount of lactose actually needed in the colon is small, but in some persons digestion and absorption are so rapid that no lactose reaches the colon unless a large quantity, an ounce or two, is taken at a single dose.

The size of the dose of Lacto-Dextrin required is readily determined by the amount of gas produced. When much gas is formed, the amount of lactose or Lacto-Dextrin administered should be reduced until the gas does not cause inconvenience.

Irrigation of the colon with Soy Acidophilus Milk is highly successful in cases of colitis, either acute or chronic, and in diarrhea, dysentery and in cases of obstinate constipation.

With irrigation of the colon, the Soy Acidophilus Milk and Lacto-Dextrin are most useful in cases of diverticulosis. This treatment not only arrests the progress of the disease by suppressing gas production, but robs it of its perils by eliminating streptococcic infection.

A good plan is to give the patient at breakfast two five-grain capsules of carmine, then to continue the evening colon washing until the red color disappears, thus making sure that the colon residues do not remain long enough to undergo putrefaction. By adding half a pint of Soy Acidophilus Milk to the enema, its effectiveness may be greatly increased and the implantation may be greatly facilitated, while gas production is notably diminished. Psyllium seed, or better, Kaba, is efficient means of combating intestinal stasis.

Cleansing the colon once or twice daily with a quart of Soy Acidophilus Milk diluted with an equal quantity of water, will greatly facilitate the change of flora, and is an excellent means of suppressing gas production. The acidophilus produces lactic acid which is non-volatile instead of CO_2, the production of which it suppresses. It also stops the production of offensive gases by suppressing putrefaction.

dextro-

Gal. 4

Every Bottle-fed Baby Needs the Soy Acidophilus Milk Culture

Since the bottle-fed baby does not come in contact with the maternal breast, it has no opportunity to acquire the protective aciduric organisms which the nursing baby gets from its mother. Because of this, its stools are likely to become infected and putrid so that it cannot thrive. A few spoonfuls of Soy Acidophilus Milk daily will provide and maintain a good protective intestinal flora, the best possible insurance against bowel disorders and a host of other ailments.

Nursing Mothers Need Soy Acidophilus Milk

The maintenance of a normal or nonputrefactive flora by an expectant mother is one of the most efficient of all possible means of insuring protection against the child-birth complications arising from intestinal and renal disease and preparing her to provide her infant with a good protective flora.

The feeding of an efficient *L. acidophilus* culture is essential to the health and safety of bottle-fed babies. Breast-fed babies are not only supplied with mother's milk but also with the mother germs which they secure by the act of suckling. Mother's milk supplies the lactose necessary (6%) to stimulate the few acidophile organisms in the mixed flora derived from the mother to such a high degree that within a few days after birth they obtain the ascendancy over other organisms in the intestinal flora and become dominant in the infant's stools.

According to Tissier, of the Pasteur Institute, a nursing infant's stools, at the end of its first week of life, contain the bacteria usually found in adult stools, but by the end of the second week they show 75-100 per cent acidophilus, *B. coli*, putrefactive and other pernicious organisms having disappeared.

A very young infant should receive one or two teaspoonfuls of Soy Acidophilus Milk with each feeding. The amount may be advantageously increased to half an ounce at six months, if bottle-fed.

If bowel trouble develops in a nursing infant, as is often the case when the mother has a bad flora, Soy Acidophilus feeding should be begun as quickly as possible, with Lacto-Dextrin, a rounded teaspoonful for each ounce of the Soy Acidophilus Milk given.

Soy Acidophilus Milk Protects the Canadian "Quins" from Bowel Trouble

When the sagacious physician in charge discovered that the bowel trouble which appeared in his famous quintuplets last year (September, 1934) was doubtless due to the fact that, while his charges were receiving pure mother's milk, they were not having through suckling, the mother contacts necessary to inoculate them with protective bacteria, he gave them Soy Acidophilus Milk, and with the result that the bowel trouble promptly disappeared, and has returned only when the culture feeding has been temporarily stopped. On such occasions, it has been found that the stools soon become bad, the babies do not do well, and gas and distention appear. By the use of Soy Acidophilus Milk, the "quins" are kept free from bowel troubles.

Clinical Proof of the Efficiency of Soy Acidophilus Milk

This new product has been subjected to hundreds of laboratory tests in which its superiority over other cultures of the protective organism has been fully demonstrated. In addition, it has been used in many hundreds of cases during the last two years, both at the Battle Creek Sanitarium, and at the Miami-Battle Creek Institution, and has shown itself, when used in connection with Lacto-Dextrin, to be the most efficient means thus far discovered of changing the intestinal flora and arresting intestinal putrefaction.

Improvement in the character of the stools is shown within a few days after beginning the use of the culture in an efficient manner. The odor will become less offensive, and usually the stools will be more normal in character. It is very desirable to have an examination made by a competent bacteriologist and an estimate of per cent of *L. acidophilus* present. The most satisfactory results appear when the percentage of aciduric organisms becomes 85 or more.

* galley 3

The above facts, as well as its own investigations, have so far discredited dairy milk cultures of _L._ _acidophilus_, usually called _acidophilus_ _milk_, as to justify the "Committee on Foods" in publishing in the _Journal of the American Medical Association_ for August 17, 1935, the following statement:-

"The implantation of acidophilic organisms in the intestine is an uncertain procedure even when large doses of an acidophilic culture are fed."

The above remarks apply solely to the dairy milk cultures which are offered to the public, often under the name "Acidophilus Milk," and not to the new and more potent "Soy Acidophilus Milk," described in this brochure, which the committee have not studied.

The general disappointment of clinicians with the results of using acidophilus milk led us to prepare and to present this new and much more potent culture of the unique and most useful microörganism which Nature has provided for the protection of the human organism against the invasion of pernicious parasitic bacteria.

Gal. 3

Special attention is called to this particular feature of the new culture, for the reason that disappointment in the results obtained from the use of acidophilus milk has become so general that it has been in the minds of many practitioners wholly discredited. But the failure to meet expectations must be charged not to *L. acidophilus* but to the inferior quality of most of the commercial products sold as acidophilus cultures which generally have *too small a number of living organisms to* be of any practical value as a means of implanting a new protective flora.

Of 105 samples of commercial acidophilus milk and concentrates examined by James, 79, or three-fourths, were found wholly worthless. Most of the rest were of little value. Observations by Rettger and by our own experts have given similar results.

Acidophilus Strains Differ. Various investigators have shown that ~~for best results~~ the human, or "X" type of acidophilus, is most likely to survive in the the human intestine. The "rat" or "Y" strains in common use in acidophilus milk are of doubtful value, often useless, as well as many other of the "Y" type. Only the "X" type of recent human origin is dependable. The strain employed in our soy acidophilus products is of this type, and from a human subject who showed a spontaneous native flora 85 per cent acidophilic.

How We Found This New and More Potent Acidophilus Culture

Several years ago our laboratory experts undertook a research to determine the influence of various foodstuffs on the growth of the protective organisms in the alimentary tract. Among other culture media employed, was a milk prepared from the soy bean, which has been used by the Chinese for many thousands of years as a substitute for dairy milk, cows being almost unknown in the Orient. To our surprise, we found that in this soy milk, the *Lactobacillus acidophilus* grew with extraordinary vigor.

Another striking and important feature of the soy culture is the fact that while the cow's milk culture deteriorates so rapidly after a few days that in a few weeks its potency is practically lost, the soy milk culture retains its vitality for many months.

Acidophilus Feeding Almost a Panacea for Bacterial Intestinal Infections

The recognition by bacteriologists and well informed internists that the intestinal flora may be changed by feeding lactose or dextrin and implanting a potent culture of *Lactobacillus acidophilus* and thus producing an aciduric flora, has brought within easy control a large class of intestinal disorders which have long been the cause of a vast amount of human misery and a source of great perplexity, and often chagrin, to medical practitioners.

Fortunately, the change of flora may be accomplished by simple, practical and dependable methods which comprise only regulation of the diet, increasing intestinal motility, and reimplanting the lost or inert protective microörganisms by liberal feedings of cultures of *Lactobacillus acidophilus* and Lacto-Dextrin.

Soy Acidophilus Milk, used according to directions, will quickly change the character of the stools when they are highly putrescent, or show any degree of putrefactive change. Foul odors quickly disappear, the tongue clears, the offensive breath disappears, headaches are mitigated, and often disappear entirely, attacks of migraine become less frequent, and may even cease; chronic colitis and pseudo-appendicitis, or colitis of the cecum, duodenitis, with symptoms often attributed to chronic constipation,— these, and many other chronic disorders of the stomach and intestines which are associated with, or produced by infection, usually improve with remarkable rapidity.

Pediatrists Watch Infants' Stools

Pediatrists have long recognized this fact in the case of infants, and progressive internists are coming to see that the same therapeutic principle applies with equal force, and may be utilized with equal success in adults.

** gal 2

Since 1917 several observers, first Howe and Hatch, and later Bunting, have called attention to the presence of aciduric organisms in carious teeth, but Bunting informs us that pyorrhea is very rarely found when L. acidophilus is present, from which the protective action against streptococci infection in the mouth as elsewhere may be inferred. Rettger, of Yale, who has made an intensive study of the bacteria of the alimentary canal during many years, insists that the aciduric bacteria of the mouth are of a different strain or type from those found in the intestine.

* galley 2

It has long been known that the vagina is protected by an aciduric flora, as is the intestinal tract, and Jötten claims that the protective microörganism long known as the "_Doederlein bacillus_," is identical with the _Lactobacillus acidophilus_. Nanjoks found _L_. _acidophilus_ usually present in the vagina of pregnant women. Cooper and other obstetricians, have found that by the use of Lacto-Dextrin as a vaginal dressing, the usual copious discharge is greatly lessened in volume and the usual unpleasant odor is replaced by a slightly acid odor. The temperature remains close to normal, the healing of lacerations is rapid and the patient's comfort greatly enhanced.

The ordinary American diet is such a highly unfavorable medium for the *Lactobacillus acidophilus* that in most persons the protective organism is so greatly reduced in numbers that it does not prevent the growth of proteolytic bacteria; the *Clostridium Welchii*, *B. coli*, and other allied organisms gain the ascendancy, the stools become putrid, and large quantities of indol, skatol, pyrrol, and other toxic products are produced, and indican appears in the urine. This condition will continue until the protective flora is restored. If some, even a few, of the aciduric organisms, *Lactobacillus acidophilus*, are still present in the intestine, the administration of lactose or Lacto-Dextrin will cause the *L. acidophilus* to develop so rapidly that it soon becomes dominant, the intestinal contents become normally acid, and putrefaction ceases.

The Protective Flora May be Restored by Reimplantation

It is thus evident that the *Lactobacillus* plays a most important rôle as a protective agent. When it is absent, Lacto-Dextrin will not create it; but in such cases, it may be restored by implantation, and this may be most effectively accomplished by the administration of the highly potent cultures of *Soy Acidophilus Milk;* and by the continued use of the culture, a nonputrefactive type of flora may be maintained in the intestine, and intestinal toxins and their malign effects may be suppressed.

Although some enthusiastic clinicians may have attributed to this organism greater therapeutic properties than the facts justify, it cannot be denied that the presence of a vigorous growth of aciduric organisms in the human colon, whether in the infant or the adult, is a practical and efficient means by which an enormous burden of unnecessary work in the destruction and elimination of putrefactive bacteria and their toxic products may be eliminated. By this means the energies of the body may be conserved and its ability to combat disease increased.

Lactobacillus Acidophilus With Lacto-Dextrin Successfully Combat Pathogenic Flora and Putrefaction

Professor Cruickshank, of Aberdeen, Scotland, demonstrated that *Lactobacillus acidophilus*, when its growth is stimulated by proper nutrients, so completely dominates the bacterial field that pathogenic organisms, such as streptococci, Welch's bacillus, colon bacillus, and other pathogenic organisms, disappear.

If to a culture medium consisting of a half pint of tomato broth containing Lacto-Dextrin, two grams of human fecal matter are added, after incubation for a week, examination shows a practically pure culture of *Lactobacillus acidophilus*, all of the numerous other organisms usually found in fecal matter having disappeared.

A thin paste prepared by mixing Soy Acidophilus Milk and Lacto-Dextrin will in a few hours wholly remove the unpleasant odor of foul ulcers, sloughing cancerous growths, and gangrenous tissues.

Suppressing Putrefaction

Since the researches of Coleman, Torrey and Rettger, all dietetic authorities recognize the importance of suppressing putrefactions in typhoid and other enteric infections by the use of lactose, which encourages the growth of aciduric organisms, but if these are not present, little benefit is derived from the use of this unique carbohydrate, which owes its efficiency to the fact that it is more likely to reach the colon in efficient quantities than any other. The reason is that this peculiar carbohydrate cannot be absorbed until it has been inverted into dextrose and galactose, a change which takes place in the mucous membrane of the intestine.

Even in cases of infection with *Entamoeba histolytica*, the distressing symptoms are almost immediately ameliorated by liberal doses of Lacto-Dextrin and Soy Acidophilus Milk, although specific remedies are of course needed for the extermination of the parasite. This is easily accomplished after the organisms have been attenuated by changing the flora and producing an acid culture medium in the intestine.

Worthless Acidophilus Preparations

A fresh culture of soy acidophilus shows a count of 1,000,000,000 to 5,000,000,000 per cubic centimeter, several times the number usually found in milk cultures.

SOY ACIDOPHILUS MILK

The New Acidophilus Therapy

A more potent culture and more efficient means of combating intestinal disorders and suppressing intestinal putrefaction by changing the intestinal flora

The BATTLE CREEK FOOD CO.
BATTLE CREEK, MICHIGAN

A NEW AND MORE POTENT CULTURE OF LACTO-BACILLUS ACIDOPHILUS

Soy Acidophilus Milk

The researches of Morro, Tissier, Torrey, Kendall, Coleman and Rettger prove conclusively that the *Lactobacillus acidophilus* is a protective organism provided by nature to defend the alimentary canal against invasion by parasitic, putrefactive, disease-producing microörganisms, particularly Welch's bacillus (*Cl. Welchii*).

In his recent work, "Lactobacillus Acidophilus and Its Therapeutic Application", Rettger presents invincible evidence that by a proper technic the protective flora, *L. acidophilus*, when lost, may be restored either by stimulation of the growth of the few surviving protective organisms which may be present in adult stools through Lacto-Dextrin feeding, or by the implantation of a hardy, vigorous, and reliable strain of artificially cultivated *L. acidophilus*.

The extensive clinical and laboratory researches of Kellogg and his colleagues of the Battle Creek Sanitarium have fully confirmed the conclusions reached by other scientific investigators, and with the results obtained by thousands of other physicians, place this new and most interesting bacteriodietetic therapy upon a sound foundation of demonstrated fact.

Intestinal Putrefaction Abnormal and Avoidable

Physiologists are agreed that *putrefaction is not normally present in the alimentary canal*, and the researches of Combe, Herter and a host of other pathologists, have shown that putrefaction products developed in the intestine, chiefly the colon, when absorbed into the blood stream, impose a heavy burden upon the liver, kidneys and other poison-destroying and poison-removing glands, lower vital resistance and interfere with nearly every vital process. Lee, of Columbia, made a study of the physiologic effect of indol and skatol, two well-known products of proteolytic decomposition, and found them to be powerful fatigue poisons, which clearly accounts for the malaise, depression, mental dullness and ineptitude so commonly associated with putrid stools, coated tongue, foul breath, indicanuria and other indications of intestinal toxemia.

The knowledge of these facts leads the up-to-date pediatrist to keep careful watch of his patient's stools. The wide difference between the stools of breast-fed and bottle-fed infants is related to the high morbidity of artificially fed infants, for whom official statistics show a mortality rate ten times that of breast-fed babies.

A putrid odor in the stools of adults is equally as significant as in the stools of infants, although less deadly because of the difference in body weight.

Source of the Protective Aciduric Organisms

A nursing infant gets from its mother something besides mother's milk, and something almost equally important, viz., the bacteria which form the basis of its intestinal flora. Normally, according to Dr. Tissier of the Pasteur Institute, the group of bacteria with which the infant becomes inoculated in the act of nursing, includes the aciduric organisms, *Lactobacillus acidophilus* and *bifidus*, which by the aid of the lactose of the milk flourish to an extraordinary degree and in a few days become dominant. These organisms produce lactic acid, which the objectionable bacteria — the putrefactive streptococci and various other pathogenic types — are unable to tolerate because they require an alkaline medium.

When the Flora is Lost

Unfortunately, the protective flora easily loses its dominance, which depends upon the presence of lactose in the food. When the infant is weaned, the diluted cow's milk usually given it contains only about one-third the amount of lactose found in breast milk, and this is not sufficient to maintain a vigorous growth of the *Lactobacillus acidophilus*. The stools lose their acidity and soon become putrid. When lactose or Lacto-Dextrin is added to the feeding mixture, this does not occur.

The Iron Content of Foods

The accompanying figures indicate the number of thousandths grains of iron in one ounce of food. The body requires daily at least one-fourth (250 thousandths) of a grain. The white figures on black ground indicate the average for each group. (See last section.)

LEGUMES

31

	Calories	Iron
Lentils	100	38
Garbanzos	100	31
Beans	100	31
Peas	101	25

WHOLE GRAIN CEREALS

23

	Calories	Iron
Rye bran	83	61
Wheat bran	70	34
Wheat	100	22
Rye	100	18
Oatmeal	113	17
Corn (dried)	109	13
Graham bread	74	11
Rice (brown)	100	9

GREENS

14

	Calories	Iron
Dock	17	28
Red root	17	28
Mustard	17	21
Spinach (cooked)	16	14
Dandelion	17	12
Chard	11	11
Turnip tops	17	10
Cabbage	9	5
Brussels sprouts	6	3
Lettuce	6	[illegible]

NUTS AND DRIED FRUITS

12

	Calories	Iron
Hazel nuts	95	18
Almonds	183	17
Dates	100	16
Figs (dried)	90	13
Prunes	86	13
Hickory nuts	202	13
Pecans	208	11
Zante currants	90	11
Raisins	90	9
Walnuts	200	9
Peanuts	155	9
Chestnuts	114	3

MEATS AND EGGS

8

	Calories	Iron
Oysters	14	21
Chicken	31	14
Steak (round)	54	13
Eggs	42	13
Liver	36	13
Tenderloin	81	11
Pork chop	96	11
Mutton	96	10
Trout	27	3
Herring	40	3
Halibut	29	3
Codfish	20	2

DENATURED CEREALS

4

	Calories	Iron
Pearled barley	100	8
Wheat flour (fine)	100	7
White bread	75	5
Macaroni	102	5
Corn bread	74	4
Hominy	100	4
Corn flakes	100	4
Polished rice	100	4
Rice flakes	100	4
Cornstarch	102	0

FRESH VEGETABLES

3.7

	Calories	Iron
Green peas	31	7
Potatoes	24	6
Carrots	13	6
Asparagus	6	6
String beans	11	5
Green corn	29	3
Beets	13	3
Cauliflower	9	3
Pumpkin		3
Kohl-rabi	9	3
Parsnips	18	3
Onions	14	3
Cucumber	5	2
Turnips	11	2
Sweet potato	35	2
Eggplant	8	[illegible]
Tomato	6	[illegible]
Celery		[illegible]

FRESH FRUITS

2

	Calories	Iron
Blueberries	21	4
Strawberries	11	3
Bananas	28	3
Blackberries	17	3
Raspberries	19	3
Cranberries	13	3
Cherries	22	2
Currants	16	2
Plums	24	2
Grapes	27	1
Pears	16	1
Grapefruit	15	1
Cantaloup	11	1
Apples	18	1
Peaches	12	1
Oranges	15	1

DAIRY PRODUCTS

2

	Calories	Iron
Cheese	125	6
Cottage cheese	31	4
Milk	20	1
Butter	218	1
Cream	55	1
Buttermilk	10	1

Battle Creek Health Foods Rich in Iron

50

	Calories	Iron
80% Gluten Bis.	100	150
Soy Bis.	100	70
40% Gluten Bis.	100	60
40% Gluten meal	100	60
Fig bran	50	34
Protose	70	25
Malt Sugar	104	22
Malted Nuts	150	19
Malt Honey	86	17

Savita 500 | **Food-Ferrin 1456** | **Sal-Savita 735**

THE BATTLE CREEK FOOD COMPANY

BATTLE CREEK, MICH., U.S.A.

To Balance the Diet for Iron

More than half the people of the United States are suffering from anemia. A sufficient cause for this condition is found in the fact that the average American diet is deficient in iron. The body loses daily of its precious store of 43 grains of iron, 250 thousandths of a grain (¼ gr.). At least this amount must be supplied by the daily food. In cases of anemia, the daily intake of iron should be very greatly increased to insure a rapid gain.

By the use of the table "The Iron Content of Foods" (see other side of sheet) the daily bill of fare may easily be balanced so as to insure any desired amount of iron. [illegible]eed as follows:

[illegible] Determine the amount of food, that is, the number of calories required. To do this, multiply the normal weight by 16. If a person's proper normal weight (that is, the weight for one of his height) is 150, his day's ration would be 2400 calories ($150 \times 16 = 2400$). (For normal weights, see table.) A person who is underweight should take more than the standard number of calories, and one who is overweight less.

2. Select from the table foods sufficient for three satisfactory meals, breakfast, dinner and supper, setting them down in a column and opposite, in separate columns, place the number of calories and the amount of iron contained in each portion selected, as in the following example:

	Ounces	Calories	Iron
[illegible]m bread	5	370	55
[illegible]eal	1 (dry)	113	17
[illegible]	24	480	24
Strawberries	4	44	12
Apples	5	90	5
Dates	3	300	48
Lentils	1	100	38
Potatoes	4	96	24
String beans	4	44	20
Spinach	4	64	36
Tomatoes	4	24	8
Cucumbers	2	10	4
Lettuce	2	12	6
Butter	3	654	5
		2401	320

In making up the list of foods from which the day's bills of fare, breakfast, dinner and supper are to be prepared, as many as possible are chosen from the food groups which are richest in iron. The foods in each group are arranged in order, according to their iron content.

Where care is taken to select the foods which contain the most iron, there will be no difficulty in arranging bills of fare which adequately meet the normal needs of the body.

In cases of anemia, in which it is desirable to very greatly increase the normal daily requirement, any required amount of iron may be easily made available by including in the bill of fare selections from the list of Battle Creek health foods rich in iron, and especially by the free use of SAVITA, SAL-SAVITA and FOOD-FERRIN. SAVITA and SAL-SAVITA are not only rich in iron but also extraordinarily rich in vitamin B, and hence may with great profit be added to the regular bill of fare of each member of the family, and especially growing children. FOOD-FERRIN renders extraordinary service in cases of anemia.

A little study of the table will readily show how greatly lacking in iron is the ordinary bill of fare, to say nothing of its other grave deficiencies. This is well illustrated in the following day's bill of fare, also selected from the table.

A Day's Ration Deficient in Iron

	Ounces	Calories	Iron
White bread	5	75	5
Rice	1	100	4
Milk	24	480	24
Cantaloup	8	88	8
Apples	5	90	5
Grapefruit	8	120	8
Trout	4	108	12
Potatoes	4	96	24
Tomato	4	24	8
Cauliflower	4	36	12
Eggplant	2	16	4
Green corn	3	87	9
Eggs	3(2)	126	39
Cucumber	2	10	4
Lettuce	2	12	6
Cane sugar	2	200	0
Cream	2	110	2
Butter	3	654	3
		2432	177

Although the above day's bill of fare, or ration, supplies an ample amount of energy, the calorie content being adequate, the iron content is only two-thirds the amount required to make good the daily losses of an adult; yet many thousands of persons are subsisting upon a diet containing a still smaller amount of food iron. For example, a growing child fed upon bread and milk receives scarcely more than one-third the amount of iron which he requires, as both milk and white bread are very deficient in iron.

Savita, Sal-Savita and **Food-Iron** are precious resources for making good the iron deficiency of foods, and thus building up and maintaining a high quality of blood, rich in the hemoglobin that is necessary for good health and stamina, and high resistance to disease.

But in this the Dispensatory is entirely out of date and is following obsolete precedents rather than up-to-date knowledge. Not an atom of scientific proof can be adduced in support of the assertion that alcohol is a stimulant or a supporting drug. Alcohol supports nothing but boot-leggers, alms houses, hospitals, prisons and lunatic asylums.

ALCOHOL - A DISCREDITED DRUG

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

FIFTY years ago scarcely a scientist of standing could be found who was willing to undertake the defense of total ~~abstinence on scientific grounds. Medical men believed~~ and ~~taught~~ that alcohol ~~was~~ a food, a stimulant, a remedy of the highest value; that it ~~was~~ indispensable in the treatment of collapse, surgical shock, in blood poisoning, in pneumonia, in tuberculosis or consumption, in weakness from whatever cause, as a preventive in exposure to contagion, ~~in protection from fevers,~~ in heart weakness from hemorrhage or other causes; ~~in fact,~~ alcohol ~~was~~ the one and universal remedy, first on the list of emergency supplies, the biggest item next to foods in the hospital expense bill, the most frequent prescription of the medical practitioner, and the prescription which he most often ~~took~~ himself. ~~The use of alcohol as a remedy was most emphatically endorsed by scientific men and supposed to be backed up by scientific evidence.~~

~~Today all this is changed.~~ Laboratory researches conducted by the aid of instruments of precision, the same class of instruments which measure the velocity of light, the movements of the stars, and by which the occult forces of nature have been revealed and studied—these delicate methods of precision have been brought to bear upon the study of alcohol and its effects upon the human body, and the result has completely upset and reversed the old beliefs and the old teachings.

Every function of the body has been subjected to the minutest scrutiny; every bodily activity and energy has been calipered with the finest accuracy. By this means we have become acquainted with the normal man. We know how long it takes him to think, to feel, to see, to smell, to hear, to taste. We know how much fuel in the shape of food is required to maintain body heat and to enable the body engine to do its work. We know how much oxygen is consumed, how many foot pounds of work can be done in a minute or in an hour or in a day. With a normal man before him, measured, calipered, tested and charted in every conceivable way, the modern laboratory physiologist has made a study of the influence of alcohol upon the human body, its tissues and its activities. The result has been the discovery that alcohol damages every tissue and impairs every function; that it is a universal poison; that it is of no essential assistance to the body under any circumstances whatever; that it is not capable of increasing strength or endurance or vitality one iota, but does the opposite.

Here are a few of the things which science has demonstrated that alcohol does to the body: In doses so small as one twenty-five hundredth of the body weight, that is, one ounce for a man weighing one hundred and fifty pounds, alcohol shrivels the nerve cells and impairs every mental function.

By most careful measurements, it has been found that under the influence of alcohol the fires of the body burn low, the amount of oxygen consumed is less, and the tissue activities are slow.

Alcohol is not a stimulant or a tonic in any sense of the word. It is a depressing agent, an anesthetic, a narcotic; it is the mother of many anesthetics.

The old idea that alcohol strengthens the heart and hence is just the thing to use in case of fainting, shock, or collapse, has been shown to be utterly fallacious. According to Professor Kronecker of Berne, Switzerland, a two per cent solution of alcohol (Bavarian beer), will paralyze a frog's heart. Ordinary beer and hard cider contain two or three times as much alcohol; wine, five to ten times as much; brandy and whisky, twenty to twenty-five times as much. Hence, the paralyzing effect of these strong liquors is proportionately greater.

One of the most notable discoveries made by modern scientific study of alcohol is the fact that it lessens vital resistance. Animals under the influence of alcohol are a more likely prey to germs. For example, pigeons, which are ordinarily proof against the bacteria which produce malignant carbuncle, under the influence of small doses of alcohol are easily infected and die.

When nearly fifty years ago the writer was walking the wards of Bellevue Hospital as a pupil of the Senior Flint, that most eminent therapeutist of his time was an enthusiastic advocate of the use of alcohol as a supporting agent in all conditions of vital exhaustion. Following Todd, Doctor Flint led the medical profession in this country to adopt the whisky bottle as a mainstay in the treatment of typhoid fever, pneumonia and most other acute febrile disorders, and for a whole generation this practice was current in this country in the treatment of fevers of all sorts. Even so late as the Spanish-American war, alcohol was relied upon as a chief remedy in the treatment of typhoid fever and pneumonia in the army.

Sir Thomas Barlow, who was one of the early dissidents from this practice, in commenting upon the great change which has taken place in the opinion of the medical profession in relation to the necessity for alcohol as a remedy, remarked that when the Temperance Life Insurance Society of England was formed, some of the men who constituted the first Board of Directors had actually been refused insurance by other companies because they were total abstainers; and when the Temperance Hospital of London was founded thirty years ago, threats were made that if any deaths occurred in the institution in cases in which alcohol had not been administered, a coroner's inquest would be demanded.

The medical profession of the whole world was at that time captivated by the teachings of Todd, whose sole prescription in a grave fever case was "more brandy," although Jenner, Gull, and other eminent English physicians of the time never endorsed the alcoholic methods of their countrymen.

Now that the struggle of a hundred years has at last resulted in placing in the organic law of our land a mandate against the manufacture or use of alcohol except in the arts and sciences and for medicinal purposes, the value of this agent as a remedy for disease has become a question of imminent importance. If alcohol is possessed of valuable properties as a tonic or a stimulant or a means of supporting the vital forces or functions of the body, then every old toper stands greatly in needs of it, and any physician is justified in prescribing the drug as a medicinal agent for every habitual user of alcohol who misses his matutinal or postprandial libation.

The National Dispensatory still recommends alcohol in the treatment of typhoid fever and as a circulatory stimulant in collapse, and in the treatment of pneumonia, scarlet fever, and other infectious diseases; also as an aid to digestion and as a supporting measure in tuberculosis and other wasting diseases.

Since the ordinary sale of intoxicating drinks has been outlawed by constitutional prohibition, some physicians have been willing to assist rum-thirsty citizens by supplying them with prescriptions to be filled at drug stores, relying upon such obsolete and erroneous teaching as that of the Dispensatory to support and justify their action. But there is good reason to believe that in the near future such pernicious statements will cease to appear in standard medical literature.

Several years ago, at its annual meeting, the American Medical Association, the world's largest body of organized scientists, adopted the following preamble and resolution:

"*Whereas*, We believe that the use of alcohol is detrimental to the human economy, and whereas its use in therapeutics as a tonic or stimulant or for food has no scientific value,

"*Resolved*, That the use of alcohol as a therapeutic agent should be discouraged."

This view is amply sustained by laboratory research and by the experiences in the treatment of wounded soldiers during the war. No informed medical man would now think of administering alcohol to combat shock or collapse, since it has been clearly shown that alcohol when introduced into the circulation, does not raise blood pressure and of itself produces the very conditions which are the fundamental causes of shock and collapse.

Alcohol Hinders Immunity

According to Professor Woodhead, experiments have been made with various animals which demonstrate that immunity cannot be established in an animal which is under the influence of alcohol. The reason for this is because alcohol not only lessens the resistance of the body, but also destroys its power to fortify itself against the attacks of germs and germ poisons; and Barlow calls attention to the fact that the conditions produced by the frequent administration of alcohol to fever patients are precisely the same as those produced by the "nipping of an inebriate tippler." In other words, the fever patient is made drunk, and in this condition the ability of the body cells to fight against invading germs that produce the fever is lessened, and the mortality is necessarily increased.

Alcohol Increases the Mortality of Typhoid Fever

The death rate under the old method of treating typhoid fever and pneumonia was from twenty to thirty per cent. Since the use of alcohol has been lessened, and water and other physiologic remedies have been substituted, the mortality from typhoid fever has been reduced to three to five per cent. In one series of twelve thousand cases the mortality was scarcely three per cent.

Alcohol Lessens Nerve Sensibility

Nervous impressions travel over nerves in a healthy person at the rate of ninety-one feet per second; but under the influence of alcohol the rate of transmission may be as low as thirteen feet per second. That is, under the influence of alcohol, seven times as long may be required to hear, feel, taste or to receive an impression of any sort, as by a normal person. Such a man called upon in an emergency would require at least seven times as long to make up his mind what he ought to do as a healthy person requires, and when large doses of alcohol are administered, the effects are still more pronounced. Certainly, this cannot be regarded as the effect of a tonic. Alcohol possesses no tonic or stimulant power. When taken into the stomach, there is a very slight, transient irritation produced, which gives the impression of a tonic or stimulant effect, but as soon as the alcohol has been absorbed into the blood, so that it actually comes in contact with the nerve centers and other delicate structures of the body, its real effects, which are those of a narcotic poison, become at once apparent.

Smiedeberg, more than twenty years ago, pointed out the fact that under the influence of alcohol "the finer degrees of observation, judgment and reflection disappear," and that all the effects produced by alcohol are really those of a sedative or paralyzing agent. Benedict, of the Carnegie Nutrition Laboratory of Boston, has shown that the depressant toxic effects of alcohol are produced by ordinary beverage doses, and that not alone the higher faculties are affected, but the automatic reflexes, including those which control the circulation and other vital functions. Indeed, the carefully conducted researches of Benedict and Wells showed that the reflexes are much more sensitive to the effects of alcohol than the higher faculties, and are the first to show its influence.

Some twenty-five years ago, the writer demonstrated by means of the chronometer of Verdin and other delicate measuring instruments, that alcohol, even in small doses, depresses all the nerve functions concerned in the reception of impressions through the sense of touch and sight. The reaction time was notably lessened, even by very small doses. The lifting power of the muscles was also reduced nearly twenty-five per cent by a dose of whisky. The maximum effect was noted at the end of one or two hours.

F. G. Benedict has published the results of elaborate studies of the effects of alcohol by means of the most delicate psycholic tests, conducted by himself and his colleagues, concerning which he says: "It will doubtless be considered of enormous practical significance that in none of the data have we any indication of the pure facilitation of the motor processes, but depression . . . seems to be one of the most characteristic effects of alcohol . . . . The general neuro-muscular depression may be regarded as presumptive evidence of the effect of alcohol on organic efficiency." In other words, Doctor Benedict found unmistakable evidence that alcohol is first, last, and all the time, a depressing drug, a poison which strikes at the very foundations of life.

Smith found that moderate amounts of alcohol daily (one to three ounces) for twelve days, diminish the power to memorize seventy per cent. Smith concluded that half a bottle of wine or two to four glasses of beer a day not only counteract the beneficial effects of "practice" in any given occupation, but also depress every form of intellectual activity: *that every man, who, according to his own notion, is only a moderate drinker, places himself by this indulgence on a lower intellectual level and opposes the full and complete utilization of his intellectual powers.*

Alcohol Weakens the Heart and Lowers Blood Pressure

One of the most common and pernicious of the popular errors relating to alcohol is the supposition that it somehow strengthens the heart. The full, bounding pulse, usually produced by the administration of an ounce or two of brandy, gives the impression of an increased vigor of heart action; but it is only necessary to determine the blood pressure by means of a ~~Riva-Rocci~~ instrument or ~~Gaertner's tonometer,~~ to discover that the blood pressure

proper

paralyzed

is not raised and may be lowered. ~~This lowering may amount to twenty or thirty millimeters or even more. The tonometer measures, not the average blood pressure, but~~ the actual force of the ~~heart. It can readily be seen, then, that~~ the bounding pulse is not the result of increased vigor, but indicates rather a weakened state of the heart, combined with a dilated condition of the small vessels.

In this connection, the fact should be recalled that the heart is not the only force involved in the circulation of the blood. It is doubtless the great engine of circulation, but it has been clearly shown by Schiff and numerous other physiologists that the movement of the blood is greatly aided by a rhythmic action of the small vessels, both arterioles and capillaries. These contractions are not simultaneous with those of the heart, but serve most efficiently in pushing the blood along toward the veins. The heart keeps the large arteries pumped full of blood, while by means of the contractile movements of the peripheral vessels, the blood is, so to speak, milked out into the veins.

Alcohol ~~dilates the small vessels, that is, paralyzes the peripheral heart.~~ The accumulation and sluggish movement of the blood in the ~~small vessels~~ is shown by the purplish hue of the skin in a person under the influence of alcohol—a wide contrast to the ruddy glow presented by the skin in which the small vessels are actively engaged in the pumping of the blood out of the arteries into the veins, an action in which the small vessels of the whole body may be made to participate by a suitable application of cold water to the surface. It is evident, then, that the beneficial effect of alcohol upon the ~~heart is apparent~~ only, and not real.

Alcohol in Shock and Collapse

The common practice of administering alcohol to persons in a state of shock or collapse from hemorrhage or accident, or a person who has fainted away, has been shown to be almost the worst thing that could be done.

The apparent beneficial results following the administration of alcohol in such cases are caused by the irritation produced by alcohol when it first comes in contact with the mouth and stomach. Alcohol is highly irritating to the sensitive nerves of the mucous membrane, and the irritation or excitation thus produced is followed by a slightly exciting effect. But this disappears very quickly, for as soon as the alcohol is absorbed, its narcotic or depressant effects begin to make their appearance. Then the vessels dilate, the heart's energy is weakened, and the pernicious effects of the drug become manifest. This fact is now so well recognized that railway surgeons instruct employees to avoid giving alcohol in cases of serious accident, as the effect of the drug may be to take away from the victim of a railway smash-up his one remaining chance for life. And at the present time, no up-to-date physician thinks of administering alcohol as a remedy for shock or collapse. Caffein, pituitrin, and other remedies of known value have long since replaced alcohol as a remedy for shock. In cases of sudden fainting, applications of cold to the face and chest, percussion over the heart, and compression of the abdomen, are other well-known measures which render prompt and efficient service, while alcohol renders no service whatever but does actual harm.

Alcohol Hinders Digestion

It has long been known to physiologists that the administration of alcohol excites the stomach and causes an increased flow of gastric juice. But Radzikowski, the famous Russian investigator, has shown that the gastric juice thus produced by the action of alcohol upon the stomach is absolutely worthless as a digestive agent since it contains no pepsin, which is one of the two essential principles required for digestion. Alcohol, then, only induces the stomach to pour out an acid liquid which has no digestive power. Professor Chittenden, the eminent director of the Sheffield Scientific School of Yale University, in experiments upon a dog, found that strong alcohol produced an abundant flow of gastric fluid, but he also observed that an equal quantity of simple water produced an equal amount of gastric juice. Further investigation showed that the gastric juice produced by the administration of water was possessed of much more powerful digestive properties than the gastric juice produced by the administration of alcohol. Since the alcohol was well diluted with water, it is possible that the actual effects produced by the diluted alcohol were the result of the water used with it rather than the alcohol itself. This conclusion is, in fact, irresistible in the presence of the fact that pure water, if taken in quantity of seven or eight ounces, produces a decided flow of gastric juice possessed of active digestive properties. And the further conclusion may also be drawn that alcohol actually hinders the development of pepsin, since the juice produced by pure water manifested more active digestive properties than the juice which followed the administration of diluted alcohol.

Other investigators, especially Haan, have shown that the influence of alcohol in stimulating the formation of acid by the stomach glands, is a temporary effect which rapidly disappears, so that the ultimate effect of the administration of alcohol is not only to hinder the formation of pepsin, but also to diminish the acid secretion as well. Large doses of alcohol cause the mucous glands to pour into the stomach a large amount of alkaline fluid which completely upsets stomach digestion.

The reason for this, according to the late Lauder Brunton, is that alcohol blunts the sensibility of the gastric nerves, so that the stomach fails to respond in a normal way to the natural stimuli of the foodstuffs. The only natural stimuli of the stomach are those which are found in normal food and water.

~~It is thus apparent that~~ alcohol does not aid digestion, but, on the contrary, hinders it. ~~A great number of authorities might be cited, the results of whose observations agree with those of Chittenden and others who have been referred to above.~~ It may fairly be said, indeed, that there is no fact in physiology more clearly established at the present time than that the use of alcohol as an aid to digestion has no support on scientific grounds.

The Hereditary Effects of Alcohol

The poisonous effects of alcohol have been well shown by the striking experiments of Doctor Stockard, of the Cornell Medical College, to determine the hereditary effects of alcohol. It was found that in the case of guinea pigs, if one parent was of normal heredity and the other from grandparents to which alcohol had been given, numerous defective offspring resulted. The descendants of inebriate guinea pigs were found to be dwarfed, weakly, malformed, sterile, and few survived more than a few days.

Dr. Raymond Pearl, of the Johns Hopkins University, conducted experiments to determine the effects of alcohol upon domestic fowls. He found that alcoholized fowls produced only one-half as many fertile eggs as the non-alcoholized. Doctor Pearl concluded that alcohol has a destructive effect upon the germ cells of fowls, as well as upon guinea pigs.

The facts clearly show the inevitable result of alcohol habits upon a community or a nation, and leave no room to doubt that inebriety is one of the powerful and insidious forces that is dragging humanity down through race degeneracy. Any influence which depreciates the germ plasm is a race poison, and hence a race menace.

Alcohol in Consumption

Fifty years ago, alcohol was regarded as almost a panacea for consumption. In nearly every large community could be found persons who had become confirmed drunkards through the use of alcohol as a remedy for pulmonary tuberculosis, or lung consumption. But this popular apology for the use of alcohol, like others of its sort, has been shown by modern research to be absolutely baseless. Indeed, it has been proved that alcohol produces consumption.

Alcohol is a Discredited Drug

The verdict of modern science respecting the use of alcohol in disease may be briefly summed up as follows:

(1) Alcohol never, under any conditions, increases the vital energy of the body, but, on the contrary, decreases it in a marked and uniform manner, through its poisonous influence upon the living cells.

(2) Alcohol is never a tonic or stimulant. It is always a narcotic, interfering with the bodily functions and lessening the nerve tone and vital energy.

(3) Alcohol always diminishes, never increases, the energy of the heart, and hence is detrimental rather than beneficial in cases of shock, collapse, fainting, etc.

(4) Alcohol increases the liability to infectious disease, and prevents the development of immunity.

(5) Alcohol does not aid digestion, but actually hinders it, especially in cases in which the digestion is already weak or slow; hence its use in connection with meals is absolutely unscientific and irrational, as well as its use as an aid to feeble digestion.

(6) Alcohol diminishes the alkalinity of the blood, and so diminishes the vital resistance and increases susceptibility to disease.

Laboratory research has now fully demonstrated the absolute folly of administering alcohol in any form or in any dose in cases of fainting, shock, collapse, weakness, heart failure, nerve failure, depression, or any other condition in which "support" or vital stimulation is required. As fast as the intelligent and conscientious members of the profession become acquainted with these highly important facts and become convinced of their reliability, they will renounce the use of alcohol, as they have already very largely done.

The observations of Benedict are of greatest importance for the reason that they negative the findings of Kraepelin, who reported that small doses of alcohol produced at first and for a short time so-called facilitation effects, or apparent stimulation. The more refined and careful research of Benedict and his colleagues have shown this to be an error. Any apparent stimulation caused by alcohol is due to the chemical irritation produced by its first contact with the tissues, an effect similar to that caused by strong acids, a hot iron, or any other gross irritant.

The mystic spell by which this subtle drug has held the race in bondage is broken at last. By the refined detective methods of the modern laboratory, the imposter has been exposed, and alcohol can no longer play the rôle of amiable stimulant which has for centuries given it first place in the doctor's list of remedies and every "first aid" outfit. It is destined rapidly to find its place among the numerous other discarded drugs which gained their reputation when science was in its infancy and unable to discover their deceptive character, but are unable to stand the searchlight scrutiny of modern laboratory methods.

In view of the above facts, what apology can be offered for the continued use of alcohol in medical practice? So far as the writer is himself concerned, he finds none, and is glad to be able to say that during an experience of fifty years as medical director of the Battle Creek Sanitarium, in the treatment of more than 175,000 patients, he has found no necessity for the internal administration of alcohol.

Evidently, alcohol is a discredited drug, and only waits the further diffusion of knowledge respecting the baneful and deceptive effects among the profession and the laity to lead to its retirement ~~as an~~ addition to the growing list of obsolete drugs.

and ~~The writer considers this question one of the most important that can be considered by the medical profession.~~ There can be no doubt that thousands of men and women have become addicted to the use of liquors through first taking liquor in some form on a physician's prescription. Many thousands more, comprising perhaps a proportion of the vast army of drinking men and women who are hurrying down to premature and drunkard's graves, owe their enslavement to alcohol to the popular belief in the strength- and health-giving properties of "good wine," "sound beer," "pure" cider, gin, champagne, etc.

The influence, the teaching and the practice of the medical profession must be held more responsible than any other single influence for producing and maintaining the alcohol habit, and a practical appreciation of the facts now known and recognized by the leading men of the medical profession as scientific truth would lead to the exclusion of alcohol from the *materia medica*.

The medical profession owes to society an obligation in relation to this question which should lead to a nation-wide effort by physicians to disabuse the minds of laymen of the false notions which are held respecting the value of alcohol as a stimulant, tonic, or supporting agent. Scientific research has stripped the deceptive drug of every one of its supposed virtues, and it stands exposed as the most delusive, treacherous and pernicious agent that has ever been widely trusted by mankind. The popular faith in its healing power, in its value as an emergency aid, must be uprooted by education. Physicians owe to their profession as an instrument of human welfare an earnest effort to destroy the false beliefs which the people have imbibed from age-long erroneous medical teaching and practice and upon which the public confidence in alcohol is based, and should be of all men most active and efficient in supporting the administration of prohibitory laws. And in no way can this be done more effectively than by the frank acknowledgment that alcoholic liquors are useless as remedies and the refusal to write prescriptions for their internal use.

idea that by the taking of food, the stomach or any other part of the system will be strengthened, is an error. When the stomach has a "faint and tired" feeling at night, of which many complain, what it wants is not food, but rest. A writer on indigestion says very truthfully, "A tired stomach is a weak stomach." When the stomach feels "weak and faint," rest is what is demanded, and is the only thing that will do it good; yet many people insist on putting more food into it, thus compelling it to work when it ought to be allowed to remain inactive until rested. The arm wearies by constant exercise, and so does the stomach, which is largely composed of muscles as well as the arm. Both secretion and muscular activity must be much lessened in a tired stomach, and the habitual disregard of this rule must be disastrous to the best digestion.

Violent exercise at any time just before or just after eating is inimical to good digestion, for the reason already assigned when the exercise is taken just before the meal, and because the vital energies are diverted to other parts—thus robbing the stomach of its necessary share—when the exercise is taken immediately after eating. An English physiologist performed an experiment which well illustrates the truth of this position. Having fed a dog his usual allowance of meat one morning, he took him out upon a fox hunt, and kept him racing over the country until night, when, having killed the animal, he examined his stomach at once and found the meat in the same condition in which it entered his stomach, no digestion having taken place. In another dog, fed with the same kind of food, but left quiet at home, digestion was found to be complete.

The hurry and press of business among Americans is allowed to override every consideration of health. It seems never to enter the thoughts of the average business man that any time is required for digestion. Rushing to his dinner from the plow, the workshop, or the counting-room, he swallows his food with all possible dispatch, and rushes back to his work again, begrudging every moment spent in meeting the requirements of nature. Many years ago, it was a custom in Edinburgh to suspend all business in the middle of the day for two hours, so as to allow ample time for meals. A similar custom once prevailed in Switzerland, we have been informed; but we presume that such a sensible custom is now considered too old-fashioned to be tolerated.

It should be remarked that severe mental labor immediately before or after, and especially during meals, is even more injurious than

325

physical employment. The habit many business men have of anxiously scanning the newspapers during their meals and when going to and from their places of business, is a bad one. A full hour, at least, should be taken for the midday meal; and if an hour's rest can be secured before eating, improved digestion would well repay the time spent in re-inforcing the vital energies. For persons of weak digestion, the rest before eating is in most cases indispensable.

The famous *L'Homme serpent* (man snake), of Paris, who astonished the world by his agility and wonderful contortions, ate but two meals a day of vegetable food, and invariably abstained from food for twelve hours before performing, a plan which was undoubtedly mutually advantageous to his muscles and his stomach, as his exercises required great muscular effort.

Sleeping after Meals.—While rest from accustomed exercise after eating is important, it should be noted that sleep at this time is equally as bad as vigorous exercise of either mind or body. Good digestion cannot take place during sleep. While it is true that digestion is an involuntary act, it should be recollected that it is dependent upon the activity of the nervous system for its proper performance. The same nerve which secures activity of the respiratory organs, the *pneumogastric*, controls the muscular activity of the stomach and intestines. During sleep, from the lessening of nervous activity both the respiration and the circulation are greatly lessened in vigor. It is but reasonable to suppose that the activity of the digestive organs is decreased at the same time, being controlled by the same nerves. Actual experiment shows this to be true. Dr. Schüle, in carefully conducted experiments upon two subjects, showed that sleep during digestion greatly increases the acidity of the gastric juice but hinders the passage of food from the stomach into the intestine. Simply resting in a horizontal position after eating, without sleeping, was observed to encourage digestion. These experiments clearly demonstrate the injury resulting from late suppers.

In order to secure the best conditions for digestion after eating, an individual should take gentle exercise of some kind, as walking, carriage or horseback riding. While violent exertion seriously interrupts the digestive process, a moderate degree of physical exercise facilitates the process by increasing the muscular activity of the digestive organs and thus encouraging both secretion and absorption.

Late Suppers.—Eating late at night, when the muscular and nervous systems are exhausted by the labor of the day, and then retiring soon to rest, is one of the most active dyspepsia-producing habits to which modern society is addicted. As before explained, "a tired stomach is a weak stomach;" and in addition, we may add, a sleepy stomach is a sluggish one. Secretion must of necessity be deficient in both quantity and quality, owing to the exhausted condition of the system; and with the further obstacle afforded to prompt digestion by the slowing of the vital operations during sleep, it is almost impossible that there should be other than disturbed digestion and disturbed sleep in consequence. It is under these circumstances that people often suffer with obstinate insomnia, bad dreams, nightmare, and similar troubles, from which they arise in the morning unrefreshed, and unrecuperated by Nature's sweet restorer, the work of assimilation, by which repair takes place, having been prevented by the disturbed condition of the nerves.

No food should be taken within three or four hours of retiring. This will allow the stomach time to get the work of digestion forward sufficiently to enable it to be carried on to completion without disturbance of the rest of the economy. The last meal of the day, if three meals are taken, should be a very light one, preferably consisting of ripe fruit and simple preparations of the grains. The custom which prevails in many of the larger cities of making dinner the last meal of the day, eating of articles the most hearty and difficult of digestion as late as six or even eight o'clock, is one that ought to be discountenanced by physicians. It is only to be tolerated at all by those who convert night into day by late hours of work or recreation, not retiring until near midnight. But in such cases, a double reform is needed, and so there can be no apology offered for this reprehensible practice on any physiological grounds.

Too Many Varieties of Food.—Many dyspepsias arise from the eating of too many kinds of food at the same meal, another growing custom in modern times which deserves to be distinctly condemned. At great dinners in honor of distinguished personages, when friends are to be entertained, and in the majority of well-to-do families as a general custom, the eaters are tempted to gluttony by having presented to their palates a great variety of complicated dishes, almost any one of which would be too much for the digestive organs of most inferior animals. On the occasion of the giving of a great dinner to some notable, we have known instances in which more than a hundred dishes were served in successive courses. Such gormandizing soon breaks down the most vigorous digestive organs, since it adds to the labor of digesting food which is improperly cooked, a larger variety than the digestive juices are capable of bringing into a fit state for absorption. 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 digestive powers are naturally weak this is a matter of special importance. Such will find it well to avoid eating meat and vegetables together. Meat and grains may be taken together, but not meat and vegetables, by persons of weak digestion, the latter being much more difficult of digestion than either of the others. 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 a patent nostrum to "aid digestion." Fruit and vegetables are for many an unwholesome combination.

Hot and Cold Bathing after Meals.—Especial mention should be made of the injury to the digestive organs quite certain to result from taking either a hot or a cold bath soon after eating, as few people are aware of the danger of laying the foundation for years of discomfort in this way. If the bath be a hot one, the stomach will be deprived of the blood necessary to support the rapid secretion of gastric juice for the digestion of the food, by the sudden relaxation of the capillaries and arterioles of the skin, drawing the blood to the surface of the body. A cold bath, on the other hand, or any sudden exposure to cold, may, by causing contraction of the blood-vessels of the surface of the body, cause sudden congestion of the stomach, which is equally fatal to good digestion. Very nearly the same danger exists from the taking of baths just before a meal.

The practice very common among boys and young men, of going into the water in the summer time regardless of the condition of the stomach or of other states of the body, is a bad one. With many it is a very usual practice two or three times a week if not more often, to go at once into the water after the evening meal, not allowing even time for the work of digestion to become established. No bath involving any considerable portion of the body should be taken within two hours of a meal

Errors in Quantity of Food.—If errors in the manner of taking food are active causes of indigestion, mistakes in quantity are still more potent in this direction. It should be noted, however, that errors of this class are very closely connected with errors in the manner of eating, and in the quality of food taken. It is generally true with physical as well as moral transgression, that one bad habit implies another; and especially is this the case in reference to dietetic errors. A person who eats too fast is likely to eat more than is necessary; and the same is true if too large a variety of food is partaken of, or food rendered exciting and stimulating by seasoning with irritating condiments.

Overeating.—Intemperance in eating is, in our opinion, responsible for a greater amount of evil in the world than intemperance in drinking. We do not fear to make this statement, since we believe it can be clearly shown that intemperate eating is, in the first place, one of the most potent causes of intemperance in drinking, and, secondly, that it is one of the greatest obstacles in the way of the reformation of those who have become victims of alcoholic intemperance.

If we may believe the statements of historians, gluttony is by no means a modern vice. Indeed, there is quite good ground for believing that overeating, while a very general fault, is rarely if ever carried to the enormous excess to which some of the luxurious Roman emperors indulged, as for instance, the Emperor Maximus, who consumed forty pounds of flesh in a day; or Caligula, whose custom was to eat until compelled to desist from having distended his stomach to its utmost capacity, and then taking an emetic to enable him to repeat his gormandizing.

Eating too Little.—A far less common fault than that last mentioned, is eating too little. The instances that occur are usually in the cases of those who have attempted to subject themselves to a rigid dietetic regimen for the prevention or cure of disease, and who, from having only a partial view of the subject, entertain extreme notions. By the weakening of the system which necessarily occurs when an insufficient amount of nutriment is received, the stomach also becomes weak and debilitated, its secretions and muscular efforts being greatly impaired in both quantity and quality.

THE TRUTH ABOUT ALCOHOL.

THE great stronghold of intemperance is to be found in the false doctrines held and taught by the majority of the medical profession respecting the character and use of alcohol. At the second meeting of the American Medical Temperance Association, held at Detroit last June, Prof. N. S. Davis, M. D., LL. D., of Chicago, President of the Association, delivered a remarkable address, in which he thoroughly exposed the fallacies upon which both the common use and the medicinal use of this baneful drug are based. We give the address below :—

"Gentlemen : We are assembled to note the first anniversary of this Association, which was organized in Washington, D. C., May, 1891. The objects had in view by those who participated in its organization as declared on that occasion were 'to advance the practice of Total Abstinence in and through the medical profession, and to promote investigation as to the action of alcohol in health and disease, and to form a bond of union among medical abstainers all over our country.' That those three objects are of sufficient importance to challenge the attention of every well informed and unbiased member of the profession, must be admitted by all. Especially is this true if we consider the fact that more than $800,000,000 are annually paid for alcoholic drinks, fermented and distilled, by the people of this country, over $700,000,000 by the people of Great Britain, and nearly in the same ratio by all the nations occupying the continent of Europe ; and all this without returning so much as a single cent to the consumers who pay the money, or a pound of bread for their families. If we also consider the fact that all our highest judicial authorities and social economists attribute much more than half of all the pauperism and crime in the same countries, to the use of those drinks, while the highest authorities in our own profession freely admit that a large percentage of the sickness and mortality is traceable to the same source, we will be compelled to admit that there is no other topic more imperiously demanding a candid, persistent, and thorough investigation by every practitioner of the healing art, than that which relates to the real influence of alcohol directly upon the living human system, and indirectly upon the collateral interests of the race.

"To make such investigations accurate and reliable, the investigator must himself be free from the deceptive and perverting influence of alcohol upon his own brain and blood. In the language of our excellent Code of Ethics : 'It is incumbent upon the faculty to be temperate in all things ; for the practice of physic requires the unremitting exercise of a clear and vigorous understanding ; and in emergencies, for which no professional man should be unprepared, a steady hand, an acute eye, and an unclouded head may be essential to the well-being, and even life of a fellow-creature.' Hence, our by-laws require the practice of total abstinence from alcoholic drinks by the members of this Association, although they place no restrictions upon the conscientious use of alcohol in the treatment of disease. To determine more accurately the origin, nature, physiological effects, and therapeutic uses of alcohol, and to diffuse a knowledge of the same, both in and out of the profession, is the paramount object of our organization. As an Association we have nothing to do with the political parties and questions of the day, whether of prohibition, high license, low license, protection, free trade, or reciprocity. Our wórk is one of strict scientific inquiry and investigation.

"Prof. Schmoller, the economist of Germany, says : 'Among our working people the conditions of domestic life, of education, of prosperity, of progress, or of degradation are all dependent upon the proportion of income which flows down the father's throat. The whole condition of our lower and middle classes, one may even without exaggeration say the future of the nation, depends on this question.' As the same may be said with equal truth concerning our own people, it certainly becomes us, as the professional guardians of the public health, to ascertain more certainly the nature and effects of those drinks that 'flow down the father's throat,' and which carry with them the income on which depends the domestic happiness, the education, the prosperity, and much of the health of the whole community. It is hardly necessary to say that the one essential ingredient in all the 'drinks' here spoken of, whether fermented or distilled, is alcohol. It is not found as a proximate element in living organized bodies, either vegetable or animal, but is exclusively the product of bacteriological action on glucose or saccharine matter, constituting the process known as vinous fermentation. In other words, alcohol is an effete toxic product resulting from the action of the micro-organisms known as the *torula cerevisiæ*, of Turpin, on sugar or glucose, and is composed of C_2H_6O.

It is therefore chemically a pure carbo-hydrate, and early in the progress of analytic and organic chemistry, it was unfortunately classed by Baron Liebig with those carbo-hydrates resulting from vegetable growth or nutrition,—starch, sugar, gum, and cellulose,—as supporters of combustion or respiratory food when taken into the human system. Such classification was not founded on the results of scientific investigations showing that the actual effects of alcohol, starch, sugar, etc., when taken into the living system, were similar, but solely on the fact that they were all composed of the same ultimate elements, carbon, hydrogen, and oxygen, in such proportion as to admit of further oxidation outside of the living body.

"And as such oxidation or combustion was accompanied by the evolution of heat, it was assumed without experiment or proof that all these carbo-hydrates were oxidated in the living system, and were active supporters of respiration and animal heat, while the various organized animal tissues were developed and nourished from the nitrogenous proximate elements of food. The simplicity of such a classification of foods and animal tissues, aided by the high authority of Liebig, caused it to be universally accepted and thoroughly incorporated into both medical and general literature, where, in the public mind at least, it still remains, and is a fair illustration of the danger or fallacy of assuming that similarity of chemical composition is proof of similarity of action when taken either as drink, food, or medicine.

"From a somewhat extended investigation of the subject, I think it may be stated as a general law, that all the orders of animal life are dependent for their development, growth, and nutrition, upon materials resulting from either vegetable or animal growth. Certainly none of the higher orders of animal life assimilate and appropriate for the growth or repair of their structures and the support of their physiological processes, inorganic materials not previously combined under the formative or vitalizing influence of vegetable or animal life. It may be further stated as an equally general law, that the products of retrograde metabolism or tissue metamorphosis as represented in the excretions and eliminations from living bodies, both vegetable and animal, are not only incapable of being used as food, but are either inert or positively toxic if retained or reintroduced into the living body.

"Hence, we have a clear and most important distinction between such carbo-hydrates as starch, sugar, gum, cellulose, and dextrine, resulting from vegetable and animal nutrition, and the alcohols, which result solely from retrograde metamorphosis or bacteriological excretion, usually termed fermentation. And instead of acting alike as respiratory or indirect food, as has been claimed so long, all the strictly scientific investigations of the last half century have proved their action upon the structures and functions of the living body to be as diverse as their origin. Thus the carbo-hydrates of the first class named,—starch, sugar, gum, etc.,—when taken into the healthy stomach, readily undergo such digestive and assimilative, or molecular changes that their identity is not recognizable in either the blood or the tissues of the healthy animal, and products derived from them produce no unnatural excitement or disturbance in any of the functions and processes of the living body. Though taken in proper quantities daily from year to year, they create no craving or morbid appetite for more; and when the quantity taken at one time is excessive, such excess is rejected with the ordinary fæcal matter of the intestines.

"But the alcohols constituting the second class undergo no such digestive or assimilative changes in the stomach or digestive apparatus. If the ordinary ethylic alcohol is taken into the living stomach undiluted and absolutely pure, it acts directly upon the tissues with which it comes in contact as a destructively corrosive poison, and speedily destroys the life of both vegetables and animals when brought in contact with them. When largely diluted with water, as it is in the various fermented and distilled liquors, and taken into the stomach, it is rapidly imbibed, without change, and carried directly into the blood, and with it, into every tissue and organ of the body, as has been demonstrated by the application of reliable tests many hundred times. More or less of it also soon reappears in the excretory secretions and eliminations of the lungs, skin, and kidneys, like other foreign or non-assimilable materials. While retained in the blood and in contact with the tissues, the alcohol modifies in a marked degree the sensibility of the nervous structures, and also the molecular or metabolic changes concerned in nutrition, disintegration, and sensation. If taken daily for a considerable length of time, it invariably creates a morbid appetite or craving for steadily increasing quantities, and sooner or later establishes degenerative changes in nearly all the organized structures of the body. It is obvious, therefore, that there is actually no similarity or analogy, either histological or physiological, between the carbo-hydrates of vegetable and animal growth and those derived from bacteriological or putrefactive fermentation. And the time has fully come when the purely theoretical and most mischievous error of grouping them together as respiratory and force-generating food, should be corrected in all our literature and eradicated from the public mind. Half or three quarters of a century since, when alcohol was placed at the head of the list of respiratory foods by the chemico-physiologists of that day, it was claimed that when taken into the living body, it readily combined with oxygen, and was resolved into carbon-dioxide and water, with the evolution of heat; and hence it came into almost universal use as a supposed stimulant and promotor of animal heat. Step by step, however, investigations carefully devised and faithfully executed, have not only demonstrated this supposition to be erroneous, but they have equally demonstrated the real action of alcohol in the living human system to be that of an active anæsthetic, directly diminishing cerebral and nerve sensibility and muscular action; a retarder of the internal respiration, by which oxygen is carried from the pulmonary to the systemic capillaries; and a sedative or retarder of the molecular or metabolic changes in the tissues and secreting structures of the body.

"These several propositions have been so fully sustained by the direct experimental investigations of Prout, Böcker, myself, Richardson, Anstie, Hammond, Harley, Sidney Ringer, Martin, H. C. Wood, Lauder Brunton, Dubois, Reichert, and many others, that it would be superfluous to quote them in detail. There are, however, still many, both in and out of the profession, who claim that alcohol is an anæsthetic only when given in large doses; while if given in smaller doses and repeated at suitable intervals, they claim it acts as a stimulant and tonic, especially on the cardiac nerves. The incorrectness of this claim is completely demonstrated by the investigations of Drs. Ringer and Sainsbury and Professors Martin and H. C. Wood.

"The experiments of Sidney Ringer and Harrington Sainsbury were instituted for the purpose of determining the relative strength of different alcohols, as indicated by their influence on the action of the heart of the frog. In closing their report on the subject, they say: 'By their direct action on the cardiac tissues these drugs (alcohols) are clearly *paralyzant*, and this appears to be the case from the outset, no stage of increased force of contraction preceding.'

"The experiments of Professor Martin, of Johns Hopkins University, were performed on the dog, and he states the results obtained as follows: 'Blood containing ⅛ per cent by volume of absolute alcohol has no immediate action on the isolated heart. Blood containing ¼ per cent by volume, that is 2½ parts per 1000 of absolute alcohol, almost invariably remarkably diminishes, within a minute, the work done by the heart; blood containing ½ per cent always diminishes it, and may even bring the amount pumped out by the left ventricle to so small a quantity that it is not sufficient to supply the coronary arteries.'

"Prof. H. C. Wood, of the University of Pennsylvania, also executed his experiments on the dog, and in his address to the International Medical Congress at Berlin, 1890, states his results as follows: 'An 80 per cent fluid (alcohol) was used, diluted with water. The amount injected into the jugular vein varied in the different experiments from 5 to 20 cubic centimeters, and in no case have I been able to detect any increase in the size of the pulse, or in the arterial pressure, produced by alcohol, when the heart was failing during advanced chloroform anæsthesia. On the other hand, on several occasions the larger amounts of alcohol apparently greatly increased the rapidity of the fall of the arterial pressure, and aided materially in extinguishing the pulse rate.' That alcohol exerted not only a general anæsthetic effect upon the nervous system, but also a special or direct paralyzing influence on the cardiac and vaso-motor nerves, strictly parallel with that produced by chloroform and ether, was clearly shown by R. Dubois, in 1883. And the editor of the department of experimental therapeutics in the fifth volume of the 'Annual of Universal Medical Sciences,' 1892, in referring to the review of the work done by nearly all those who have engaged in experimental investigations regarding the effects of alcohol on the living system, by E. MacDowell Cosgrove, truly says: 'Contrary to what has been and is supposed, it is found from all these researches that small doses of alcohol, from the first, produce a narcotic rather than a stimulating effect.' And he adds that all the observers except one, had 'also found that alcohol in small doses diminished the amount of carbon-dioxide exhaled.' It is thus shown, by direct experimental researches of the most eminent men in different countries, aided by all the instruments of precision invented in this period of active scientific progress, that alcohol in the living system actually diminishes the sensibility and action of nerve structures in direct proportion to the quantity used. An ordinary regard for scientific accuracy, therefore, demands that it should be classed as an anæsthetic or narcotic, and in no sense as a stimulant or tonic. In studying further the mode by which alcohol produces its effects while in the living human system, it is necessary to appreciate the full import of the following propositions: —

"1. All nerve sensibility and force, and all natural molecular or metabolic changes, nutritive, secretory, and disintegrating, taking place in the living tissues, are absolutely dependent on the presence and movement of blood containing its natural proportion of oxygen.

"2. The oxygen needed in the blood is received from the pulmonary air cells by the hæmoglobin and serum of the blood and in them conveyed to the systemic capillaries, where it comes in contact with, and exerts its influence on, every cell and structure of the body.

"3. Alcohol at ordinary temperatures of the air, or even of that of the living human body, manifests but a very feeble affinity for oxygen, but does manifest a very strong affinity for water, albumen, and hæmoglobin, acting upon them readily at all ordinary temperatures.

"If, therefore, alcohol sufficiently diluted to permit its circulation in the blood, should be introduced, either by the stomach or any other method, instead of uniting with the oxygen, it would present its superior affinity for the hæmoglobin and serum albumin, and thereby directly interfere with their reception of more oxygen from the pulmonary air cells. It is thus that the presence of the alcohol hinders the hæmoglobin from being converted into oxy-hæmoglobin in the pulmonary capillaries, and in the same ratio diminishes the amount of oxygen conveyed to the systemic capillaries; and in the same ratio, also, the nerve sensibility and metabolic changes diminish. This affords a full explanation of the facts now admitted by all who have carefully studied the subject, namely, that the presence of the alcohol retards both nutritive and disintegrative changes, diminishes excretory products and temperature, and lessens nerve sensibility and force.

"An explanation of these admitted facts has been hitherto, and still is, sought for on the supposition that alcohol simply unites with the oxygen of the blood, and thereby prevents or diminishes the action of the latter on the tissue elements of the body, and yet generates heat and some kind of force. The fatal defect in this old combustion or oxidation theory is that no investigator has been able to find the legitimate products of such oxidation. So far as is known, the oxidation of alcohol resolves it into either aldehyde and carbon-dioxide, or acetic acid and water, with evolution of heat. Consequently, if alcohol underwent oxidation in the system, some increase of one or all of these products should have been uniformly found, in the blood, the exhaled air, or in the other excretions. But instead, the most accurate and numerous investigations show less carbon-dioxide in the exhaled air, less temperature of the body, and neither acetic acid *nor* aldehyde in the blood.

"And yet the puzzled investigators turn and say that, inasmuch as the alcohol disappears in the system and cannot be all regained from the secretions and eliminations in a limited time, it *must* have been oxidized and converted into some kind of force. But what force? Certainly not nerve force, mental force, muscular force, heat force, or metabolic force; for all of these are directly diminished by its presence. The only force found operative in the case, is the superior affinity of the alcohol for the hæmoglobin, albumin, and water of the blood, and its toxic power to so modify their molecular condition and properties as to diminish their efficiency in receiving and conveying the oxygen from the pulmonary to the systemic capillaries, and thereby impairing all the vital processes in which the presence of oxygen is required.

"This view also affords a rational explanation of the numerous pathological changes everywhere recognised as resulting from the habitual use of alcoholic drinks, even in the most moderate quantities. These changes were well exposed in the celebrated discussion on chronic alcoholism by the Pathological Society of London, only two years since, and are easily found on the pages of our medical literature.

"It enables us also to see clearly the philosophy or rationale of those illusions and delusions that have been imposed upon the human mind by the use of alcohol in both health and disease through all the generations of the past. Thus, a moderate dose in health, by its anæsthetic effect on the nerve cells of the brain, lessens the individual's consciousness of cold or heat, of weariness or despondency or weakness, and he is deluded with the idea that it had warmed and cheered and strengthened him, when it had done neither; but instead, had simply diminished the acuteness of his own perceptions, while the evils continued in full force. So in the progress of disease, its use generally has the same anæsthetic effect, causing the patient to complain less, rest more, and often say he feels better; but it neither removes the exciting cause, nor corrects the morbid processes constituting the disease, nor increases the activity of the metabolic changes of either nutrition or elimination. Nor is this all; for in the same proportion as alcohol diminishes the internal distribution of oxygen and thereby acts as a so-called conservator of tissue, it still more actively interferes with the katabolic processes by which the natural excretions are maintained and foreign disturbing elements are eliminated; and consequently it prolongs the morbid processes, favors molecular degenerations, and increases the ratio of mortality. Clinical facts and cases could be cited in abundance, illustrating and sustaining the correctness of the foregoing views, did my time permit. I will, however, at present only add for your consideration the following questions: 1. If the physiological standard of health requires a natural degree of sensibility of the cerebral hemispheres and the internal distribution of oxygen in natural quantity, and the presence of alcohol diminishes both in direct ratio to the quantity taken, how is it possible for persons in health to use it without injury?

"2. If alcohol, while in the living system, does thus diminish the sensibility of the nerve structures and retard the internal distribution of oxygen, is it not a true anæsthetic and organic sedative, and, therefore, adapted to the treatment of only a very limited number of morbid conditions presented in the progress of disease?

"3. Is it not true that all the fermented and distilled alcoholic liquors are genuine toxic products of bacteriological cultures? and ought we not to uniformly designate them as such, instead of continuing to delude ourselves, our patients, and the public, by calling them tonics, stimulants, or indirect food?"

GERMS IN RELATION TO EVERY-DAY LIFE.

(See Frontispiece.)

The discovery of germs and their relations to the ordinary conditions of health, is one of the most important advances made in modern times in sanitary science. Moses evidently understood the mischief-working power of these microscopic organisms, though he was unacquainted with the real nature of the cause of the various forms of an infectious disease due to these minute vegetable forms, such as leprosy and various maladies arising from insanitary conditions. It was this which led to the quarantine regulations of Bible times, respecting persons suffering from leprosy, now well known to be a germ disease, and the vigorous sanitary measures required in case of the appearance of so-called leprosy in a human habitation. We are far less scrupulous nowadays in the care of our premises than were the Israelites while living under the law of Moses. Thousands of modern houses are leprously infected with must and molds of various species, while the inhabitants are, through their ignorance, wholly oblivious to the dangers to life and health amidst which they live.

The purpose of this article and of the frontispiece which appears with the present number, is to impress upon our readers the importance of recognizing, and as far as possible avoiding the unseen foes of human life which surround every human being living in a civilized community.

First of all, we must mention dust as the most dangerous of all sources of germs. The dust of the street is a miscellaneous assemblage of almost every species of unclean and hurtful germs. The decomposing matters in the gutters and moist places by the wayside, the excreta of animals, dead bodies of insects and small animals left upon the highway to undergo decomposition and disintegration, are ground into an impalpable powder by the wheels of passing vehicles and the feet of horses and pedestrians, and are then lifted into the air by every passing wind or breeze, so that the atmosphere ultimately becomes densely charged with these minute organisms. Moist germs are incapable of floating in the air, and hence are comparatively harmless, unless they find their way into our food and drink; but when dried and separated into small masses, these microscopic growths, which are smaller than the finest dust visible to the naked eye, easily float in the air, and are carried into the lungs with every respiration.

Street dust finds its way into our houses through open doors and windows, and upon the feet of inmates and visitors, so that carpets, rugs, and mats become saturated with it; and in houses in which the old style of carpets lined with a thick matting of straw are still to be found, each carpet hides in the loose meshes of the straw beneath it countless millions of the most deadly foes of human life, which are ready to issue from their hiding-place and begin their work of mischief whenever disturbed by the pressure of a shoe, the stroke of the broom, or the movement of an article of furniture. When the housemaid begins her usual morning round of sweep-

ing, dusting, and "putting things to rights," the house air becomes thoroughly alive with these potent destroyers of life and health. They may not be ordinarily visible, but that they are there, may be readily demonstrated by the experiment of closing a room under the conditions named, and allowing a single ray of sunshine to penetrate the darkness through a minute opening in a dark curtain, or a closely fitting shutter. The poetic "motes which dance in the sunbeams," are nothing more nor less than germs — at least in large part.

A household in which dust abounds cannot be a healthful place. In such a home, catarrhs, influenzas, sore eyes, earaches, and other maladies still more serious, such as diphtheria, pneumonia, etc., are frequent visitors. The relation between drain-pipes and diphtheria, and other germ disorders, has been so long and so thoroughly established, that it is scarcely necessary to mention this source of household infection. The similar connection between impure water and typhoid fever has been too often and too vividly enforced by such examples as that of the little town of Plymouth, Pa., in which a large proportion of the inhabitants suffered, scores fatally, from this malady, as the result of contamination of the city water-supply by a single case of typhoid fever, in a mountain district where originated one of the little streams employed by the water company to fill its reservoirs.

The frequent contamination of milk with tyrotoxicon and other germs, is unquestionably one of the most common causes of cholera infantum, cholera morbus, and the numerous forms of so-called bowel complaints which prevail in the warm season of the year. Milk is unquestionably one of the most common sources of noxious germs. It was formerly supposed that these germs were somehow derived from impure water swallowed by the cow and excreted by the milk glands. It has been shown, however, that this very rarely, if ever, occurs. The real source of contamination is the careless manner in which milkmen care for the cows and empty their udders. The cow's body becomes covered with excreta and various forms of filth, and being rarely washed or groomed, the hair becomes filled with dust-laden germs, which drop into the milk, together with the minute particles of excreta, and thus the milk becomes infected after it leaves the animal. Warm milk encourages the rapid development of germs, so that, in the course of a few hours, each drop is swarming with millions of these micro-organisms, most of which are, fortunately, comparatively harmless, though now and then germs of a very deadly character appear, and serious results are then likely to follow.

Observations made a few years ago, at the Experiment Station of the Connecticut Agricultural College, show that when obtained under ordinary conditions, milk contains from twenty-five to thirty different kinds of germs, each with its characteristic odor, suggesting its origin in barnyard, pig-sty, chicken-coop, and other germ strongholds which exist in close proximity to the ordinary dairy.

It is indeed a most astonishing thing that an article of food so freely and commonly used, should be produced under conditions so obnoxious, not only to health, but to the natural instincts of cleanliness and wholesomeness which every civilized human being is supposed to possess. No other article of food eaten by human beings is really so greatly and almost uniformly contaminated with filth as milk. The father who would exercise the greatest care as regards neatness and cleanliness of habits and appearance in the selection of a wet-nurse for his motherless infant, will not hesitate to supply his family with milk from cows which are kept in prison stables teeming with the vilest filth, their bodies smeared with ordure, not infrequently covered with vermin, and their lungs inhaling air saturated with germs and the poisonous products of putrefaction and decay. How can it be imagined that food from such a source can be otherwise than poisonous?

In order to furnish milk of the proper quality to nourish a human being, a cow should be kept under conditions as wholesome and cleanly as those under which human beings should be kept. The animal should be well groomed and washed daily, if kept in a stable (which should be only during cold weather), and abundant supplies of fresh air should be provided. The same care should be taken respecting her food and diet; it should be as wholesome and free from germs and putrefactive processes as though it were intended to be taken directly by human beings. Germs at second hand are nowise improved, as a rule, but are likely to be multiplied and intensified in their activity.

Cheese, one of the products of milk, exhibits the germ-life present in this common article of food, in the highest degree of activity. The process of cheese-making includes no means by which germs are killed, or their development prevented, and consequently we have in cheese not only the original milk, but the countless myriads of germs which have been developed since its infection after leaving the cow, and the various poisonous products which are the result of the growth of these micro-organisms.

We think it not too much to say that an article in every grain of which are to be found swarming millions of germs, is in nowise fit to enter the human stomach.

Much more might be said respecting the relation of germs to the common conditions of life as regards health, but space forbids for this time, and we conclude by simply calling attention to the colored frontispiece which appears in the present number, on which are represented some of the most common germs, which are shown as they appear under a powerful microscope. A number of explanations accompany the plate.

Not all cheeses contain worms, but all contain microbes or germs in great numbers. According to investigations recently published by Professor Adametz, who has made a careful study of the microscopic organisms that live in cheese. This food substance, so common and so popular, contains, besides worms, mites, and other larvæ, which everybody knows, a prodigious number of microbes of different sorts; every gram of fresh cheese has from 90,000 to 140,000. The population of a cheese twenty-five days old would rise to 1,200,000 microbes a gram; at the end of forty-five days it would be 2,000,000.

The microbes are much more numerous near the outside of the cheese than in the center, probably because the air favors their development. We find from 3,000,000 to 5,600,000 germs in a piece the size of a small marble; uniting these different observations, we may conclude that at an average every pound of cheese contains nearly twice as many germs as there are inhabitants on the surface of the earth.

The reader will doubtless follow with interest the results obtained in special researches made at the request of the writer, in his laboratory. The aim of these researches was to determine the influence of different articles of food upon the number of germs found in the stomach an hour after a meal.

With granose, zwieback, and other perfectly sterilized foods, no germs were found, the gastric juice being capable of destroying them all in the stomach. But when sixteen cubic centimeters of cheese were taken with 240 grams of water, the presence was shown of an innumerable quantity of germs that the gastric juice could not destroy; more than 100,000 in a dozen drops of liquid, taken from the stomach an hour after the ingestion of the cheese, together with a considerable number of molds.

The author has met a certain number of cases of fatal inflammation of the intestines, which could be directly attributed to the use of cheese. According to Professor Vaughan, of the University of Michigan, poisoning by cheese is due to the presence of an excessive quantity of a special poison, to which he has given the name of tyrotoxicon, and which always exists in cheese in larger or smaller quantities. Under certain conditions, the germs which produce this poison continue to multiply in the stomach and provoke symptoms of cholera.

Certain varieties of cheese, such as Roquefort and Brie, owe their characteristic qualities to the presence and the rapid multiplication of molds. Edam cheese owes its peculiar properties to certain bacteria which give a viscid appearance to milk.

A Natural Death.

An Illinois paper recently announced the death of Mrs. Catherine Butler, who died of old age at her home in Indianola, March 30, aged 93 years. She had never used a cane or a crutch, had never worn glasses, or taken a drop of medicine.

Death from old age is not a very common occurrence nowadays. The majority of people die violent deaths, killed either by accident or by their own misdeeds and violations of the laws of health. The natural limit of human life is estimated by naturalists to be somewhere from one hundred to one hundred and twenty years, but there are plenty of examples of human beings who have lived to one hundred and twenty-five and thirty years, and not a few in whom the length of life has been prolonged to one hundred and fifty, and even one hundred and seventy-five years. Examples of this sort are not confined to Bible times, but are recorded in the history of the last two or three centuries. Half the human race die before the age of five years, and the average length of life in civilized countries at the present time is barely forty-two years, scarcely more than two fifths the normal length of life. This enormous loss of human life ought to give rise to serious consideration of all the influences which bear upon health and longevity. Unfortunately, however, too large a share of the attention of physicians and scientists is devoted to apologizing for popular practises which human experience, assisted by common-sense principles, easily shows to be in the highest degree injurious to both the individual and the race. Not a few apologists are to be found for the pernicious habit of tobacco-using, even of cigarette smoking, and there are any number of defenders of moderate drinking as a sanitary practise. Tea and coffee have been lauded to the skies as needed nerve comforters, and there are multitudes of men who are devoting almost their entire time to the search for some new form of nerve tickler.

What the world needs most of all just now is a John the Baptist of health, who will raise his voice like a trumpet in a wilderness of disease and degeneracy, and call the people to repentance from their evil ways. The world is going down physically, mentally, and morally, and deterioration and degeneracy are taking place much more rapidly than can be discovered by a cursory observation. The more this question is studied, the more apparent it will become that the only hope for the world is to be found in the reformation of the habits of individuals, whereby a new and healthy race of human beings may be developed. We hear a great deal nowadays about the new woman. The new man is just as much needed as the new woman. We need general reconstruction all around.

THE TAP-ROOT OF INTEMPERANCE.

NOTWITHSTANDING the earnest efforts which have been made by temperance organizations of all sorts within the last quarter of a century, and especially by that grandest of all reformatory organizations, the Woman's Christian Temperance Union, statistics show that there is no very perceptible diminution in the prevalence of intemperance. With the exception of States in which prohibitory laws are in force, there has, in fact, been an increase in the number of arrests for drunkenness and for other crimes dependent upon intemperance. The use of alcoholic drinks, as well as the use of tobacco, has perceptibly increased within the last quarter of a century. The amount of alcoholic liquor of various sorts used per capita is greater at the present time than at any previous time in the history of this country.

The significance of these facts is not that the Woman's Christian Temperance Union and other similar organizations are not doing splendid work in behalf of temperance. The efforts which have been made, and which are being made, are well directed, and will accomplish much to stay the march of this terrible Juggernaut which for so many centuries has been grinding beneath its slowly moving wheels multitudes of victims who have discovered their danger too late to escape, and who, covered with shame, have gone down by hundreds of thousands into untimely graves. We have no criticism whatever to offer upon the efforts which have been made thus far by associations of men or women who are engaged in contending against this prodigious evil, but it occurs to us that there is a deeply rooted cause of intemperance which has heretofore received comparatively little attention. We refer to the use of alcohol as a medicine. The majority of physicians believe alcohol to be a good stimulant, and hence recommend it in nearly all cases in which it is supposed that the patient needs an increase of strength or vigor, better appetite, better digestion, an increase of nerve energy. After many years of practise, the majority of intelligent physicians discover that the increase of strength which follows the use of alcohol and other stimulants is only apparent in character, and that the use of these drugs inevitably gives rise in the end to a weakening of the very functions it is supposed to rebuild.

Alcohol, although called a stimulant from time almost immemorial, is in no sense a stimulant. It is a narcotic, hence should not be used where an increase of energy is required; if used at all, the indication would be in cases requiring a diminution rather than an increase of energy. Alcohol lessens the vigor of the heart, and hence must be discarded in syncope, fainting, collapse, shock, and other cases supposed to require a

EDITORIAL.

DIABETES A DISEASE OF HIGH CIVILIZATION.

THOUGHTFUL men long ago reached the conclusion that the conditions of life afforded by "high civilization" are not conducive to health, but, on the contrary, tend to physical deterioration. The class statistics of death from diabetes mellitus show this very clearly; for example, according to Saundby, the rate of mortality from diabetes has risen, in Paris, within the last ten years, from an average of eight in each 100,000 population to an average of thirteen; while in Copenhagen it has risen from five to eight; and in England and Wales it has increased, in fourteen years, seventy per cent., after allowing for the increased population.

Bertillion, a leading physician of Paris, has shown that, while this is true of all classes of persons, the increase is much more pronounced among the wealthy classes than among the poor, the average in the poorer parts of the city being only seven to nine in 100,000, while in the wealthy quarters the average is sixteen to twenty.

Recent investigations by Marie and others show that the old idea that the liver is usually healthy in diabetes is an error, and that, on the contrary, it is generally the seat of inflammatory processes. Accumulating facts point more and more directly to the idea that diabetes is, like most other chronic disorders, the result of vicious habits of life, and probably chiefly dependent upon errors in diet. The liver is a long-suffering organ, and seldom undergoes derangement of any sort except from abuses heaped upon it through dietetic errors, its relations with the digestive tract being such that it is compelled to perform an immense amount of unnecessary labor as the result of any disturbance of digestion which impairs the integrity of the digestive process.

The cheapness of sugar and its various products, and the consequent increase of the use of sweets of various sorts, including confections, jellies, sirups, etc., must be held largely accountable for the enormous increase in frequency of this disorder within the last two decades.

Especially to be deprecated is the custom of adding sirups, sugar, and other sweets to farinaceous articles of foods, such as oatmeal, breakfast cakes, etc. The absurdity of such a practise is apparent when one recalls the fact that farinaceous foods are fully one-half starch, and that this starch is all converted into sugar in the process of digestion; hence to add sirup or sugar to oatmeal is simply adding sugar to sugar, like sweetening sirup with honey. It should be remembered also that cane-sugar is not an alimentary principle which is naturally adapted to the human digestive apparatus.

Considered from a zoological standpoint, man is unquestionably dietetically related to the gorilla, the chimpanzee, and the orang-outang, his nearest relatives in the animal kingdom. These animals subsist, when in their natural state, exclusively upon fruits and nuts, the chief saccharine element of which is levulose, a sugar which is much sweeter than cane-sugar, and which is closely allied to, if not identical with, the final product of starch digestion in the alimentary canal.

Starch, when cooked, begins to undergo digestion as soon as it is received into the mouth. The conversion of this element continues from half to three quarters of an hour after the food enters the stomach, and may extend so far as to change almost the entire amount of starch taken, when conditions are favorable. The writer has found as high as fourteen per cent. of sugar after a test-meal consisting of water and one and one-half ounces of dried bread which contained no sugar. Cane-sugar is not acted upon by the saliva, and undergoes no change until the intestines are reached, when, coming in contact with the intestinal fluid, it is transformed into a sugar which is capable of assimilation. Cane-sugar is, however, capable of fermentation while remaining in the stomach, on account of the presence of microbes, which first transforms it into a more highly hydrated form of sugar, and then converts it into alcohol, and later, into acetic and other fatty acids.

It is thus apparent that cane-sugar, while not itself readily digested, also interferes with the digestion of other foods. When taken in large quantities, it must impose an enormous amount of extra labor upon the liver by leading to the absorption of large quantities of imperfectly converted starch and an excess of saccharine material. In addition to this, the products of fermentation resulting from the presence of sugar must exercise a most damaging influence upon the liver, and may be the cause of the interstitial hepatitis which commonly accompanies diabetes. Loeb has recently expressed the opinion that in many cases sugar is present in the urine in small quantities for many years before its discovery, the quantity of urine finally increasing to such an extent as to lead the patient to consult a physician.

In the writer's opinion, cane-sugar is an unwholesome article of food, and should be discarded from our tables. If used at all, it should be only in moderate quantities, as a means of rendering palatable excessively acid fruits. Its use in such cases even is decidedly doubtful, since the acidity of sour fruits may be equally well neutralized by the addition of sweet fruits. It should be remembered also that sugar, from a chemical standpoint, is an acid, and hence, when added to sour fruit, does not in the slightest degree neutralize or antidote the free acids present, but only hides them, or prevents their recognition by the nerves of taste.

The love for sweets is doubtless a natural instinct. Sweet foods are, as a rule, wholesome, and the taste for them may be safely indulged without stint ; but this rule applies only to those possessed of the sweet flavors found in nature. If a natural sugar, like that contained in malt extracts, were substituted for the cane-sugar of commerce, a great gain would be made so far as the digestion is concerned, as this is a natural sugar, produced by the diastatic digestion of starch, and is precisely the same as that resulting from the action of saliva upon starch.

THE EFFECTS OF ALCOHOL UPON THE BRAIN.

Dr. Bedford Pierce, medical superintendent of the York Retreat, England, in a recent article in the *Medical Pioneer*, calls attention to some most interesting and important facts in relation to the effects of alcohol upon the brain and nervous system. Dr. Pierce shows from statistics that more than fourteen per cent. of all cases of insanity in England are due to alcohol, 20.08 per cent. of cases of insanity in men being the result of alcohol, and 8.1 in women. At the Royal Edinburgh Asylum, the number of cases of alcoholic insanity during the past fifteen years was 16.4 per cent. During "influenza year," this number was suddenly increased, doubtless as the result of the extensive use of alcohol as a remedy for la grippe.

The effects of alcohol are shown to be hereditary — at any rate as regards idiocy and imbecility. We quote as follows from the article referred to : —

"Dr. Howe, of Massachusetts, in examining the antecedents of three hundred idiots, found that forty-eight per cent. were the children of habitual drunkards. Dr. Beach, out of four hundred and thirty patients in Darenth Idiot Asylum, found thirty-one per cent. similarly the progeny of drunkards.

"Dr. Legrain, in a recent work upon 'Social Degeneration and Alcoholism,' has published an account of the descendants of two hundred and fifteen drunkards that he personally has traced. This work shows conclusively that in such families a very large number of the children die young, and that the families rapidly die out; that epilepsy, insanity, and other nervous disorders are extremely common.

"Before leaving this part of my paper, it may not be out of place to express the opinion that I consider the influence of alcohol upon the brain of infinitely greater importance than its influence upon the circulation or upon other parts of the body. And it is on this account that I regret that we have, so far as I know, to look to Germany for workers to elucidate the action of alcohol and other drugs upon the mind.

"In England it is true that we have heard of the watering of geraniums by diluted solutions of alcohol, and of attempts to accustom water-fleas to live in weak spirits and water; but we hear that neither geraniums nor water-fleas flourish. All this, however, is remote from the problem in hand, and the skeptical person is not convinced by deductions drawn from such experiments. The work done by Professor Kraepelin and his pupils in Heidelberg promises to be of very great importance. Unfortunately for us, his book detailing his experiments and researches into the mental phenomena produced by alcohol and other drugs, has not been translated into English.

"Kraepelin has summed up his conclusions as to the action of alcohol in his *Psychologische Arbeiten, Band I*, p. 83. He states that experiment has shown that the idea that alcohol strengthens, has arisen from self-deception. Alcohol only facilitates the discharge of motor impulses, and does not make them more powerful. If there is any strengthening effect, any increase of power, it is very transitory, and is quickly followed by a pronounced diminution, which takes some time to disappear. He goes on to say: 'Moreover, the powers of conception and judgment are from the beginning distinctly affected, although we perceive nothing of it. The actual facts are exactly the opposite to the popular belief. I must confess that my own experiments, extending over more than ten years, and the theoretical deductions therefrom have made me an opponent of alcohol.'"

The observations of Professor Kraepelin agree exactly with experiments undertaken several years ago by the writer, which clearly show that alcohol even in moderate doses diminishes the acuteness of all the perceptives, and the ability of the brain to receive impressions and to transmit impulses. Two ounces of brandy lessened a young man's lifting capacity more than twenty-five per cent. Science gives no countenance to the use of alcohol, even in the greatest moderation.

THE OYSTER GOING.

It is gratifying to know that that filthy bivalve, the oyster, whose proper function in the world is the consumption of the ooze and slime which cover the bottom of the ocean, and the stems of submarine plants, is rapidly creating such a bad reputation for itself that there is already a prospect that its consumption as an article of food may be practically abandoned.

It has long been known that the consumption of the oyster not infrequently gives rise to severe illness. A few years ago an eminent surgeon in Chicago died as the result of consuming a few raw oysters. It is more recently, however, that the fact has been made clear — and it has been established beyond the possibility of doubt — that the oyster is a common source of epidemics of typhoid fever. The *British Medical Journal* has been particularly active in making this fact known to the public, as the result of which it is claimed by the leading oyster companies of Great Britain that there has been a decrease in the consumption of oysters amounting to three fourths; that is, the quantity required to meet the demand at the present time is only one fourth that of three or four years ago.

In their anxiety to save their business from utter ruin, the oyster companies have appealed to sanitary authorities for relieving suggestions. Professor Herdman, of Liverpool, comes forward with the suggestion that oysters received from foreign parts, should, like cattle, be subjected to quarantine for from one to four weeks; and also suggests that no one should think of consuming oysters without subjecting them to at least one day's washing in a stream of water running from a tap. It is not claimed, however, that any of these measures will entirely obliterate typhoid fever and other poisonous germs, but only to some degree diminish them.

The companies, are, of course, laboring earnestly to recuperate their rapidly failing business; and it is accordingly proposed that the government shall appoint oyster inspectors, whose duty it shall be to make careful investigation of the bivalves offered for sale in the English markets,— to examine their mouths, and look at their tongues, so to speak, — and ascertain whether there remain behind any of the filthy germs which they have been in the habit of swallowing in the pursuit of their life calling.

It must be clear to any one that to provide for the inspection of every oyster — the only method by which complete safety could be obtained — would be altogether too expensive a process, and one which can never be adopted. Consequently it is pretty certain that, however successfully the public alarm may be quieted for the time being, it will redevelop sooner or later as the result of new outbreaks; and it is to be earnestly hoped that the ultimate result will be the repudiation of the oyster as an article diet, the germy bivalve being left alone pursue, unmolested, the avocation allott him by nature.

THE FOUNDER OF THE RED CROSS IN A POORHOUSE.

J. Henry Dunant, the real founder of the Red Cross society, and the organizer of the famous convention of Geneva, was born in Geneva, May 8, 1828. The horrors which he witnessed in the campaign of Napoleon III against the Austrians in Italy, in 1859, led him to write a pamphlet upon the subject, which horrified the civilized world with the terrible cruelties of war, especially the account of the suffering of the wounded through neglect. A few years later, in 1863, he traveled at his own expense from capital to capital throughout Europe, and finally succeeded in organizing the conference in Geneva in October, 1864, which resulted in the permanent organization of the Red Cross society.

M. Dunant spent the greater portion of his fortune in developing this splendid charity, and, a few years later, lost the balance of it. He has since been obliged to live as an object of charity in a poorhouse. It is to the credit of the empress of Russia that she has recently provided for his comfort and maintenance. Like many other philanthropists, M. Dunant does not find the compensation for his philanthropic labors in this world. It is unfortunate indeed that society is so little appreciative of the sacrificing efforts of such men as to deny them even proper recognition.

A Better Chance for the Insane.— We are glad to note that the management of the MacLean Insane Asylum at Waverly have provided their patients, both men and women, with a fine gymnasium, completely equipped with gymnastic apparatus and a Turkish bath. It is understood that regular classes in gymnastics will be organized for the patients, so that they will thus have something of an advantage over their more unfortunate fellow mortals who happen to be nervously sick outside of an insane asylum; in fact, we are not quite sure but that the unfortunate inmates of the Waverly Asylum are, in some respects, better off than the neurasthenics and other nervous invalids outside who require treatment, as there are not more than two or three institutions for the sick in this country where proper attention is given to the employment of gymnastaining, as it does, nitric acid, sulphate of ammonia, sulphate of magnesia, and sulphate of lime,—all valuable plant foods. Coal ashes are very useful, especially in heavy soils; while wood ashes are extremely beneficial, for they contain much potash and other valuable plant foods.

"The ashes of all burnt vegetable matter are very useful as inorganic food for plants, but a more economical way of using vegetable matter is to bury it in the soil, where it decays, and by a process of slow combustion gives up to the soil the organic matter which would be dissipated by the extravagant method of burning. Decaying vegetable matter, too, has other uses in the soil, so that a good gardener will think often before consigning such refuse to the bonfire. Couch grass, diseased potato haulms [stems], clubbed roots of the cabbage tribe, and other hindrances to the proper growth of plants must of course be thoroughly consumed by fire — the quickest method possible; but as a principle, let every portion of a decayed healthy plant be restored to the soil whence it originated. Many persons take this right away, and then buy manure to replace the lost plant food.

"Exposed soil absorbs ammonia,—a most valuable plant food, which exists to a certain extent in the atmosphere, but which is very expensive to buy. It is caught in the meshes of deep and roughly dug soil. It is averred by some that charcoal mixed with the soil largely absorbs ammonia, and being very porous, 'has a great power of condensing air and oxygen within itself.' The grass cut from the sides of paths when they are trimmed, and above all, the mowings of the grass plots or lawn, should be utilized as fertilizers.

"Sufficient attention is not given to green manuring. How frequently, after a crop has been raised, is the ground allowed to lie idle. Instead of this, a crop might be sown (white mustard, for instance, or any growing crop with searching roots), and after a few weeks dug in to decay and produce nitric acid, ammonia, etc., in the soil, besides benefiting it mechanically. Green crops thus treated collect a quantity of plant food from the soil and from the air, and hold it as a reserve for the succeeding crop of vegetation, which more readily takes its food from the decaying crop than from the soil itself. . . .

"Thinking persons will discover numerous additional ways of collecting plant food. This thinking and planning is also a very pleasant hobby. One feels a certain amount of satisfaction in gardening independently of excremental matter, and in proving to neighbors who do not wish to be convinced, that farm-yard manure is not absolutely indispensable."

THE EFFECT OF ALCOHOL IN DISEASE.

THE following extracts are from a paper by Dr. T. D. Crothers, of Hartford, Conn., secretary of the American Medical Temperance Association, and a recognized authority on the effects of stimulants :—

"The value of alcohol in disease has been and is seriously questioned in the minds of many persons. Tradition, social custom, and empiric dogmatism have invested the question with difficulties which, happily, are fast disappearing. A number of authorities have enumerated the diseases and conditions in which alcohol is counterindicated. This list has now grown to such an extent as practically to include almost every condition of disease and degeneracy known. Dr. Clouston is very emphatic in showing the danger of alcohol to all who have suffered from head injuries and inflammation of the brain and other nerve affections.

"Professor Woodhead, the Cambridge pathologist, gives the following list of conditions in which it should not be used: (1) Persons who have any family history of drunkenness, insanity, or nervous disease; (2) those who have used alcohol to excess in childhood or youth; (3) those who are nervously irritable or badly nourished; (4) those who suffer from injuries to the head, gross disease of the brain, and sunstroke; (5) those who suffer from great bodily weakness, particularly during convalescence from exhausting diseases; (6) those who are engaged in exciting or exhausting employment, in bad air and surroundings, in workshops and mines; (7) those who are solitary or lonely, and require amusement; (8) those who have little self-control, either hereditary or acquired; (9) those who suffer from brain weaknesses, the result of senile degeneration; (10) those who suffer from organic or functional diseases of the stomach, liver, kidneys, or heart; (11) it should never be given to young children, or those in the adolescent stage.

"This list is practically prohibitive of all use of alcohol in medicine.

"The brilliant discoveries in pathology and psychology have brought out the fact that alcohol, next to syphilis, is one of the most dangerous poisons in its effects on the body. This is rousing new critical inquiries about the theories as to its value, and reveals the errors concerning its use in medicine. The test of clinical experience confirms the conclusions of pathology and physiology. As a result, Continental physicians are rapidly changing their views of alcohol in therapeutics, and questioning the theories on which its use is based. Doubts concerning the place of alcohol in medicine are rapidly increasing in all German schools of medicine, and the physicians are recognizing this change in their practice.

"In this country, several elaborate experiments have been made of treating cases without alcohol, and the results have fully confirmed the theories of Continental physicians. . . . There is a critical spirit abroad, and the current literature is full of doubts and denials. The defenders of alcohol in therapeutics are disappearing, and reference to spirits as a tonic or stimulant are timidly made and feebly supported in the journals.

"The question is very tersely put by Dr. Baer, of Berlin, who says, in substance: The time has come for a change of theory and practice concerning alcohol in medicine, when modern pathological, chemical, and psychological research all fail to support the theories on which alcohol is used in medicine. Dr. Lagand, of Paris, puts the same idea in another form when he says: 'Our previous conceptions of alcohol and its action on the body are contradicted by clinical experience and chemical experiment in the laboratory.' From a pathological point of view, alcohol is shown to be one of the most insidious and destructive of tissue poisons, and its use is followed by certain cell and tissue degenerations that are uniform in their progress and growth. The theory of a tonic and stimulant value, or a force producer or conserver, can not be sustained by any facts that are unquestioned.

"The conclusions are inevitable, that alcohol and its theories as a therapeutic drug must be modified, and that its use in medicine will change, and no doubt will in the near future be put aside as worthless and dangerous."

THE SCHOOL PHYSIOLOGY JOURNAL
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IS ALCOHOL A POISON ?

"IF we were to include in one list the deaths indirectly due to chronic as well as acute poisoning by alcohol, it would stand first of all poisons in order of frequency," says the standard author Alexander Winter Blyth, (an English public analyist) in the latest edition of his great work on "Poisons."

Another well-known authority, Professor James M. Anders, M. D., of the Philadelphia Medico-Chirurgical College says in his "Text-Book of the Practice of Medicine" (p. 1207):

"Since alcohol is physiologically a poison and not a food, and essentially a drug and not a drink, the effects of its habitual ingestion are directly to produce degeneration of nearly all the bodily tissues, and indirectly to increase the liability to many diseases."

KNOWLEDGE OF THE NATURE OF ALCOHOL IMPORTANT.

That alcohol is a poison is commonly taught in medical literature and is recognized and taught by leading medical writers, but is not yet well understood by the people. It is most important, however, that it should be, for the beverage use of this substance, begun largely in ignorance of its nature, is a cause of untold injury to the individual and to the state. Therefore, the laws of nearly the whole of the United States require that "all pupils in all public schools" shall be taught not only the effects but the nature of alcoholic drinks.

AN UNPROVED AND ILLOGICAL CHARGE.

In accordance with this requirement and with the statements of the medical writers above mentioned concerning the nature of alcohol, the indorsed school text-books teach that alcohol is a poison. Because they thus teach they are now publicly charged with inaccuracy by Professor Atwater of Middletown, Connecticut, who says that "alcohol used in quantities and ways which cause no injurious effect can not be called a poison." Concerning the logic of this assertion the "Practical Druggist" says:

"Dr. Atwater can maintain his contention that alcohol is a food only by framing this unique sort of definition of a poison, but in this he is certainly in error. Every standard work on toxicology and medical jurisprudence classifies alcohol with other poisons; and if alcohol is not a poison because it is possible to use it in ways and doses to which poisonous or fatal consequences can not be directly attributed, then we should be compelled to admit that there is no such thing as a poison on earth, for whatever may be true of alcohol in this respect may prove to be true of every poisonous drug known."

A DEFINITION MADE TO FIT THE CASE.

The "Practical Druggist" also says:

"In making a definition to fit his case, Professor Atwater is begging the whole question. . . . In dealing with questions of this sort, it is evidently necessary that we should not take new definitions to suit ourselves or our theories, but that we should accept the meaning of terms as they are generally understood; otherwise our statements and conclusions will serve to confuse rather than enlighten the public mind."

STANDARD DEFINITION OF POISON.

The essential features of the definitions of the term poison in the medical dictionaries are contained in the following:

Blyth's "Text-Book on Poisons" says: "A substance of definite chemical composition, whether mineral or organic, may be called a poison, if it is capable of being taken into any living organism, and causes by its own inherent chemical nature impairment or destruction of function."

Quain's "Dictionary of Medicine" says: "A poison may be defined as a substance having an inherent deleterious property which renders it capable of destroying life by whatever avenue it is taken into the system."

THE INDORSED PHYSIOLOGIES' DEFINITION OF A POISON.

The definition of a poison given in most of the indorsed school physiologies, virtually the same as the foregoing, is as follows: "A poison is any substance whose nature it is when absorbed into the blood to injure the health or destroy life."

THE NATURE OF A SUBSTANCE DOES NOT CHANGE WITH THE QUANTITY.

The school text-books make the same statement regarding alcohol that standard works on toxicology do, viz., that "Alcohol is a poison." They do not say, as some of the critics think they should, "Alcohol is a poison if you take enough of it," because this would be erroneous, as is shown by Dr. Koppe of Germany who says, in his book for physicians, "Das Alkoholisichtum":

"The chemical nature of a substance can not change with the quantity, and can not be

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lost in the smallest quantity; but must in every qualitative analysis remain the same, so long as by progressive division this substance as such still exists, even down to the last molecule."

Another reason why it would be scientifically erroneous to say that alcohol is a poison only in large quantities is well stated in Allbut's "System of Medicine," which says:

"As with other poisons or drugs there is no constancy in the dose of alcohol which produces distinct results."

Woodman and Tidy's "Forensic Medicine" says: "Oxalic acid is a poison and an active one; but usually at least half an ounce is necessary to cause death. Half an ounce can scarcely be called a small quantity."

There is, therefore, just as much reason for saying that oxalic acid is a poison "only when taken in large quantities" as there is for saying the same of alcohol.

FIRST DEMAND REVISION OF STANDARD TREATISES.

If the school text books on physiology are inaccurate in teaching as they do, in simple, unexaggerated terms, the unqualified fact that alcohol is a poison, then all the standard treatises on poisons, forty or more, are inaccurate for teaching the same thing, and the Committee of Fifty should at once inaugurate a movement for their revision.

SAMPLES FROM THE "CONSENSUS OF SCIENTIFIC OPINION."

A few of the strong utterances concerning alcohol a poison made by great medical writers, which might be many times multiplied if space permitted, are the following:—

Woodman and Tidy's "Forensic Medicine" says (p. 435): "Alcohol acts as a true poison, whether the vapor be respired or the liquid be swallowed or injected into the cavity of the chest or into the cellular tissue."

Allbut's "System of Medicine" says: "Alcohol has first of all an indirect effect; by its action on the circulation it supplies the brain and spinal cord with more blood and so increases their activity; it acts, however, directly on the nerve cells as a functional poison."

In 1895, a special commission consisting of eminent members of the highest scientific body in France, the Academy of Sciences, was appointed by the government to investigate the causes of the alcoholism which is now ravaging that land of light wines.

Many experiments were performed by the members of this commission and the discussion ran through a number of sessions. (Bulletin de l'Academie de Medicine, Paris, 1895, xxxiv). The following were a few of the conclusions there given:

M. Magman said: "I agree with M. Daremberg when he says all the alcohols are dangerous poisons."

M. Rochard said: "It must not be thought that the danger will be exorcised, that the scourge which devours modern society will be stopped, that the question of alcoholism, in a word, will be solved by the rectification of alcohol, the prohibition of artificial bouquets. Alcohol (and M. Laborde has very justly emphasized it in these considerations) *is always a poison*."

Finally, the secretary interrupted the discussion by saying, "We all acknowledge that alcohol is a poison and alcoholism a scourge; but what we have to do is to indicate the means of arresting the progress, every year more menacing, of this scourge."

RESPECT FOR AUTHORITY NOT JEOPARDIZED.

The professed motive of those who are attacking the present indorsed temperance text-books is the fear that pupils studying them will find after leaving school that they have been taught error and will come to the sweeping conclusion that just the opposite of what they have been taught about every thing is true.

In this circular it has been shown that one of the two errors charged against the indorsed physiologies is not an error, but a fact which no pupil will have to unlearn when he leaves school. In circular No. 23, "Leading Medical Journals on the Alcohol-a-Food Theory since Jan. 1, 1900," it is clearly shown that Professor Atwater is in error in claiming that alcohol is even "to a certain extent a food," and that the indorsed school text-books are right in teaching that it is not a food.

Thus it is clearly demonstrated that the fears professed are groundless, and that no scientific reason exists for continuing the campaign against the indorsed physiologies and the present teaching in the schools as required by law.

THE REAL SECRET OF THE OPPOSITION.

"The secret of this whole contention," says Honorable Henry Sabin, former superintendent of schools of Iowa, in a recent number of "Education," "is not whether alcohol is a food or a poison, but that in our attempts to indoctrinate the children with the idea that the only course of safety is that of total abstinence, we are cutting across the grain of a phase of modern society which regards the use of intoxicants as a lesser and not a greater evil."

The children of a whole nation can not be sacrificed to prejudice which has its root in personal indulgence.

Text-book Committee of Advisory Board:

A. H. PLUMB, D.D.
JOSEPH COOK, LL.D.
DANIEL DORCHESTER, D.D.
T. D. CROTHERS, M.D.
C. H. SHEPARD, M.D.
L. D. MASON, M.D.

MARY H. HUNT,
World's and National Supt. of the Dept. of Scientific Temperance Instruction of the Woman's Christian Temperance Union.

May 15, 1900.

Please preserve silence with reference to this matter to any who are not interested in the true Sabbath, and keepers of it.

TO THE NATIONAL WOMAN'S CHRISTIAN TEMPERANCE UNION.

GREETING:—

In consideration of the acknowledged character of the Woman's Christian Temperance Union, its fundamental principles, and of facts which have come to our notice, we, whose names are signed below, are constrained to memorialize your honorable body concerning that section of your plan of work known as the "Sabbath Observance Department," and to pray that this department may be abolished, or so modified as to remove from it its sectarian features.

Our reasons for this petition are:—

1st, That as the sacredness of conscience is a fundamental Christian principle, and you always have aimed to sacredly regard all that is Christian in principle, and since it seems clear that the effort to secure the enactment and enforcement of laws making Sabbath observance compulsory, is contrary to this great principle, therefore, this department must be out of harmony with your organization.

2d, That as an organization you have always claimed, and do now claim, to be unsectarian, and the fact that you have a department for enforcing the observance of any day as the Sabbath makes you practically sectarian, since there are two denominations of Christians who keep the seventh day as the Sabbath of the Lord God.

3d, That this effort on the part of the W. C. T. U. is entirely outside the province of a Temperance Organization, and cuts you off from many who would gladly aid you in your legitimate work. It really sets your organization against its best interests, by robbing you of the co-operation of thousands of earnest Christian temperance people; since for them to co-operate with an organization which, as one of its lines of work, seeks to enforce Sunday observance, is themselves to aid in bringing suffering and persecution upon themselves, or their brethren.

4th, That many have gone out from you because of their conscientious belief that this department is not in harmony with God's word as to the rights of conscience; and that it is in itself a menace to peace and security, since it is used as an endorsement and support by those who are indulging the spirit of religious intolerance and persecution in making and enforcing Sunday laws.

5th, That as the Sabbath question is a live one, and destined to become more and more aggressive on the side of those who are using the law for the maintenance of Sunday observance; and as this will produce more and more of that sort of contention which will jeopardize your work, and since we whose names are appended, are personally interested, some of us being members in active work with you, we feel that we are warranted in saying that the organization would do well to withdraw from all alliance with every movement for Sabbath or religious legislation of any sort, before it shall become hopelessly entangled.

6th, We, your petitioners, fully believe that the real object of this department can be better served by changing it to one for the protection of the employed, whose effort shall be, as originally intended, simply to make it impossible for a mercenary employer to exact seven days' labor for a week, leaving to the conscience of each individual the particular day on which rest shall be taken.

We desire that it shall be perfectly understood that in this we do not ask the W. C. T. U. as a body, nor any of its members individually, to modify or compromise in any way their own beliefs with respect to what day is the Sabbath. That is a matter that pertains to the individual conscience; and each one has undisputed right to exercise her own belief thereon without question or molestation from any source. What we ask is that the *legislative and compulsory features* of the "Sabbath Observance Department" of the National Women's Christian Temperance Union shall be discontinued.

Believing in the Christian character, and fidelity to God, of those who compose your great organization, we, members of the W. C. T. U., and others who would gladly join you and do all in their power to forward the work in which you are engaged, do most earnestly pray you to regard this our memorial, and grant our petition "In the name of God and home and native land."

(Beginning of a chapter)

Old Ms

FOOD AND DIET

A food is a substance which when taken into the body is capable of supplying material with which to repair losses sustained by the body tissues and fluids, or which may aid in maintaining the bodily functions while at the same time in no way interfering with any vital function or causing injury of any sort.

There are many substances which possess some of the properties of food and yet are not foods. For example, there are many vegetable products which contain all the useful elements found in common foodstuffs and yet cannot be regarded as foods because they also contain poisonous substances and hence cannot be eaten without injury. There are many other substances, such as alcohol, which may undergo in the body changes similar to those which take place in foodstuffs and so by some has been regarded as a food, but such persons evidently overlook the fact that alcohol is also capable of producing serious injury, which is not the case with real foods. A characteristic difference between foods and poisons is that a food is injurious only when taken in considerable excess of the body needs, whereas a poison is more or less injurious in all doses and shows decidedly poisonous effects in quantities in which foods are readily tolerated.

LIFE A PROCESS OF COMBUSTION

Heat is produced by the oxidation, or burning, of combustible substances similar in chemical composition to those which are used for the production of heat in our stoves and furnaces. Hence food may be regarded as fuel. By the burning of food in the body animal heat is produced which maintains the body temperature at about 100 degrees. The food fuel also supplies energy for muscular work and other forms of bodily activity. Beside this the food and the taking of food serve as stimuli to the body cells and various forms of bodily activities.

THE CHEMICAL COMPOSITION OF THE BODY

The following table shows the quantities of the various elements which enter into the body of a man weighing 150 pounds:

A N. D., p. 27.

A p. 28.

	Per cent.		
Oxygen	65.00	97.5	lbs.
Carbon	18.00	27.0	"
Hydrogen	10.00	15.0	"
Nitrogen	3.00	4.5	"
Calcium	2.00	3.0	"
Phosphorus	1.00	1.5	"
Potassium	0.35	8.4	oz.
Sulphur	0.25	6.0	"
Sodium chlorid	0.15	3.6	"
Magnesium	0.05	1.2	"
Iron	0.004	~~.1~~ 45	~~"~~ grains
Zinc	.003	30	"
Iodine	Minute quantities		
Fluorine	Minute quantities		
Silicon	Minute quantities		
~~Zinc~~	Minute quantities		

The water-content of a new-born infant is about 75 per cent. of its body weight; that of an adult, 58 per cent. The muscles of an adult are 77 per cent. water. Growing infants need considerable quantities of water. An infant needs to take daily in some form, about one-seventh its weight of water. Most of this is absorbed from its food. An adult requires daily about one-thirtieth his body weight of water in food and drink.

The amount of water is determined somewhat by the kind of food eaten. When considerable protein is taken, much water is required to carry off through the kidneys the urea and other waste products resulting from its metabolism. Carbohydrates, that is, starch and sugar, require the retention in the body of three times their weight of water, while retained salt requires more than one hundred times its own weight of water.

THE SOURCE OF FOOD

The ultimate source of all foodstuffs is the sunlight. The chlorophyl grains of green leaves are laboratories in which the energy of the sunlight is somehow captured and utilized in the manufacture of organic materials which may be used for supporting the life processes of both plants and animals.

Food is simply sunlight in cold storage. The function of the plant is to store the energy borrowed from the sun, preparing it for the service of man and animals that, like the steam engine, the furnace or the lamp, must be regarded as mechanisms for using or expending energy. The heat which glows in the fire on the hearth, the light which shines out from the incandescent lamp or the brilliant electric arc are nothing more than resuscitated sunlight; so likewise the heat of our bodies and the energy of mind and muscle which we are able to display are transmuted sunshine.

In the established order of nature the plant is a mechanism for creating, collecting and storing energy, while the animal, like the locomotive, is a mechanism for using or consuming energy. The plant gathers, while the animal dissipates.

FOOD PRINCIPLES

There are six essential substances found in foods of which the body makes use and which constitute the essential food principles.

B p. 30.

These are:

1. Proteins.
2. Carbohydrates.
3. Fats.
4. Salts or food minerals.
5. Vitamins.
6. Cellulose.

PROTEINS

B p. 30.

A p. 31.

As known to the chemist, proteins are the dead remains of the protoplasm or living substance of plants and animals. Proteins are produced by plants. They cannot be produced by the chemist, and the tissues of animals are able only to slightly modify the proteins which plants produce.

Proteins are not so simple in their composition as are other food principles. The protein molecule is, indeed, very complex. It is made up of a considerable number of substances loosely held together by the energy derived from the sun. These simpler bodies or "building stones" which, in a pure state, appear in a crystalline form, are known to the chemist as amino acids. There are known more than forty of these amino acids. Of these, only eighteen enter into the composition of the human body.

COMPLETE PROTEINS

Many plant proteins are lacking in one or more of the building stones required for constructing human tissues. A protein which contains a complete assortment of these building stones, that is, all that are needed for the construction or repair of the living tissues of the body, is known as a complete protein.

B pp. 31 and 32.

A p. 32.

It is interesting to note that those foodstuffs which have become staple articles of diet throughout the world are the ones which contain the highest quality of protein. Rice, millet, and the potato owe their popularity, in large part at least, to the fact that they furnish an excellent quality of protein. Among the few vegetable products which furnish proteins which are complete may be mentioned nuts of various sorts. The soy bean is also notable in this respect. It is particularly interesting to note that while the soy bean furnishes a complete protein, that is, a protein 100 per cent. of which may be utilized in tissue building, the proteins of ordinary peas and beans are worth for tissue building much less than their face value.

and the peanut are

Lean meat furnishes complete proteins, which fact is probably one of the chief reasons for its use as a foodstuff. It is important to remember, however, that the proteins of milk and eggs are equally as complete as meat proteins.

CARBOHYDRATES

Plants produce many different kinds of carbohydrates, but those of which the body can make use are starch, dextrin, and sugar and fruit acids. The utilizable sugars are cane sugar, or sucrose, malt sugar, or maltose, milk sugar, or lactose, and grape sugar, or dextrose, and fruit sugar, or levulose.

A 33, B 33, C 33, D 33, A 34, B 34, C 34, D 34 and 35.

Starch is the most abundant of all the carbohydrates, being found in all cereals, in unripe fruits and a few ripened fruits, in certain nuts and in most vegetables.

There are many different kinds of starches. Each plant produces its own variety, the form of which is so characteristic that it may be used as a means of identification.

Dextrin is derived from starch and is practically identical with it in chemical composition. Sugars are also derived from starch.

Of the various vegetable acids, the only ones which are utilized by the body are citric acid, malic acid and tartaric acid.

Glycogen is an animal starch produced by the liver of animals from sugar brought to the liver in the portal vein after absorption from the stomach and intestines. The body of a full-sized man contains about two pounds of glycogen, which is stored in the liver and the muscles. It is converted into sugar as needed for use as fuel, which is its sole function in the body.

Milk sugar is another carbohydrate peculiar to animals, being exceedingly rare in the vegetable kingdom.

The human constitution seems to be adapted to a dietary very rich in carbohydrates. A well-balanced bill of fare will contain more than half, at least three-fifths, of its energy value in the form of carbohydrates. Energy in this form is apparently more readily and easily utilized than in any other form. Sugar, in other words, is the natural fuel of the body.

The carbohydrates are used in the body to maintain animal heat and to supply energy for work. Every muscular contraction, every heart beat, every bodily movement of any sort involves the burning or destruction of carbohydrate.

If more carbohydrate is eaten than is required for immediate use, it may be stored in the form of fat, a residual tissue which is intended to be drawn upon when the food supply is cut off or reduced.

carbohydrates, to the amount of two or three ounces daily, are absolutely essential to the maintenance of good health,

for the reason that the utilization of fats requires the presence of carbohydrates.

FATS

There are animal fats and vegetable fats.

~~A 35, A 36.~~

It is generally believed that a certain amount of fat in the diet is essential for the maintenance of health; but Hindhede, the eminent Danish physiologist, has shown in recent years that a man may live in perfect health and sustain his strength for many months on a diet from which fat is excluded.

Fats, if not absolutely essential, are a wholesome and useful constituent of the dietary. More than any other food, they produce the sense of satiety or satisfaction after eating. They are the most concentrated of all forms of foodstuffs, having an energy value more than double that of either carbohydrates or proteins. If eaten in excess, fats usually produce a rapid gain in flesh, encouraging intestinal putrefaction, with rancid stools, and are apt to give rise to a troublesome and even dangerous condition known as acidosis. It is strictly physiologic that fats be eaten with cereals or breadstuffs, for the starch which is found abundantly in cereals, as has already been shown, is necessary for the proper utilization of fats by the body cells.

FOOD SALTS

Compounds of calcium, sodium, potassium, magnesium, iron, phosphorus, sulphur, and chlorine, known as salts, constitute about 4 per cent. of the body weight, amounting to 5 or 6 pounds in a person of ordinary weight. It is important to note that these so-called salts as they are found in the body are very different from the chemical compounds of the laboratory.

While small amounts of inorganic salts are found in the tissue fluids, iron, sulphur, phosphorus, and calcium are found in the body only in a specially organized or organic state. This is well shown by the fact that while the presence of inorganic iron may be readily demonstrated by means of various laboratory tests, organic iron, the iron of the blood and other tissues, cannot be detected by these tests. Evidently the chemistry of the plant by which these organic substances are originally produced is a far more refined and subtle process than any of the procedures known to the chemical laboratory. It is for this reason known that the chemist is not able to manufacture foodstuffs. Original foodstuffs are only produced by the magic alchemy of the sun's ray.

B 36.

A 37.

The body loses daily in the excretions from two-thirds of an ounce to an ounce of salts—chlorids, sulphates, phosphates and other salts of calcium, magnesium, sodium and potassium. To make good this loss, the daily food must contain at least an equal amount of organic or food salts. This subject will be more fully discussed, together with the method of balancing the diet for food salts, in later chapters.

Vitamins.

Vitamins are subtle substances other than carbohydrates, fats, proteins or salts which are essential for growth, development and good nutrition. Their purpose seems to be to activate or stimulate the various functional activities of the body. The term vitamin was given by Funk to a substance which he isolated from foodstuffs and which in minute quantities was found to be capable of curing and preventing beri-beri, a fatal disease very common among rice eating people. This substance is found abundantly in the bran and germ of seeds, grains and yeast and in greenstuffs, fruits and to some extent in most foods. It is deficient or absent in polished rice, superfine flour, new process or degerminated corn meal, sugars, many other denatured foods and in fats. This vitamin was given the name water-soluble B by McCollum. When the word *vitamin* is used alone, it is generally understood that reference is made to vitamin B.

Other vitamins discovered later are fat soluble A, found in butter, cod liver oil, some other fats, green leaves, and young sprouts. The absence of this vitamin gives rise to sore eyes, especially in young children and young animals. Water soluble C, the antiscorbutic vitamin, found in fresh vegetables and green sprouts, the juice of the orange, the lemon and the tomato, by its presence in foodstuffs prevents scurvy. Vitamin D, found in _______ and cod liver oil, prevents rickets. Vitamin E, found in ________, appears to be essential to reproduction.

CELLULOSE

While cellulose is not essential for the maintenance of life as are the several other food principles, it is nevertheless practically always found in foodstuffs and it renders important service in the body in giving bulk to the food and so encouraging intestinal activity.

Formerly regarded as practically indigestible in the human alimentary tract, it is now known that considerable quantities of cellulose are digested along with the other foodstuffs. Jaffa, in studies of the digestibility of common fruits and nuts, showed that 76 per cent. of the crude fiber was digested.

R e f e r e n c e s

Constantinidi showed that 79 per cent. of the crude fiber of potatoes is digestible, and Weiske states that the crude fiber of celery, cabbage, and carrots is digestible to the extent of 55 per cent.

Sixty per cent. of the crude fiber of green corn is digested, according to Bryant Millner, 80 per cent. of the crude fiber of beets, and 90 per cent. of the cellulose of apple.

According to Prausnitz, even the crude fiber of bran is digestible to the extent of 53 per cent.

254

Medical Uses of Milk.

Milk is not only useful as a nutrient for healthy persons, but by proper management, may be made to play a highly important role as a curative agent. For example, there is no better means of inducing a rapid gain in flesh than by milk feeding. There are many other medical uses of milk in the form of the milk regimen. The free use of milk is especially useful to cure as well as to prevent lime starvation.

How to Eat Milk.

Milk must be eaten, not swallowed as a beverage. It must be chewed. All foods need to be masticated. The calf and the nursing infant chew the milk which they draw from the maternal font. The movements of the jaws and the sucking movements executed by an infant in nursing induce an abundant flow of saliva which, mixing with the milk, properly dilutes it and to a high degree promotes digestion. Milk when swallowed rapidly as a beverage is likely to form in the stomach large and hard curds which are very slowly digested. Many persons who suffer from taking milk in this way imagine themselves to be unable to take milk and so abandon its use. The writer remembers a man to whom he had recommended the liberal use of milk. He protested that he was absolutely unable to use it at all and stated that on the last occasion on which he had taken milk he had nearly lost his life. A few hours after hastily swallowing several glasses of milk he experienced a sensation of suffocation, was then nauseated and on attempting to vomit experienced a choking sensation. On reaching his finger down his throat he felt a mass which he seized and to his astonishment drew out a rope of milk nearly a yard in length. The milk had formed in his stomach one large, hard curd which he was certainly very fortunate in being able to get rid of so easily. The famous English surgeon, Dr. Lawson Tait, told of a case in which he was obliged to perform a surgical operation to remove a similar mass of curds which had lodged low down in the intestine.

Milk should be sipped slowly and with a sucking movement or taken through a straw so as to secure a liberal admixture of saliva. By this means the formation of hard, indigestible curds will be prevented.

Milk must be taken in right quantities and in right combinations. It cannot be denied that milk digests better when taken by

Hermanter

itself or in very simple combinations than when mixed with a large variety of other foodstuffs. In some instances, also, a large quantity of milk is more easily digestible than a small quantity. When the stomach produces a large amount of highly acid gastric juice, as is usually the case with persons who have been accustomed to a hearty meat diet, the curds formed when a small amount of milk is taken will be large and tough, whereas if a larger amount of milk is taken, the curds formed will be smaller and softer. Hence, the proper remedy in many cases in which a person complains that he cannot take milk is to take more milk.

As already remarked, the taking of milk with meat is perhaps the worst of all dietetic combinations. The reason for this was made clear by Pavlov, the eminent Petrograd physiologist, who showed that meat requires a highly acid gastric juice for its digestion and that the stomach produces this sort of juice when meat is eaten, while milk demands and calls forth a juice lower in acid.

When milk is largely used as a nutrient, the remainder of the diet should consist chiefly of fruits and vegetables for the reason that milk contains an excess of lime and is deficient in the potash and soda which are necessary for perfect human nutrition. The last named elements are abundant in fruits and vegetables, particularly the potato, which is also very rich in salts of potash. A diet consisting exclusively of milk and cereals is less satisfactory. Such a diet often gives rise to scurvy in infants. Cereals are deficient in the alkaline elements which are needed to neutralize the acid products developed in the body.

In the use of milk, especially when it is freely taken, it is well to remember, also, that one may easily by this means ingest an excess of fats. The milk of certain breeds of dairy cattle is exceedingly rich in fat. The use of such milk in some persons, and especially in infants and young children, gives rise to symptoms which are sometimes denominated as biliousness, but which are not directly connected with the liver, being due to putrefactive changes set up in the intestine by the presence of an excess of fat. Breeders of dairy cattle have labored to produce strains of milch cows which produce milk containing a large amount of fat because they are more profitable, but for table use milk containing only a moderate amount of fat is preferable.

Milk is very little used by the Chinese, who from the most remote times have had a prejudice against this article of food, believing that by using milk one would acquire the characteristics and qualities of the animals from which the milk was obtained, just as certain primitive tribes refuse to eat pigs, fearing that their eyes will become small like those of the pig. The Chinese have been able to dispense with milk because of the superior virtues of the soy bean, from which they prepare an excellent milk and also a palatable cheese, and because of the very large use of greens.

It must be recognized, however, that the greatest value of milk as a food for adults is to be found in its use as a supplementary or complementary food; that is, as a means of rendering biologically complete a dietary otherwise consisting exclusively of the products of the vegetable kingdom. A strictly vegetarian diet is likely to be incomplete unless formulated with extraordinary care and scientific wisdom; but almost any group of vegetable foodstuffs which may be selected will prove satisfactory as nutrients if supplemented with a daily pint of good milk.

The Africans, unlike the natives of the far East, make large use of milk. This may be due to the fact that they have abundant pasturage whereas the Orient has long been, in many parts at least, over-populated.

According to Simmond, the Kaffir often subsists almost exclusively on a diet consisting of sour milk with the addition of a little millet. One meal a day of this food suffices to keep him in vigorous health.

Among the primitive tribes of Africa, according to Dr. Turner and Rev. Bryant, milk is practically always permitted to sour before using. The Zulus pour the milk when still warm from the cow into a gourd kept for the purpose. Loosely stoppered, the gourd is placed in the sun. At the end of 48 hours the milk is clotted and the whey is drained off. The gourd is filled with fresh milk. The next morning the milk is ready for use. The whey is drained off and the curds shaken out. Once a week the gourd bottle is thoroughly washed and scalded. The *amasi* (*amafi* of the Kaffirs) thus prepared is closely akin to the yoghourt of the Bulgarians.

Milk a Cheap Food.

Even at its present high price which is very likely to be higher rather than much lower, milk is a comparatively cheap and economic food. A pint of milk is equal in food value (calories) to a pound of codfish, a half pound of lean beef or veal, a quart of oysters, three pints of beef juice, or three and a half quarts of bouillon.

Ten cents will buy in the form of milk more than twice as much food as in the form of beefsteak, ten times as much as in the form of oysters, three to six times as much as is supplied by ten cents worth of eggs. Milk is really by far the cheapest of our ordinary animal foods.

Milk, even at the price of certified milk, is a cheaper food than beefsteak. For example, a pound of steak at 40 cents supplies 450 to 650 calories, or 14 calories for one cent; while a quart of certified milk at 35 cents supplies 650 to 740 calories, or 20 calories for one cent, a difference of more than 40 per cent. in favor of the milk, to say nothing of the very great superiority in quality.

When we consider the amount of tissue-building material which may be produced on a given area of land, the economy of milk as a foodstuff becomes still more apparent. According to Professor Henry, late Dean of the Agricultural Department of the University of Wisconsin, 100 pounds of digestible food when fed to animals produces the following quantities of actual foodstuff:

Milk	18.0 pounds
Eggs	5.6 pounds
Beef	2.8 pounds
Mutton	2.6 pounds

It is evident from the above that the cow is more than six times as efficient a food transformer as is the steer. Feeding corn to steers wastes 97 per cent. of the corn.

256

TABLE XLI.

Percentage Composition of the Milk of Various Animals.

The following table compiled by Voltz from various sources, shows the great differences in the composition of the milk of different animals:

	Water	Solids	Fat	Casein	Total protein	Sugar	Ash	Calories per oz.
Human	87.58	12.42	3.74	0.80	2.01	6.37	0.3	19
Cow	87.80	12.20	3.40	2.70	3.40	4.70	0.7	18
Buffalo	82.30	17.70	7.70	......	4.80	4.40	0.8	31
Zebu	86.13	13.87	4.80	......	3.03	5.34	0.7	22
Llama	86.55	13.45	3.15	3.00	3.90	5.60	0.8	19
Camel	87.60	12.40	5.38	2.98	......	3.26	0.7	17
Goat	86.30	13.70	4.00	3.60	4.60	4.30	0.8	20
Sheep	81.50	18.50	7.00	4.30	5.60	5.00	0.9	30
Reindeer	67.70	32.30	17.10	......	10.90	2.80	1.50	59
Mare	90.58	9.42	1.14	......	2.50	5.87	4.36	12
Donkey	90.12	9.88	1.37	0.79	1.85	5.19	0.47	12
Elephant	67.85	32.15	19.57	......	3.09	8.84	0.65	63
Hippopotamus	90.43	9.57	4.51	......	......	......	......	12
Rabbit	69.50	30.50	10.45	......	15.54	1.95	2.56	47
Guinea pig	41.11	58.89	45.80	......	11.19	1.33	0.57	131
Dog	77.00	23.00	9.26	4.15	9.72	3.11	0.91	38
Cat	81.64	18.36	3.33	3.11	9.53	4.91	0.59	25
Pig	82.37	17.63	6.44	......	6.09	4.04	0.59	28
Blue whale	50.47	39.53	20.00	......	12.42	5.63	1.48	72

Relation of Diet to Growth

The influence of the composition of the milk of animals of different species upon the growth of their young is well shown in the following table:

	Time in days required for the newborn animal to double its weight	100 parts of milk contain— Protein	Ash	Calcium	Phosphorus
Man	180	1.6	0.2	.021	.022
Horse	69	2.0	0.4	.086	.057
Cow	47	3.5	0.7	.114	.087
Goat	22	3.7	0.78	.143	.122
Sheep	15	4.9	0.84	.178	.127
Swine	14	5.2	0.80	.178	.135
Cat	9.5	7.0	1.02	......	......
Dog	9	7.4	1.33	.321	.233
Rabbit	6	10.4	2.50	.636	.437

Goat's Milk

The claim made for goat's milk that it is more digestible than cow's milk is not justified by the facts. It contains more casein than does cow's milk, more than four times as much as does human milk, more fat and less sugar. It is sometimes cleaner, which is the best and perhaps the most that can be said in favor.

Goat's milk has the disadvantage that the goat is a carrier of germs of a disease known as Malta fever, or Mediterranean fever. This infection is very common among goats in the Mediterranean region and the germs are found in abundance in the cheese made from the milk of infected animals. This cheese is now being eaten not only in the Mediterranean region but in different parts of the world to which it is shipped. It is on this account important that the facts should be known. For the present at least imported cheese prepared from goat's milk should be avoided as incurring risk of infection.

The goat appears to be immune to the germ or is at least only very slightly inconvenienced by it. Little or nothing is being done to suppress the disease in the region where it prevails for the reason that the goat herders, having become themselves immune, cannot be made to believe in its existence.

Several outbreaks of Malta fever have occurred in this country. If goat's milk is used, great care must be taken to make certain that it is from a herd of healthy animals.

ment as the dairy industry. The country's great food need at the present time is *more milk and cleaner milk.* As soon as the public become convinced of these facts, they will be quite willing to pay the higher price which clean milk will cost. Clean milk at a dollar a quart would be preferable to beefsteak at ten cents a pound.

The accompanying cuts show the dairy of the Battle Creek Sanitarium, which supplies milk free from Welch's bacillus. Every dairy should do the same. Our milk supply should be as clean as our water supply.

A Person May Be Sensitized to Milk.

Another point to which attention should be called in the interest of both infants and invalids is the fact that certain persons become sensitized to milk as well as to other forms of protein, and in a person who is sensitized even the smallest amount of milk may give rise to dangerous or even fatal symptoms. Many infants die annually from this cause. This fact should be borne in mind in changing the infant from the breast to bottle feeding. The milk should first be given in very small quantities, a teaspoonful in a half glass of water, the proportion being gradually increased until the proper dilution is reached. The same method should be pursued with individuals who have learned by experience that unpleasant symptoms are noted after

Infections Due to Unclean Milk.

Milk must be free from the germs of disease. In addition to the common organisms which give rise to putrefaction and with which the milk becomes contaminated through careless dairy methods, milk may contain germs of various specific diseases such as tuberculosis, typhoid fever, diphtheria, scarlet fever, sore throat, Malta fever—maladies originally derived from human beings suffering from the above named disorders and with the germs of which the milk, by direct or indirect contact, becomes contaminated.

Milk may also communicate to human beings various disorders which originate in cattle, but which may be communicated to human beings by making use of the milk of sick animals, such as foot and mouth disease, milk sickness, gastroenteritis, anthrax, cowpox, rabies, actinomycosis and perhaps other maladies.

Infected Milk a Cause of Tuberculosis.

Modern research has shown that bovine tuberculosis is communicable to human beings. According to Rosenau, it must be conceded that not less than 5 to 7 per cent. of all cases of human tuberculosis are due to infection from the use of infected milk or the flesh of tuberculous animals.

A careful examination of the mortality tables published by the United States Census Bureau shows that not less than 3,000 children die annually as the result of infection with bovine tuberculosis, not less than 60,000 children are constantly suffering from bovine tuberculosis contracted chiefly through the use of diseased milk.

The New Jersey Tuberculosis Commission found 16 per cent. of the dairy cattle in that state suffering from tuberculosis. In some parts of Germany 30 per cent. of all cattle were found to be infected with this disease. An investigation made of the milk supply of the District of Columbia showed that 15 to 25 per cent. of all the cows furnishing milk to that community were infected.

Tubercle germs are not readily killed by dairying processes. Schroder killed guinea pigs by infection with germs found alive in butter five months after it was churned. Tubercle germs have been found in great numbers in cheese and ice cream. Morgenroth even found tubercle germs in 9 out of 28 samples of oleomargarine purchased in the open market.

247

Injurious Effects of the Sterilizing or Pasteurizing of Milk.

The public has been taught to place too much faith in sterilized or boiled milk. It is true that pasteurization or boiling of milk destroys certain specific disease-producing organisms such as those of typhoid fever, tuberculosis and diphtheria, but these processes at the same time destroy certain highly essential, vital properties of milk, and as has been long known, fail to destroy the spores of putrefactive organisms, which probably are, on the whole, the cause of far greater mischief and many more deaths than the organisms which give rise to tuberculosis, typhoid fever and other specific organisms. If left to itself, cow's milk does not decay but sours. Boiled milk rots. The acid-forming organisms which find their way into the milk from the air thus exercise a protective influence, preventing the toxemia which results from intestinal putrefactions. When an infant is fed upon sterilized milk, the stools, which are naturally slightly acid, quickly become foul smelling through putrefaction and the infant is thus exposed to highly potent disease-producing influences against which it is protected when fed upon natural, clean milk. A temperature of 240° F. for half an hour is required to destroy the spores of putrefactive germs and even such milk is likely to promote putrefactive processes in the intestine, especially in the case of young children. It is thus apparent that pasteurization and boiling of milk should be regarded only as makeshifts which mitigate to some degree the evils resulting from the use of milk contaminated with barnyard filth. The movement to provide certified milk should be everywhere encouraged.

Whenever pasteurized or sterilized milk is used, free use should be made daily of orange juice, tomato juice, potato soup or some other foodstuff rich in vitamins.

The boiling of milk modifies in a harmful way nearly all its ingredients and considerably reduces its nutritive value. Rats fed on boiled milk grow to only half their normal size.

Scurvy sooner or later appears in babies exclusively fed on pasteurized or boiled milk. The subtle alchemy by which milk is prepared in the laboratory of Nature is upset by the crude process of cooking. Boiled milk will sustain the life of rats but it will not enable them to grow to full development, and reproduction fails altogether.

(e) Certified milk shall be normal milk; that is, neither heated, frozen nor altered in any way except strained and cooled.

(f) Certified milk shall be of uniform quality and contain not less than 3.8 per cent. nor more than 4.2 per cent. of fat, unless it is labeled otherwise, in which case it shall not vary more than 0.2 per cent. from the amount stated on the label.

(g) Certified milk shall not be subjected to the action of heat; shall not be subjected to the action of any preservative whatever except cold; shall not be subjected to the action of light, electricity, pressure, or any special force or agency of any kind for any purpose; no substance of any kind shall be added to the milk for any purpose; and no part of the milk shall be removed.

Pastures or paddocks to which cows have access shall be:

(a) Free from marsh or stagnant pools.

(b) Crossed by no stream which might have easily become dangerously contaminated.

(c) A sufficient distance from offensive conditions to suffer no bad effects from them.

(d) Free from plants which affect the quality of the milk deleteriously.

It is highly desirable that associations for the production of certified milk should be formed in all parts of the United States so that safe milk may be provided, especially for children and invalids. As a matter of fact, the entire milk supply of the country ought to be produced under certified conditions. Milk is wholesome only when clean, and it is to the highest degree absurd to accept the ordinary commercial product as it reaches the average consumer at the present time. Water containing one-thousandth part as many germs as are usually found in milk would be at once condemned as unfit for use.

The importance of clean milk can scarcely be exaggerated and cannot be too strongly insisted upon. Notwithstanding all that has been spoken and written on this subject within the last 25 years, the apathy of the general public in reference to the character of the milk they use is truly amazing. This apathy and the ignorance of which it is the result are responsible for thousands of deaths annually and for an enormous amount of morbidity not only in infants but in older children and adults.

The importance of thorough cleanliness as a condition of healthy human life is only just coming to be appreciated. During the long ages of savagery from which the human race has only recently begun to emerge, we acquired a great number of filthy practices which as yet we have only in part eliminated. In the savage state our vital resistance was so high we were able to withstand these insanitary conditions, but in our present weakened and degenerated state, they become ~~a~~ potent agents of destruction.

~~nates~~ rapidly in sterilized milk and sporulates in the intestine. Within two days after giving a guinea pig milk infected with B. Welchii spores were found in the feces.

It is evident, then, that aside from partial protection against B. tuberculosis, pasteurization affords little advantage, from a hygienic standpoint, for ordinary milk-souring germs are not at all dangerous or even unwholesome, while, on the other hand, pasteurizing milk enables B. Welchii to germinate and multiply, and sometimes to such an extent as to make the milk a rich culture of this pathogenic organism.

It seems to the writer high time that more attention should be given to the character of the bacteria of milk, rather than to mere numbers. The millions of acid-forming organisms in buttermilk are harmless, whereas a few thousand B. Welchii are not only an evidence of gross contamination but also a menace to health since this organism easily becomes domiciled in the intestine and flourishes amazingly under the anerobic conditions found in the colon, producing spores as well as vegetative forms.

The dangerous character of this organism has unfortunately not been fully appreciated until recently. Wright, West and others had erroneously concluded that B. Welchii produces no toxin, either exo- or endo-, and this led to its being grouped among harmless organisms; but the researches of Bull and Pritchett in 1917 and the later study of the pathogenicity of the organism by Esty (1920), have clearly shown the older views to be erroneous, and it is now well established that B. Welchii is highly pathogenic, although non-virulent strains are often met.

Bull and Pritchett showed that B. Welchii produces a specific bacterial toxin which may be separated from the bacteria. This highly virulent toxin Esty has shown to be similar to the toxin of the diphtheria bacillus.

The highly dangerous character of Welch's bacillus will be recognized when it is recalled that this organism is the cause of gas gangrene, one of the most formidable complications of wounds with which the military surgeon has to contend. Experimentally, the organism shows itself to be highly active. So small a quantity of culture as 2 c.c. injected into the abdomen of a guinea-pig causes death from gas gangrene in 12 to 30 hours. A still smaller dose, 0.25 c.c. (four minims), injected into the peritoneal cavity, caused the death of a 607-gram guinea-pig (Esty), and 0.1 c.c. killed a 400-gram guinea-pig.

(13 87)

As already noted, some strains of B. Welchii are not virulent. This fact was first pointed out by Herter, who noted that strains of B. Welchii obtained from the droppings of cows were less virulent than those from meat eating animals. Esty found of 9 strains obtained from human sources, all were pathogenic. Of 10 strains from the cow, 40 per cent. were pathogenic, and of 11 strains from milk 8, or 72.7 per cent., were pathogenic. The conditions found in the colon of a meat eater or a mixed feeder, such as man, are particularly favorable for the development of B. Welchii.

Observations made by Esty as regards the effects of heat upon B. Welchii showed that some strains survive 100° C. (211° F.) for 30 to 40 minutes. Roderick has confirmed these results.

These facts show most conclusively the utter futility of pasteurization which seldom exceeds 160° F., as a means of rendering unclean milk safe.

In view of these facts it is evidently important that milk inspection should take account of the frequency and extent of infection with B. Welchii. Esty found B. Welchii in nearly every sample of pasteurized milk examined in Providence, R. I. Roderick found B. Welchii present in 54 per cent. of 470 samples of market milk examined in Battle Creek. The organism is never found in freshly drawn milk protected from contamination. Its presence is wholly the result of lack of cleanliness. Most dairies are badly infected with B. Welchii. Esty found the organism everywhere not only on all parts of the cow, but on the walls, ceiling and floor of barns, in the milk pails and containers, in the stable air and barn dust and even on the milker's hands. That milk may by sufficient care be kept free from B. Welchii has been many times demonstrated. It is only a matter of painstaking cleanliness as has been abundantly shown in the experience of the Battle Creek Sanitarium dairy.

The number of B. Welchii present in raw milk may be considered, then, as a measure of the amount of filth contamination, while the total bacteria count is more an indicator of the rate at which the milk was cooled and the temperature at which it has been kept. Certainly it is much more important to determine the extent of filth contamination than of the heat exposure, for the reason that the bacteria which grow in raw milk are acid formers and not of the dangerous sort.

~~The examination of milk for the presence of B. Welchii is~~

The presence of B. Welchii always means filth and should lead to prompt inspection of dairies, creameries and handlers and prohibition of sale if the contamination is not eliminated. That such elimination is possible is proven by the fact that this organism is rarely found in certified milk and then only when the count has suddenly gone up through some accident or neglect. It must be remembered, however, that neglect of prompt cooling will not increase the number of B. Welchii for the reason that practically only spores are found in milk and these do not grow in raw milk, the organism being an obligate anerobe.

Interest in clean milk is heightened by the importance now being attached to changing the intestinal flora. As pointed out some years ago by Burnett, in the war against pernicious intestinal bacteria the chief enemy to be overcome is B. Welchii. This organism is always found more or less abundant in proportion to the intensity of the toxemia. As pointed out by Herter many years ago, there are two types of intestinal toxemia; the "indolic type" in which the dominant organism is B. putrificus and the

"butyric type," in which B. Welchii is dominant. In the most severe cases, both organisms are present, forming a third or mixed type.

At the outset of its independent life, nature supplies every mammal with a stock of acidophile organisms to keep its alimentary canal free from putrefactive processes and the resulting toxic products. So long as an infant receives only mother's milk, it usually remains in health. Its stools are frequent, of slightly acid odor, free from mucus, and yellowish in color. Soon after weaning, infants fed cow's milk begin to show symptoms of disturbance. The stools are less frequent. They often become foul smelling, dark colored, and show more or less mucus. These are the first evidences of infection with B. Welchii and allied organisms. If nothing is done to change the situation, the infection will steadily increase from year to year, giving rise to a succession of maladies and miseries of which constipation, headaches, nervous ~~prostration~~ exhaustion, insomnia, skin disorders, colitis, appendicitis, rheuma-

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tism, Bright's disease, arteriosclerosis, so-called neuritis (neuralgia), with manic depressive insanity, are only a few common examples.

There is no way in which intestinal toxemia with all its dire consequences can be successfully combated except by changing the intestinal flora, that is, by getting rid of B. Welchii and establishing the dominance of acidophile organisms (B. acidophilus). This cannot be done efficiently so long as fresh importations of B. Welchii are being constantly made with the food intake. It is of especial importance that sick infants and children that depend much upon cow's milk as well as adults who take the "milk cure," must be provided with milk free from B. Welchii.

Practically the whole population, not only of the United States, but of every civilized country, is suffering from the use of unclean milk. The bacteriologists have shown us the facts, and it is now the duty of the Boards of Health and milk commissions to inform the people by a campaign of education which will open their eyes to the necessity for using more milk as well as cleaner milk.

A recent bacteriological examination of market meats made by Roderick of the Battle Creek Sanitarium bacteriological laboratory showed that all meats are rich cultures of the colon group of bacteria. Roderick found in apparently fresh beefsteak, 1,500,000 bacteria per gram; in corn beef 31,000,000; in Hamburger steak 75,000,000 and in pork liver 95,400,000. Examination of the droppings of calves, cows, goats and horses showed 15,000,000 to 80,000,000 bacteria of the same sort found in meat. That is, some meats actually contain more manure germs than does fresh manure.

In view of these facts, the producer of the dirtiest milk may feel proud of his product as compared with that of the butcher and the packer. The conditions under which the dirtiest milk is produced are clean compared with those which exist in the average slaughter house. In the process of slaughtering, all meats are freely infected with manure germs and within twenty-four hours every carcass is swarming with B. Welchii and other putrefactive organisms, and the bacteria increase continually even in cold storage until the meat is eaten.

The dairy industry rather than the packing industry needs encouragement. There is no other essential American industry so poorly paid and so much in need of and deserving of encourage-

1

220

Animal Foods

All food comes originally from the vegetable kingdom. The chlorophyl grain of the green leaf is the mystic laboratory in which the lifeless inorganic elements of the mineral world are endowed with life. The green parts of plants are factories in which are woven the living fabrics known as organic substances, of which the actinic rays of the sun constitute the warp while nitrogen, carbon, hydrogen, oxygen, calcium and other elements which enter into the composition of living things form the woof. Each little chlorophyl grain is a trap which captures sunshine and stores it up in the form of carbohydrates, protein, fats and other food principles to serve as fuel to feed the vital fires which burn within the bodies of animals. Animals cannot originate food; they only utilize food principles which have been produced by plants. In passing through the bodies of animals, food materials undergo changes of form, but are not produced.

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Plants are food producers; animals, food users. Food is to the animal what fuel is to the lamp, the stove or the locomotive.

The only animal substances specifically prepared by Nature as food for animals are milk and the yolk of eggs, both of which are intended to be used by the infant animal until able to gather food for itself.

~~In the economy of Nature,~~ while it is true that muscle tissue is largely used as food by animals, it is clearly evident that its first and primary purpose is to serve for force transformation through food consumption.

221

Special Characteristics of Animal Foods.

Milk and eggs are animal foods especially adapted not only to meet the needs of young animals in general but to suit exactly the nutritive requirements of infant animals of the particular species to which the animal producing the milk or the egg belongs; that is, cow's milk is exactly suited to meet the needs of calves. Goat's milk is different and is adapted to kids. The milk of the dog or the seal is still different, and is precisely adapted to the young of these animals. A young animal may be raised on the milk of an animal of another species, but not without considerable difficulty and risk, and not infrequently the experiment is a failure. Of the 300,000 infants who die in the United States annually not less than nine-tenths are bottle-fed infants, a fact which bears eloquent testimony to the inferiority of cow's milk to human milk for human infants.

The yolk of an egg is a complete foodstuff, and is easily digestible; whereas, the white of egg in a raw state is almost totally indigestible in the alimentary canal of human beings. Eggs are poisonous to some people. Cooking, however, to a large

Of the three sorts of animal foodstuffs, milk, eggs and flesh, milk is the only one that contains any appreciable amount of carbohydrates. In cow's milk about one-third of the total solids consists of lactose, or milk sugar, a wholesome carbohydrate, although one which is utilized with much greater difficulty than any other of the sugars. Cow's milk is very deficient in iron, while flesh foods are equally deficient in lime. The yolk of the egg is well supplied with both lime and iron. Milk and egg yolks furnish a rich supply of vitamins. Meats are very deficient in vitamins for the reason that in animals the vitamins are chiefly stored in the liver and kidneys, just as the lime is almost wholly stored in the bones, leaving the lean flesh, the part commonly eaten as food, almost wholly deficient in vitamins as well as lime, two highly important food principles.

Food iron, another essential food principle, is present in meat, but in not nearly so large an amount as is generally supposed. Most of the iron contained in the body of an animal is found in its blood. In the slaughtering of an animal most of this is lost, the amount left being so small that an ounce of beefsteak contains no more iron than the same weight of garden greens such as spinach, and only half as much as is found in the same weight of certain greens, as red root or dock. Graham bread, the date, the fig, and a score of other common vegetable foodstuffs, contain as much or more iron as does meat, and iron of better quality (Sherman).

The only particular in which all animal foods are superior to most vegetable foods is in the amount and quality of the protein which they supply. The protein of milk, eggs and meat is necessarily complete protein; that is, it contains all the elements (amino acids) essential for the building of animal tissues.

Most vegetable proteins are incomplete, although there are many vegetable products, such as almonds, peanuts, soy beans, and probably many more not yet discovered which contain complete proteins.

The protein of grains and of most of the common staples which have been selected for human consumption are incomplete, and it is probable that this is the principal biologic reason why meat has come to be considered an essential part of the dietary in cases in which grains are the chief food staple. The lack of knowledge of this fact has been the principal cause of failure in some attempts to live on a diet consisting exclusively of vegetable foodstuffs. It is possible, however, to select from the vegetable kingdom a complete and satisfactory diet, as has been abundantly proven by McCollum, Hindhede and others. It must be admitted, however, that the present supply of available vegetable foodstuffs containing complete proteins is not large enough to furnish the great population of the world with a sufficiency of this essential element.

We are glad to be able to say at once, however, that it is not on this account necessary to resort to the use of flesh foods, for, as several investigators have abundantly proven, milk is even better adapted than is meat to complement the proteins of vegetable foodstuffs. Milk not only supplies its own complete proteins, but furnishes the elements necessary to render complete the proteins of other foodstuffs to which it is added.

Eggs also are an important and competent source of complete proteins. And so we are not compelled to resort to the use of flesh foods for our essential supply of complete proteins, although it is important that care should be taken to make certain that the dietary is not deficient in this essential element. This may be accomplished even when the dietary is otherwise exclusively vegetable by the inclusion in the daily bill of fare of milk to the amount of 16 to 20 ounces. With a diet of cereals, such as corn, the addition of 10 per cent. of milk protein (Sherman) is found to be sufficient to insure perfect nutrition.

EGGS

The eggs of birds, especially of domestic fowls, are ~~universally~~ largely used as food by human beings as well as by the anthropoid apes and various other animals. The eggs of the common domestic fowl and the guinea hen are the most delicate and agreeable. The eggs of the duck and goose are richer in fat and of stronger flavor.

The eggs of sturgeon and other fish, known as roe, are much used in some countries.

The egg is a highly nitrogenous food. The whole egg affords 15 calories of protein to the ounce and 31.7 of fat, a total of 46.7 calories, or two-thirds that of porterhouse steak and more than double that of milk.

A hen's egg of average size weighs a little less than two ounces. Approximately, the egg consists of one part shell, six parts white, and three parts yolk.

Weights of Eggs and Constituents (Average)

	Grains	Ounces
Whole egg	56.8	2.0
Edible portion	50.0	1.8
White	33.0	1.2
Yolk	17.0	0.6
100 calories—whole edible portion	68.0	2.4
100 calories—white	189.0	6.7
100 calories—yolk	27.0	1.0

Composition of Whole Egg

	Per cent.
Shell	11
Yolk	32
White	57

Percentage Composition of Egg, Edible Part (Sherman)

	Whole	White	Yolk
Protein	13.400	12.3000	15.7000
Fat	10.500	0.2000	33.3000
Lime (CaO)	0.093	0.0150	0.2000
Iron	0.003	0.0001	0.0085

A single egg furnishes about 30 calories of protein. It is evident, then, that four or five eggs supply protein sufficient for an ordinary day's ration. But it is to be remembered that cereals are rich in protein and all vegetables contain some of this element, while milk contains an excess, and supplies in one-half pint more protein than does an egg. A dietary which includes two glassfuls of milk with a sufficiency of other foods not of animal origin will afford an abundance of protein without the addition

Eggs and Biliousness.

Many persons know by repeated experiences that the free use of eggs produces a well defined physical condition which is commonly termed "biliousness" although, very likely, connected with the bile or bile-making function of the liver only in a remote way. "Biliousness" is really acute autointoxication. Its cause is the putrefaction of undigested and unabsorbed protein in the colon and the absorption of the poisonous products of bacterial action. Eggs encourage putrefaction, milk does not.

If the eggs happen to be even a little stale, the putrefaction and autointoxication are greatly intensified.

Doctor Tissier of the Pasteur Institute has recently shown that eggs are often infected with the B. paracoli or paratyphoid bacillus. The white diarrhea of fowls is caused by this germ and is always present in eggs laid by fowls suffering from this very common disorder.

Eggs and Acidosis

When burned in the body, eggs, like meat, leave a strongly acid residue which lessens the alkali reserve and so tends to cause acidosis. On this account eggs must be used very sparingly, if at all, by persons suffering from arteriosclerosis, high blood pressure or nephritis.

Egg Poisoning.

Some persons are sensitized to eggs and cannot eat even a small fraction of an egg without suffering most unpleasant consequences. Nausea, vomiting, purging, headache, and a distressing nettle rash or urticaria are a few of the symptoms which result from the use of eggs by sensitized persons. Similar symptoms have been observed to follow the use of milk and of various other foodstuffs in different persons.

Lemoine, an eminent French authority who has recently made a careful study of this subject, tells us that raw egg albumin and the lean flesh of animals in a raw state contain poisons which damage the kidneys. To the effects of this poison is due the appearance of albumin in the urine when raw eggs are eaten freely. These poisons may be destroyed by the gastric juice and by thorough cooking. The action of normal gastric juice upon raw egg albumen is so slow that its use is hazardous since, in many cases of chronic nephritis, achylia exists. Nephritics should use eggs sparingly and never raw.

9

When Eggs Should Not Be Eaten.

Persons suffering from Bright's disease, or who have albumin in the urine, or arteriosclerosis, should avoid the use of eggs, or at least should use eggs very sparingly, eating the yolks only.

Persons who are subject to so-called bilious attacks, sick headaches, or who have bad breath or other marked symptoms of autointoxication, would do well to avoid the use of eggs because they encourage the development of putrefactive flora in the colon. This is especially true of the white of egg. Egg white, when raw, leaves the stomach quickly but is not well digested, and soon finds its way to the colon, where it readily undergoes putrefaction.

Cholesterol, a resinous substance of which gallstones are formed, is normally present in the blood in the proportion of one part in 2,000 parts of blood. The blood of a person of ordinary size contains about 20 grains of cholesterol. Laroche has shown that in persons suffering from gallstones the amount of cholesterol in the blood is considerably increased. A single egg contains about 4 grains of cholesterol. A couple of eggs would thus increase the amount of cholesterol in the blood to the extent of 40 per cent. From these facts it appears that persons who have undergone operations for the removal of gallstones, or are believed to be suffering from this disease, should carefully avoid the use of eggs.

16

The Bacteria of Meat.

According to Weinzirl (*Amer. Jour. Pub. Health*, 1914): The standard of 1,000,000 bacteria per gram, advocated by some as a limit, is apparently too low, since it would condemn nearly all samples of hamburger, when showing no taint or other evidence of putrefaction. *Samples of other market meats, all of which would otherwise pass inspection, often exceed this limit.*

A bacterial standard of 10,000,000 per gram is the limit proposed, on the basis of which 50 per cent. of the market samples of hamburger would still be condemned. This is justified on the following grounds: (a) much of it is actually spoiled when it reaches the consumer or is to be cooked; (b) meat teeming with 10,000,000 per gram is potentially rotten and soon will be actually spoiled under ordinary methods of handling; (c) the fact that markets are prone to add sodium sulphite to hamburger, even though the dealer knows it to be contrary to law, indicates that something is wrong with the hamburger; (d) and finally, if hamburger were made from wholesome meat in the first place, then properly iced, it is believed that the bacterial content could readily be held within the 10,000,000 limit.

Ten million bacteria per gram may be said to be equivalent to 300,000,000 bacteria per ounce. The significance of this will be appreciated when it is remembered that certified milk is not permitted to contain more than 10,000 bacteria per gram, or 300,000 per ounce; that is, marketable hamburger steak may contain a thousand times as many bacteria as certified milk.

Milk which contains as many as 200,000 bacteria per cubic centimeter, or 6,000,000 per ounce, is regarded as unmarketable, and is promptly condemned wherever a milk inspection service is maintained, while at the same time hamburger steak containing fifty times as many bacteria is sold and eaten without protest.

It is to be further noted that the bacteria of milk consist almost wholly of harmless lactic acid-forming organisms, or sour milk germs, while the bacteria of meat consist almost exclusively of putrefactive organisms such as the Welch bacillus, the cause of gas gangrene, the *bacillus putrificus*, the *bacillus proteus* and

other bacteria which are usually present in carrion or putrefying animal bodies.

17

To prevent the contamination of flesh meats with manure germs, it would be necessary that the slaughtering process should be conducted with the same aseptic precautions with which surgical operations are performed. So long as butchering is done in the present fashion, it will continue to be no exaggeration to say that ordinary steaks and chops are the filthiest things which ever appear upon our tables.

According to Bailey "the *bacillus putrificus coli* is present in the colon of animals and contaminates all meats. The spores of this bacillus are killed by exposure to a temperature of 224° F. for 15 minutes; 230° F. for 10 minutes; 240° F. for 5 minutes. In the process of canning meats, if these temperatures are not maintained, the meat in the interior of the can is not sterilized. This gives the bacilli an opportunity to develop and decompose proteins and other organic compounds. The sulphur generated by decomposed proteins forms a sulphid of iron which blackens the tin, while the generated gas may cause the end of the can to be "blown" or "swollen."

A research carried on by the Meat Committee of the Food Investigation Board of Great Britain has shown that the fungus which produces black spot on cold storage meats will grow at a

18

temperature 9 degrees below freezing. Numerous other molds have been found which grow well at the freezing point.

It remains further to be said that all fresh meat is eaten in a state of decay. The process may not have proceeded so far that the dull human nose can discover it, but a carrion bird or a carrion fly can smell it from afar and various scavenger creatures will quickly show their appreciation of the unsavory tidbit if the arch scavenger man does not get the start of them by an hour or a day. Indeed, the putrefactive bacteria always found in meat in countless numbers, smoked and salted meats as well as fresh meats, are scavenger parasites which play in nature the important role of reducing back to the soil the dead bodies of animals. Another and quite different class of bacteria performs this office for plants.

Dr. C. E. Roderick, bacteriologist of the laboratory of the Battle Creek Sanitarium, ~~recently~~ made, at the request of the writer, an extended study of the bacteria of meat and of the fresh droppings of animals. Specimens of meat were purchased from seven different markets. The bacteria found were identical with those found in fresh manure and in several instances the bacteria in meat exceeded in number those of fresh manure. It should be said that the meats examined appeared to the eye and the nose to be in as good condition as usual, and would have been sold to some one else and eaten if they had not been collected for examination. Care was taken to make the examination at once after collecting the specimens so as to allow no time for further putrefactive changes. The figures given show the maximum number of manure germs per gram found in meats and in fresh manure droppings, also in oyster juice and limburger cheese. The higher figures were the most frequently observed and of course are of chief interest. The various species of putrefactive and other bacteria found in the human colon and the colons of animals were all present in meat together with some other species due to air contamination.

MEATS

	Bacteria per Gram
Beefsteak	1,500,000
Corned beef	31,000,000
Hamburger steak	75,000,000
Pork liver	95,000,000
Limburger cheese	18,000,000

19

DROPPINGS OF ANIMALS

	Bacteria per Gram
Oyster juice	3,400,000
Fresh droppings of calf	15,000,000
Fresh droppings of goat	20,000,000
Fresh droppings of horse	25,000,000

It is evident, then, that all flesh, as eaten, is to some degree unsafe. Ordinary cooking does not destroy the germs of meat. They are killed only by a temperature of 240° F. The usual cooking temperature is less than 212°. Even roasting will not destroy these germs for the oven heat does not penetrate to the interior of the roast.

Canned Meats Usually Not Sterile.

The generally accepted belief that canned meats are necessarily sterile because they do not spoil, has been completely exploded by the recent report of the British "food investigation board" on the bacteriology of canned foods. Of 323 cans examined, 246 were found to contain living bacteria. The most surprising thing was the fact that less than 30 per cent. of the cans which appeared to be perfectly sound were found, on examination, to be really sterile. Of such cans, apparently good, and which would have been sold and eaten if they had not been subjected to the examination, 36 per cent. of the sardines, 63.6 per cent. of the meats, and 100 per cent. of the crabs were found not sterile, and were rejected as unfit for food (*Jour. A. M. A.*, for March 24, 1923). Since all fresh,smoked, dried and salted meats are infected, and 30 per cent. of all canned meats, it is evident that the only safe course is to discard meats from the dietary.

20

The Food Investigation Board of Great Britain has been making a study of the fungi of frozen meat. *Special Report No. 6* contains information concerning "the black spot and other types of fungi found on chilled and frozen meat. Black spots on the surface of beef and mutton brought from the Argentine and New Zealand and some other countries are commonly found upon arrival."

These black spots are produced by molds of fungi and indicate that the meat has been stored for a long period before shipping. The spots are frequently so numerous that they overlap one another and the fungus threads penetrate below the surface of the meat. Experiments have shown that these fungi grow at temperatures 10 or 12 degrees below freezing.

The writer was recently informed by a Boston meat dealer that hotel chefs preferred meats that were covered with slime, doubtless because such meats are much more tender, being farther advanced in putrefaction.

Edelmann, Mohler and Eichhorn, in their *Text-Book of Meat Hygiene,* quote Marxer as authority that "meat should be considered as putrefactive if one gram contains over a million organisms of any kind, or proteus bacteria in large numbers."

According to Weinzrl and Newton, a standard of 1,000,000 bacteria per gram (30,000,000 per ounce) *"would condemn nearly all samples of hamburger,* when showing no taint or other evidences of putrefaction. Samples of other market meats, all of which would otherwise pass inspection, often exceed this limit."

It is evident that whether the standard be 1,000,000 or 10,000,000, it is a question of degree of rottenness, since the lower standard named means not less than 30,000,000 bacteria

21

per ounce, and bacteria of the most objectionable class, including *B. Welchii,* the terrible organism of gas gangrene. Hamburger steak is carrion, and quite unfit for food except by a turkey buzzard, a hyena, or some other scavenger.

Parasites of Meat

That meat often contains parasites dangerous to man has long been known. Ambrose Paré, a famous French surgeon who lived in the sixteenth century, advised that meat should always be boiled to kill parasites, which, according to Dr. Stiles of the U.S. Public Health Service, are always present in animals. This eminent authority says,

~~ND p 405 a~~

ANIMAL FOODS 405

Every animal used for food has in its intestines either protozoa, round worms, flukes, or tapeworms. Some of these parasites, especially certain protozoa, are mere scavengers in the intestinal tract, but many of the infections undoubtedly do more or less harm to their hosts. Accordingly, academically these animals are diseased. . . .

Dr. Stiles further says that pork

ND 405 b

in its raw state is dangerous to health for the reason that it frequently contains certain disease germs, trichinae, the absence of which cannot be guaranteed by any practical and proper method of meat inspection known.

Among other parasites which infect man through the eating of flesh, one of the most common and serious is the tapeworm, which occurs in both pork and beef, but is most often derived from the latter. The natural history of both the trichina and the tapeworm is interesting.

Insert accounts of
Tapeworm
Trichina and the round worm that gets into the lungs. (See G.H.)

If women will smoke, let them smoke a pipe as the Irish grandmothers of some of them did. The pipe may be somewhat less injurious than the cigaret for the reason that some of the nicotine condenses in the stem and does not reach the mouth; whereas, in the case of the cigaret, the smoke enters the mouth at a higher temperature and carries a larger percentage of the various poisons of tobacco.

Evidently English doctors regard the tobacco habit as very harmful, especially for women. They do not claim that pipe smoking is harmless, but only call attention to the fact that if women smoke cigarets they are likely to die soon; whereas, if they smoke pipes instead, they may live a little longer. Nothing could be more foolhardy or more irrational than is the use of tobacco in any form whatever. A man goes to a drug-store and buys a package of rat poison on which he finds the words, "Pure nicotine made from tobacco." Then he scatters the nicotine about in his barns, his basement or some other infected place and pretty soon he is picking up dead rats by the dozen. Nicotine is one of the most reliable sure killers known to science. Having secured a supply of rat poison, the same man goes across the road to a cigar stand and buys a box of cigars to be administered to himself. How can any intelligent person imagine that a drug which is deadly to rats can be harmless to man?

The box of rat poison bears a skull and cross-bones and the words, "THIS IS POISON. BEWARE!" Every package of cigarets, every box of cigars, should be similarly labelled, and every cigar should be wrapped with the same warning. We are amazingly stupid to permit great financial organizations to spread abroad throughout the land through deceptive and alluring advertisements, the utterly false idea that tobacco is a friend and comfort, a harmless and really necessary drug. The majority of those who learn to smoke have no idea of the deadly character of the drug with which they are temporizing. They are led to seek in tobacco a harmless means of enjoyment without the slightest suspicion of the terrible potency for fatal mischief which tobacco always carries no matter what the form in which it is used.

The Packers' Pound of Flesh

THE packers are jubilant over the fact that they have increased the consumption of pork in the United States one pound per month, per capita. They are so tickled that they have succeeded in persuading the American people to help them dispose of their surplus of pigs by swallowing them that they are sending out tens of thousands of circulars boasting of their success. We recall that one of Shakespeare's most despicable characters likewise hankered for a pound of flesh but declined to take it when warned by the Venetian judge that with his pound of flesh he must "take not one jot of blood."

These modern Shylocks are not troubled about the injury to the life and health of the American people which may be the result of their "Eat-More-Meat" campaign. What care they for the fact that every year more than 70,000 U. S. citizens die of Bright's disease, which, as the researches of Doctor Newburgh, of the University of Michigan, have clearly shown, may be justly attributed, in part at least, to the use of flesh foods? Doctor Newburgh calls attention to the fact that among the Bedouins, or wild Arab tribes, who live chiefly on milk and dates, rarely tasting meat, Bright's disease occurs so seldom it may justly be said to be practically unknown.

Doctor Newburgh is not a vegetarian nor

an advocate of a meatless diet, but with practically all other respectable medical authorities in this country, is thoroughly convinced that the American people would be healthier and in every way better off if they ate less meat. The "Eat-More-Meat" campaign is an impudent attempt to override the authority of the world's most eminent medical authorities. It is an insult to the intelligence of the American people and a conspiracy against the health of the nation. If the packers' campaign of deception actually succeeds in persuading the American people to increase their consumption of meat, the result will inevitably be an accelerated increase in the death rate from chronic diseases. It is to be hoped, however, that American good sense will protect the average citizen against this nefarious scheme of the packers and livestock owners to make his stomach the dumping place for the surplus cattle and pigs for which no market can be found.

The packers have got their pound of flesh; their pocketbooks are again beginning to swell up with profits, but the end is not yet. Trichinosis is spreading so rapidly among the hogs, probably ten per cent of which are already infected, that if the American people continue to eat an increasing amount of pork, trichinosis may yet get to be a greater human plague than is cancer. The United States Government has warned the public that it is powerless to protect eaters of pork against the trichina parasite by inspection. Every effort in this direction has failed and the Federal Government has frequently given notice to the public through the newspapers that the infection of pork through trichinosis is very general and that it is marketed without inspection, so that those who eat pork do so at their own risk. In one case in which suit was brought against a butcher for selling meat infected by trichina as the result of an outbreak of trichinosis in a family, which resulted in the death of one or more members, the judge decided that the butcher could not be held responsible, and that all people who eat pork do so at their own risk. The symptoms of this disease are obscure and so closely resemble those of several other diseases that it is probable that many hundreds of people die from trichina poisoning without the real cause being known, and that tens of thousands of people are suffering from muscular pains and other miseries attributed to rheumatism and other disorders which are really due to thousands of hungry trichina worms infesting their muscles.

The livestock industry is doomed. It will not reach its end tomorrow nor next year, but the handwriting is on the wall.

Mene, Mene, Tekel, Upharsin (weighed in the balance and found wanting) is the verdict of science against meat-eating and the meat industry.

Milk Protein vs. Meat Protein

THE idea that meat is in some way superior to other foodstuffs as a source of nutrition, has been so long held by the medical profession as well as by the laity, it is hard to uproot, although scientific research showed years ago the fallacy of this teaching. Caspari, who many years ago made a research upon the value of milk protein as compared with the protein of meat, under the supervision of the late Professor Zuntz, showed that nitrogen equilibrium could be maintained on a smaller amount of protein when the source was milk than when meat was eaten. A few years later Sherman, of New York, showed in a very extended and carefully conducted research that the cereal proteins when supplemented by ten per cent of milk protein were equal to the protein of meat in dietetic efficiency.

Recently, Dr. Mary Swartz Rose, of the

Poisonous Meats

The flesh of animals readily develops poisons under various conditions.

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502

The flesh of a horse which was killed in the effort to brea[k] him was fed to hogs. The hogs sickened and died. (Kahnert)

The flesh of a deer caught in a trap and killed by its efforts to escape was the cause of sickness in a large number of persons who ate of it. The infant of an overworked mother showed marked symptoms of poisoning which disappeared when the child was nursed by another woman.

It has long been known that the flesh of overworked animals undergoes putrefaction very rapidly after death. It is even possible that in such cases the tissues of the animal may be pervaded by bacteria during life on account of the greatly lowered resistance which results from overwork. It should be generally known that the flesh of an animal subjected to violent exertion or overwork before killing is absolutely unfit to eat. Without doubt, many such animals find their way to the market.

It should always be recollected that fish are scavengers, and when caught in waters near the mouths of sewers are very likely to be infected by the sewage which they greedily consume as food.

Poisonous substances are found in the flesh of animals which have suffered from apoplexy, especially hogs, animals which have died of indigestion and which have been affected with dropsy or infectious disorders. Poisons of this sort are not destroyed by

24

cooking and have given rise to symptoms in human beings resembling cholera or typhoid fever. Of more than one hundred people who ate of a cow that had died of puerperal fever half were made very sick.

The flesh of animals which have suffered from disease of the lungs, from enteritis, peritonitis, nephritis, and hepatic affections, always contain poisonous substances and are wholly unfit for food.

Dr. Weseberg reported some time ago an epidemic of meat poisoning in which sixty-three persons became seriously ill as the result of eating the flesh of a cow which had been killed because of pericarditis resulting from an accident. The persons who became ill had eaten of minced meat prepared from the animal and also portions of the cooked liver. The symptoms resulting were violent headache, severe abdominal pain, dizziness, muscular weakness, diarrhea and vomiting. Bowel discharges were highly offensive. Mice inoculated with portions of the meat died within one to three days, with symptoms similar to those shown by the persons who had eaten of the same flesh.

When the fact is recalled that all the flesh sold in the market, and practically all that is eaten, is swarming with the bacteria of putrefaction, the wonder is that the number of persons who suffer from acute symptoms of poisoning after eating flesh is so small.

24½

Ptomains are poisons produced by the decomposition of protein. They are particularly encountered in decomposing animal foodstuffs, and especially in flesh that has been too long kept after the slaughter of the animal. Some of the ptomains are highly virulent poisons. The most deadly are likely to be found in sausage, hamburger steak, game, and chickens, turkeys, ducks and geese which have been long in cold storage.

Ptomains are produced in the early stages of decay and so may be present before there is any taint of decomposition perceptible to the senses. On this account it is, in the writer's opinion, important that all meats, including fish, should be examined bacteriologically before using as food. Meat may be swarming with putrefactive, ptomain-producing bacteria when only recently killed—within a few days—and when apparently perfectly fresh. Such meat should be condemned.

Oysters and mussels may contain deadly ptomains when fresh, doubtless because they are scavengers and subsist upon the offal which they find in the water, especially about river mouths.

There are more than 60 different ptomains known, of which may be named, *cadaverine, putrescin, butylamin, amylamin, neuridine, saprin, sperium, mydalein, cholin, neurin, muscarin, betain, gadinin, mytilotoxin, callidin, parvolin, corrindin, morrhuin, asellin, typhotoxin, tetanin, spasmotoxin, telanotoxin, pyocyanin, tyrotoxicon.*

Among the most deadly of these are cadaverin, putrescin, neurin, neuridin, and cholin, found in stale meat and fish; mytilotoxin, occurring in oysters and other shell-fish; muscarin, found in meat and mushrooms;

This is certainly a formidable array of deadly agents, nearly all of which may be escaped by avoiding flesh foods, which under all ordinary circumstances must be regarded as wholly unnecessary additions to the bill of fare.

25

Food Toxins.

Besides ptomains, there may occur in food other deadly poisons known as toxins. These are the result of the growth in animal tissues, either before or after slaughter, of germs which cause specific infections. One source of food toxins is a germ which gives rise to botulism. This germ grows readily in fish and meats which have not been properly processed in canning. It has also been found in spoiled canned beans, spinach, and ripe olives canned in glass.

Animal foods are especially liable to contamination with poisons which may be produced by the action of either specific germs or the ordinary organisms which produce putrefaction. Sausages, potted meats, fish, oysters, lobsters, eels and canned meats which have spoiled in the can or been allowed to stand after opening, often contain poisons which produce very severe and often fatal illness.

Meat poisoning often results from the ingestion of Gärtner's bacillus in cold storage meats. It most frequently occurs as the result of eating pork, veal, fowl, beef or ham.

Fish poisoning may result from the use of fish that are partly decomposed or diseased, or which have spoiled in the can, either before or after opening, or it may result from the use of fish of certain species which are always poisonous. Fish sometimes become poisonous through feeding on decomposing corals and other poisonous substances.

Poisoning often occurs as the result of eating shellfish which contain a special poison, mytilotoxin. Shellfish are scavengers and thrive in the vicinity of the outlets of rivers which receive the sewage in large cities. Typhoid fever and other germs are found in the intestines of shellfish. Oysters strain the water through their gills and capture great numbers of bacteria and other organisms as well as particles of decomposing matter. The poison found in these creatures is chiefly concentrated in their livers.

Oysters and shellfish of all sorts are always swarming with bacteria. Oyster juice is fairly alive with the wriggling bacilli. Raw shell fish are too unclean to be given a place in any stomach except that of a scavenger.

26

According to Roger, shellfish are a dangerous diet. He says: "Even healthy mussels are not a good food. Their prolonged use seems to be capable of producing chronic poisoning and cirrhosis of various organs. These effects have been observed in the natives of Terra del Fuego."

Virchow reported an epidemic in which nineteen persons were made sick, four fatally, by eating mussels. Mussels habitually gather poisons from the waters in which they live.

Typhoid fever germs have many times been found in oysters, and numerous epidemics of typhoid have been traced to their use. Simon reports a case of poisoning through eating of lobsters. Rapin reports an epidemic of severe illness from eating crabs. One of the sufferers died at the end of twenty-three days from symptoms resembling typhoid fever.

All of these creatures—oysters, clams, mussels, lobsters, crabs—are scavengers and quite unfit for food.

The flesh, milk, and dairy products from cows infected with foot and mouth disease, particularly cheese, butter, and milk, may give rise to the same disease in human beings.

Acute poisonings from animal foods are frequently seen in the sickness which follows the use of herring, pickled fish advanced in decay, particularly stale oysters, salted sturgeon and tainted horse flesh.

The flesh of hunted animals often becomes poisonous through the entrance of the *B. coli* into the blood before death.

Cold storage meats sometimes become poisonous from the slow decomposition which takes place even at temperatures only a little above freezing.

Rouennaise ducks are rendered poisonous by the peculiar way in which they are killed. They are killed by a puncture of the medulla, which causes death without loss of blood. They are afterwards beaten, causing absorption of intestinal bacteria and poisons which are diffused throughout the body.

(Advance to +Ax) + Ax not indicated in Dr's MSS-

CHRONIC ACIDOSIS FROM FLESH-EATING

Acidosis is due to an over-production of poisonous acids in the body. As regards the origin of these acids, Gautier, the eminent French authority, says

~~ND p 401 a~~

"On a flesh diet these toxic bodies accumulate and acidify the blood, excite the heart and intoxicate the subject, disturbing the functions of the skin, lungs, liver or kidneys."

In meat-eating countries many thousands of persons suffer constantly from this chronic acidosis, which reduces resistance to disease, raises bloodpressure, wears out the liver and kidneys and leads to premature old age. This, according to Hunter, the Actuary of the New York Life Insurance Company, is the reason that Americans have an average blood-pressure ten points higher than have the native Chinese. Higher blood-pressure necessarily means shorter life.

Even

FLESH MEATS INJURIOUS TO FLESH-EATING ANIMALS

p 395 a 401 b

402 a,b,403

Pezard, a French investigator, has shown that an exclusive flesh diet in cocks causes degeneration and atrophy of the genital glands with the usual effects of castration. Chalmers Watson made similar observations.

Hunter, in experiments to determine the effects of meat eating upon animals (rats), found that a flesh diet, as compared with a bread and milk diet, caused a great concentration of the urine with strong odor; the stools were dark colored. Examination of the animals after death showed in the meat-fed animals hypertrophy of the kidneys, which was very pronounced in the second generation. The effects produced were like those caused by toxins and were considered to be the result "of a special strain on the functional activity of the kidneys," due to the increased work required to excrete the great excess of protein.

For several years, Dr. L. H. Newburgh, a professor in the Medical Department of the University of Michigan, assisted by Sarah Clarkson, M..S., has been engaged in a research to determine the effects of a high protein diet or, to be more specific, the effect of the feeding of meat to rabbits.

Of ten animals fed on bread containing chiefly meat, two, or 20 per cent., showed disease of the blood-vessels within four to eight weeks. Of six animals that lived from ten to sixteen weeks on the same diet, four, or 66 per cent., showed disease of the blood-vessels. Of eight other animals that lived from eight to thirty-six weeks on the same diet, every one "showed marked and extensive atherosclerosis; that is, all these animals showed the blood-vessels extensively hardened with chalky deposits.

Not one of the animals kept in the laboratory under the same conditions as the experimental animals, showed any evidence of disease of the arteries, although two-thirds of them lived more than six months.

It thus appears that the larger the amount of protein received by the animals and the longer the duration of the experiment, the greater was the destructive effects upon the arteries.

It is notable that the amount of meat eaten by the rabbits was no greater than that which is eaten by many persons habitually, at least by those who try to follow the teachings of Woods Hutchinson, the number of which, let us hope, is not very great. Indeed, the proportion of protein given to the rabbits was not much greater than that required in the Atwater ration.

It is interesting to note, in this connection, the fact that Atwater himself died of arteriosclerosis after having lived for two or three years a completely helpless, imbecile paralytic. It is also to be remembered that Hall, Peary and Shackleton, three noted Arctic explorers who adopted the meat diet of the Eskimos, died early from the results of changes in the blood-vessels.

The fact that meat produces changes in the blood-vessels of rabbits, is especially significant, as pointed out by Dr. Newburgh, because "spontaneous atherosclerosis (arteriosclerosis) is a very rare disease in rabbits."

Certain animals naturally subsist upon flesh, but it is by no means to their advantage. These animals must be looked upon as an unfortunate class that have somehow been reduced to the necessity for subsisting upon flesh and have to some degree become accustomed to it. A dog's liver can convert the poisonous uric acid into harmless urea. Man's cannot do this. Besides, a dog's liver is four times as large as a man's in proportion to its size.

Dr. Fox, pathologist of the Philadelphia Zoological Garden, has examined every animal that has died in the garden for many years. He has observed that flesh-eating animals are practically the only ones that have diseases of the kidneys and bloodvessels (Newburgh).

Milk

Milk is nearly a perfect food, containing not only protein and fat as do other animal foods, but also carbohydrates, besides salts and vitamins. It is deficient only in iron.

TABLE XXXIX.

Percentage Composition of Cow's Milk and Milk Products.*

	Water	Proteins	Fats	Sugar	Salts	Lactic acid
Butter	6.0	0.3	91.0	......	2.7	......
Buttermilk	90.6	3.8	1.2	3.3	0.6	0.3
Cheese	36.8	33.5	24.3	......	5.4	......
Cottage cheese	72.0	20.9	1.0	4.3	1.8	......
Cream	66.0	2.7	26.7	2.8	1.8	......
Milk	86.8	4.0	3.7	4.8	0.7	......
Skimmed milk	88.0	4.0	1.8	5.4	0.8	......
Whey	93.6	0.8	0.2	4.65	0.7	......

Cow's milk contains about one-eighth its weight of solids, of which approximately one-third or 4 per cent., is fat, 4 per cent. casein and other proteins and 4.5 per cent. lactose or milk sugar. To these are added 0.6 per cent. of lime and other salts. The milk of each species of animals is exactly adapted to the use of the young of the species. In the milk of rapidly growing animals the amount of protein and salts is much greater than in that of animals that grow slowly.

The milk of the cow enjoys in this country almost exclusive favor, but is by no means the universal lacteal food. Milk of various animals is used in different countries. Among the ancient Egyptians the milk of dogs was employed as well as that of the

*Compiled from various sources.

Nature

cow. In various parts of Europe the milk of the goat and the ewe is used quite extensively, and to some extent also the milk of the ass. The milk of the camel is used in Arabia and Persia, of mares in Tartary, of the buffalo in Africa and China, of the yak in Tibet, of the reindeer in Lapland, and the llama and vicuna in South America.

The amount of milk produced in the United States yearly is about 87,000,000,000 pounds, representing 11,250,000,000 pounds of dry food substance, which is produced by 24,000,000 dairy cattle, each of which requires daily 17 pounds of digestible food to produce 456 pounds (equivalent to 1800 quarts) of milk yearly, 13 pounds of dry digestible foodstuff for each pound of dry milk. To support these dairy cattle requires the product of not less than 48,000,000 acres of land. There can be no doubt that, as meat production diminishes, as it is certain to do, milk production will likewise decrease. There is even at the present time a notable shortage of dairy products and the average per capita production will undoubtedly continue to decrease from the same causes which inevitably lead to a lessened meat production. Some other source of the complete protein needed to supplement the incomplete proteins of cereals and roots must be provided. Fortunately, Nature has supplied us with this all-essential foodstuff in nuts. This is a vitally important fact which sometime will save the race from protein starvation.

It is due to the presence of lactose that milk sours while meat putrefies. Several years ago (1908), the writer placed in a jar of buttermilk a raw beefsteak with no antiseptic of any sort. The beefsteak is still intact, thanks to the antiputrefactive properties of milk sugar and the acid-forming bacteria it feeds. One reason for this antiputrefactive property of milk is that in the presence of sugar even highly active putrefactive organisms produce harmless acids instead of noxious toxins and ptomaines. This is a most beneficent provision of Nature whereby the normal food of the young infant is kept in a wholesome state while undergoing digestion and absorption in the intestine.

The Special Value of Milk Proteins.

Milk is of special value in the dietary of human beings because of the fact that its protein is of very superior value. It is not only complete, but is capable of supplying all the elements required for building or repairing the living structures of the body, and is so rich in certain essential elements that it is able to make good the deficiencies in cereals and vegetables. In other words, the proteins of milk may be regarded as super-complete. Experiments have shown (Caspari) that milk protein is superior to meat protein.

~~It is evident, then, that milk is a foodstuff of high value, since it not only makes available to their fullest value the enormous stores of protein found in wheat, oats and other cereals, but is also able to completely replace flesh-foods and even eggs in the dietary (Sherman).~~ Nar

McCollum considers milk of greater importance than meat in the national bill of fare and attributes to milk rather than to meat the physical superiority of certain meat-eating nations. This writer calls especial attention to the fact that meat-eating nations are also milk-eating. In view of this highly interesting result of recent scientific inquiry it is evident that the dairy interests of the country should be encouraged rather than beef and pork production.

231

Milk Rich in Vitamins.

Another notable quality of milk is its richness in vitamins. These remarkable and magic-working substances are, according to Funk, the discoverer, produced only by vegetables. Each plant produces its own sort of vitamins. The vitamins of milk are not produced by the cow, but are only collected by her.

It should be mentioned, however, that the full value of milk is possessed only by clean milk as it flows from the cow, and not by milk which has been boiled or pasteurized, or doped with alkaline or antiseptics, which destroy the vitamins and deprive the milk of one of its most unique and valuable properties.

Influence of Food of Cow upon the Vitamins of Milk.

Every farmer knows that both the quality and the quantity of milk produced are influenced by the food of the cow. Scientific research and practical experience have developed in recent years the science of animal feeding to a high state of perfection. The up-to-date farmer knows just what and how much to feed to produce the most milk containing the highest percentage of butter fat. Richness in fat, is not, however, the quality of greatest importance. Of far greater significance is the vitamin content of the milk. Recent investigations have shown that cow's milk varies greatly in the amount of this most essential food constituent. Cows fed upon fresh grass or other fresh green food produce milk rich in vitamins, while the milk of cows fed on dry hay is deficient. Since milk is often the exclusive food of young infants for several months during the most critical development period of their lives, this becomes a matter of greatest importance.

232

Infants fed on milk from hay-fed cattle do not grow at the proper rate and may be dwarfed and weakened for life, not only in stature but in other vital respects, even in the development of important internal structures.

Milk inspection should not stop with sanitary conditions and the health of the cow, but should include inspection of the cow's food supplies with reference to the infant's needs. Vitamins are produced only by plants; and if green stuffs are lacking in the food of the cow, they will be lacking in the milk, and the milk fed infant will suffer.

The feeding of sprouted grains to cows is an excellent means of increasing the vitamin content of their milk. Bottle-fed babies always require orange or tomato juice to insure an ample supply of vitamin, even when fresh, unpasteurized milk is used.

Milk Rich in Salts.

Cow's milk is very rich in salts, containing four times as much of these mineral elements as does mother's milk. Milk contains more lime than is found in lime water. Note the contrast in this regard between milk and beef. Meat supplies only half a grain of lime to the pound, although containing twice as large an amount of solids as does milk. The reason for this is obvious. Milk is a substance provided by Nature as an exclusive food for a growing animal, and so must furnish lime for the bones as well as protein for the muscles. Meat represents but a fraction of the original foodstuff. When corn or other food is eaten by an ox the several elements are separated, each going to form its own tissues—fat to fat, muscle to muscle, and lime to the bones. So to get back the whole assortment of food principles fed to an animal one must eat its entire body, the whole ox, or the whole hog, bones and all. This being impossible, kind Nature has supplied us in milk with bones, muscles, brains, nerves, every bodily structure in solution and in attractive form. Milk, in other words, is liquid flesh and bones with the tissue wastes, putrefaction products, parasites and other objectionable features left out.

The Lime Content of Milk and Cheese.

This group of foodstuffs is of unrivaled value as a source of food lime. All dairy products with the exception of butter are very rich in salts of lime. Pure fat is, of course, free from lime,

233

which is chiefly associated with the protein or casein of the milk. But butter is not pure fat. It retains a portion of the buttermilk and so has a small lime content, which is, however, too insignificant to deserve consideration in the planning of a balanced bill of fare.

Milk, in some form, is one of the most convenient and reliable of all sources of food lime. Whole milk contains three-quarters of a grain of lime to the ounce. This is only half the amount found in almonds and filberts; but while these nuts can be utilized only to the extent of a few ounces daily, the milk intake may be raised to several quarts.

A pint of milk contains 12 grains of food lime of finest quality and 20 ounces of whole milk will supply a whole day's ration of food lime. Skimmed milk is a little richer in lime than whole milk, a fact which in itself condemns the very common waste of skimmed milk in connection with creameries. Considering the great lack of lime in the national dietary it is a serious question whether the feeding of skimmed milk to domestic animals should not be discontinued. The 87,000,000,000 pounds of milk produced annually in this country contain lime enough to supply 200,000,000 persons.

We are rapidly becoming a toothless nation because of the lack of lime in our national bill of fare. This deficiency may be easily made up by the proper utilization of our dairy products and a suitable selection of foodstuffs. Cattle and hogs can easily obtain their lime from grass and other foodstuffs, to the utilization of which their digestive organs are specially adapted, so that they can consume the large bulk necessary.

In the use of milk, man adapts to himself the choice lime salts which the mother cow has laboriously garnered from the fields and meadows and prepared in concentrated form for the feeding of her calf. Associated with the lime in whole milk is found also a choice collection of vitamins which promote growth, so that milk not only furnishes the material needed for building and maintaining the body frame work, but supplies an activating hormone which insures the proper utilization of the building material at hand.

It is interesting to note that a tablespoonful of milk supplies nearly the same amount of lime as an egg yolk, while a little more than half a pint of skimmed milk (9 ounces) supplies as much lime or bone building material, as a dozen eggs.

While skimmed milk contains more lime than whole milk the vitamin content is much less, a large portion being held in solution by the butter fat which has been removed. But the chief values of milk are left after the fat has been removed, and the great economic waste and physiologic damage which have resulted from the past failure to utilize this by-product of our great dairy industry should be stopped as speedily as possible.

Buttermilk has a lime value almost equal to that of whole and skimmed milk, a pint and a half affording a full day's supply of lime. Sour milk commonly sold as buttermilk and under various trade names is fermented or soured skimmed milk and hence has the same lime content as skimmed milk.

Cream is not by any means the equivalent of milk as a source of lime. An ounce of cream contains only two-thirds as much lime as the same quantity of whole milk. Nearly a quart of cream is necessary to supply a day's ration of lime on account of the larger amount of fat present.

But it is in cottage cheese that we find the richest and readiest means of increasing our lime intake. The solids of milk constitute one-eighth of its bulk and weight. Consequently, the elimination of the greater part of the water in the process of cheese making results in a great concentration of the lime content. Ordinary cheese has a lime content of 5.7 grains per ounce, or eight times the amount in whole milk, more than any other foodstuff. An ounce of average cheese supplies as much lime as seven yolks or five entire eggs, five pounds of beefsteak, or half a peck of potatoes.

Old cheese is not easily digested by many persons. The butyric acid which it contains in considerable amount when old and strong, excites the gastric glands to secrete an excess of hydrochloric acid, and so gives rise to heartburn, a common symptom following the free eating of cheese. There are in old cheese various more or less toxic products, the result of the activities of the numerous molds, yeasts and germs which co-operate in the production of cheese, to say nothing of the "mites," "skippers" (maggots) and other scavengers which are usually found in "ripe" specimens of cheese.

In view of these discouraging facts, it is pleasant to find that the simple cottage cheese which the farmer's wife prepares on short notice in her own kitchen from the well skimmed sour milk of her milk house, possesses all the good qualities of ordinary cheese while free from all its objectionable features. The only inconvenience is that it must be freshly prepared unless kept in an ice box. Cottage cheese supplies 4.2 grains of lime per ounce, and hence three and three-fourths ounces of cheese will furnish a day's lime ration.

Yogurt cheese, a cream cheese prepared by a process modified by the writer from that employed in making the famous camembert cheese, omitting the green mold and using pure cultures of the *B. acidophilus*, has all the advantages of cottage cheese and will keep for months if in a cool place. This dairy product is a complete and satisfactory substitute for ordinary cheese for all but those who have developed a connoisseur's appetite for the putrescent aromas of limburger and gorganzola.

Even whey, a by-product of cheese making which usually goes down the sewer, possesses no mean value as a source of nutritive lime salts. There are in the whole category of foodstuffs few, in fact, which are so rich in lime as is whey, which contains more than one-fourth grain to the ounce. The lime content of whey is greater than that of any cereal, three times as great as that of egg whites, and four times as much as that of cornmeal or rice. A large glassful of whey contains as much food lime as a large serving of rice. The same amount of whey contains as much lime as two pounds of beefsteak and a pint is equal in lime content to two-thirds of a dozen eggs. Three pints a day, taken as a beverage in place of beer, for example, would supply nearly a day's lime ration, as much as would be furnished by a fifty gallon cask of beer.

The Iron Content of Milk.

The milk of all animals is notably deficient in iron. The milk of woman contains only a trace of iron for the reason that in human infants, as well as in the young of all animals that have a comparatively long nursing period, iron is before birth stored up in large amount in the liver. The liver of the new born child contains iron enough to furnish an adequate supply for blood-making until the appearance of teeth enable it to make use of iron-containing foods. The same is true of the calf. It is to be noted, however, that in the case of the calf the possession of teeth enables the young animal to begin securing supplies of iron from other sources than its maternal food within a few days after its birth. On this account cow's milk contains but a very small proportion of iron, less than one thirtieth of a grain to the quart, or one-third as much as breast milk.

Dried Milk.

Milk powder, or dessicated milk, consists of either whole milk or skimmed milk which has been reduced to a powder by removal of the water content by either one of several processes.

Dried milk possesses all the nutritive properties of fresh milk except that it is deficient in the scurvy-preventing vitamin, and so should be supplemented by orange or tomato juice.

The experiments of Chick and others have shown that the value of the antiscorbutic vitamin of milk is reduced at least one-half by drying, twice as much dried milk as raw milk being required to prevent scurvy in guinea pigs and monkeys.

Cream.

Cream consists of the fat of the milk with a certain proportion of casein and a small amount of salts and milk sugar. The fat of cream is in a state of emulsion and for this reason more readily mixes with the digestive fluids and is usually more quickly digested than is butter, oils or other animal or vegetable fats.

Butter.

Butter is the most important of all the animal fats. It is superior to vegetable fats in the fact that it is rich in vitamins which are derived from the milk. Vit-

Good butter has a natural and decided yellow color. There is reason for believing that pale butter, which requires the use of annatto or some other coloring matter to give it the usual color, is lacking in vitamins, since Stenback and Bontwell have shown that the fat-soluble A vitamin, the absence of which gives rise to rickets, is often, if not always, associated with the yellow color found in yellow corn, carrots and green herbage.

Cheese.

Recently-made cheese, particularly cream cheese and cottage cheese, is wholesome food. The so-called ripening of cheese in no way improves it, but rather develops objectionable qualities. The ripening process is carried on by means of molds, yeasts and bacteria which are present in the milk or added to it in the process of manufacture. Cheese cannot be made from sterilized milk without the addition of bacteria. Fresh cheese, particularly cottage cheese, is a valuable addition to the dietary as a source of lime. As a rule, the food contains a sufficient amount of protein without the addition of cheese, even in the absence of meat, but lime is very frequently deficient and may be conveniently added in the form of cottage cheese. Four ounces of cottage cheese will supply a day's ration of food lime.

237

Cream or cottage cheese, when freshly made, is more wholesome than meat and more nutritious. According to Williams, 20 pounds of cheese contain as much nutrient as the carcass of a sheep weighing 60 pounds. Cheese contains both more fat and more protein than beef and less than half as much water. ~~The~~

Since the ripening process in cheese-making is really a process of decomposition due to the action of bacteria, yeasts and molds, all ripened cheese contains considerable quantities of decomposition products.

Examination of a limburger cheese in the bacteriological laboratory of the Battle Creek Sanitarium (Roderick), showed 18,000,000 bacteria per gram (540,000,000 per ounce). The bacteriologist noted that the bacteria were of the same character as those found in the human intestine.

Indol is usually found in limburger cheese and may occur in camembert cheese. Carbolic acid, a common product of putrefaction, is found in limburger. The older the cheese, that is, the longer the "ripening" process has continued, the larger the amount of toxic products present. During the early stage of the ripening,

the growth of putrefactive organisms is prevented by the presence of milk sugar, but this disappears after the first few days as the result of the action of lactic acid bacilli upon lactose, and the decomposition changes in the milk protein, or casein, to which the softening of the cheese is due, proceeds at a rate depending upon the temperature to which the cheese is exposed.

Ordinary cheese, especially old cheese, such cheeses as camembert, roquefort, limburger and other varieties of highly flavored well-ripened cheese, are wholly unfit for human food and are positively dangerous for use by persons suffering from diseases of the liver or kidneys.

Skimmed Milk.

Milk which has been skimmed, especially separated milk, has been deprived of one of its most precious constituents, a highly valuable fat. Butter fat as present in milk is in a state of fine emulsion, a condition which greatly aids its digestion and assimilation, and contains a very precious vitamin, fat-soluble A, or antirachitic (anti-rickets) vitamin.

~~The suggestion of some writers that skimmed milk may be used in place of full milk as a measure of economy, provided that margarine or some other fat replaces the fat removed, is bad advice. Skimmed milk has a considerable nutritive value, but it lacks the growth-promoting power of full, fresh milk, and on this account cannot wholly take its place.~~ When skimmed milk is used, it should not be used as a substitute for full milk but as an addition to the regular daily supply of full milk which every child should have. It may also be used as an added source of lime salts. It may be employed in cooking as in the preparation of bread, puddings, etc.

Skimmed milk may be used without detriment in connection with a liberal supply of butter. Used in this way, the skimmed milk now thrown away or fed to pigs, if fed to human beings, would be worth more to the country than all the meat produced by the live stock industry.

Canned Milk.

Sekina, in experiments on white mice, found that canned milk in time gave rise to anemia and beri-beri. The mice did well for 100 days, then rapidly failed. The addition of iron and the water-soluble vitamin quickly restored them to the normal condition. Canned milk and condensed milk are thus shown to be unsuited to serve as staple foods for infants because of the lack of iron and the water-soluble B.

Canned milk may be advantageously used in connection with other foodstuffs as a source of complete protein, but should never be used as the chief food for any length of time unless supplemented by orange or tomato juice to supply vitamins and purée of spinach to furnish food iron.

TABLE XL.

Average Percentage Composition of Condensed Milks (Mohan).

	Solids Per cent.	Ash Per cent.	Fat Per cent.	Protein Per cent.	Lactose Per cent.	Cane sugar Per cent.
Condensed whole milk........	72.6	1.6	10.0	8.0	12.0	41.0
Condensed skimmed milk....	70.0	2.0	1.0	10.5	14.5	42.0
Evaporated milk..................	26.3	1.6	7.9	7.7	9.1	......
Whole milk powder............	96.3	5.6	26.8	32.0	31.9	......
Skimmed milk powder........	91.7	6.9	1.7	33.8	49.3	......

Cane sugar to the amount of 16 to 19 pounds is usually added to 100 pounds of raw milk. The condensing is done by heating for about 2 hours at 140° F. Condensed milk contains too much cane sugar to be suitable for use as an infant food.

Buttermilk.

Buttermilk and sour milk have essentially the same composi-

239

tion. The sour flavor is produced by harmless lactic acid-forming bacteria. Buttermilk contains essentially everything which whole milk contains except the fat, which is reduced to about one-fourth of the ordinary amount. Buttermilk is more easily digestible than sweet milk. The acid-forming bacteria found in ordinary sour milk are of no particular value in changing the intestinal flora for they are unable to live and grow in the intestine. When buttermilk is desired for correcting biliousness or changing the intestinal flora, it should be prepared with the *B. acidophilus*. A quart or better, three pints of acidophilus buttermilk taken daily for a week or two will usually produce a marked change in the character of the stools, causing the disappearance of the putrid odors through the suppression of putrefactive processes in the intestine.

Buttermilk ice cream is greatly to be recommended in place of ordinary ice cream. It contains but a small proportion of the fat found in ordinary ice cream and hence is much more easily digestible. Buttermilk ice cream is also practically free from any danger of tyrotoxicon poisoning, which occasionally occurs from ice cream made in the usual way.

Whey.

The fluid residue left in the process of cheese making contains the milk sugar and much of the mineral matters of the milk, the casein or protein and fat having been removed. Whey ~~is~~ also ~~rich in~~ vitamins. It may be freely used to great advantage by persons who have long subsisted upon a dietary insufficient in lime. The composition of whey is as follows (Hutchinson):

Water	93.64 per cent.
Protein	0.82 per cent.
Fat	0.24 per cent.
Milk sugar	4.65 per cent.
Mineral matters, lime, etc.	0.64 per cent.

The whey cure has long been practiced at various health resorts in Europe. The whey is not used alone, but in connection with other foodstuffs, particularly with a mixed diet from which flesh foods are largely excluded. The patient usually begins by taking a tumblerful of whey night and morning. The amount is increased from day to day until 10 tumblerfuls are taken daily. The whey is taken either warm or cold, plain or aerated. It is

240

and useful for changing the intestinal flora.

recommended by Gautley as a substitute for milk in feeding typhoid fever patients. The caloric value of whey is small, only 7 calories per ounce. By the addition of malt sugar or cereals, the food value of whey may be increased to any desirable extent. By adding 3 ounces of malt sugar or lactose to a pint of whey, the energy value is increased to 25 calories to the ounce, or 400 to the pint, a good carbohydrate food,

Modified Milk.

When employed in the artificial feeding of infants and in very many cases in the feeding of invalids, cow's milk must be modified. Ignorance of this fact and of the proper method of feeding milk is responsible for the death annually of a great multitude of artificially fed infants. Of the 2,500,000 infants born in the United States annually not less than 250,000* die as the result chiefly of improper feeding. The mortality of bottle-fed infants is more than four times that of breast-fed infants. Cow's milk differs very decidedly from mother's milk. It contains four times as much lime and three times as much protein and only two-thirds as much sugar. Protein and fat are the elements of cow's milk which are the greatest source of trouble to the human infant.

Cow's milk contains a large amount of protein and lime to support the rapid growth of the calf which attains puberty at the end of two years, about one-seventh of the time required for the human infant to reach the same stage of development.

Various formulas have been devised and recommended for the modification of cow's milk in artificial feeding. The most of these are more or less complicated. Recent experience has shown that a very simple method is much superior to the complicated measures which have been developed. It is only necessary to add two things, water and milk sugar or malt sugar, to render cow's milk suitable for the use of very young infants. A good formula is equal parts of full milk and boiled water with an ounce of malt sugar for each pint of water added to the milk.

Milk Must Be Clean.

The chief reason assigned for the pasteurizing or sterilizing of milk is the presence in the milk of large or small quantities of filth which should have been left in the stable or the barnyard. Combe and others have shown that the germs associated with this putrefying filth are the most prolific source of diarrheas and other intestinal disorders which annually carry off so many thousands of infants during the summer months. These same putrefactive germs are likewise the cause of intestinal toxemia or autointoxication.

As received from the cow, milk may or may not contain bacteria. In general, the milk of a healthy cow, if removed from the animal with sufficient care, will be found to be absolutely free from bacteria and if put into a proper container will keep without spoiling for an indefinite period. Certified milk must contain less than 10,000 bacteria to the cubic centimeter (about one-fourth of a small teaspoonful). Ordinary commercial milk contains from 100,000 to several million bacteria to the cubic centimeter and is absolutely unfit for use. The number of bacteria found in milk rapidly increases. For example, in a specimen of milk examined 24 hours after milking the number of bacteria had increased from 100,000 to 5,600,000.

By the exercise of sufficient care in dairy management the number of bacteria count may be kept below 1,000, and such harmful bacteria as Welch's bacillus, and other putrefactive organisms, as well as the specific organisms of typhoid, tuberculosis and other infectious organisms may be practically excluded. The cost of clean milk will, of course, be greater than the dirty product now offered to the public; but the superior value of clean milk will far more than balance the extra cost. The model dairy of the Battle Creek Sanitarium has for years demonstrated the practicability of producing clean milk on a large scale at a reasonable cost. In this the bacterial count is often kept below 1,000 even in summer weather.

Sour Milk.

The souring of milk is due to the development of lactic acid through the growth of acid-forming bacteria. There are many varieties of acid-forming bacteria which readily find access to milk, and as they grow rapidly at ordinary temperatures milk will naturally sour within a few hours after milking unless the temperature of the milk is at once lowered to a point at which the growth of the bacteria is prevented.

The *B. acidophilus* is a special acid-forming organism which not only grows and thrives in milk but is also able to live in the colon of animals. This is known to be true of the *B. acidophilus*,

241

The importance of this subject is [illegible] at once recognized when we consider the facility with which the fecal matters of the cow become mixed with milk, especially when cows are kept confined in a stable or small enclosure.

The immense importance of these facts will be recognized only when we take into consideration the facility with which cows may become infected with the excreta of human beings. Although no small care is taken to secure a pure water supply for human beings, very little attention, indeed, is given to the water supply of animals.

It is safe to say that very few people, indeed, are fully acquainted with the dangers to life and health which lurk in the milk supply. Strange as this may appear, a still stranger observation is the fact that almost every savage nation on the face of the globe that makes use of milk in any form, has learned by experience to adopt measures of protection of a more or less effective character, while the English and Americans are about the only peoples who seem to have profited nothing by sad experience in this particular.

Among other savage tribes milk is seldom or never used. The teeming millions of China--a country which contains nearly one-third of the entire population of the globe, are practically ignorant of this article of food. The high-caste Hindoo regards milk as a loathsome and impure article of food, speaking of it with the greatest contempt as "cow-juice," doubtless because of his observations of the deleterious effects of the use of milk in its raw state.

347½

The savages of Central Africa make use of milk only after converting it into a sort of kumyss by leaving it for some hours in a gourd specially prepared for the purpose. A portion of the ferment is always left behind in the gourd, so that a strong degree of acidity is developed in a few hours.

The half-civilized Tartars of Western Asia prepare milk in the same manner, as do also the Turks and the Armenians. The natives of Italy use milk from goats instead of that from cows, a custom which will be better appreciated when the fact is known that goats are not subject to that dread disease, tuberculosis, so common among cows. Even the German peasant scalds the milk as soon as it comes from the cow, and makes little use of the article except in the sour state, in which it is comparatively safe. The Irish peasant is equally fond of sour milk, and the same is true of the natives of Scandinavian countries.

The French dairywoman scalds the cream before she churns it, experience having shown her that by this method a superior quality of butter may be made, although the philosophy of sterilization is probably unknown to her.

American and English people, as before stated, stand almost alone in the recklessness with which they make use of raw milk as a food and as a beverage, and in the fact that they seem to have learned nothing by the experience of centuries in the use of an article which is certainly responsible for a prodigious annual addition to the mortality list.

~~Let us glance into~~ the conditions which give origin to the microscopic dangers to life and health which lurk in milk.

There are various germs which change the color of milk, each producing a characteristic color. Other germs produce a peculiar flavor, as acid or bitter, still others change the consistency of the milk, producing either a thickened or coagulated condition, or rendering the milk thready or viscid in character. The following are a few of ~~the more important~~ examples of this sort: —

Blue Milk. — The peculiar color of blue milk, not referring, of course, to milk which has been made blue by skimming, is due to the development of a peculiar coloring matter by the *bacillus cyanogenus*. The blue color does not appear, however, when the germ is planted in sterilized milk, but only by its growth in raw milk, as the development of the blue color requires the presence of lactic acid. A gray color is produced in sterilized milk.

3

Red Milk.—The *bacillus prodigiosus* gives rise to a red color, which appears in patches upon the surface of the milk. Two species of red yeast produce a red or brownish color, which first appears at the surface of the milk, then gradually extends until the whole is colored.

The *bacterium lactis erythrogenes* colors the whey only.

A dozen different lactic-acid-producing germs are ordinarily found in milk, and there are a great number of other germs which produce sour milk.

Freudenreich has shown that the unusually spongy condition often found in cheese, giving the cheese a swollen or puffy appearance, is frequently due to germs furnished by the intestines of the cow. Some germs ferment casein but do not produce lactic acid, but a sort of rennet. The germs which produce lactic acid are killed at a temperature of 158° F. The spores of some germs which ferment casein resist a temperature above the boiling point of water, sometimes even 248° F.

There are many of these germs, ten or more species of which are well known, besides a large number included under the general term, "potato bacilli," which comprise a great variety of germs that grow upon the surface of the earth, and also a large number of bacilli which cause butyric acid fermentation.

Cheese owes its properties to the development of these various germs at the expense of the sugar of milk, the casein, and the fat which it contains.

Drs. Schaffer and Bondzynski showed many years ago that cheese made from cooked milk does not mature.

Adametz has shown that the addition of thymol and other germicides to milk in making cheese prevents the maturing of the cheese.

Yeasts and Molds.—A variety of yeasts grow in milk. The characteristic action of yeast in milk is the production of lactic acid and alcohol. Some of these yeasts coagulate milk, others do not. Kumyss is one of the familiar products of the action of yeast upon milk. Kephir is a variety of kumyss produced by a peculiar yeast found in the so-called Kephir grains.

The red yeast already referred to, sometimes develops in cheese.

A white mold, *oidium lactis*, sometimes forms upon the surface of milk as well as upon other substances.

Green mold also sometimes attacks milk. It is, in fact, the principal agent in the production of the famous Roquefort cheese. Brie cheese owes its peculiar properties to mold. In the manufacture of these varieties of cheese, the development of mold is promoted for the purpose of securing the peculiar flavors characteristic of these molds when grown in milk.

Yellow Milk.— *Bacillus synxanthus* produces a ferment which coagulates the milk, then a rennet which dissolves the casein and colors it yellow.

Bitter Milk.— There are many different germs which produce bitterness in milk. They are most likely to occur in milk which has been boiled and then allowed to stand for a long time. In raw milk they are overwhelmed by other germs, and do not develop; but the spores survive cooking and develop later. There are a few germs capable of causing bitter milk which resist the action of other germs and grow in raw milk.

Thready or Viscid Milk.— More than a dozen different germs have been described which produce a thready or viscid condition of the milk. It is a singular fact that this condition of the milk is promoted as the basis of the manufacture of Edam cheese. Conserves of thready milk are also made in Norway, where pains are taken to produce a viscid condition of the milk in the manufacture of a peculiar kind of preserved milk known as Tättemyelk. The condition is produced by adding small leaves of a species of grass, the *pinguicula vulgaris;* sometimes instead, the same grass is fed to the cows, which suggests at once the manner in which the milk may become infected. The cows eat the grass, the mouth and nose of the cow become infected, they transfer the germs to the udder, and from the udder they readily find their way to the milk pail.

Disease-Producing Germs.— Much more important from a sanitary point of view than the various yeasts, molds, and color-producing germs which have just been mentioned, are the pathological microbes, or disease-producing germs, many of which grow with great facility in milk. Some of the diseases arising from these germs, as cholera and typhoid fever, have already been referred to.

It has been shown that cholera germs grow with less facility in raw milk than in cooked milk, lactic acid interfering with the development of the cholera germ, so that sour milk may be, under certain conditions, safer as an article of diet than sweet milk, if the latter is uncooked.

Certain forms of influenza have been proven by Freudenreich,

in milk

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 one hundred and twenty 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 fact that in older populations, like those of England and New England, the proportion of deaths from consumption to deaths from all other causes, rises as high as twenty or thirty per cent, while in the newer communities of the West the proportion falls to eight or ten per cent, is an evidence that conditions exist in intimate connection with life in a civilized community, which favor the development of this dread disease. The revelations of the post-mortem 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.

That tuberculosis may be communicated through the milk of tuberculous animals, at least under certain circumstances, is strongly suggested, if not absolutely proved, by the disproportionate frequency with which enteric consumption occurs in young children. A case recently reported in medical journals illustrates very clearly the possibility of infection by tuberculosis through the alimentary canal. Four infants were cared for by a tuberculous nurse, who fed the little ones with a spoon, and was in the habit of tasting the milk herself to test its temperature before each feeding. All four of these children suffered and died from enteric consumption — a very clear case of infection.

An important fact to which Prof. Law has called attention is this; namely, that even though the milk of a tuberculous animal may be proved to be free from tubercle bacilli, and hence not capable of giving rise to tubercular infection, or if the infected milk shall have been sterilized so that it no longer contains living bacilli, still these animal products are, nevertheless, capable of producing most potent mischief through the toxic products of the bacilli which they contain.

There is still another feature of this question to which~~, it seems to me,~~ sufficient importance has not been attached; namely, the infection of human beings with tuberculosis by contact with tubercular animals, aside from the use of their flesh or milk as food.

7

That tuberculosis is usually contracted by the reception of germs into the air passages is a point upon which there will probably be no controversy. The reception of the microbes in the form of dust, by respiration, is unquestionably the most frequent form of contagion.

Sawisky, who has investigated the length of time that dried sputum retains these infectious properties, reports that virulence was retained for two and one-half months. He found this to be true even when the sputum was exposed to the sunlight, the destructive effect of sunlight upon microbes, which is well known, being only observed in the bacillus tuberculosis when the sputum was spread out in very thin layers.

A point of importance to which we wish to call special attention is the fact that the sputum of tuberculous cattle and the apartments occupied by such cattle are as dangerous a source of infection, and more so, than the sputum of human beings, or the apartments occupied by them.

It is doubtless true that contagion from animal to man is much more common than from man to animal, and yet that contagion may occur from man to animal cannot be doubted. A case is reported in which a flock of chickens became almost wholly tuberculous through eating the expectorated matters of a consumptive young man who had charge of them and fed them, spending considerable time with them in the yard.

Hoffman has shown that flies may take up the tubercle bacilli from infected sputum, and discharge them alive and active with their excreta. A number of flies fed upon infected sputum died after a few days. Whether death was due to the growth of the microbe or to the toxic effect of the tuberculin absorbed was not shown by the experiment. It is known that the bacilli of leprosy are communicated by flies alighting upon a raw surface, and I deem it quite possible that infection of the skin, resulting in lupus, or of the lymphatic glands, producing scrofulous enlargement, may occur in this way.

A curious fact to which attention has been called, is that earthworms may receive into their bodies and retain there in a virulent condition the tubercle bacilli for many months. The bacilli may be deposited upon the surface of the earth with the excreta of the worm, become reduced to powder, raised in the air by some passing breeze, and thus find their way to human lungs. In this way the expectorated matter of cattle in pastures may find access to human beings.

In licking herself a cow suffering from tuberculosis may soil the hair about the udder or flanks with infected saliva, which, after drying, may be rubbed off during the act of milking and find its way into the milk. This may be a source of infection of milk, in cases in which, when taken with special precaution directly from the udder, the milk gives no evidence of infection.

The conditions under which milk is usually produced in civilized communities are such as to insure its contamination. The udder and other portions of the body of the cow become smeared with her excreta, or that of other animals, and this infectious material is in turn rubbed off by the contact of the hands or the clothing, or the switching of the animal's tail, and falls into the milk during the process of milking. The amount of foreign material of this sort which finds its way into the milk depends, of course, very largely upon the condition in which dairy cows are kept, as well as upon the care of the dairyman. Milk from cows in pasture is comparatively free from materials of this sort, although by no means wholly so, while milk from cows kept in stalls is certain to contain a consider- little
able quantity of stable litter. or

himself,

The average dairyman unwittingly imitates a heathen custom. The Hindoo, ~~as already stated,~~ makes no use of milk as an article ~~of food, but often~~ keeps cows for the purpose of supplying milk to his English and Mohammedan neighbors. The rules of his religion, however, require him to placate his deity for robbing the cow by performing certain religious rites, one of which consists in adding cow dung to the milk. Incredible as this statement may appear, I am certain it is authentic, as the statement was made to me by missionaries who had spent many years in India and were personally knowing to the facts. I was also informed that one great objection to the use of milk in India is the fact that it is invariably found to possess a strong flavor of cow dung. This objection not infrequently applies with a considerable degree of force to the United States milk.

When it is considered that in the cow's excreta are to be found germs of many varieties, from the ordinary germs of putrefaction to the most deadly pathogenic or disease-producing microbes, and requiring only a favorable soil in which to develop to enable them to manifest their deadly properties, it will be seen that no small importance attaches to what is generally considered an insignificant or unimportant matter.

The housewife is ordinarily contented with straining the milk through a wire-cloth strainer, or, if exceptionally fastidious, she may employ a strainer of cloth. The universal practice of straining milk in some fashion is a recognition of the source of contamination which has been mentioned. But it probably is not generally known, or at least not considered, that this mode of purification removes from the milk only the coarser masses such as are readily visible to the eye.

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.

Investigations conducted a few years ago at the experiment station of the State Board of Health of Connecticut, resulted in the discovery of more than thirty different kinds of germs in milk.

In conclusion I desire to say a few words with reference to proper methods in the production, care, handling, and use of milk: —

1. Cows must be fed upon proper food. Cows 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 by absorption and secretion by way of the mammary glands.

2. A cow must be supplied with an abundance of pure water. As much 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.

Rules for Certified Milk
B. C. Standard(?)

10

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.

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°, 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.

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.

Experience has shown that the continued use of sterilized milk or cooked food of any sort, as gruels for example, for any considerable length of time, leads to malnutrition, and is likely to result in scurvy, rickets, and other disorders. To prevent this, raw fruit juice of some sort should be used daily in all cases where feeding with sterilized milk or other cooked food is employed. Orange juice ~~is excellent~~ for the purpose. Any fresh fruit juices may be used. Banana pulp may also be used for the same purpose with excellent results. These observations apply to the feeding of adults as well as infants. Raw food of some sort should be taken at every meal.

or tomato juice is best

78

MILK

p 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442

Milk is nearly a perfect food, containing not only protein and fat as do other animal foods, but also carbohydrates, besides salts and vitamins. It is deficient only in iron.

The milk of the cow enjoys in this country almost exclusive favor, but is by no means the universal lacteal food. Milk of various animals is used in different countries. Among the ancient Egyptians the milk of dogs was employed as well as that of the

cow. In various parts of Europe the milk of the goat and the ewe is used quite extensively, and to some extent also the milk of the ass. The milk of the camel is used in Arabia and Persia, of mares in Tartary, of the buffalo in Africa and China, of the yak in Tibet, of the reindeer in Lapland, and the llama and vicuna in South America.

If in the case of adults it needs to be supplemented by other foodstuffs, cow's milk, when properly modified, is for the young infant a nearly perfect food. It contains in excellent proportions all the elements needed by the growing child. This is not true of any other substance known.

79

It is due to the presence of lactose that milk sours while meat putrefies. Several years ago (1908), the writer placed in a jar of buttermilk a raw beefsteak with no antiseptic of any sort. The beefsteak is still intact, thanks to the antiputrefactive properties of milk sugar and the acid-forming bacteria it feeds. One reason for this antiputrefactive property of milk is that in the presence of sugar even highly active putrefactive organisms produce harmless acids instead of noxious toxins and ptomaines. This is a most beneficent provision of Nature whereby the normal food of the young infant is kept in a wholesome state while undergoing digestion and absorption in the intestine.

The Special Value of Milk Proteins.

Milk is of special value in the dietary of human beings because of the fact that its protein is of very superior value. It is not only complete, but is capable of supplying all the elements required for building or repairing the living structures of the body, and is so rich in certain essential elements that it is able to make good the deficiencies in cereals and vegetables. In other words, the proteins of milk may be regarded as super-complete. Experiments have shown (Caspari) that milk protein is superior to meat protein.

13

83 79 1/2 were wholly adequate,

Milk Protein vs. Meat Protein

THE idea that meat is in some way superior to other foodstuffs as a source of nutrition, has been so long held by the medical profession as well as by the laity, it is hard to uproot, although scientific research showed years ago the fallacy of this teaching. Caspari, ~~who many years ago~~ made a research upon the value of milk protein as compared with the protein of meat, under the supervision of the late Professor Zuntz, which showed that nitrogen equilibrium could be maintained on a smaller amount of protein when the source was milk than when meat was eaten. A few years later Sherman, of New York, showed in a very extended and carefully conducted research that the cereal proteins when supplemented by ten per cent of milk protein ~~were equal to the protein of meat in dietetic efficiency~~.

~~Recently~~, Dr. Mary Swartz Rose, of the Department of Nutrition, Teachers College, Columbia University, with two of her students, ~~has~~ conducted a ~~new~~ research in which comparison was made between the proteins of the soy bean, of meat, of milk and of a combination of bread and milk. The research was conducted in such a manner as to insure the highest degree of accuracy in the results and confirmed in a very striking manner the observations previously made by Sherman and Caspari. In this research the basal diet consisted of arrowroot starch, malt sugar, milk sugar, butter and apples,—food which contained practically no protein at all. To this diet was added separately, for twelve or fifteen periods each, soy bean curd, meat, milk, and bread and milk. Care was taken to make the food value of each of these four different rations exactly equal. The intake of liquid was also the same in each case. The amount of protein eaten was about half a gram per kilogram of body weight, equal to one-quarter of a gram or one calory per pound of body weight. This amount of protein, as shown by Sherman, is ample to meet the needs of the body. The results were strikingly in favor of milk as a source of protein, for although the amount of milk protein actually taken was a little less than that of the meat protein, the amount utilized by the body was found to be more than twenty per cent greater.

The protein furnished by the combination of bread and milk showed a superiority of fifteen per cent over the protein of meat, while the protein of soy bean curd was exactly equal to that of meat.

This carefully conducted experiment ought to settle this question if there remains in the minds of any persons any reason for doubt as regards the ability of milk to fully take the place of meat as a source of protein.

The research of Sherman above referred to showed that the addition of a few ounces of milk to a bill of fare consisting of cereals, fruits, grains and vegetables, will make sure of an adequate supply of protein, although meat and eggs are wholly excluded from the diet.

The packers and others interested in the meat industry are clamoring for an increased consumption of meat, but they have not yet brought forward one single scientific fact or any evidence supported by respectable scientific authority, that the average American would be in the smallest degree benefited by increasing his meat allowance.

80

McCollum considers milk of greater importance than meat in the national bill of fare and attributes to milk rather than to meat the physical superiority of certain meat-eating nations. This writer calls especial attention to the fact that meat-eating nations are also milk-eating. In view of this highly interesting result of recent scientific inquiry it is evident that the dairy interests of the country should be encouraged rather than beef and pork production.

("The Newer Knowledge of Nutrition")

15

80 1/2

Milk Rich in Vitamins.

Another notable quality of milk is its richness in vitamins. These remarkable and magic-working substances are, according to Funk, the discoverer, produced only by vegetables. Each plant produces its own sort of vitamins. The vitamins of milk are not produced by the cow, but are only collected by her.

It should be mentioned, however, that the full value of milk is possessed only by clean milk as it flows from the cow, and not by milk which has been boiled or pasteurized, or doped with alkaline or antiseptics, which destroy the vitamins and deprive the milk of one of its most unique and valuable properties.

Influence of Food of Cow upon the Vitamins of Milk.

Every farmer knows that both the quality and the quantity of milk produced are influenced by the food of the cow. Scientific research and practical experience have developed in recent years the science of animal feeding to a high state of perfection. The up-to-date farmer knows just what and how much to feed to produce the most milk containing the highest percentage of butter fat. Richness in fat, is not, however, the quality of greatest importance. Of far greater significance is the vitamin content of the milk. Recent investigations have shown that cow's milk varies greatly in the amount of this most essential food constituent. Cows fed upon fresh grass or other fresh green food produce milk rich in vitamins, while the milk of cows fed on dry hay is deficient. Since milk is often the exclusive food of young infants for several months during the most critical development period of their lives, this becomes a matter of greatest importance.

81

81

Infants fed on milk from hay-fed cattle do not grow at the proper rate and may be dwarfed and weakened for life, not only in stature but in other vital respects, even in the development of important internal structures.

Milk inspection should not stop with sanitary conditions and the health of the cow, but should include inspection of the cow's food supplies with reference to the infant's needs. Vitamins are produced only by plants; and if green stuffs are lacking in the food of the cow, they will be lacking in the milk, and the milk fed infant will suffer.

The feeding of sprouted grains to cows is an excellent means of increasing the vitamin content of their milk. Bottle-fed babies always require orange or tomato juice to insure an ample supply of vitamin, even when fresh, unpasteurized milk is used.

Milk Rich in Salts.

Cow's milk is very rich in salts, containing ~~four times~~ twice as much of these mineral elements as does mother's milk. Milk contains more lime than is found in lime water. Note the contrast in this regard between milk and beef. Meat supplies only half a grain of lime to the pound, although containing twice as large an amount of solids as does milk. The reason for this is obvious. Milk is a substance provided by Nature as an exclusive food for a growing animal, and so must furnish lime for the bones as well as protein for the muscles.

The Lime Content of Milk and Cheese.

This group of foodstuffs is of unrivaled value as a source of food lime. All dairy products with the exception of butter are very rich in salts of lime. Pure fat is, of course, free from lime,

17

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82

which is chiefly associated with the protein or casein of the milk. But butter is not pure fat. It retains a portion of the buttermilk and so has a small lime content, which is, however, too insignificant to deserve consideration in the planning of a balanced bill of fare.

Milk, in some form, is one of the most convenient and reliable of all sources of food lime. Whole milk contains three-quarters of a grain of lime to the ounce. This is only half the amount found in almonds and filberts; but while these nuts can be utilized only to the extent of a few ounces daily, the milk intake may be raised to several quarts.

We are rapidly becoming a toothless nation because of the lack of lime in our national bill of fare. This deficiency may be easily made up by the proper utilization of our dairy products and a suitable selection of foodstuffs.

It is interesting to note that a tablespoonful of milk supplies nearly the same amount of lime as an egg yolk, while a little more than half a pint of skimmed milk (9 ounces) supplies as much lime or bone building material, as a dozen eggs.

18

While skimmed milk contains more lime than whole milk the vitamin content is much less, a large portion being held in solution by the butter fat which has been removed. But the chief values of milk are left after the fat has been removed, and the great economic waste and physiologic damage which have resulted from the past failure to utilize this by-product of our great dairy industry should be stopped as speedily as possible.

Buttermilk has a lime value almost equal to that of whole and skimmed milk, a pint and a half affording a full day's supply of lime. Sour milk commonly sold as buttermilk and under various trade names is fermented or soured skimmed milk and hence has the same lime content as skimmed milk.

Cream is not by any means the equivalent of milk as a source of lime. An ounce of cream contains only two-thirds as much lime as the same quantity of whole milk. Nearly a quart of cream is necessary to supply a day's ration of lime on account of the larger amount of fat present.

But it is in cottage cheese that we find the richest and readiest means of increasing our lime intake. The solids of milk constitute one-eighth of its bulk and weight. Consequently, the elimination of the greater part of the water in the process of cheese making results in a great concentration of the lime content. Ordinary cheese has a lime content of 5.7 grains per ounce, or eight times the amount in whole milk, more than any other foodstuff. An ounce of average cheese supplies as much lime as seven yolks or five entire eggs, five pounds of beefsteak, or half a peck of potatoes.

Old cheese is not easily digested by many persons. The butyric acid which it contains in considerable amount when old and strong, excites the gastric glands to secrete an excess of hydrochloric acid, and so gives rise to heartburn, a common symptom following the free eating of cheese. There are in old cheese various more or less toxic products, the result of the activities of the numerous molds, yeasts and germs which co-operate in the production of cheese, to say nothing of the "mites," "skippers" (maggots) and other scavengers which are usually found in "ripe" specimens of cheese.

In view of these discouraging facts, it is pleasant to find that the simple cottage cheese which the farmer's wife prepares on short notice in her own kitchen from the well skimmed sour milk of her milk house, possesses all the good qualities of ordinary cheese while free from all its objectionable features. The only inconvenience is that it must be freshly prepared unless kept in an ice box. Cottage cheese supplies 4.2 grains of lime per ounce, and hence three and three-fourths ounces of cheese will furnish a day's lime ration.

Even whey, a by-product of cheese making which usually goes down the sewer, possesses no mean value as a source of nutritive lime salts. There are in the whole category of foodstuffs few, in fact, which are so rich in lime as is whey, which contains more than one-fourth grain to the ounce. The lime content of whey is greater than that of any cereal, three times as great as that of egg whites, and four times as much as that of cornmeal or rice. A large glassful of whey contains as much food lime as a large serving of rice. The same amount of whey contains as much lime as two pounds of beefsteak and a pint is equal in lime content to two-thirds of a dozen eggs. Three pints a day, taken as a beverage in place of beer, for example, would supply nearly a day's lime ration, as much as would be furnished by a fifty gallon cask of beer.

The Iron Content of Milk.

The milk of all animals is notably deficient in iron. The milk of woman contains only a trace of iron for the reason that in human infants, as well as in the young of all animals that have a comparatively long nursing period, iron is before birth stored up in large amount in the liver. The liver of the new born child contains iron enough to furnish an adequate supply for blood-making until the appearance of teeth enable it to make use of iron-containing foods. The same is true of the calf. It is to be noted, however, that in the case of the calf the possession of teeth enables the young animal to begin securing supplies of iron from other sources than its maternal food within a few days after its birth. On this account cow's milk contains but a very small proportion of iron, less than one-thirtieth of a grain to the quart, or one-third as much as breast milk.

<u>Dried Milk</u>

Milk powder, or dessicated milk, consists of either whole milk or skimmed milk which has been reduced to a powder by removal of the water content by either one of several processes.

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Dried milk possesses all the nutritive properties of fresh milk except that it is deficient in the scurvy-preventing vitamin, and so should be supplemented by orange or tomato juice.

The experiments of Chick and others have shown that the value of the antiscorbutic vitamin of milk is reduced at least one-half by drying, twice as much dried milk as raw milk being required to prevent scurvy in guinea pigs and monkeys.

Some brands of dried milk are superior to others because of the use of improved methods of removing the water content. The longer the exposure to the air and the higher the temperature employed the greater is the loss of vitamin C., and the antiscorbutic vitamin.

Dried skimmed milk is of course deficient in fat and contains only half as much of the fat-soluble vitamin A as does full milk. Experiments conducted by Sherman and his associates in the laboratories of Columbia University have shown that

~~has been found that~~ a mixture of two-thirds whole wheat and one-third skimmed milk powder supplies enough fat-soluble vitamin to maintain growth at practically the normal average rate and apparently good general health in the rat,

However, further experimentation showed that

an increase of the fat-soluble vitamin in the diet by the use of whole milk powder instead of skimmed, results in a distinctly higher degree of health and vigor as shown in longer life and much better success in bearing and rearing young. That this is due to the increased intake of fat-soluble vitamin and not of the fat itself is shown by parallel experiments in which the same differences were found to result from diets which differed only in that one contained lard or cocoanut oil while the other contained butter-fat.

85-6

Cream.

Cream consists of the fat of the milk with a certain proportion of casein and a small amount of salts and milk sugar. The fat of cream is in a state of emulsion and for this reason more readily mixes with the digestive fluids and is usually more quickly digested than is butter, oils or other animal or vegetable fats.

Butter.

Butter is the most important of all the animal fats. It is superior to vegetable fats in the fact that it is rich in vitamins which are derived from the milk.

Good butter has a natural and decided yellow color. There is reason for believing that pale butter, which requires the use of annatto or some other coloring matter to give it the usual color, is lacking in vitamins, since Stenback and Bontwell have shown that the fat-soluble A vitamin, the absence of which gives rise to rickets, is often, if not always, associated with the yellow color found in yellow corn, carrots and green herbage.

The milk of cows contains more butter in the winter than in the summer, but winter butter is pale because winter food is largely lacking in the yellow pigments, carotin and xanthophyll, which abound in meadow grass, in which the pigments are associated with chlorophyl.

add about Cream and Butter also N.D

Cheese.

Recently-made cheese, particularly cream cheese and cottage cheese, is wholesome food. The so-called ripening of cheese in no way improves it, but rather develops objectionable qualities. The ripening process is carried on by means of molds, yeasts and bacteria which are present in the milk or added to it in the process of manufacture. Cheese cannot be made from sterilized milk without the addition of bacteria. Fresh cheese, particularly cottage cheese, is a valuable addition to the dietary as a source of lime. As a rule, the food contains a sufficient amount of protein without the addition of cheese, even in the absence of meat, but lime is very frequently deficient and may be conveniently added in the form of cottage cheese. Four ounces of cottage cheese will supply a day's ration of food lime.

Cream or cottage cheese, when freshly made, is more wholesome than meat and more nutritious. According to Williams, 20 pounds of cheese contain as much nutrient as the carcass of a sheep weighing 60 pounds. Cheese contains both more fat and more protein than beef and less than half as much water.

Since the ripening process in cheese-making is really a process of decomposition due to the action of bacteria, yeasts and molds, all ripened cheese contains considerable quantities of decomposition products.

Examination of a limburger cheese in the bacteriological laboratory of the Battle Creek Sanitarium (Roderick), showed 18,000,000 bacteria per gram (540,000,000 per ounce). The bacteriologist noted that the bacteria were of the same character as those found in the human intestine.

Indol is usually found in limburger cheese and may occur in camembert cheese. Carbolic acid, a common product of putrefaction, is found in limburger. The older the cheese, that is, the longer the "ripening" process has continued, the larger the amount of toxic products present. During the early stage of the ripening,

27

the growth of putrefactive organisms is prevented by the presence of milk sugar, but this disappears after the first few days as the result of the action of lactic acid bacilli upon lactose, and the decomposition changes in the milk protein, or casein, to which the softening of the cheese is due, proceeds at a rate depending upon the temperature to which the cheese is exposed.

Ordinary cheese, especially old cheese, such cheeses as camembert, roquefort, limburger and other varieties of highly flavored well-ripened cheese, are wholly unfit for human food and are positively dangerous for use by persons suffering from diseases of the liver or kidneys.

Skimmed Milk.

Milk which has been skimmed, especially separated milk, has been deprived of one of its most precious constituents, a highly valuable fat. Butter fat as present in milk is in a state of fine emulsion, a condition which greatly aids its digestion and assimilation, and contains a very precious vitamin, fat-soluble A, or antirachitic (anti-rickets) vitamin.

When skimmed milk is used, it should not be used as a substitute for full milk but as an addition to the regular daily supply of full milk which every child

should have. It may also be used as an added source of lime salts. It may be employed in cooking as in the preparation of bread, puddings, etc.

Skimmed milk may be used without detriment in connection with a liberal supply of butter. Used in this way, the skimmed milk now thrown away or fed to pigs, if fed to human beings, would be worth more to the country than all the meat produced by the live stock industry.

Canned milk may be advantageously used in connection with other foodstuffs as a source of complete protein, but should never be used as the chief food for any length of time unless supplemented by orange or tomato juice to supply vitamins and purée of spinach to furnish food iron.

26

p. 445 a

Sour Milk.

The souring of milk is due to the development of lactic acid through the growth of acid-forming bacteria. There are many varieties of acid-forming bacteria which readily find access to milk, and as they grow rapidly at ordinary temperatures milk will naturally sour within a few hours after milking unless the temperature of the milk is at once lowered to a point at which the growth of the bacteria is prevented.

The souring of milk is due to the lactose or sugar of milk which it contains. Sugar ferments with the production of acids. The fermentation process begins so quickly under favorable conditions that the ground is occupied by acid-forming germs and so the putrefactive organisms cannot develop to any considerable extent. Pioneer housewives of the Western fronteer kept fresh meat sweet by immersion in buttermilk. The Arabs preserve meat in camel's milk and the Icelanders preserve meat for winter use in barrels of sour milk.

Nature uses the same method by planting in the intestine of the young infant a milk-souring or acid-forming germ, B. acidophilus. This organism differs from ordinary sour milk germs in the fact that it will live and multiply in the body while ordinary sour milk germs will not. This organism resembles in appearance and mode of growth the B. Bulgaricus so closely that the two were for many years confused. They differ chiefly in the fact that one, the B.acidophilus, will grow in the intestine while the other, B.Bulgaricus, will not.

The B.acidophilus has been isolated, that is, separated from other colon germs and is now used for making buttermilk, which may be advantageously used in changing the intestinal flora.

Neglect to cool the milk immediately after taking from the cow is the chief cause of souring. Fortunately, souring is a harmless change. Sour milk is fully as wholesome as fresh milk. The nutritive value is usually the same as that of buttermilk or skim milk, that is, half that of full fresh milk, or II calories per ounce.

DIRECTIONS FOR MAKING ACIDOPHILUS BUTTERMILK

The "cultured" milk blamable commercially is usually disappointing in that it is of uncertain quality, often of very inferior or even repulsive flavor, and not infrequently contaminated or containing chiefly dead bacilli, so that little benefit is derivable from its use. The best results are gotten by making the acidophilus milk or buttermilk at home. The following directions, if carefully followed, will produce a most excellent quality of acidophilus milk which will have the advantage of being fresh and dependable as a source of friendly or protective bacteria.

BITTER, SLIMY AND COLORED MILK

Germs which produce a pink, reddish or blue color may give to milk their characteristic tints.

Other germs produce a bitter flavor and still others produce a peculiar viscous substance which makes the milk slimy or ropy. Milk having these peculiarities is unwholesome and unfit for food.

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SOURCES OF INFECTION OR CONTAMINATION

Stable dust consisting very largely of dried excreta, stable filth from the body of the cow, unclean hands of milkmen, unclean containers, impure water, contact of the milk with infected animals or persons, disease of the cows furnishing the milk,--these are some of the most common sources of contamination of milk.

p. 447 a, 446 a, 444, 445 x
Boston paper (a) p. IO, II
p. 447 a, 446 a

In addition to the common organisms which give rise to putrefaction and with which the milk becomes contaminated through careless dairy methods, milk may contain germs of various specific diseases such as tuberculosis, typhoid fever, diphtheria, scarlet fever, sore throat, Malta fever—maladies originally derived from human beings suffering from the above named disorders and with the germs of which the milk, by direct or indirect contact, becomes contaminated.

Milk may also communicate to human beings various disorders which originate in cattle, but which may be communicated to human beings by making use of the milk of sick animals, such as foot and mouth disease, milk sickness, gastroenteritis, anthrax, cowpox, rabies, actinomycosis and perhaps other maladies.

The city health department of Baltimore, Maryland, made a study of the bacteria deposited on the caps and rims of milk bottles. In the handling of milk bottles by milk distributors and their exposure to city dust in milk wagons and while waiting upon doorsteps to be taken in, germs of various sorts, some dangerous to life, are deposited in considerable numbers. Germs, even very dangerous germs, are sometimes conveyed to the lips of milk bottles by the hands of milkmen. Other germs, such as typhoid and dysentery germs, are deposited by flies. Contamination may occur through contact of animals with milk bottles. Cats and dogs often lick the mouths of milk bottles while standing on the doorstep.

The examinations made of numerous milk bottles showed various sorts of dangerous germs and indicated that there is a real risk in the use of milk from containers in themselves thoroughly clean and sanitary. The milk becomes contaminated by contact with the lip of the bottle when it is poured from the bottle. The cap and lip of the milk bottle should be very carefully wiped with a cloth dipped in boiling water or peroxide of hydrogen before the milk bottle is opened. The importance of doing this should be known to every housewife and should never be forgotten.

27

Modified Milk.

Cow's milk contains a large amount of protein and lime to support the rapid growth of the calf which attains puberty at the end of two years, about one-seventh of the time required for the human infant to reach the same stage of development.

Various formulas have been devised and recommended for the modification of cow's milk in artificial feeding. The most of these are more or less complicated. Recent experience has shown that a very simple method is much superior to the complicated measures which have been developed. It is only necessary to add two things, water and milk sugar or malt sugar, to render cow's milk suitable for the use of very young infants. A good formula is equal parts of full milk and boiled water with an ounce of malt sugar for each pint of water added to the milk.

~~Combe and others have shown that the germs associated with this putrefying filth are the most prolific source of diarrheas and other intestinal disorders which annually carry off so many thousands of infants during the summer months. These same putrefactive germs are likewise the cause of intestinal toxemia or auto-intoxication.~~

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Among the pernicious organisms found in unclean milk is Welch's bacillus, or the gas bacillus, so-called because of the great rapidity with which it develops enormous quantities of gas. This organism is always present in decomposing dead animals and wherever decomposition of flesh is taking place. It is naturally found in the stools of carnivorous animals. This organism is known to be the chief cause of gas gangrene, a form of infection which was the cause of many deaths during the war. The germ in growing gives rise to butyric acid and various highly offensive odors. A few drops of the culture of the gas bacillus injected into a rabbit may cause death in less than half a minute. It is one of the well-known causes of infection of the colon, or colitis, and is a recognized cause of diarrheas which sometimes appear in epidemic form. Much more might be said about the mischievous properties of the Welch's bacillus as well as of the *bacillus putrificus*, the *bacillus sporogenes*, and otner putrefactive organisms which are everywhere present, either in active growth or in the form of spores; but it has already been made clear that putrefactive bacteria are very undesirable tenants for the human intestine. Herter, who some years ago made a thorough study of the gas bacillus, one of the worst of these organisms, showed that it is frequently found present in the stools of children, and is practically always present in the stools of human adults living on the ordinary diet. Welch's bacillus appears, in fact, to be the chief cause of the intestinal gas from which many people suffer and the usual disgusting odors of human feces.

It is important that the public should know that this dangerous germ is likely to be present to a greater or less degree in

31

market milk, as shown by a careful study made some years ago by J. R. Esty, who found the organism in all but two of many specimens examined of commercial milk in Providence. It is this bacillus which gives rise to the strong odor of rancid butter. The gas bacillus is generally accompanied by the other spore-bearing organisms mentioned. It is for this reason that the pasteurizing of milk does not render it safe, for while heating to a temperature of 160° may destroy the growing organisms, it does not destroy their spores.

traced

Septic Sore Throat from Milk

I~~N March, 1922,~~ an epidemic of septic sore throat occurred in Portland, Oregon, the cause of which was ~~attributed~~ to the use of milk. 427 cases occurred, with 22 deaths. Nearly all the cases occurred among persons who used the milk from a single dairy. On examination of the cows of this dairy, one was found suffering with abscess of the udder, which was without doubt the source of the infection. Careful investigation showed that one of the milkers employed in the dairy was suffering from sore throat, and it was believed by the investigators that this man was the source of infection of the cow. Of the 22 fatal cases, all died from general infection of the vital organs, lungs, heart, and brain, with the infected organism. In 20 cases, there were symptoms of erysipelas; in 14, suppuration of the ear; in 12, infection of the joints occurred; peritonitis in 10; appendicitis in 2. An inflammation of the lymph glands of the neck occurred in nearly all cases. In a few cases, the infection extended to other persons through contact.

(1922)

33

8

Gd. Sept. 1923

Diarrhea from Infected Milk

A DENMARK medical journal, ~~*Hospitalstidende*~~, recently ~~reported~~ an outbreak of epidemic diarrhea ~~which~~ occurred in a large hospital as the result of the use of milk from a cow suffering from diarrhea. The cow was taken sick with a very offensive diarrhea ~~October 9th~~ and died three days later. The milk given by the cow on the ~~ninth~~ was mixed with that of other cows. Two days later the epidemic broke out affecting 39 members of the hospital staff and 56 patients, who suffered from fever, abdominal pain, headache, vomiting, diarrhea and, in some cases, herpes of the lips and loss of consciousness.

in Denmark

first day of her sickness

The cause of the diarrhea appeared to be a bacterial infection which frequently produces diarrhea in calves and less frequently in older animals. ~~Sufficient evidence has accumulated to make very plain the fact that milk should be clean, free from infection with animal feces. Such milk is produced only under sanitary conditions. One of the greatest needs of the country at the present time is clean milk. The production of clean milk would, of course, cost more than dirty milk, but the value of milk as human food is so great the matter of cost need not be seriously considered, even if the present cost of milk should be doubled, which probably would be necessary to insure really clean and wholesome milk. Commercial milk in general use is absolutely unfit and dangerous unless pasteurized or sterilized, but pasteurizing unquestionably impairs the food value of milk and is not the true solution of the milk problem.~~

34

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Botulism from Cow's Milk

EXPERIMENTS conducted by Graham, Schwarze and Boughton at the Laboratory of Animal Pathology and Hygiene of the University of Illinois have ~~recently~~ shown that the milk of cows is liable to contamination with the *bacillus botulinus*, and may thus become a source of botulism in human beings. If the milk is cooked, it will of course destroy any toxin which may be present, but since ordinary cooking will not destroy the spores of this germ, if contaminated milk is used in the preparation of other foods and then allowed to stand for a period, the germs may develop and produce toxins which may give rise to the symptoms of botulism, provided the food is not again cooked before eating.

~~These observations are highly important, as they serve to show, as have other recent observations, that this dangerous organism, *B botulinus*, is more widely dispersed and a greater menace to health and life than was formerly supposed.~~

The discovery of the *B botulinus* in milk which has been produced under conditions which permit contamination with fecal matter, affords additional evidence of the great importance of such reforms in current dairy methods as shall insure a clean milk supply. The present methods of milk production are such as to make this very necessary article of food one of the most unclean and dangerous of all the various substances encountered in the ordinary bill of fare.

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MILK FROM TUBERCULOUS COWS DANGEROUS

Cows are fully as subject to infection by the tubercle germ as are human beings, and are usually infected to about the same degree in any given locality as are the people of the same region.

p. 447 b

Modern research has shown that bovine tuberculosis is communicable to human beings. According to Rosenau, it must be conceded that not less than 5 to 7 per cent. of all cases of human tuberculosis are due to infection from the use of infected milk or the flesh of tuberculous animals.

A careful examination of the mortality tables published by the United States Census Bureau shows that not less than 3,000 children die annually as the result of infection with bovine tuberculosis, not less than 60,000 children are constantly suffering from bovine tuberculosis contracted chiefly through the use of diseased milk.

The New Jersey Tuberculosis Commission found 16 per cent. of the dairy cattle in that state suffering from tuberculosis. In some parts of Germany 30 per cent. of all cattle were found to be infected with this disease. An investigation made of the milk supply of the District of Columbia showed that 15 to 25 per cent. of all the cows furnishing milk to that community were infected.

Tubercle germs are not readily killed by dairying processes. Schroder killed guinea pigs by infection with germs found alive in butter five months after it was churned. Tubercle germs have been found in great numbers in cheese and ice cream. Morgenroth even found tubercle germs in 9 out of 28 samples of oleomargarine purchased in the open market.

Milk should never be used except from cows known to be free from tubercular disease. Both federal and state governments are ready to make inspections of dairy herds and to eradicate the infection. In the case of animals this may be easily done by killing all infected ones. There is no reason why tuberculosis in animals may not be wholly stamped out. The doing of this will assist greatly in stamping out the disease in human beings.

CLEAN VERSUS PASTEURIZED MILK

p 445 c
San Francisco paper a p. I,2
Boston paper p. II b
" " " I2, I3, a, I5, a
San Francisco paper p. 2,3,b.

As received from the cow, milk may or may not contain bacteria. In general, the milk of a healthy cow, if removed from the animal with sufficient care, will be found to be absolutely free from bacteria and if put into a proper container will keep without spoiling for an indefinite period. Certified milk must contain less than 10,000 bacteria to the cubic centimeter (about one-fourth of a small teaspoonful). Ordinary commercial milk contains from 100,000 to several million bacteria to the cubic centimeter and is absolutely unfit for use. The number of bacteria found in milk rapidly increases. For example, in a specimen of milk examined 24 hours after milking the number of bacteria had increased from 100,000 to 5,600,000.

By the exercise of sufficient care in dairy management the number of bacteria count may be kept below 1,000, and such harmful bacteria as Welch's bacillus, and other putrefactive organisms, as well as the specific organisms of typhoid, tuberculosis and other infectious organisms may be practically excluded. The cost of clean milk will, of course, be greater than the dirty product now offered to the public; but the superior value of clean milk will far more than balance the extra cost. The model dairy of the Battle Creek Sanitarium has for years demonstrated the practicability of producing clean milk on a large scale at a reasonable cost. In this the bacterial count is often kept below 1,000 even in summer weather.

11

THE importance of clean milk can scarcely be exaggerated, and cannot be too strongly insisted upon. Notwithstanding all that has been spoken and written on this subject within the last 25 years, the apathy of the general public in reference to the character of milk is truly amazing. This apathy, and the ignorance of which it is the result, are responsible for thousands of deaths annually and for an enormous amount of morbidity not only in infants but in older children and adults.

The importance of thorough cleanliness as a condition of healthy human life is only just coming to be appreciated. During the long ages of savagery from which the human race has only recently begun to emerge, we acquired a great number of filthy practices, which as yet we have only in part eliminated. In the savage state, our vital resistance was so high we were able to maintain good health notwithstanding our intimate contact with pernicious bacteria of various kinds, because of the high resistance of our tissues; but under the conditions imposed by civilized life, especially house dwelling and pernicious habits in eating, drinking, etc., our vital resistance has been greatly reduced, and we have become a prey to a great number of microorganisms, which to our tougher forebears of prehistoric times were innocuous.

In very recent times we have learned the importance of clean water, and by applying this knowledge we have practically eliminated typhoid fever and other water-borne diseases from the mortality tables. The slightest taint or odor in water, or the slightest suspicion of filth contamination, leads to an appeal to the health authorities, and a report that the water submitted for examination contains one or two hundred colon bacteria per cubic centimeter will lead to its condemnation as unfit for use.

No one has ever offered any reason for believing that colon germs in milk are any less unwholesome than in water; and yet average commercial milk contains a hundred times as many bacteria as would be regarded as sufficient to condemn water as quite unfit for use.

The pasteurizing and sterilizing of milk certainly mitigates the evils of unclean milk to some degree; but it is a mistake to accept pasteurization as the solution of the clean milk problem. Pasteurization lessens the liability of tuberculous infection, but this is about the only real service it renders, and in this it is by no means 100 per cent efficient. Doctor Schloss, of the Harvard Medical School, from a very extended experience in connection with the Infants' Hospital, insists that ordinary pasteurization does not adequately protect against tuberculosis, and requires that all milk given to infants and young children shall be boiled three minutes. Mr. C. W. Barron has also demonstrated the inefficiency of pasteurization as a protection to calves. The only real protection against tuberculosis must be sought in thorough and continuous testing and inspection of dairy cattle by qualified experts.

So far as typhoid is concerned, cases of this disease are now becoming so rare that protection against it is scarcely needed. About the only thing that pasteurization does is to destroy the bacteria which cause the souring of milk, and so to increase its keeping properties. But even this has its disadvantages, for Esty has shown that the mischievous *B. Welchii* which is generally found in market milk does not germinate in raw milk, but germinates rapidly in sterilized milk, and sporulates in the intestine. Within two days after giving a guinea pig milk infected with *B. Welchii*, spores were found in the feces.

38

12

It is evident, then, that aside from partial protection against *B. tuberculosis*, pasteurization affords little advantage, from a hygienic standpoint, for ordinary milk-souring germs are not at all dangerous or even unwholesome, while, on the other hand, pasteurizing milk enables *B. Welchii* to germinate and multiply, and sometimes to such an extent as to make the milk a rich culture of this pathogenic organism.

It seems to the writer high time that more attention should be given to the character of the bacteria of milk, rather than to mere numbers. The millions of acid-forming organisms in buttermilk are harmless, whereas a few thousand *B. Welchii* are not only an evidence of gross contamination, but also a menace to health sinces this organism easily becomes domiciled in the intestine and flourishes amazingly under the anerobic conditions found in the colon, producing spores as well as vegetative forms.

The dangerous character of this organism has unfortunately not been fully appreciated until recently. Wright, West and others had erroneously concluded that *B. Welchii* produces no toxin, either exo- or endo-, and this led to its being grouped among harmless organisms; but the researches of Bull and Pritchett, in 1917, and the later study of the pathogenicity of the organism by Esty, in 1920, have clearly shown the older views to be erroneous, and it is now well established that *B. Welchii* is highly pathogenic, although non-virulent strains are often met.

Bull and Pritchett showed that *B. Welchii* produces a specific bacterial toxin, which may be separated from the bacteria. This highly virulent toxin Esty has shown to be similar to the toxin of the diphtheria bacillus.

The highly dangerous character of Welch's bacillus will be recognized when it is recalled that this organism is the cause of gas gangrene, one of the most formidable complications of wounds with which the military surgeon has to contend. Experimentally, the organism shows itself to be highly active. So small a quantity of culture as 2 c. c. injected into the abdomen of a guinea pig causes death from gas gangrene in 12 to 30 hours. A still smaller dose, 0.25 c.c. (four minims), injected into the peritoneal cavity, caused the death of a 607-gram guinea-pig (Esty), and 0.1 c.c. killed a 400-gram guinea-pig.

As already noted, some strains of *B. Welchii* are not virulent. This fact was first pointed out by Herter, who noted that strains of *B. Welchii* obtained from the droppings of cows were less virulent than those from meat-eating animals. Esty found of 9 strains obtained from human sources, all were pathogenic. Of 10 strains from the cow, 40 per cent were pathogenic, and of 11 strains from milk 8, or 72.7 per cent, were pathogenic. The conditions found in the colon of a meat-eater or a mixed feeder, such as man, are particularly favorable for the development of *B. Welchii*.

Observations made by Esty as regards the effects of heat upon *B. Welchii* showed that some strains survive 100° C. (211° F.) for 30 to 40 minutes. Roderick has confirmed these results.

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13

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Pasteurized Milk Acquires Very Unpleasant Flavors and Odors

It is well known that while pasteurized or sterilized milk may be kept without souring for a few days, if allowed to stand in a warm place it often acquires very unpleasant flavors and odors. This is due to the development in the milk of the Welch's bacillus and other putrefactive organisms, the spores of which are not killed by pasteurizing, and some of which even survive a boiling temperature. Rabbits and guinea pigs are quickly killed by the injection of cultures prepared from such milk. The same changes that take place in pasteurized milk outside of the body may also take place within the body, where the spores of putrefactive organisms find in the colon conditions most favorable for their development.

Many observers have noted that the stools of healthy infants which have been nursed or fed on raw milk, often become offensive from the presence of putrefactive organisms when the diet is changed to sterilized milk.

40

144

Pasteurization Does Not Render Dirty Milk Safe

Most of the facts about unclean milk have been long known to bacteriologists and those who have made a scientific study of milk; but, unfortunately, from a practical standpoint they have not received the emphasis which they deserve. ~~For example,~~ The impression generally prevails that it matters little whether milk is originally clean or teeming with micro-organisms, provided only that it is pasteurized. This confidence in pasteurization as a means of rendering unclean milk safe and wholesome is misplaced. While pasteurization lessens certain minor dangers, it enormously increases other and even greater evils. Clean milk is just as important as clean water, and there is no method by which milk once contaminated with stable filth can be made perfectly safe for use as food by either infants or adults without destroying some of the constituents which are essential to good nutrition.

It is of course to be admitted that pasteurization is a most valuable means of protection against infection from typhoid, tuberculosis, and other milk-borne acute infections, but pasteurization does not protect against infection of the intestine with the mischievous putrefactive organisms which because of their widespread action are, as a matter of fact, the cause of much more disease and many more deaths than are the bacteria which give rise to typhoid and other acute infections, or even bovine tuberculosis. In fact, pasteurization increases the danger of infection of the intestine with Welch's bacillus and other putrefactive organisms by destroying the lactic acid-forming organisms which, when present, hinder the growth and development of the putrefactive flora. The destruction of these germs gives the putrefactive bacteria an opportunity for unlimited growth and development under favorable conditions either outside or inside of the body. If

41

15

Two puppies of the same age. The larger one had an abundant supply of milk; the smaller one had little milk but plenty of other food. (*The Shattuck Farms*).

such milk is completely digested, no immediately harmful results may be observed, but there will be a steady accumulation of the putrefactive organisms in the colon; and if, as the result of indigestion or any other cause, undigested curds happen to find their way into the colon, active putrefaction in these residues may be set up, causing an attack of diarrhea, colitis, or even appendicitis. As Herter pointed out long ago, many attacks of acute intestinal autointoxication, or even so-called ptomaine poisoning, are not due to the fact that the food eaten contained unusually pernicious organisms, but because of the great number of pernicious or putrefactive bacteria present in the colon, the development of which happens to be encouraged by the special food eaten.

It is now universally recognized by physicians that when pasteurized milk is used, it is necessary to make systematic use of orange juice, tomato juice or some other reliable source of the antiscorbutic vitamine. But unfortunately this knowledge is not possessed by the average mother, and consequently, while pasteurization of a city's milk supply may be a protection against typhoid and other infectious diseases, it is a grave menace through exposure of the whole infant population to death or lifelong injury from scurvy.

Pasteurization must be looked upon as only a temporary solution of the milk problem. Certified, or clean milk is the only rational solution of this, one of the most important questions in human dietetics.

42

In view of these facts it is evidently important that milk inspection should take account of the frequency and extent of infection with *B. Welchii.* Esty found *B. Welchii* in nearly every sample of pasteurized milk examined in Providence, R. I. Roderick found *B. Welchii* present in 54 per cent of 470 samples of market milk examined in Battle Creek. The organism is never found in freshly drawn milk protected from contamination. Its presence is wholly the result of lack of cleanliness. Most dairies are badly infected with *B. Welchii.* Esty found the organism everywhere, not only on all parts of the cow, but on the walls, ceiling and floor of barns, in the milk pails and containers, in the stable air and barn dust, and even on the milker's hands. That milk may by sufficient care be kept free from *B. Welchii* has been many times demonstrated. It is only a matter of painstaking cleanliness, as has been abundantly shown in the experience of the Battle Creek Sanitarium dairy.

The number of *B. Welchii* present in raw milk may be considered, then, as a measure of the amount of filth contamination, while the total bacterial count is more an indicator of the rate at which the milk was cooled, and the temperature at which it has been kept. Certainly the determination of the extent of filth contamination is a much more important matter than the heat exposure for the reason that the bacteria which grow in raw milk are not of the dangerous sort.

The presence of *B. Welchii* always means filth, and should lead to prompt inspection of dairies, creameries and handlers, and prohibition of sale if the contamination is not eliminated. That such elimination is possible is proven by the fact that this organism is rarely found in certified milk, and then only when the count has suddenly gone up through some accident or neglect. It must be remembered, however, that neglect of prompt cooling will not increase the number of *B. Welchii,* for the reason that practically only spores are found in milk, and these do not grow in raw milk,

S.T. 2.3.6.

Some Quickly Prepared Pies.

Some one has estimated that in the average home where pie is considered an essential of everyday diet, no more to be dispensed with than the meal itself, the housewife spends at least one-third of her working hours in its preparation. And the result of this labor, while requiring such an outlay of time and strength, is far too apt to be of a character neither conducive to good health nor wholesome living. We believe it possible to live well and leave pie entirely off the daily bill of fare; but if from long custom it is sometimes considered desirable, we would suggest the use, in place of the ordinary article, of one of the following quickly prepared and simple pie recipes, which approach more nearly the hygienic standard than any others with which we are acquainted: —

Quickly Prepared Pie Crust. — For one pie take two-thirds of a cup of granola (manufactured by the Sanitarium Food Co.), moisten with an equal quantity of thin cream or rich milk, and let it stand a few minutes; place the moistened mass in the center of the pie tin, and with a spoon spread it evenly and thinly over the bottom and around the sides of the tin, leaving no holes. Fill with any one of the different prepared fillings given, and bake ten or fifteen minutes. To form the edge nicely, rest the length of the first finger of the left hand against the edge of the tin, and press the material against it. The shaping of the crust will require but a few moments, and should be done at once as soon as the granola is well moistened, as it absorbs the liquid and soon becomes dry again.

Prune Filling for Pie. — Cook sweet California prunes (which have been well washed and cleaned) in three parts water to one of prunes, slowly for several hours. When well done, rub through a colander to remove the skins and stones. If the pulp when thus

2

prepared is too thin, place in a covered earthen dish and set on the stove to remain until the liquid has evaporated sufficiently to leave the pulp of about the consistency of thin marmalade. Fill the crust with the prune pulp, and bake. No sugar will be needed with the sweet prunes. Sour prunes sweetened may be used if preferred. A meringue may be added, if desired.

Dried Apple Filling.—Stew dried apples nicely; when done, rub through a colander, evaporate to the proper consistency, add sugar to taste, and use the same as the prune marmalade. Dried peaches may be utilized in the same manner, also fresh green apples.

Custard Filling.—Take one pint of milk, one well-beaten egg, a tablespoonful of cornstarch, one-third of a cup of sugar, and a little grated lemon rind for flavoring. Heat the milk to scalding, stir in the cornstarch, and cook until thickened; cool, and then add the egg well beaten. Turn into a granola crust and bake.

Lemon Filling.—Take four tablespoonfuls of lemon juice, the grated yellow portion only of the rind of half a lemon, and two-thirds of a cup of sugar. Beat the lemon juice and the sugar together. Braid a slightly heaping tablespoonful of cornstarch with as little water as possible and pour over it, stirring constantly, one-half pint of boiling water, to thicken the starch. Add the lemon and sugar to the starch, and let it cool; then stir in the yolks of two eggs and half the white of one well beaten together. Beat thoroughly, pour into the crust and bake.

Berry Filling.—Stew the fruit, sweeten, and thicken with a little cornstarch or flour; or the fresh fruit may be introduced into a cup or more of water in which has been cooked a rounding spoonful of sago or manica.

613.2

How to Cook Rice

The best way to cook rice is to steam it. Soak one cupful of rice in a cupful of warm water for one hour, then add one half cup of water and one cup of sweet milk. Steam for one hour, cooking in the dish in which it is to be served. Do not stir, except at first when it begins to swell, and when it is entirely done, every grain will be perfect and dry. Another very excellent dish is prepared from rice by looking it over carefully, and putting it into the oven and browning it until it is a yellowish brown color. Prepared in this way it does not need soaking. Add two parts of water to one of rice, and steam as before.

Grains should be properly eaten as well as properly cooked. Although soft and easily swallowed they require insalivation just as much as though they were solid foods. Most persons swallow grains without any mastication. It is best to eat them with some hard food. Toasted whole-wheat wafers are most excellent for this purpose. Dish the grain in bowls, and break up the whole-wheat wafers on it, and then pour over the cream. Sugar is no addition to grains served in this way. Thus you will eat hard and soft foods together, and the result will be not only an additional flavor to the grains, but this will obviate the difficulty of swallowing the grains without mastication.

Lemon Syrup.—Extract the juice from a dozen lemons, cut the yellow portion from the rinds, cover it with water, and boil for a few minutes. Add this liquor to the lemon juice, and strain all through a fine strainer. For each pint of juice allow a pound of white sugar, boil ten minutes, and then bottle. One or two teaspoonfuls of this syrup in a glass of cold water makes a delicious and cooling beverage. If sealed in the same manner that fruit is canned, the syrup may be kept for months.

Pineapple Drink.—An exchange says that "if a pineapple be sliced thin and set away in a jar of water properly sweetened and kept in ice, the sharp, aromatic oil, which most persons find irritating to the mouth, becomes diffused in the delicious flavoring of the fruit, and yields a lively sensation, which we should suppose might make an acceptable substitute for spirituous liquor, without, of course, the slightest intoxicating quality."

Bread.

BEAUTIFUL loaves of bread,
  Crusty and golden brown,
Whose wholesome fragrance maketh glad
  The heart of king or clown.

Outside, the hue of the wheat,
  As it bent in the sun of June,
Or lay in heaps of yellow bronze,
  In the light of the harvest moon;

And inside sweet as the scent
  Of tasseling heads of corn,
And light as the sprays of the valley-mists
  That float in the wake of the morn.

In homes of wealth and ease,
  The board is richly spread;
But what would the choicest viands be
  If there was lack for bread?

And in the humble home—
  The cottage small and gray,
The poor man's wife, in calico frock,
  Cheerily works away.

Her eyes are clear with health,
  Her dimpled cheeks are red,
And she sings a tender, old-time song,
  As she kneads her sweet brown bread.

Homely and wholesome bread—
  This is our need each day,
From the millionaire in his mansion grand,
  To the beggar beside the way.

The daily physical want
  Of nations from pole to pole,
An humble type of the Heavenly Bread,
  That feedeth the hungry soul.

And do we comprehend,
  When our daily prayer is said,
How great the gift we ask of God,
  When we ask for our daily bread?

— *Good Housekeeping.*

Some Ways in Which to Use Green Corn

In selecting corn for the table, choose young, tender, well-filled ears, from which the milk will spurt when the grain is broken with the finger nail. The following are some of the many ways in which it may be acceptably served : —

Green Corn Soup. — Take six well-filled ears of green corn. Run a sharp knife down the rows and split each grain ; then with the back of a knife, scraping from the large to the small end of the ear, press out the pulp, leaving the hulls in the cob. Break the cobs if long, put them in cold water sufficient to cover, and boil half an hour. Strain off the water, of which there should be at least one pint. Put the corn water on again, and when boiling, add the corn pulp, and cook fifteen minutes, or until the raw taste is destroyed. Rub through a rather coarse colander, add salt and a pint of hot, unskimmed milk. If too thin, thicken with a little cornstarch or flour, boil up and serve. If preferred, a teaspoonful of sugar may be added to the soup. A small quantity of cooked macaroni, cut in rings, makes a very pretty and palatable addition to the soup. This soup is also excellent flavored with celery.

Corn and Pea Soup. — Use one cup of cooked, dried Scotch peas that have been rubbed through a colander to free them from skins, and one cup of corn pulp. Add milk to make of the right consistency. Re-heat the whole, and while re-heating, add a few bits of celery to flavor. When the soup is heated, remove the celery, season with salt and serve.

Macaroni with Corn Pulp. — Break macaroni into inch lengths and cook in boiling water. Prepare the corn pulp as directed for soup. If not rich with corn milk, some cream or milk may be added and the whole thickened slightly with flour. The pulp mixture should be of about the consistency of white sauce. When the macaroni is done, drain and add the corn in the proportion of a pint of corn to one and one half cups of macaroni. Mix well, turn into an earthen dish, and brown in a moderate oven. This makes an excellent breakfast dish.

Lentil and Corn Soup. — Prepare a bran stock by boiling for every quart of soup required, one cup of good wheat bran in three pints of water for two or three hours, or until reduced one third. To this stock as a base, add equal parts of cooked lentils (after being rubbed through a colander to remove the skins) and well-cooked corn pulp to make the soup of the desired consistency. Season with salt and serve.

Some New Breads.

Rye and Indian Puffs.— Measure and mix together thoroughly two thirds of a cup each of rye meal and cornmeal and one teaspoonful of sugar. Beat to a stiff froth the white of one egg. In a mixing bowl beat (not stir) well together one cup of good milk and the yolk of the egg. Sift in the meal rather slowly, continuing the beating some minutes. *Fold* in quickly the beaten white, and when this has been done, turn into heated (not hot) iron cups, like those shown in the cut, and bake in a moderate oven at least forty-five minutes; one hour is better.

Hominy Crisps.— Take a portion of hominy (home made, or hulled corn is just as good) which has been cooked until it is soft and quite dry, sift through a fine colander, make it very stiff with whole wheat or Graham flour, knead well, roll very thin, puncture thickly with a fork, cut in squares, and bake quickly. Perforated baking tins are best for this purpose.

Water Breads with Eggs.— Beat together until all of a foam, the yolk of one egg and one third of a cup of very cold water. Into this incorporate flour enough to make a dough which will clear the board without dusting with flour, but not so stiff that it will be difficult to form into the required shapes. Work it so thoroughly by beating with a hammer, pulling, stretching, picking, wringing, or twisting that breaking off a piece will cause a sharp, snapping sound. Make up in the same way and size as for raised biscuit, make an indenture by allowing the thumb and finger to meet in the center. Place on perforated tins one inch apart, and bake one hour in an oven of a temperature right for raised bread. The dough may be formed into rolls or sticks, if preferred.

A very excellent crisp may be made by rolling the dough to about the thickness of a knife blade, pricking closely with a fork to prevent blistering, cutting in squares, and baking quickly.

The same preparation, treated as above, only left thicker, makes an excellent cracker.

Roll two sheets of this dough so they shall be of the same size and shape, spread chopped dates or figs on one sheet, and cover with the other. Press them together with the rolling pin, prick with a fork, cut in squares, and bake on perforated tins. This makes a very palatable fruit cracker.

The material used for these breads should be as cold as practicable, and the breads will be all the better if placed in the refrigerator near the ice, to become perfectly cold before being put in the oven.

How to Cook Grains.

There are four special points to be observed in the cooking of grains. *First*, we should measure accurately both the water and the grains with the same-sized utensil. This is important, and it is where many cooks fail. *Second.* Have the water boiling when the grains are introduced, and turn in slowly so as not to stop the boiling of the water. *Third.* The cooking must be continuous. *Fourth.* Stir the grain continuously until it ceases to settle to the bottom, but do *not* stir afterward during the cooking.

Grains should be cooked rapidly at first. When the double boiler is used, the water in the outer boiler should be boiling on some other part of the stove, and the inner boiler should be set directly over the fire with the water boiling when the grains are put in. As soon as the grain has ceased sinking to the bottom, or in other words has "set," take the inner boiler off the stove and put into the outer boiler, covering it. Then all you have to do is to keep the fire burning and the outer boiler furnished with water. If it is desired to have the grains dry, take off the cover toward the latter part of the cooking stage. Slow cooking develops a finer flavor. In a double boiler the grains will be cooked at a temperature just below the boiling point.

The different grains require different proportions of liquid. The following is the proper proportion of liquid to be added to different grains when cooked in a double boiler. Other cooking vessels require more on account of evaporation.

Grains.		Water.	Time.
Pearl barley	1 cup	4 cups	4 hrs.
Coarse hominy	1 "	5 "	6 to 10 "
Fine hominy	1 "	4 "	4 to 6 "
Coarse oatmeal	1 "	4 "	4 to 6 "
Rolled wheat	1 "	3 "	2 to 3 "
Rolled oats	1 "	3 "	2 to 3 "
Cerealine	1 "	1 "	½ "
Graham grits	1 "	4 "	4 to 5 "
Cracked wheat	1 "	4½ "	4 to 5 "
Whole wheat	1 "	5 "	4 to 5 "
Pearl wheat	1 "	4½ "	4 to 5 "

The Strawberry,

THE flavor of antiquity rests upon the wild strawberry. Its fruit was peddled by itinerant dealers about the streets of ancient Grecian and Roman cities. Vergil sings of it in pastoral poems, and Ovid mentions it in words of praise. The name by which the fruit was known to the Greeks indicates its size; with the Latins its name was symbolic of its perfume. The name *strawberry* probably came from the old Saxon *streawberige*, either from some resemblance of the stems to straw, or from the fact that the berries have the appearance when growing of being strewn upon the ground. In olden times, children strung the berries upon straws, and sold so many "straws of berries" for a penny, from which fact it is possible the name may have been derived. The strawberry is indigenous to the temperate regions of both the Eastern and Western Hemispheres, but it seems to have been matured in gardens only within the last two centuries.

First Strawberries for the Table.— If it is necessary to wash strawberries, they should be put into cold water, a few at a time, pushed down lightly beneath the water several times until entirely clean, then taken out one by one, hulled, and used at once. Like all other small fruits and berries, they are more wholesome served without cream; but if cream is used, each person should be allowed to add it to his own dish, as it quickly curdles, and renders the whole dish unsightly; if allowed to stand, it also impairs the flavor of the fruit.

Strawberry Minute Pudding. — Cook a quart of ripe strawberries in a pint of water till well scalded. Add sugar to taste. Skim out the fruit, and into the boiling juice stir a scant cup of granulated wheat flour previously rubbed to a paste with a little cold water; cook fifteen or twenty minutes, pour over the fruit, and serve cold with cream sauce.

Sago Fruit Pudding. — Soak a small cup of sago an hour in just enough water to cover. Drain off any water that may not be absorbed. Mix two thirds of a cup of sugar with the sago, and stir all into a quart of boiling water. Let it boil until the sago is perfectly transparent, then pour in a pint of nicely hulled strawberries. Turn into molds to cool, or serve warm with cream, as preferred. Tapioca can be used instead of sago, but needs longer soaking. Raspberries, stoned cherries, or currants can be used in place of strawberries.

Strawberry Manioca Mold. — Heat a pint of water, and when boiling, sprinkle into it four scant tablespoonfuls of manioca, and cook for ten minutes or until transparent, stirring continually. When transparent and thickened, remove from the fire, and add a tablespoonful of lemon juice and one cup of sugar. Place a layer of the cooked manioca in the bottom of a pudding dish, add a layer of freshly picked red strawberries, then another of the manioca, filling the dish in alternate layers with one of manioca for the top. Set away in some cool place until well molded. Serve in slices with cream flavored with rose.

Some Ways in Which to use Apples.

Sweet Apple Pudding.— Pare, core, and slice enough juicy sweet apples to fill a pint bowl. Heat a quart of new milk to scalding point in a double boiler. Pour it hot over one cupful of good granulated cornmeal, and beat very thoroughly to remove all lumps. Return to the double boiler, and cook until the meal is set. The batter should then be about the consistency of corn mush. Remove from the fire, add a pint of cold milk and the sliced apples, one third a cup of sugar or molasses, and a teaspoonful of flour braided with a very little milk. Turn all into a deep earthen crock or pudding dish, and bake slowly from three to four hours, stirring frequently during the first hour. It should be moderately browned on top when done.

Apples with Raisins.—Pare, core, and quarter a dozen or more sour apples. Clean thoroughly one fourth as many raisins as apples, and turn over them a quart of boiling water. Let them steep until well swollen ; them add the apples, and cook until tender. Add sugar to taste. Dried apples soaked over night may be made much more palatable by stewing with raisins or English currants, in the same way.

Graham Apple Mush. — Prepare a smooth apple sauce of rather tart apples. Sweeten it slightly, and thin with boiling water. Have this mixture boiling, and sprinkle into it Graham flour sufficient to make a well-thickened mush. Cook, and serve hot with cream.

Apples Stewed in Tomato.— Take stewed and strained tomato, and cook slightly tart apples in this as in water. Serve without the addition of sugar. The combination of the apple and tomato makes the sauce taste sweet. Salt may be added if desired.

Apples and Cream.— Well ripened sweet boughs make a most delicious breakfast dish sliced and served with sweet cream. Perfectly ripened pears served in the same way are also well liked.

Relishes for the Sick.

Fruit Juice Egg-Nog.— Beat the white of one egg to a stiff froth. Add a tablespoonful of white sugar, then beat again. Next, add the yolk of the egg and beat again. Then add a tablespoonful of milk, one of cold water, and one of raspberry juice, or the juice of any other fruit preferred which is not tart enough to curdle the milk. Serve at once.

Lemon Juice Egg-Nog.— Prepare the egg-nog the same as above, only using two tablespoonfuls of water, instead of one of water and one of milk. Then put in a teaspoonful of lemon juice instead of the fruit juice. This is very nice.

Egg Lemonade.— Beat the white of an egg to a stiff froth; then mix it with the juice of a small lemon, and a level teaspoonful of sugar. Add a half pint of cold water; stir thoroughly, and use at once. It will not do to let it stand.

Lemon Oatmeal Gruel.— This is specially suitable for fever patients. Rub one tablespoonful of fine oatmeal smooth in a little cold water. Stir into this three pints of boiling water. Cook until the quantity is reduced to two pints. Let it cool and settle, and then pour the clear gruel from the sediment. Add the juice of a lemon, and sugar to sweeten. This may be served cold or hot, but if served hot, it must be reheated before the lemon juice is added. It will not be so good if heated after the lemon is put in.

Recipes.

Potatoes Stewed with Celery.— Pare and slice the potatoes, and put them into a stewpan with two or three tablespoonfuls of minced celery. Use only the white portion of the celery and mince it finely. Cover the whole with milk sufficient to cook and prevent burning, and stew until tender. Season with cream and salt.

Potato Puff.—Mix a pint of mashed potatoes (cold is just as good, if free from lumps) with a half cup of cream and the well-beaten yolk of an egg; salt to taste and beat till smooth; lastly, stir in the white of the egg beaten to a stiff froth. Pile up in a rocky form in a bright tin dish, and bake in a quick oven until heated throughout and lightly browned. Serve at once.

Potatoes with White Sauce.—Steam or bake potatoes in their jackets, until tender. Then remove the skins, cut in slices, and turn over them a hot white sauce prepared by thickening a pint of thin sweet cream with a tablespoonful of flour. Serve at once. If potatoes are steamed over a kettle in which beets are boiling, and served in this way, they will be found especially sweet and nice.

Parsnips with Egg Sauce.— Cut the parsnip in thin slices so that it will all cook alike, then steam until tender. For three pints of parsnips, heat to boiling one quart of rich milk or thin cream. Stir into it two level tablespoonfuls of flour rubbed smooth with a little milk, and let it boil a few minutes, stirring constantly until the flour is well cooked; add the well-beaten yolks of two eggs, letting it boil up; then pour over the parsnips and serve.

Chopped Turnip.—Chop cold boiled turnips fine, add a little salt if desired and sufficient lemon juice to moisten. Turn into a saucepan and heat over the fire, stirring constantly with a knife, that all portions may be thoroughly heated through, and serve hot. The white turnip is best for this purpose.

Recipes.

WHEAT CRISPS.—Sift a quart of graham flour into a bowl. Make a hole in the center and stir into it gradually two thirds of a pint of ice-cold water—that is, stopping to make a bit of dough with each teaspoonful of water before more is added. After the water is all added in this way, mix very thoroughly, or beat with a mallet to incorporate more flour and air. To do this, beat into a thin sheet; sprinkle on more flour; double over half, and pound quickly around the edges to keep in as much air as possible. Repeat the process, and keep up the beating for at least three-quarters of an hour. Then roll as thin as the blade of a knife, and bake quickly in a hot oven. Turn carefully, and brown upon both sides. It will be found nice and crisp and quite tender. These are very nice for people who are either dyspeptic or diabetic.

RYE PUFFS.—Beat together the same as for whole-wheat puffs one cupful of milk, one tablespoonful of sugar, and the yolk of an egg. Add one cupful of good rye flour, mixed with one half cupful of Graham flour, and stir in lastly the well beaten white of the egg. Bake at once, in heated gem-irons.

SALLY LUNN GEMS.—Beat together the yolk of one egg, two tablespoonfuls of sugar, and one cupful of thin, ice-cold sweet cream. Add slowly, beating at the same time, one cup and two tablespoonfuls of sifted Graham flour. Beat vigorously until full of air bubbles, add the white of the egg beaten stiffly, and bake in heated irons.

GRAHAM PUFFS.—Beat together vigorously until full of air bubbles, one pint of unskimmed milk, the yolk of one egg, and one pint and two tablespoonfuls of Graham flour, added a little at a time. When the mixture is light and foamy throughout, stir in lightly the white of the egg, which has been previously beaten to a stiff froth; turn into heated irons, and bake in a rather quick oven. Instead of all Graham, one third white flour may be used if preferred.

CURRANT PUFFS.—Prepare the puffs as directed in the foregoing recipe, with the addition of one cup of Zante currants which have been well washed, dried, and floured.

Recipes.

Corn Meal Fluff.— Take of good, fresh corn meal one quart, fresh and rather dry snow three quarts. If salt is desired, mix a very little with the corn meal while dry. Mix the snow thoroughly with the corn meal, heap up in a dripping pan which has been previously oiled and cooled, and bake brown in a hot oven.

Corn Meal and Fig Pudding.— Beat together a scant cup of best sifted corn meal with a cupful of molasses, and stir the mixture gradually into a quart of boiling milk. Cook ten or twelve minutes, or until well thickened, then set aside to cool. Add a cupful of finely chopped figs, one and two thirds cups of cold milk, part cream if it can be afforded, and when the mixture is cool, add two well-beaten eggs. Pour into a pudding dish and bake in a moderate, steady oven for three or more hours; the longer the better. When the pudding has baked an hour, pour over it a cupful of cold milk. Do not stir the pudding but allow the milk to soak in gradually. A pint of finely sliced or chopped sweet apples may be used in place of figs for variety, or if preferred, both may be omitted.

Sweet Potato Pie.— Bake sufficient sweet potatoes to make a pint of pulp when rubbed through a colander; add one pint of rich milk, a scant cup of sugar, salt if desired, the yolks of two eggs, and a little grated lemon rind for flavor. Bake with only an under crust. The granola crust, mentioned in August number of Good Health, may be used if the potato custard be first cooked in a separate utensil. If desired, the whites of the eggs beaten up with a tablespoonful of sugar, may be used for meringue.

Pignolia Macaroni.— Take one cup of macaroni, add one pint of milk, two tablespoonfuls of flour, salt to taste, and six tablespoonfuls of pignolias roasted and chopped fine. Put into a shallow pudding dish, and bake in a moderate oven until nicely browned.

Recipes.

FRUIT SOUP.—Take one quart of gluten stock, (prepared by boiling two cups of good wheat bran in three pints of water until reduced to one quart); one cup of dried apples, previously cut into small bits and stewed until tender and the juice evaporated; three fourths of a cup of currant juice, three fourths of a cup of pineapple juice; one tablespoonful of sugar, and a little grated lemon rind for flavoring.

FRUIT SOUP NO. 2.—One quart gluten stock prepared as above; one cup strawberry juice and one half cup of the berries; two tablespoonfuls of lemon juice; two tablespoonfuls of sugar; one tablespoonful each of dried currants and seedless raisins, and one half cup of dried apples prepared as in the preceding recipe.

BANANA DESSERT.—Heat a quart of milk in a double boiler to boiling temperature; add one fourth of a cup of sugar and four tablespoonfuls of cornstarch rubbed smooth in a little cold milk. Cook until it thickens, then set aside to cool. When nearly cold, add three thinly sliced bananas. Serve with whipped cream, flavored with orange or lemon.

PRUNE DESSERT.—Wash and stew two quarts of sweet California prunes in a small amount of water. When done, rub through a colander to remove the stones and to render the whole homogeneous. Place the prune pulp thus prepared on some part of the range or in a slow oven where it will slowly simmer until the water has all evaporated and the pulp become so thickened that it can be cut with a knife. Turn into a pudding dish, and cover with the white of an egg beaten to a stiff froth with a tablespoonful of sugar and a little grated lemon rind as flavoring. Spread over the top of the prunes, and set for a moment in the oven. Bits of sugar, colored red with fruit juice, strewn over the top, adds to its attractiveness.