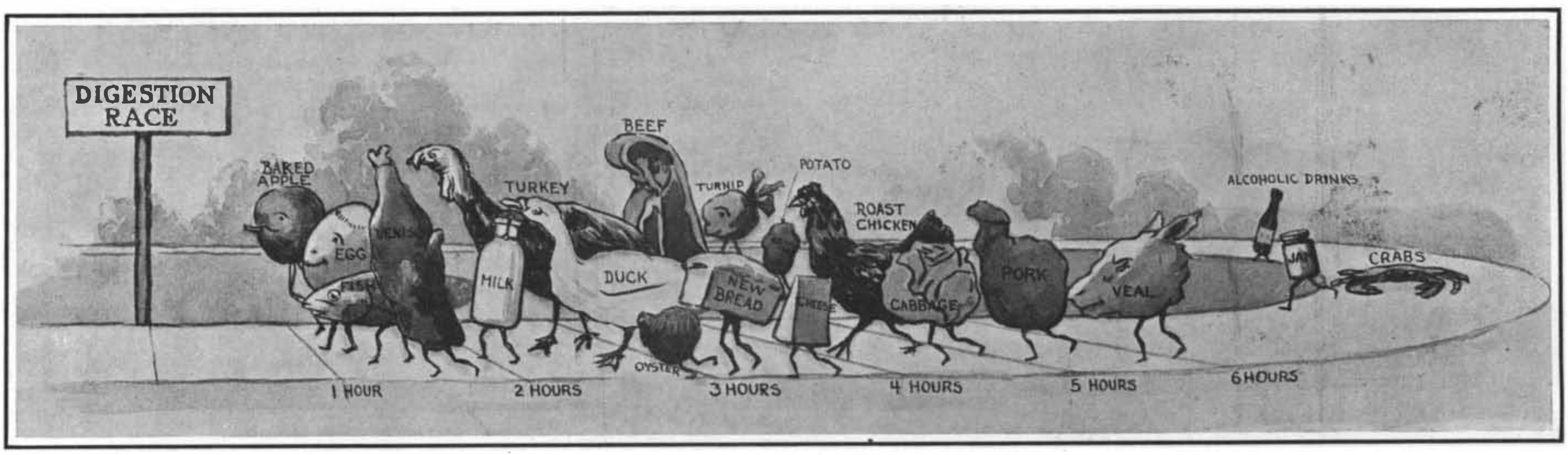
capacity of the plant on the Miraflores locks is about 2,500 cubic yards of concrete per day. That of the cranes at Pedro Miguel is about one-half this, as the structure will be only half as large as the ones at Miraflores. All of the cranes, cableways, mixers, etc., will be electrically operated, and the power plants for furnishing the current are now about completed.

The forms for the concrete walls are to be of steel, and will all be interchangeable, which will allow them to be used on successive stages of the work. The circular forms for the water conduits, machinery chambers, etc., will all be of the rapid collapsible sheet-steel type.

FOODS AND DIGESTION.

The subject of food and its digestion is one of the most important with which the human family is concerned, and yet, strange to say, there is very little known about the comparative digestibility of foods by the average person.

To present certain facts relative to digestion, we have prepared an engraving which shows the relative digestibility of foods of various kinds. It will be seen that the baked apple and the raw egg are near the winning post, the egg being tied by the fish. Then follows venison, all these being digested within an hour. Then come milk, turkey, duck, and oysters. New bread and cheese follow in the same class with the above, the time required to digest them being about three hours. Then come turnips, potatoes, roast chicken, and cabbage. We are fast getting into the period of indigestibility, which is beautifully summed up in pork and veal, which require, under the most favorable conditions, five hours to digest. In the sixth hour and "beyond" class, we find jam, crabs, and alcoholic beverages of various descriptions. Certain other articles of food are about as bad as crabs and jam, notably eels, which are notoriously indigestible, requiring six hours, also stone fruits, which require the same period.



THE RACE OF FOODS FOR FIRST PLACE IN THE DIGESTION RACE.

It will be seen by our engraving that, as a rule, cooking facilitates digestion, partly by softening the food, and partly by inducing chemical changes, which would otherwise have to be induced by functional activities. Fat retards digestion, as it has to undergo a long process of emulsifying before being absorbed. This accounts for the indigestibility of pork.

Under normal conditions it is well that the digestive process should not be prolonged beyond four and one-half hours. For invalids and others with weak stomachs, the time should be much less. As a result of repeated experiments, the following digestive time table will be found of considerable interest:

Food.	How Prepared.	Time. Hours.	Time. Minutes.
Apples, sweet	Raw	1	30
" green	Stewed	1	35
Asparagus	Boiled	1	30
Barley Soup	——	1	30
Barley	Boiled	2	00
Beans	Boiled	2	30
"	Puree	1	30
Beef, lean	Roasted	3	00
" tender	Stewed	2	45
Beefsteak	Grilled	3	00
Beef, fresh salted	Boiled	2	45
" old salted	Boiled	6	00
Beets	Boiled	3	45
Brains	Boiled	1	35
Bread, fresh	Baked	3	30
Butter	Melted	3	30
Bread and Butter (with coffee)	——	3	45
Cabbage	Pickled	4	30
Celery	Boiled	1	30
Chicken	Boiled	2	00
"	Fricasseed	2	45
"	Roast	4	00
Cheese, old	——	3	30
Custard	Boiled	2	45
Duck	Roasted	2	00
Eel	Roasted	6	00
Eggs, fresh	Raw	2	00
"	Soft boiled	3	00
"	Hard boiled	4	00
"	Whipped (raw)	1	30
"	Scrambled	3	00
Fish (other than fat varieties)	Boiled	1	30
" " " "	Fried	3	00
Fowls	Boiled	4	00
"	Roasted	4	00
Game (most kinds)	Roasted	4	15
Goose	Roasted	2	30
Hashed meat	Warmed	2	30
Liver (calves)	Fried or sauteed	2	30
" (ox)	" "	3	00
Lamb	Grilled	2	30
Lentils	Boiled	2	30
Milk	Raw	2	15
"	Boiled	2	00
Mutton	Boiled & Broiled	3	00
" lean	Roasted	3	15
Nuts	——	5	00
Oysters	Raw	2	55
"	Stewed	3	30
Onions	Stewed	3	30
Peas	Boiled	2	30
Pig, sucking	Roasted	2	30
Pork, fat	Roasted	5	15
" salt	Boiled	3	15
Potatoes	Fried or baked	2	30
Rice	Boiled	1	00
Salad	Raw	3	15
Sausage	Grilled	3	30
"	Smoked	5	00
Suet	Boiled	5	30
Sago	Boiled	1	35
Soles	Fried	3	00
Spinach	Stewed	1	30
Salmon, fresh	Boiled	1	30
" smoked	Boiled	4	00
Stone Fruit	Raw	6	00
Tapioca	Boiled	2	00
Tripe	Boiled	1	00
Trout	Boiled	1	30
Turkey	Roasted	2	30
"	Boiled	2	15
Turnips	Boiled	3	30
Veal	Roast or Grilled	5	00
Venison	Grilled	1	00

Spontaneous Combustion of Textile Fibers.

Unspun and uncarded textile fibers collected in large masses have caused many conflagrations through spontaneous combustion. It appears to be established that clean fibers do not ignite spontaneously and that the combustion is due to the impurities, which consist chiefly of oils used in the preparation of the fibers and of the natural grease of unwashed or insufficiently washed wool. The refusal of a shipping company to transport shoddy in a ship's hold has led a German investigator to make comparative studies of the shoddy and the fibers which were accepted for shipment, in regard to the nature of their impurities and the degree of spontaneous heating to which they are subject. The admitted fibers included unwashed wool containing 6 to 21 per cent of grease, washed wool containing about 3 per cent of grease, wool cardings and combings containing 2 to 3 per cent of added oil, and raw cotton containing about ½ per cent of grease. The shoddy contained from 1 to 5 per cent of oil. The experiments were conducted by compressing with the hands about 2 ounces of the fiber into a ball, surrounding the bulb of a thermometer, placing the ball in a wool oven heated to 230 deg. F., and reading the thermometer at intervals until the temperature ceased to rise. The first series of experiments were made with cotton, with which increasing quantities of oil were incorporated in successive experiments. A curious and inexplicable fact was observed. The cotton to which no oil was added, and which contained only 1/6 per cent of fatty matter, showed at the end of two hours an elevation of temperature of 16 deg. F. above the constant temperature of the oven.

Very dirty unwashed wool, which lost 64 per cent of its weight in washing, showed a superheating of 21½ deg. F. in five hours. Wool washed in three baths of boiling petroleum naphtha for three hours, superheated 11 deg. F. in three hours, and the same wool, after the addition of 10 per cent of olein, superheated 21½ deg. F in three hours. Five specimens of wool shoddy, containing a maximum of 5 per cent of olein and a maximum of 10 per cent of cotton, showed elevations of temperature varying from zero to 18 deg. F. in three hours or more. The conclusion is that spontaneous combustion cannot occur in fibers containing less than 10 per cent of fatty matter, and that such fibers may safely be stowed in the hold of a ship.

The Chemist in the Soap Factory.

In view of the lively competition which prevails in the soap industry it is necessary to exercise constant control, by chemical analysis, over everything, from the raw material to the finished soap and by-products. In the analysis of raw material great care should be taken to obtain fairly representative specimens. In analyzing animal fats it is only necessary to determine the proportions of water, ash, dirt (matter insoluble in ether), free fatty acids, and unsaponifiable matter. From these data the yield of glycerin and fatty acids can be calculated. In vegetable fats it is necessary to determine the proportions of water, dirt, unsaponifiable matter, the iodine ratio, and in some cases the saponification ratio and the amount of free fatty acids. It is often necessary, also, to apply iodine, saponification, titration, and color tests to the fatty acids after separation.

As the proportions of the different fatty acids in a mixture can be determined only approximately (to 5 or 10 per cent) by these methods, it would be very desirable to have all the constants, especially those of the most largely used fats and oils, accurately remeasured. Another desideratum is an agreement among soapmakers to employ similar methods, in order to prevent controversy in buying and selling.

The alkalies employed must be analyzed quantitatively for caustic and carbonated alkali and sometimes for the proportions of soda and potash. The purity of the acids and other chemicals used in bleaching and clarifying should also be tested.

The actual soapmaking should be left to the practical soapmaker, but the chemist should always determine the excess of alkali or of fatty acid in the finished product, in order that the manufacturer may give guarantees of quality.

Finally, the residual liquors must be analyzed for glycerin, salt, impurities, and alkali.

Another extensive field of work is open to the chemist in devising and testing new processes and products, and improvements in manufacture.

The Beginning of Iron.

It is commonly believed that the use of iron commenced in either Africa or Asia, but Ridgeway, in his recently published work, "The Beginning of Iron," states that the latest investigations prove that iron was not worked in Egypt until the ninth century before the Christian era or in Libya until 450 B. C., that the Semites adopted its use still later, and that it has been known in Uganda only within the last five or six centuries. In China iron is first mentioned in 400 B. C. Bronze weapons were employed in China until 100 A. D., and in Japan until 700 A. D. According to Ridgeway, the metallurgy of iron must have originated in central Europe, especially in Noricum, which approximately represented modern Austria and Bavaria. Only at Hallstatt and in Bosnia and Transylvania, from which countries the Achaians and Dorians are supposed to have migrated to Greece, are found evidences of a gradual introduction of iron, at first as an ornament applied to the bronze which it ultimately displaced. Everywhere else, iron was introduced suddenly—a fact which implies a foreign origin. Of course, Ridgeway does not assert that iron was unknown outside of central Europe. On the contrary, he states that meteoric iron was known in Egypt in remote antiquity, but that it was worked as flints were worked, by cutting or chipping, and was not smelted. In other words, it was the metallurgy, not the knowledge, of iron that originated in central Europe.