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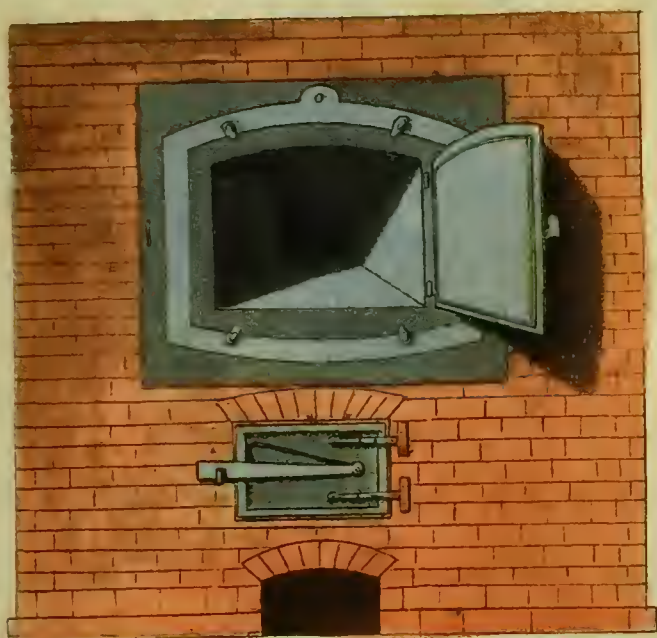


A TREATISE
ON THE ART OF
MAKING GOOD AND WHOLESOME
BREAD

OF
WHEAT, OATS, RYE, BARLEY,
AND
OTHER FARINACEOUS GRAIN,

EXHIBITING

THE ALIMENTARY PROPERTIES AND CHEMICAL CONSTITUTION
OF DIFFERENT KINDS OF BREAD CORN, AND OF THE
VARIOUS SUBSTITUTES USED FOR BREAD, IN
DIFFERENT PARTS OF THE WORLD.



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PREFACE.

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THE object of this Treatise is to exhibit the chemical principles of the art of making good and wholesome Bread, of Wheat, Oats, Rye, Barley, Rice, Potatoes, and other farinaceous substances used for this purpose in different parts of the world.

I have first taken a view of the chemical constitution of the Alimentary Substances derived from the vegetable kingdom, and have added an Historical

Sketch of the Art of Making Bread. I have elucidated the chemical constitution of the substances of which Bread is made among civilized nations, as well as of various nutritive materials, besides Bread Corn, which are used in different countries as substitutes for Bread.

I have described the chemical analysis of Bread Flour, its immediate constituent parts, their proportions in different kinds of grain, and the method of separating them. I have pointed out the materials more particularly fitted for the fabrication of Bread; I have explained the reason why a variety of Alimentary Farinaceous Seeds, in common use, cannot be made into light and porous loaf bread, although they are well calculated, under other forms, of being converted into highly nutritious food.

I have explained the chemical distinction which exists between bread made with yeast, as well as with leaven, and bread made without either of these species of ferment ; and, lastly, I have given specific directions for making the different kinds of Bread prepared from Wheat, Oats, Rye, Barley, Rice, Maize, Buck-wheat, Potatoes, and other farinaceous substances, as practised in various countries.

FREDRICK ACCUM.

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A

TREATISE

ON THE ART OF MAKING

Good and Wholesome Bread.



PRELIMINARY OBSERVATIONS.

To most animals nature has designed a limited range of aliment, when compared to the extensive choice allotted to man. If we look into the history of the human race, inhabiting the different parts of the globe, as far as we are acquainted with it, we find, that man appears to be designed by nature to eat of all substances that are

capable of nourishing him : fruits, grains, roots, herbs, flesh, fish, reptiles, and fowls, all contribute to his sustenance. He can even subsist on every variety of these substances, under every mode of preparation, dried, preserved in salt, hardened in smoke, pickled in vegetable acids, &c.

The Author of Nature has so constructed our organs of digestion, that we can accommodate ourselves to every species of aliment ; no kind of food injures us ; we are capable of being habituated to every species, and of converting into nutriment almost every production of nature.

When we enquire more minutely into the chemical constitution of the different alimentary materials, which promote the growth, support the strength, and renew the waste of our body, we find that animal substances are not suited to form the whole of

our daily food ; and that, in fact, if long and extensively used, their stimulating effects at length exhausts and debilitates the system, which it at first invigorated and supported. Those, accordingly, who have lived for any great length of time on a diet composed entirely of animal matter, become oppressed, heavy, and indolent, the tone and excitability of their frame are impaired, they are affected with indigestion, the breathing is hurried on the smallest exercise, the gums become spongy, the breath is fœtid, and the limbs swell. We recognize in this description the approach of scurvy, a disease familiar to sailors, to the inhabitants of besieged towns, and, in general, to all who are wholly deprived of a just proportion of vegetable aliment.

On the other hand, vegetable food being less stimulating is also less nourishing ; be-

sides, this kind of aliment is, upon the whole, of more difficult assimilation than the food derived from the animal kingdom. Hence it is, perhaps, that nature has provided a greater extent of digestive organs for animals wholly herbivorous. It is insufficient to raise the human system to all the strength and vigour of which it is susceptible. Flatulency of the stomach, muscular and nervous debility, and a long series of disorders, are not unfrequently the consequences of this too sparing diet. Some Eastern nations, indeed, live almost entirely on vegetable substances ; but these, it is remarked, are seldom so robust, so active, or so brave, as men who live on a mixed diet of animal and vegetable food. Few, at least, in the countries of Europe can be sufficiently nourished by vegetable food alone ; and even those nations, and indi-

viduals, who are said to live exclusively on vegetables, because they do not eat the flesh of animals, generally make use of milk at least, of eggs, and butter and cheese.

Food composed of animal and vegetable materials is, in truth, that which is best suited to the nature and condition of man. The proportions in which these should be used it is not easy to determine, but generally the quantity of vegetables should exceed that of animal food. "On this head," says Dr. Fothergill, "I have only one short caution to give. Those who think it necessary to pay any attention to their health, at table, should take care that the quantity of bread, of meat, and of pudding, and of greens, should not compose, each of them, a meal, as if some only were thrown in to make weight, but carefully to observe that the sum of, altogether, do not exceed due

bounds or inroach upon the first feeling of satiety.”

All the products of the vegetable kingdom, used as aliment, are not equally nutritious. When we contemplate with a chemical eye the nutritive principles contained in vegetable substances, we soon perceive that they are but few in number, namely, starch, gluten, mucilage, jelly, fixed oil, sugar, and acids; and the different vegetable parts of them are nutritious, wholesome, and digestible, according to the nature and proportion of their principles contained in them. The starch and gluten appear the most nutritious, and together with mucilage at the same time, the most abundant ingredients contained in those vegetables from which man derives his subsistence. Hence, from time immemorial, and in all parts of the earth, man has used farinaceous seeds

as part of his food, for they contain the above-mentioned materials in the greatest abundance. Of these the most nutritive are the seeds of the *Cerealia*, under which title are commonly comprehended the *Gramineæ*, or *Culminiferous* plants. Whilst the seeds of the *Gramineæ* supply the most important part of food furnished by the vegetable kingdom, in almost every part of the world, their leaves and young shoots support that class of animals hence called graminivorous, whose flesh is most generally eaten.

These vegetables are distributed so universally over the face of the earth, and have become to such a degree the object of culture, that they are very generally made into bread, or are employed instead of it; and, upon the whole, it appears that they are nutritive merely in the proportion to the

quantity of farinaceous matter contained in them ; but this substance exists in different combinations in different cereal and leguminous seeds. It is combined with gluten in wheat, with a saccharine matter in oats, and in many leguminous seeds, such as Harricot beans and pease, and with viscous mucilage in rye and Windsor beans.

Next to the *Cerealia* and *Leguminosæ* may be ranged the oily farinaceous seeds, such as almonds, walnuts, filberts, &c. These abound in starch and mucilage. The use of chocolate, which is prepared from the chocolate nut, growing in the West Indies, ground into a paste, with or without sugar, is in itself a nutritious substance, and to those with whom it agrees, it may be considered as a wholesome nutritious aliment. Yet the vegetable farina, in this state of existence, though highly

nutritious, and to many palates very agreeable, is more difficult of digestion, and does not, upon the whole, afford a very wholesome alimentary substance. When too freely used, those kinds of seeds are sure to disagree, more especially if from age the oil has become rancid. They must be considered rather as a delicacy than as fitted to form a portion of our daily food, and with some particular stomachs they never agree.

Of the alimentary farinaceous roots, the potatoe, boiled or roasted, is one of the most useful, and perhaps after the *Cerealia*, one of the most wholesome and most nutritious vegetables in common use; its nourishing powers, there can be no doubt, depend upon the amylaceous fecula of which it is chiefly composed. The Jerusalem artichoke deserves likewise to be

noticed here, as being a highly alimentary root, chiefly composed of farinaceous matter. Of the fruits rich in farinaceous and mucilaginous matter, few are indigenous. The chesnut, when roasted, affords an alimentary food, but in the East and West Indies the bread fruit, bananas, and the fruit of the plantain tree, are the substitutes for bread.

Scarcely any of the various alimentary substances employed by man are consumed in the raw and crude state in which they are presented to us by nature. Almost all of them are previously subjected to some kind of preparation, or change, by which for the most part they are rendered more wholesome and more digestible, and sometimes more nutritive. Accordingly, the observations we have made on the properties of different vegetable aliments, are to

be considered as applied to them in the state in which they are commonly used among us.

When in the preparation of bread a baking heat is applied to the flour dough, a complete change is produced in the constitution of the mass. The new substance of bread differs materially from flour, it no longer forms a tenacious mass with water, nor can starch and gluten be any more separated from it.

By the application of heat to vegetables the more volatile and watery parts are in some cases dissipated. The different principles, according to their peculiar properties, are extracted, softened, dissolved, or coagulated; but most commonly they are changed into new combinations, so as to be no longer distinguishable by the forms and chemical properties which they originally possessed.

In like manner the leguminous seeds, and farinaceous roots are greatly altered by the chemical action of heat. The raw potatoe is ill-flavoured, extremely indigestible, and even unwholesome. By roasting, or boiling, it becomes farinaceous, sweet, and agreeable to the taste, wholesome, digestible, and highly nutritious. Little is lost, and nothing is added to the potatoe by this process, yet its properties are greatly changed; its principles, in short, have suffered very remarkable chemical changes.

Even in the simple boiling of the various leguminous seeds, pot-herbs, and esculent roots, the effect does not seem confined to the mere softening of the fibres, the solution of some, and coagulation of other of their juices and principles; not only their texture, but their flavour, and other sen-

sible qualities have undergone a change, by which their alimentary properties have been improved ; the farinaceous matter by boiling is rendered soluble, the vegetable fibre softened. Saccharine matter is often formed, mucilage and jelly extracted and combined, and the product is rendered more palatable, wholesome, and nourishing. And, although every country has its own favourite articles of food, and modes of preparing them, and there is perhaps no subject in regard to which local prejudices are so strong, yet there can be no reason why the farinaceous matter of cereal seeds should always be consumed in the state of bread ; many of them are not less agreeable, and not less wholesome in other forms of food.

In Scotland nine-tenths of those in the more humble walks of life live upon barley-

broth, and there are not more healthy people to be found any where.—*Cullen's Materia Medica*, v. I. p. 287.

It is chiefly to save the trouble of dressing any other kind of food, and that bread, from its portability and convenience of always being ready, has become the principal sustenance, but it is far from being the most economical method of using farinaceous grain. There can be no doubt that the same quantity of farinaceous matter made into bread might, in other forms, be used to a much greater advantage; for the great art of preparing good and wholesome food is to convert the alimentary matter into such a substance as to fill up the stomach and alimentary canal without overcharging it with more nutritive matter than is requisite for the support of the animal, and this may be done either by bread, or by converting

the mealy substance of which it is composed into other forms, of which there is a great variety.

Persons who have travelled much on the continent are well aware that our neighbours have the art of throwing much more variety and gratification of the palate into the article of subsistence which has been emphatically called the staff of life, than we possess. The French and Germans convert the farinaceous flour of vegetables into a variety of excellent articles of food, and not serving, like our own, as a mere companion to pair off with so many mouthfuls of meat.

In speaking thus of the use of bread, I do not mean to deny that bread is highly alimentary, its nourishing powers are undoubtedly very great.

The finest bread, says an eminent physician (Dr. Buchan), is not always the best

adapted for answering the purposes of nutrition. Household bread, which is made by grinding the whole grain, and only separating the coarse bran, is, without doubt, the most wholesome.

The people of South Britain generally prefer bread made of the finest wheat flour, while those of the Northern countries eat a mixture of flour and oatmeal, or rye bread. The common people of Scotland also eat a mixed bread, but more frequently bread made of oatmeal only.

In Germany the common bread is made of rye. The flour of millet is made in France, Spain, and Italy, into wholesome and nourishing pastry and puddings. The American and West Indian labourer thinks no bread so strengthening as that which is made of Indian corn.

The inhabitants of Westphalia, who are a hardy and robust people, capable of en-

during the greatest fatigues, live on a coarse brown rye bread, which still retains the approbrious name once given to it by a French traveller, “ *Bon pour Nicole*—good for his horse Nichol.”

The great advantage of eating pure and genuine bread must be obvious ; but bread is often spoiled to please the eye. I have elsewhere* shewn, that in the making of bread, more especially in London, various ingredients are occasionally mingled with the dough. The baker is obliged to suit the caprice of his customers, to have his bread light and porous, and of a pure white colour. It is impossible to produce this sort of bread from flour alone, unless it be of the finest quality. The best flour, however, being mostly used by the biscuit bakers and

* Adulterations of Food and Culinary Poisons, 2nd Edit. 1820, p. 130.

pastry cooks, it is only from the inferior sorts that bread is made ; and it becomes necessary, in order to have it of that light and porous quality, and of a fine white, to mix alum with the dough. Without this ingredient the flour used by the London bakers would not yield so white a bread as that sold in this metropolis, and herein consists the fraud, that the baker is enabled by the use of this ingredient to produce, from bad materials, bread that is light, white, and porous, but of which the quality does not correspond to the appearance, and thus to impose upon the public.

In the following pages I have enumerated the methods by which all the different kinds of farinaceous substances are made into good and wholesome bread, and are used in different countries as articles of daily sustenance.

Art of making Bread.

HISTORICAL SKETCH

OF

THE ART OF MAKING BREAD.

Nothing appears so easy at first sight, as to grind corn, or other farinaceous substances, to knead the flour with water into dough, and to convert it, by baking, into porous bread. But, simple as these operations may now appear to us, the art of making loaf-bread was by no means one of the earliest among human inventions.

C

For, however essential this species of food may be considered among us as an article of primary subsistence, it is perfectly certain, that men had long existed in a state of civilization, before bread was known among them.

It is evident that every species of corn must have been originally the spontaneous production of the earth ; but as the grain, previous to cultivation, would grow but scantily, its importance as food might long escape observation, and mankind would naturally derive a more obvious, though less nutritive subsistence, from acorns, berries, and other fruits which were within their reach. Ages elapsed ere Ceres, according to the Grecian mythology, descended from heaven to teach mankind the use of agriculture.

In the early ages of society, according

to some historians, men were satisfied with parching their corn for immediate use as food. The next advance appears to have been, to pulverize the grain in a mortar or handmill, and to form it, by the addition of water or milk, into a kind of porridge; or to make the bruised grain into dough, which was rendered eatable by baking on embers.

Even after the method of grinding corn into meal, and separating the bran by sifting, had become known, it was long before the art of fermenting the dough, in order to produce bread full of eyes and of a soft consistence, was discovered.

Like most other operations of primary importance, the origin of the art of making bread is lost in the darkness of ages past.

We are, however, certain that the Jews practised this art in the time of Moses; for

we find in the Book of Exodus, chap. xii. v. 18, a prohibition to make use of *leavened*, that is, fermented bread, during the celebration of the Passover. But it does not appear that *loaf-bread* was known to Abraham, for in his history we read frequently of cakes, but not of fermented bread. It is, therefore, very probable, that the art of making fermented bread took its rise in the East, and that the Jews learned it from the Egyptians.

The Greeks attribute the art of making bread to the god Pan.

Bakers were unknown in Rome till the year of the city 850, or about 200 years before the Christian era. The Roman bakers, according to Pliny, came from Greece with the Macedonian army. Before this period, the Romans were often distinguished by the appellation of *eaters of pap*.

At the time of Augustus, there were upwards of 300 baking houses in Rome, almost the whole of which were occupied by Greeks. The bakers enjoyed in ancient Rome great privileges. The public granaries were entrusted to their care; they formed a corporation, or kind of college, from which neither they nor their children were permitted to withdraw. They were exempted from guardianships and public services, which might interfere with their occupation. They were eligible to become Senators; and those who married the daughters of bakers, became members of the college.

From the establishment of bakers in Rome, the art of making loaf, or fermented bread, spread amongst the ancient Gauls; but its progress in the northern countries of Europe was slow, and in some northern

districts, the luxury of eating fermented, or loaf bread, is at this day not in general use. Some of the modern Italians consume the greatest part of their bread-flour in the state of *maccaroni* and *vermicelli*, and in other forms of *polenta*, or soft pudding; and even at present millions of people neither sow nor reap, but content themselves with enjoying the spontaneous productions of the earth.

Bread Corn,

Properly so called, of which loaf-bread is chiefly made among cultivated nations, comprehends the seeds of the whole tribe of (*cerealia*), or gramineous plants; for they all contain a farinaceous substance, of a similar nature, and chiefly composed

of starch. Those of the *cerealia* in common use are the following :

Wheat	<i>Triticum hybernum.</i>
Barley	<i>Hordeum vulgare.</i>
Rye	<i>Secale cereale.</i>

With us, wheat is chiefly employed for the fabrication of bread. It is, in fact, the only grain of which light porous bread can be made ; but rye and barley are also used as bread-corn. The farina of the other *cerealia* afford also a nutritive and wholesome bread ; though their flour is not so susceptible of the panary fermentation, it cannot be made into the white texture of of the wheaten loaf. The bread formed from them is consequently much inferior to that prepared from wheat. The following seeds are chiefly employed to make a species of bread :

Oats	. . .	<i>Avena Sativa.</i>
Maize	. . .	<i>Zea Mays.</i>
Rice	. . .	<i>Oriza Sativa.</i>
Millet	. . .	<i>Panicum milliaceum.</i>

Oats are used in the north of Europe for making a kind of bread, called oatmeal-cake, and particularly by the inhabitants of Scotland. Maize is frequently employed as bread-corn in North America.

Rice nourishes more human beings than all the other seeds together, used as food ; and it is by many considered the most nutritive of all sorts of grain. A very ridiculous prejudice has existed with respect to rice, namely, that it is prejudicial to the sight, by causing diseases of the eye ; but no authority can warrant this assertion : on the contrary, the opinion of the ablest men (Cullen's Mat. Med. v. i. p. 229) may be quoted in favour of rice being a very

healthy food: and the experience of all Asia and America may be adduced with sufficient weight to have answered this objection, if it had been supported by any thing more than vulgar prejudice, unsupported by facts. This grain is peculiarly calculated to diminish the evils of a scanty harvest, an inconvenience which must occasionally affect all countries, particularly those which are very populous. It is the most fitted of all food to be of use in relieving general distress in a bad season*, because it comes from a part of the world where provisions are cheap and abundant; it is light, easy of carriage, keeps well for a long time, and contains a great deal of wholesome food within a small compass. Indeed, it has been ascertained that one

* Reports of the Society for bettering the Condition of the Poor, Vol. I. p. 137.

part of rice contains as much food and useful nourishment as six of wheat.

Next to the *cerealia*, the seeds of *leguminous plants* may be regarded as substitutes for bread corn. Their ripe seeds afford the greatest quantity of alimentary matter. Their meal has a sweetish taste, but they cannot be made into light and porous bread, without the addition of a portion of wheaten flour. Their meal, however, though it forms but a coarse and indifferent bread, neither very palatable nor very digestible, except by the most robust stomachs, is yet highly nutritive.

It is remarked by Dr. Cullen, that “on certain farms of this country, upon which the leguminous seeds are produced in great abundance, the labouring servants are much fed upon that kind of grain; but if such servants are removed to a farm upon

which the *leguminous seeds* are not in such plenty, and therefore they are fed with the *cerealia*, they soon find a decay of strength ; and it is common for servants, in making such removals, to insist on their being provided daily, or weekly, with a certain quantity of the leguminous meal." We are not, however, to conclude from this observation, that pease-meal bread, is really more nutritive than wheaten bread, or than the meal of the other *cerealia*. We are rather disposed to regard it as an example of the effect of habit.

The *leguminous seeds* employed in the fabrication of bread, are

Pease	<i>Pisum Sativum.</i>
Beans	<i>Vicia faba.</i>
Kidney Beans	<i>Phaseolus vulgaris.</i>

The whole of this tribe afford a much

more agreeable, though not a more nutritive aliment, when their seeds are used green, young, and tender, and simply boiled, than when fully ripened, and their flour baked.

It is remarked, that all the substances of which bread is made, as well as the substitutes for it, when chemically considered, are chiefly composed of one and the same identical material; namely, the farinaceous matter of the seeds, roots, fruits, or other products of vegetables, of different climates and soils; and that *starch*, or the amyloseous fecula, forms the most valuable part of all the materials used for making bread, and its substitutes.

This substance forms by far the most abundant, the most nourishing, and the most easy to be procured aliment, obtainable from the vegetable kingdom.

“ Whilst immense tribes of creatures devour the amylaceous fecula in the grain, as nature produces it, man knows how to give it different forms, from the most simple boiling to the most complicated delicacies of the arts of the confectioner and pastry-cook.

“ It is singular that man should waste so valuable a substance for the purpose of hair-powder, a kind of custom perhaps ridiculous, in which modern nations imitate, without being aware of it, those people whom they term barbarous, and by which custom they lavish away a portion of the subsistence of a great number of families.”

This nutritive aliment, we find, exists in various combinations, in the roots, seeds, in the stems, and fruits of plants. Many roots abounding in the amylaceous fecula, yields a palatable and highly nutritious aliment.

Hence the potatoe is a substance largely employed as a substitute for bread. Its nutritious qualities are fully ascertained by the experience of all Europe ; it makes a considerable portion of the food of the poor ; and in Ireland in particular, millions of people exist, who, from sufficient evidence, we are pretty certain live for years together almost wholly on this root and water, without any other seasoning than a little salt. It contains much amylaceous fecula, and when mixed with wheaten flour, may be formed into good and palatable bread. Other substances, besides the grains before mentioned, are in different parts of the world substituted for bread. These are the following :

The Bread-Fruit.

The Bread-fruit Tree (*Artocarpus incisa*) affords the inhabitants of the South Pacific Ocean a substance resembling bread. They only climb the tree to gather the fruit, which is of a round shape, from five to six inches in diameter; it grows on boughs like apples, and, when quite ripe, is of a yellowish colour. The bread-fruit has a tough reticulated rind; there is neither seed nor stone in the inside of it. The eatable part, which lies between the skin and the core, is as white as snow, and of the consistence of new bread. The fruit is roasted on embers, or baked in an oven, which scorches the rind and turns it black; this is rasped off, and there remains a thin

white crust, while the inside is soft and white, like crumbs of fine loaf-bread. It is eaten new, for if it is kept longer than twenty-four hours, it becomes harsh and unpalatable. It is also boiled, by which means the interior is rendered white, like a boiled potatoe. They make three dishes of it, by putting either water or the milk of the cocoa-nut to it, then beating it into a paste with a stone pestle, and afterwards mixing it with banana paste, which has been suffered to become sour.

The bread-fruit remains in season eight months in the year, during which time the natives eat no other sort of food of the bread kind; and the deficiency of the other four months of the year, is made up chiefly with cocoa-nuts, bananas, plantains, bread nuts (*brosimum alicastrum*), and other farinaceous fruits.

Sago Bread.

The Sago Tree (*Cycas Circinalis*), which grows spontaneously in the East Indies, and particularly on the Coast of Malabar, furnishes to numerous Indian tribes their bread. In the Islands of Banda and Amboyna, they saw the body of the tree into small pieces, and, after bruising and beating them in a mortar, pour water upon the fragments; this is left for some hours undisturbed, to suffer the pithy farinaceous matter to subside. The water is then poured off, and the meal, being properly dried, is formed into cakes, or fermented and made into bread, which, it is said, eats nearly as well as wheaten bread.

The Hottentots make a kind of bread of

another species of sago-tree (*Cycas Resoluta*.) The pith, or medulla, which abounds in the trunk of this little palm, is collected and tied up in dressed calf's or sheep's skin, and then buried in the ground for several weeks, which renders it mellow and tender. It is then kneaded with water into dough, and made into small loaves or cakes, which are baked under embers. Other Hottentots, not quite so nice, merely dry and roast the farinaceous pith, and afterwards make it into a kind of frumety or porridge.

SAGO.

The same meal, or medulla, of the sago-tree, reduced into grain, by passing it whilst still moist through a kind of sieve, produces the *sago* of commerce, which receives its brown colour by being heated on hot stones.

Casaba Bread.

In the Caribbee Islands they make bread of a very poisonous root (*Jatropha Maniat*), rendered wholesome by the extraction of its acrid juice, which the Indians use for poison to their arrows. A tea-spoonful of the juice is sufficient to poison a man.

The root of the maniat, after being washed, scraped clean, and grated in a tub, is enclosed in a sack of rushes, of very loose texture, which is suspended upon a stick placed upon two wooden forks. To the bottom of this sack a heavy vessel is suspended, which, by drawing the sack, presses the grated root and receives the juice that flows out of it. When the starch is well exhausted of its juice, it is exposed

to smoke in order to dry it; and when well dried it is passed through a sieve. In this state it is termed *Casava*. It is baked into cakes, by spreading it on hot plates of iron or earth, turning it on both sides, in order to give it a good reddish colour.

TAPIOCA.

The ~~part~~ ^{part} of commerce, called *tapioca*, is the finest part of the farinaceous pith of the casava. It is separately collected and formed into small tears, by straining the mass while still moist, to form it into small irregular lumps.

Plantain Bread.

The Plantain Tree (*Musa Paradisiaca*), which is a native of the East Indies and other parts of the Asiatic Continent, furnishes the inhabitants with a species of bread. The fruit of the plantain-tree is about a foot long, and from an inch and a half to two inches in diameter. It is at first green, but when ripe of a pale yellow. It has a tough skin, and within is a soft pulp of a sweet flavour. The fruit is generally cut before it is ripe; the green skin is peeled off, and the heart is roasted in a clear coal fire for a few minutes, and frequently turned; it is then scraped and served up as bread. This tree is cultivated on an extensive scale in Jamaica. With-

out this fruit, Dr. Wright says, the Islands would be scarcely inhabitable, as no species of provisions could supply its place. Even flour and bread itself would be less agreeable to the labouring Negro.

Banana Bread.

The fruit of the Banana Tree (*Musa Sapientum*), differs from the preceding, being shorter, straighter, and rounder. It is about four or five inches long, of the shape of a cucumber, and of a highly grateful flavour. Bananas grow in bunches that weigh twelve pounds and upwards. This fruit yields a softer pulp than the plantain-tree, and of a more luscious taste. It is never eaten green, but when ripe is a very pleasant food, either raw or fried in

slices like fritters. It is relished by all ranks of people in the West Indies. When the natives of the West Indies undertake a voyage, they take the ripe fruit of the banana and make provisions of the paste; and, having squeezed it through a sieve, form the mass into loaves, which are dried in the sun or baked on hot ashes, after being previously wrapped up in leaves.

Bread of Dried Fish.

The Laplanders, who have no corn of their own, make a kind of bread of the inner soft bark of a pine tree, either mixed with the coarsest barley meal, or with dried fish beaten into powder. The bark is collected when the sap is rising, it is afterwards dried in the sun, or over a slow

fire, and then mixed with the coarsest barley meal, or dried fish beaten into powder. The poorer people grind the chaff, and even some of the straw along with the barley.

Another kind of bread is made of dried fish and the root of the water dragon (*Calla palustris*), the root is taken up in the spring, before the leaves shoot out. It is dried, pounded, and boiled, till it becomes thick, like flummery, and after standing three or four days to lose its bitterness it is mixed with the powder of dried fish and the inner bark of the pine tree, and then made into a stiff paste, and baked over embers.

Bread made of Moss.

Some species of the tribe of **Lichen**, contain a considerable portion of starch, as the *Lichen Rangiferinus*, or rein-deer moss, which affords food to the stags and other fallow cattle of the North of Europe. The Icelanders form the lichen islandicus into bread, which is found to be extremely nutritious. The moss is collected in the summer, and, when dry, ground into powder, of which bread and gruel, or pottage, are made. It is sometimes also put whole into broth, or is boiled in whey, till it be converted into a jelly. In general, it is either previously steeped for some hours in warm water, or the water of the first boiling is rejected, in order to remove a part of the

bitter extractive matter, which, if left, produces a disagreeable taste, and is apt to prove purgative.

Bread made of Earth.

The strangest substitute for bread that has ever been employed, is a sort of white earth. The poor in the Lordship of Moscoa in Upper Lusania, have been frequently compelled to make use of this earth as a substitute for bread.

The earth is dug out of a pit where salt-petre had formerly been worked; when exposed to the rays of the sun it splits and cracks, and small globules issue from it like meal, which ferments when mixed with flour. On this earth, baked into bread, many persons have subsisted a considerable

time. A similar earth is met with near Genomu, in Catalonia.

In the western parts of Luisania too, the inhabitants have a most extraordinary custom of eating a white earth, mixed with clay and salt.

The rowers also, who ply on the river Mississippi, frequently drink large quantities of muddy water, which cannot fail to leave in the stomach a considerable quantity of earth. But it cannot be doubted, that a large quantity of earthy substances taken into the stomach would prove deleterious to health.

Analysis of Bread Flour.

On examining bread corn, for instance wheat, we perceive an outside coating, which after the grain has been soaked in water, may readily be peeled off. This forms the bran of the flour. Immediately under it, is that part of the grain which affords the coarsest flour, it is soft to the touch, and not easily reduced to an impalpable powder, and of a sweetish taste. This constitutes about one half of the grain. Underneath this substance lies what is called by millers, the kernel or heart of the wheat, namely, a hard mealy substance, almost transparent. This part of the grain is capable of being speedily reduced to an

impalpable powder, it ferments more readily than the outer layers, and it is this which produces the finest and best kind of wheaten flour. Such is the mechanical constitution of the grain. When chemically examined we find that the flour of wheat, rye, and barley, is composed of three ingredients, or immediate constituent parts, which may be separated by simple processes, viz. starch, gluten, and saccharine mucilage. The proportion of these differ materially in different kinds of corn. The method of separating them is as follows :

Make any quantity of wheaten flour into a stiff paste with cold water, and let it be kneaded and wrought in the hands under water ; or put the flour into a coarse linen bag, and knead it between the hands whilst a small rill of cold water is suffered to pass

over it. The water will carry away the starch in the form of a white powder, and the dough become more and more elastic, in proportion as the water carries off the starch ; continue kneading the mass till the water runs off from the kneaded dough colourless. It will also be observed, that in proportion as the water carries off the starch, the paste in the bag assumes a more grey colour, less brilliant, as it were semi-transparent, and of a softer consistence, but, at the same time, more tenacious, more viscid, more gluey, and more elastic.

Thus the flour is separated into three substances, by a method incapable of decomposing or altering any of its immediate constituent parts. The starch is precipitated in a white powder at the bottom of the water, from which it may readily be

separated by suffering it to subside, and the supernatant liquid, contains in solution the saccharine mucilage; this may be obtained in the form of a syrup, by evaporating slowly in a warm place the clear decanted fluid; and the third substance, the gluten, remains in the bag, in the state of a soft, cohesive, and elastic substance.

In a similar manner the analysis of any species of bread corn may be effected.

QUANTITY OF FLOUR OBTAINABLE FROM VARIOUS KINDS OF CEREAL AND LEGUMINOUS SEEDS EMPLOYED IN THE FABRICATION OF BREAD, AND DIFFERENT KINDS OF FLOUR MANUFACTURED FROM WHEAT.

The Board of Agriculture, in order to ascertain what each of the various sorts of grain employed as substitutes for bread-

corn would produce, when ground into flour, with only the broad bran taken out, caused a bushel of each of the undermentioned sorts of seeds to be ground for their inspection: the weight of the grain, as well as the bran and the flour, was as follows:

	Weighed.	Weight of Flour.	Weight of Bran.
<i>One Bushel of</i>	<i>lb.</i>	<i>lb. oz.</i>	<i>lb. oz.</i>
Barley . .	46	38 10 $\frac{1}{2}$	5 10 $\frac{1}{2}$
Buckwheat	46 $\frac{1}{4}$	38 9	5 5
Rye . .	54	43 0	9 5 $\frac{1}{2}$
Maize . .	53	44 0	8 10 $\frac{1}{2}$
Rice . .	61 $\frac{1}{4}$	60 5	0 0
Oats . .	38 $\frac{1}{4}$	23 5	13 10 $\frac{1}{2}$
Beans . .	57 $\frac{3}{4}$	43 5 $\frac{1}{2}$	12 5
Pease . .	61 $\frac{3}{4}$	47 0	12 5

A bushel of wheat, upon an average, weighs sixty-one pounds; when ground, the meal weighs 60 $\frac{3}{4}$ lbs.; this on being

dressed, produces $46\frac{3}{4}$ lbs. of flour of the sort called *seconds*, which alone is used for the making of bread in London, and throughout the greater part of this country; and of pollard and bran $12\frac{3}{4}$ lbs., which quantity, when bolted, produces 3 lbs. of fine flour; this when sifted produces in good second flour $1\frac{1}{4}$ lb.

	lbs.
The whole quantity of bread-flour obtained from the bushel of wheat, weighs . . .	} 48
	lbs.
Fine pollard	} $4\frac{1}{4}$
Coarse pollard	} 4
Bran	} $2\frac{3}{4}$
	—
The whole together	59
To which add the loss of weight in manu- facturing the bushel of wheat	} 2
	—
Produces the original weight	61

REASON WHY OATS, PEASE, BEANS, RICE, MAIZE, MILLET, BUCKWHEAT, AND OTHER NUTRITIVE GRAINS CANNOT BE MADE INTO LIGHT AND POROUS BREAD.

Every person is acquainted with the difference there is between light well fermented bread, and that which is sodden, heavy, and badly risen, and the decided preference given to the former over the latter, as the most palatable, and easy of digestion.

The only substances for making *loaf bread*, by which term is meant, bread which is light, white, and porous, is the flour of wheat; and it is to the larger quantity of gluten, that wheat flour owes the property of being converted into loaf-bread. The average quantity of gluten contained in wheat flour, amounts to about one-fifth of

the whole weight of the meal ; but it varies in quantity in different kinds of wheat, according to the soil and season in which the corn has been reared, culture, and various other circumstances. Wheat kept in damp storehouses affords scarcely any gluten, and hence, in proportion as the flour of wheat is altered and deteriorated, which happens, as it is known, when it is kept too much compressed, without being occasionally stirred up and aired in hot and close granaries ; in a word, as it undergoes a chemical change, its property of making good bread is diminished ; and chemical analysis shows the quantity of gluten has become lessened under such circumstances ; and when it is greatly diminished the meal forms no longer a tenacious ductile dough. The spoiled flour produces a kind of bread which is heavy, harsh, and difficult of digestion.

The greater the proportion of gluten, the easier the panification of bread-flour is effected, and the better is the bread. The wheat of the South of Europe generally contains a larger quantity of gluten, and is therefore more excellent for the manufacture of Maccaroni, Vermicelli, and other alimentary substances, requiring a glutenous paste.

Sir H. Davy found the flour of the wheat of this country to consist of from twenty to twenty-four per cent. of gluten. Barley contains six, and rye five per cent. of gluten.

We may now understand why potatoes, rice, beans, pease, buckwheat, millet, oats, and other nutritive cereal grains, abounding in starch, cannot be made into light and porous bread, although they are well calculated for being made into wholesome puddings, and why they only form crude,

heavy, insipid cakes, when made into dough and baked, and not light porous loaf bread.

In further confirmation of this statement it may be remarked, that if gluten of wheat, or only a portion of wheaten flour be incorporated by kneading with the before-named kinds of flour, a fermentable cohesive paste is produced, from which perfect bread may be made.

THEORY OF THE PANIFICATION OF BREAD FLOUR.

Bread, when chemically examined, is very different from flour; it no longer forms with water a tenaceous ductile mass, nor can starch, gluten, and saccharine mucilage be separated from it.

The chemical changes that take place in the panification of bread-flour, are by no

means well understood. The saccharine mucilage, it appears, commences the fermentative chemical action that takes place in the dough, for without this substance, a mixture of flour, yeast, and water, cannot be made into true bread. The fermenting process when once commenced, is kept up by the gluten, forming the body of the paste through which the fécula and saccharine matter are diffused; and when the slight fermentation which it suffers, from changes in the saccharine matter, and supported by the presence of the gluten, has commenced, the paste becomes spongy and porous, from the disengagement of carbonic acid gas, while it still retains in some measure its elasticity; hence the lightness and porosity of well-baked wheaten bread; and hence bread, possessing these qualities, cannot be prepared

from the flour of oats, barley, rye, or rice, or from any of the nutritive roots, as in all of these the quantity of gluten is considerably less, or entirely wanting, and no gluey elastic dough can be formed. The starch, which was merely diffused through the gluey dough, combines, during the baking, with a portion of water, into a stiff jelly, which renders the bread more digestible, and the gluten wholly disappears. A portion of carbonic acid gas, which becomes disengaged during the fermenting process, enlarges the bulk of the dough, which is thus rendered light, porous, and full of eyes, or cavities, in consequence of the extraction of the air bubbles, in the viscid glutenous matter; and the porosity of the bread is in proportion to the extent to which the rising of the dough is suffered to proceed.

Some chemists persuade themselves that the fermentation of the flour dough differs materially from the fermentation of saccharine substances; namely, that the vinous, acetous, and putrefactive stages of the fermenting process take place simultaneously in the dough. They imagine the vinous fermentation to take place in the saccharine mucilage, the acetous in the starch, and the putrefactive in the gluten at the same time, and from the modification of each by the others, they consider that peculiar action to originate which converts paste into bread. Against this opinion, however, the following objections may be urged. In the first place, the quantity of saccharine mucilage is so extremely small as to produce no sensible effect alone on the whole mass, and what little there is probably passes speedily into the acetous

fermentation. Secondly, the temperature that is required for bread-making is considerably lower than that at which starch dissolves in water, and where this is the case no alteration will take place, even in a long course of time : this is clearly shown by the usual process of starch-making, in which the bruised wheat is fermented for several days in large vats, in order to destroy the gluten, after which the starch is procured by simple deposition from the washings of the residue ; and thirdly, no vestige whatever of the products evolved during the putrefactive fermentation of gluten, can be traced in any stage of the panification of bread flour.

Unleavened Bread.

Bread prepared by baking from the meal of farinaceous seeds kneaded with water into a dough and baked, is divided into three sorts, namely;—1. Unleavened bread ; 2. Leavened bread ; and, 3. Bread made with yeast.

Unleavened bread contains all the component parts of the flour but little altered. The meal is simply mixed with water, and baked into cakes. It is heavy, dry, friable, and not porous. The oat-meal bread of Scotland, is unleavened bread ; as also sea biscuit, and all other kinds of biscuit.

The bread that is eaten by the Jews during the passover is unleavened. The usage of which was introduced in comme-

moration of their hasty departure from Egypt, [Exodus, chap. 12, v. 14 to 17.] when they had not leisure to bake leavened bread, but took the dough before it was fermented and baked unleavened cakes.

In Roman catholic countries it is still used, and prepared with the finest wheaten flour, moistened with water, and pressed between two plates, graven like wafer moulds, being first rubbed with wax to prevent the paste from sticking, and when dry it is used. Unleavened bread is hardly less nutritious than loaf or fermented bread, but it is generally speaking neither so wholesome nor so digestible.

To make Oatmeal Cakes.

To a peck of oatmeal add a few table-spoonsful of salt ; knead the mixture into a stiff paste, with warm water, roll it out into thin cakes, and bake it in an oven or on embers.

In some cottages oatmeal bread undergoes a partial fermentation, whereby it is rendered lighter; but the generality of the people in the more humble walks of life, where oatmeal bread is eaten, merely soften their oatmeal with water, and having added to it a little salt, bake it into cakes. To strangers oatmeal bread has a dry, harsh, unpleasant taste, but the cottagers of Scotland, in particular, most commonly prefer it to wheaten bread.

Mixed Oatmeal and Pease Bread.

To a peck of pease flour, and a like quantity of oatmeal, previously mixed by passing the flour through a sieve, add three or four ounces of salt, knead it into a stiff mass with warm water, roll it out into thin cakes, and bake them in an oven. In some parts of Lancashire and Scotland, this kind of bread is made into flattened rolls, and the cottagers usually bake them in an iron pot.

In Norway they make unleavened bread of oatmeal and barley, which keeps thirty or forty years, and is considered the better for being old, so that at the baptism of a child, bread is sometimes used which has been baked perhaps at the baptism of its great grandfather.

Unleavened Maize Bread.

The bread made of maize flour, which is in common use in North America, is unleavened bread. The maize flour is kneaded with a little salt and water into a stiff mass; which, after being rolled out into thin cakes, is usually baked on a hot broad iron hoe.

Another kind of unleavened *maize cakes*, which is a North American bread, called *Hoe cake*, is made in the following manner.*

Take maize, boil it with a small proportion of kidney beans, until it becomes

* This and several other of the directions here given, for making various species of bread, are taken from Edlin's excellent Treatise on bread making, a small work, long ago out of print.

almost a pulp, and bake it over embers into a cake.

Unleavened Bean-Flour Bread.

Take a quarter of a peck of bean flour and one ounce of salt, mix it into a thick batter with water, pour a sufficient quantity to make a cake into an iron kettle, and bake it over the fire, taking care to turn it frequently.

Unleavened Buckwheat Bread.*

Take a gallon of water, set it over a fire, and when it boils, let a peck of the flour of buckwheat be mixed with it, little by little,

* From the Reports of the Board of Agriculture.

and keep the mixture constantly stirred, to prevent any lumps being formed till a thick batter is made. Then add two or three ounces of salt, set it over the fire again, and allow it to boil an hour and a half, pour the proper proportion for a cake into an iron kettle and bake it.

Unleavened Acorn Bread.

Take acorns, fully ripe, deprive them of their covers and beat them into a paste, let them lay in water for a night, and then press the water from them, which deprives the acorns entirely of their astringency. Then dry and powder the mass for use. When wanted, knead it up into a dough with water, and roll it out into thin cakes, which may be baked over embers.

Bread made after this method is by no means disagreeable, and even to this day, it is said to be made use of in some countries.

Sea Biscuit.

The process of biscuit-baking for the British navy is as follows, and it is equally simple and ingenious. The meal, and every other article, being supplied with much certainty and simplicity, large lumps of dough, consisting merely of flour and water, are mixed up together; and as the quantity is so immense as to preclude, by any common process, a possibility of kneading it, a man manages, or, as it is termed, rides a machine, which is called a horse. This machine is a long roller, apparently

about four or five inches in diameter, and about seven or eight feet in length. It has a play to a certain extension, by means of a staple in the wall, to which is inserted a kind of eye, making its action like the machine by which they cut chaff for horses. The lump of dough being placed exactly in the centre of a raised platform, the man sits upon the end of the machine, and literally rides up and down throughout its whole circular direction, till the dough is equally indented ; and this is repeated till it is sufficiently kneaded ; at which times, by the different positions of the lines, large or small circles are described, according as they are near to or distant from the wall.

The dough in this state is handed over to a second workman, who slices it with a prodigious knife ; and it is then in a proper state for the use of those bakers who attend

the oven. These are five in number; and their different departments are as well calculated for expedition and correctness, as the making of pins, or other mechanical employments. On each side of a large table, where the dough is laid, stands a workman; at a small table near the oven stands another; a fourth stands by the side of the oven, to receive the bread; and a fifth to supply the peel. By this arrangement the oven is as regularly filled, and the whole exercise performed in as exact time, as a military evolution. The man on the further side of the large table, moulds the dough, having previously formed it into small pieces; till it has the appearance of muffins, although rather thinner, and which he does two together, with each hand; and, as fast as he accomplishes this task, he delivers his work over to the man

on the other side of the table, who stamps them with a docker on both sides with a mark. As he rids himself of this work, he throws the biscuits on the smaller table next the oven, where stands the third workman, whose business is merely to separate the different pieces into two, and place them immediately under the hand of him who supplies the oven, whose work of throwing, or rather chucking, the bread upon the peel, must be so exact, that if he looked round for a single moment, it is impossible he should perform it correctly. The fifth receives the biscuit on the peel, and arranges it in the oven; in which duty he is so very expert, that though the different pieces are thrown at the rate of seventy in a minute, the peel is always disengaged in time to receive them separately.

As the oven stands open during the whole time of filling it, the biscuits first thrown in would be first baked, were there not some counteraction to such an inconvenience. The remedy lies in the ingenuity of the man who forms the pieces of dough, and who, by imperceptible degrees, proportionably diminishes their size, till the loss of that time, which is taken up during the filling of the oven, has no more effect to the disadvantage of one of the biscuits than to another.

So much critical exactness and neat activity occur in the exercise of this labour, that it is difficult to decide whether the palm of excellence is due to the moulder, the marker, the splitter, the chucker, or the depositor; all of them, like the wheels of a machine, seeming to be actuated by the same principle. The business is to deposit

in the oven seventy biscuits in a minute; and this is accomplished with the regularity of a clock; the clack of the peel, during its motion in the oven, operating like the pendulum.

The biscuits thus baked, are dried in lofts over the oven till they are perfectly dry, to prevent them getting mouldy when stored for use.

One hundred and twelve pounds of flour produce one hundred and two pounds of perfectly dry biscuits.

Leavened Bread,

Or bread made with a portion of fermented sour dough, obtained by keeping some bread dough till the acetous fermentation takes place, when it swells, rarifies, and acquires a taste somewhat sour, and rather disagreeable. This fermented dough is well worked up with some fresh dough, which is, by that mixture and moderate heat, disposed to ferment; and by this fermentation the dough is attenuated and divided, carbonic acid is extricated, which being incapable of disengaging itself from the tenaceous and solid dough, forms it into small cavities, and raises and swells it; hence, the small quantity of fermented

dough which disposes the rest of the mass to ferment is called *leaven*.

Most of the bread used by the people in the lower walks of life in France, Germany, Holland, and other European countries, is made in this manner.

Leavened bread, therefore, differs from unleavened bread, in being fermented by means of *leaven*, which is nothing more than a piece of dough kept in a warm place, till it undergoes a process of fermentation, swelling, becoming spongy, and full of air bubbles, and at length disengaging an acidulous vapour, and contracting a sour taste. Leaven must, therefore, be considered as dough which has fermented and become sour, but which is still in its progress towards greater acidity.

The addition of leaven, or this species of ferment to fresh dough, produces an

important change in the bread, for when a small portion of leaven is intimately mixed with a large proportion of fresh dough, it gradually causes the whole mass to ferment throughout, a quantity of carbonic acid gas is extracted from the flour, but remaining entangled by the tenacity of the mass in which it is expanded by heat, this raises the dough, and as soon as the mass has acquired a due increase of bulk from the carbonic acid gas which endeavours to escape, it is judged to be sufficiently fermented and fit for the oven, the heat of which, by driving off the water, checks the fermentation, and forms a bread full of small cavities, entirely different from the heavy, compact, viscous masses, made by baking unfermented dough.

A great deal of nicety is required in conducting this operation, for if it is conti-

nued too long, the bread will be sour, and if too short a time has been allowed for the dough to ferment and rise, it will be heavy.

Bread raised by leaven is usually made of a mixture of wheat and rye, not very accurately cleared of the bran. It is distinguished by the name of *rye bread*; and the mixture of these two kinds of grain is called bread-corn, in many parts of the kingdom, where it is raised on one and the same piece of ground, and passes through all the processes of reaping, thrashing, grinding, &c. A mixture of one-hundred pounds of equal parts of wheat and rye flour, produce from one-hundred and fifty-four to one-hundred and fifty-six pounds of leavened bread.

Leavened Rye Bread.

Take a piece of dough, of about a pound weight, and keep it for use—it will keep several days very well. Mix this dough with some warm water, and knead it up with a portion of flour to ferment; then take half a bushel of flour, and divide it into four parts; mix a quarter of the flour with the leaven, and a sufficient quantity of water to make it into dough, and knead it well. Let this remain in a corner of your trough, covered with flannel, until it ferments and rises properly; then dilute it with more water, and add another quarter of the flour, and let it remain and rise. Do the same with the other two quarters of the flour, one quarter after another,

taking particular care never to mix more flour till the last has risen properly. When finished, add six ounces of salt; then knead it again, and divide it into eight loaves, making them broad, and not so thick and high as is usually done, by which means they will be better baked. Let them remain to rise, in order to overcome the pressure of the hand in forming them; then put them in the oven, and reserve a piece of dough for the next baking. The dough thus kept, may with proper care, be prevented from spoiling, by mixing from time to time small quantities of fresh flour with it.

It requires some attention to be able to determine the exact quantity of leaven necessary for the proper fermentation of the dough. When it is deficient in quantity, the process of fermentation is interrupted,

and the bread thus prepared is solid and heavy, and if too much leaven be used, it communicates to the bread a disagreeable sour taste.

Hungarian Rye Bread.

Two large handfuls of hops are boiled in four quarts of water: this is poured upon as much wheaten bread as it will moisten, and to this are added four or five pounds of leaven. When the mass is warm, the several ingredients are worked together till well mixed. It is then deposited in a warm place for twenty-four hours, and afterwards divided into small pieces, about the size of a hen's egg, which are dried by being placed on a board, and exposed to a dry air, but not to the sun; when dry, they are

laid up for use, and may be kept half a year. The ferment, thus prepared, is applied in the following manner: for baking six large loaves, six good handfuls of these balls are dissolved in seven or eight quarts of warm water; this water is poured through a sieve into one end of the bread trough, and after it three quarts of warm water; the remaining mass being well pressed out. The liquor is mixed up with flour, sufficient to form a mass of the size of a large loaf; this is strewed over with flour: the sieve, with its contents, is put upon it, and the whole is covered up warm, and left till it has risen enough, and its surface has begun to crack; this forms the leaven. Fifteen quarts of warm water, in which six handfuls of salt has been dissolved, are then poured upon it through the sieve; the necessary quantity of flour is added, and mixed and

kneaded with the leaven : this is covered up warm, and left for about half an hour. It is then formed into loaves, which are kept for another half-hour in a warm room ; and after that they are put into the oven, where they remain two or three hours, according to their size.

Bread made with Yeast.

The principal improvement that has been made in the art of fabricating bread, consists in the substitution of yeast, (or the froth that rises to the surface during the fermentation of malt liquors,) instead of common flour dough, in a state of acescency, called *leaven*, to rise the bread dough, made of flour and water, before it is baked. This substance very materially improves the bread. Yeast makes the dough rise more effectually than ordinary *leaven*, and the bread thus produced is much lighter, and free from that sour taste which may often be perceived in bread raised with *leaven*; because too much has been added to the paste, or because the

dough has been allowed to advance too far in the process of fermentation before it was baked.

The discovery of the application of yeast, to improve the panification of bread flour, was made and first secretly adopted by the bakers of Paris ; but when the practice was discovered, the College of Physicians there, in 1688, declared it prejudicial to health, and it was not till after a long time that the bakers succeeded in convincing the people, that bread made with yeast was superior to bread made with sour dough or leaven.

The bread used in this metropolis and in most other large towns in England, is made of wheaten flour, water, yeast, and salt. The average proportion are two pints by weight, of water, to three of flour, but the proportions vary considerably with

the diversity of climate, years, season, age, and grinding of the wheat. There are some kinds of wheat flour that require precisely three-fourths of their weight of water. That flour is always the best which combines with the greatest possible quantity of water. Bakers and pastry-cooks judge of the quality of flour from the characters of the dough. The best flour forms instantly by the addition of water a very gluey elastic paste, whereas bad flour produces a dough that cannot be elongated without breaking.

The flour, in this case, being seldom mixed up oftener than twice, that is, the yeast previously diluted with water, is added to a part of the flour, and well kneaded; in a short time, swells and rises in the baking trough, and is called by the bakers,

setting the sponge. The remainder of the flour is afterwards added, with a sufficient quantity of warm water to make it into a stiff dough, and then allowed to ferment. It is of essential consequence that the whole of the yeast should be intimately mixed with the two-thirds of the quantity of the flour put into the kneading trough, in order that the fermentation of the dough may commence in every part of the mass at the same time. The dough is then covered up, and the water which is mixed with the yeast being warm, speedily extricates air in an elastic state, and as it is now by kneading, diffused through every part of the dough, every particle must become raised, and the viscosity of the mass retains it, when it is again well kneaded and made up into loaves, and put into the oven. The heat

converts the water also into an elastic vapour, and the loaf swells more and more, till at last it is perfectly porous.

During the baking, a still greater quantity of gaseous matter is extricated by the increased heat; and as the crust of the bread becomes formed, the air is prevented from escaping, the water is dissipated, the loaf rendered somewhat dry and solid, and between every particle of bread there is a particle of air, as appears from the spongy appearance of the bread.

It is curious that new flour does not afford bread of so good a quality as that which has been kept some months. The flour of grain too, which has suffered incipient germination, is much inferior in the quality of bread prepared from it: and from this principally appears to arise the injury which wheat sustains from a wet

harvest. Various methods have been employed to remedy the imperfections of bread from inferior flour, such as washing the grain with hot water if it is musty, proposed by Mr. Hatchet;* drying and heating it even to a certain extent; adding various substances, such as magnesia, &c. Some experiments on this subject have been given by Mr. E. Davy. See a Treatise on Adulterations of Food, Second Edition, p. 137.

METHOD OF MAKING WHEATEN BREAD, AS
PRACTISED BY THE LONDON BAKERS.

To make a sack of flour into bread, the baker pours the flour into the kneading trough, and sifts it through a fine wire sieve, which makes it lie very light, and

* See a Treatise on Adulterations of Food and Culinary Poisons, Second Edition, p. 143.

serves to separate any impurities with which the flour may be mixed. Two ounces of alum are then dissolved in about a quart of boiling water, and the solution (technically called liquor,) is poured into *the seasoning-tub*. Four or five pounds of salt are likewise put into the tub, and a pailful of hot water. When this mixture has cooled to the temperature of about 84°, from three to four pints of yeast are added; the whole is mixed, strained through the seasoning sieve, emptied into a hole made in the mass of the flour, and mixed up with the requisite portion of it to the consistence of a thick batter. Some dry flour is then sprinkled over the top, and it is covered up with sacks or cloths. This operation is called setting *quarter sponge*.

In this situation it is left three or four hours. It gradually swells and breaks

through the dry flour scattered on its surface. An additional quantity, (about one pailful,) of warm (liquor) water, in which one ounce of alum is dissolved, is now added, and the dough is made up into a paste as before ; the whole is then covered up. In this situation it is left for four or five hours. This is called *setting half sponge*.

The whole is then intimately kneaded with more water, (about two pails full,) for upwards of an hour. The dough is cut into pieces with a knife, and penned to one side of the trough ; some dry flour is sprinkled over it, and it is left to *prove* in this state for about four hours. It is then kneaded again for half an hour. The dough is now taken out of the trough, put on the lid, cut into pieces, and weighed, in order to furnish the requisite quantity for each loaf.

The operation of moulding is peculiar, and can only be learnt by practice ; it consists in cutting the mass of dough destined for a loaf, into two equal portions : they are kneaded either round or long, and one placed in a hollow made in the other, and the union is completed by a turn of the knuckles on the centre of the upper piece.

The loaves are left in the oven about two hours and a half, or three hours, when taken out of the oven, they are turned with their bottom side upwards to prevent them from splitting. They are then covered up with a blanket to cool slowly.

QUANTITY OF BREAD OBTAINABLE FROM A
GIVEN QUANTITY OF WHEATEN FLOUR.

A sack of flour, weighing two hundred and eighty pounds, is made with five pounds of salt, and from three to four pints of yeast, into dough, with the requisite quantity of water, which varies according to the quality of the flour.

The older the flour, provided the wheat has been sound, and the flour well preserved, the greater will be the quantity of water required to convert it into a stiff dough, and the greater the produce of bread.

The quantity of flour for a quartern loaf is reckoned at an average, three pounds and a half, which produces, if the flour be of the best quality, five pounds avoirdupoise

of dough. The quartern loaf produced from this quantity of flour weighs four pounds, five ounces and a half, and hence the dough loses, during baking, eleven ounces and a half.

The quantity of bread obtainable from the same quantity of flour is, however, much influenced by the manner in which the dough is fermented, and the skilful regulation of the heat employed for baking the bread.

A variation of temperature also makes a considerable difference to the baker's profit or loss. In summer, a sack of flour will yield a quartern loaf more than in winter; and the sifting it, before it is wetted, if it does not make it produce more bread, certainly causes the loaves to be larger.

The loss of weight occasioned by the heat is proportional to the extent of the

surface of the loaf, and to the length of time it remains in the oven. Hence the smaller the surface, or the nearer the figure of the loaf approaches to a globe, the smaller is the loss of weight sustained in baking; and the longer the loaf continues in the oven the greater is the loss.

A loaf that weighed just four pounds when taken out of the oven, after the usual baking, was put in again, and after ten minutes was found to have lost two ounces, and in ten minutes more it lost another ounce. The longer bread is kept the lighter it is, unless it be kept in a damp place, or wrapt round with a wet cloth, which is an excellent method of preserving bread fresh and free from mould, for a long time.

Home-made Wheaten Bread.

Take a bushel of wheaten flour, and put two third parts of it in one heap into a trough or tub; then dilute two pints of yeast with three or four pints of warm water, and add to this mixture from eight to ten ounces of salt. Make a hole in the middle of the heap of flour, pour the mixture of yeast, salt, and water into it, and knead the whole into an uniform stiff dough, with such an additional quantity of water as is requisite for that purpose, and suffer the dough to rise in a warm place.

When the dough has risen, and just begins again to subside, add to it gradually the remaining one third part of the flour; knead it again thoroughly,

taking care to add gradually so much warm water as is sufficient to form the whole into a stiff tenaceous dough, and continue the kneading. At first the mass is very adhesive and clings to the fingers, but it becomes less so the longer the kneading is continued; and when the fist, on being withdrawn, leaves its perfect impression in the dough, none of it adhering to the fingers, the kneading may be discontinued. The dough may be then divided into loaf pieces, (of about 5lb. in weight). Knead each piece once more separately, and having made it up in the proper form, put it in a warm place, cover it up with a blanket to promote the last rising; and when this has taken place, put it into the oven. When the loaves are withdrawn they should be covered up with a blanket to cool as slowly as possible.

To make Pan Bread,

Mix up the flour, salt, and yeast, (See page 97), with the requisite portion of warm water, into a moderately stiff paste ; but instead of causing part of the flour to ferment, (or setting the sponge), as stated in the preceding process, suffer the whole mass to rise at once. Then divide it into earthenware pans, or sheet iron moulds, and bake the loaves till nearly done, in a quick oven ; at that time remove them out of the pans, or moulds, and set them on tins for a few minutes, in order that the crust may become brown, and when done wrap them up in flannel, and rasp them when cold.

Bread made in this manner is much

more spongy or honeycombed, than bread made in the common way. It is essential that the dough be not so stiff, as when intended for common bread, moulded by the hand.

Brown Wheaten Bread.

Suppose a Winchester bushel of good wheat weighs fifty-nine pounds, let it be sent to the mill and ground; including the bran, the meal will weigh fifty-eight pounds, for not more than a pound will be lost in grinding.

Mix it up with water, yeast, and salt, like the dough of common bread, (See page 97); the mass, before it is put into the oven, will weigh about eighty-eight pounds.

Divide it into eighteen loaves, and put

them into the oven; when thoroughly baked, and after they are drawn out and left two hours to cool, they will weigh seventy-four pounds and a half.

Mixed Wheaten Bread.

Take a peck of wheaten flour, the same quantity of oatmeal, and half a peck of boiled potatoes, skinned and mashed; let the mass be kneaded into a dough, with a proper quantity of yeast, salt, and warm milk; make the dough into loaves, and put them into the oven to bake.

The bread, thus prepared, rises well in the oven, is of a light brown colour, and by no means of an unpleasant flavour; it tastes so little of the oatmeal, as to be taken, by those who are unacquainted with its composition,

for barley or rye bread. It is sufficiently moist, and, if put in a proper place, keeps well for a week.

Rolls, French Bread, Muffins and Crumpets.

The dough of which rolls are made by the generality of the London bakers, is suffered to *prove*, that is to rise more, than dough intended to be made into loaf bread. It is, therefore, left in the kneading trough, whilst the loaves made of the same dough are in the oven. During this period it rises more, and the fermentation is further promoted, by placing the rolls, when moulded, in a warm place, to cause the dough to expand as much as possible. When this has taken place, they are put in

the oven to be baked, which is effected in about twenty or thirty minutes. When taken out of the oven they are slightly brushed over with a buttered brush, which gives the top crust a shining appearance, they are then covered up with flannel to cool gradually.

I have witnessed at a baker's, who has the reputation for making excellent rolls, forty-eight pounds of dough moulded into one hundred (penny) rolls; they weighed, when drawn out of the oven, twenty-six pounds.

The bread called in this metropolis French rolls, and French bread, is made precisely in the same manner, namely, from common bread dough, but of a less stiff consistence; they are suffered to rise to a greater extent than dough intended for loaf bread.

Some bakers make rolls and French bread of a superior kind, for private families, in the following manner:

Put a peck of flour into the kneading trough, and sift it through a wire sieve, then rub in three quarters of a pound of butter, and, when it is intimately blended with the flour, mix up with it two quarts of warm milk, a quarter of a pound of salt, and a pint of yeast; let these be mixed with the flour, and a sufficient quantity of warm water to knead it into a dough; suffer it to stand two hours to prove, and then mould it into rolls, which are to be placed on tins, and set for an hour near the fire or in the proving closet. They are then put into a brisk oven for about twenty minutes, and when drawn, the crust is rasped.

The cakes, called in this metropolis, *muffins* and *crumpets*, are baked, not in an oven, but on a hot iron plate.

For muffins, wheaten flour is made with water, or milk, into a batter or dough. To a quarter of a peck of flour is usually added three-quarters of a pint of yeast, four ounces of salt, and so much water (or milk) slightly warmed, as is sufficient to form a dough of rather a soft consistence. Small portions of the dough are then put into holes, previously made in a layer of flour, about two inches thick, placed on a board, and the whole is covered up with a blanket and suffered to stand near a fire, to cause the muffin dough to rise. When this has been effected, the small cakes will exhibit a semi-globular shape. They are then carefully transferred on the heated iron plate to be baked, and when the bottom

of the muffin begins to acquire a brown colour, they are turned and baked on the opposite side.

Crumpets are made of a batter composed of flour, water (or milk), and a small quantity of yeast. To one pound of the best wheaten flour is usually added three table spoonsful of yeast. A portion of the liquid paste, after having been suffered to rise, is poured on a heated iron plate, and quickly baked, like pancakes in a frying pan.

Barley Bread.

Barley, next to wheat, is the most profitable of the farinaceous grains, and when mixed with a small proportion of wheat flour, may be made into bread. Barley bread is not spongy, and feels heavier in the hand than wheaten bread.

To remedy this defect in part, it is always best to set the *sponge* with wheat flour only, for barley flour does not readily ferment with yeast, and adding the barley flour, when the dough is intended to be made. Bread made in this way requires to be kept a longer time in the oven than wheaten bread, and the heat of the oven should also be somewhat greater; but barley bread is sometimes made without the addition of wheaten flour.

Suppose a bushel of barley to weigh fifty-two pounds and a half to be made into bread; let it be sent to the mill, and have the bran taken out, which, with what is lost in grinding and dressing, will probably reduce it to forty-four pounds. If the meal be kneaded into dough, with water, yeast, and salt, suffered to rise, and then divided into eight loaves, and

thoroughly baked, they will weigh about sixty pounds, after drawn out of the oven, and left two hours to cool.

Barley bread is eaten by many of the farmers and labourers in husbandry, also by the miners in Devonshire and Cornwall.

Mixed Barley Bread.

Take four bushels of wheat ground to form one sort of flour, extracting only a very small quantity of the coarser bran.* Add to it three bushels and a half of barley flour, mix up the flour into a dough in the usual manner, with salt, yeast, and warm water, (See page 97), let it be divided into loaves, and put them into the oven made

* From the Reports of the Board of Agriculture.

hotter than it would be for baking wheaten bread. Let them remain in the oven three hours and a half. In Yorkshire, bread made from a mixture of these grains is esteemed more wholesome to those who are used to it, than bread made from wheat alone.

Rye Bread.

Rye is a grain whose cultivation is not much encouraged in this kingdom, but in the northern parts of Europe it is in very extensive use as a nourishing food for mankind. When made into bread alone, it is of a dark brown colour, and sweetish taste, and if eat by people unaccustomed to its use, it is found to have a laxative effect. In some parts of this kingdom, a mixture of rye and wheat is reckoned an

excellent bread. In Yorkshire, bread made from a mixture of these two grains is esteemed.

The following method of making household rye bread, has been recommended by the board of agriculture.*

Suppose a bushel of rye to weigh sixty pounds, add to it a fourth part, or fifteen pounds of rice; this when ground has only the broad bran taken out, which seldom exceeds four and a half or five pounds for that quantity; it is thus directed to be prepared for household rye bread.

Take fourteen pounds of the mixed flour, a sufficient quantity of yeast, salt, and warm water, and let it be made in a dough, and baked in the usual way. It

* Account of Experiments tried by the Board of Agriculture, p. 12.

will produce twenty-two pounds weight of bread, which is a surplus of three pounds and a half in fourteen pounds, over and above what is usually produced in the common process of converting household wheat flour into bread.

Turnip Bread.

A very good turnip bread may be made by the following process: Let the turnips be pared and boiled. When they are soft enough, for being mashed, the greater part of the water should be pressed out of them, and they should be mixed with an equal quantity in weight of wheat flour. The dough may then be made in the usual manner, with yeast, salt, and warm water. It will rise well in the trough, and after

being kneaded, it may be formed into loaves, and put into the oven. It requires to be baked rather longer than ordinary bread, and when taken from the oven is equally light and white, rather sweeter, with a slight but not disagreeable taste of the turnip. After it has been allowed to stand twelve hours, this taste is scarcely perceptible, and the smell is totally lost, and after an interval of twenty-four hours, it cannot be known that it has turnips in its composition, although it has still a peculiar sweetish taste, but by no means unpalatable. It keeps for upwards of a week.

Rice Bread.

Rice, though one of the roughest and driest of farinaceous vegetables, is converted by the Americans into a very pleasant fermented bread. The process is as follows: The grain is first washed by pouring water upon it, then stirring it, and changing the water until it be sufficiently cleansed. The water is afterwards drawn off, and the rice, being sufficiently drained, is put, while yet damp, into a mortar, and beaten to powder; it is now completely dried, and passed through a common hair sieve. The flour, thus obtained, is generally kneaded with a small proportion of Indian corn meal, and boiled into a thickish consistence; or sometimes it is mixed with

boiled potatoes, and a small quantity of leaven, or yeast, is added to the mass. When it has fermented, sufficiently, the dough is put into pans, and placed in an oven. The bread made by this process is light and wholesome, pleasing to the eye, and agreeable to the taste. But rice flour will make excellent bread, without the addition of either potatoes, or any kind of meal. Let a sufficient quantity of the flour be put into a kneading trough; and at the same time let a due proportion of water be boiled in a cauldron, into which throw a few handfuls of rice in grain, and boil it till it break. This forms a thick and viscous substance, which is poured upon the flour, and the whole kneaded with a mixture of salt and yeast; the dough is then covered with warm clothes, and left to rise. In the process of fermentation,

this dough, firm at first, becomes liquid as soup, and seems quite incapable of being wrought by the hand. To obviate this inconvenience, the oven is heated while the dough is rising; and when it has attained a proper temperature, a tinned box is taken, furnished with a handle long enough to reach to the end of the oven; a little water is poured into this box, which is then filled with dough, and covered with cabbage leaves and a leaf of paper. The box is thus committed to the oven, and suddenly reversed. The heat of the oven prevents the dough from spreading, and keeps it in the form which the box has given it. This bread is both beautiful and good; but when it becomes a little stale, loses much of its excellence. It comes out of the oven of a fine yellow colour, like pastry which has yolks of eggs in it. Other

methods of making rice bread are the following :

1. Boil a quarter of a pound of rice till it is quite soft ; then put it on the back part of a sieve to drain, and when it is cool, mix it up with three quarters of a pound of wheaten flour, a spoonful of yeast, and two ounces of salt. Let it stand for three hours, then knead it well, and roll it in about a handful of wheaten flour, so as to make the outside dry enough to put it in the oven. About an hour and a quarter will bake it, and it will produce one pound fourteen ounces of very good white bread, but it should not be cut till it is two days old. Another way is the following :

2. Take half a peck of rice flour, and one peck of wheaten flour, mix them together and knead the dough up with a sufficient quantity of salt, yeast, and warm

water, as stated in page 97. Suffer it to ferment, divide it into eight loaves, and bake them.

3. Take a peck of rice, boil it over night till it becomes soft, then put it in a pan, and the next morning it will be found to have swelled prodigiously. A peck of potatoes should now be boiled, skinned, and mashed into a fine pulp, and while hot, be well kneaded up with the rice, and a peck of wheaten flour; a sufficient quantity of yeast and salt must now be added, and the dough left in the kneading trough to prove or ferment; and when well risen it may be divided into loaves and baked in the usual way.

Potatoe Bread.

Potatoes, mixed in various quantities, with flour, make a wholesome, nutritive, and pleasant bread. Various methods are employed for preparing the potatoes.

1. Pare a peck of potatoes, put them into a proper quantity of water, and boil them till they are reduced to a pulp, then beat them up into a smooth mass with the water they boiled in, and knead the mass, with two pecks of wheaten flour, with a sufficient quantity of yeast and salt, into a dough; cover it up, and allow it to ferment like common wheaten bread, then make it up into loaves and bake them. Another method is the following:

2. Take twelve pounds of the most mealy

sort of peeled potatoes, boil and press them through a fine wire sieve, in such a manner as to reduce the roots, as nearly as possible, to a state of dry flour. Mix it up with twenty pounds of wheaten flour; and of this mixture make, and set the dough in the same manner as if the whole were wheaten flour. See page 97.

3. Take three pounds of potatoes, boil, skin, and mash them, and whilst warm, bruise them with a spoon, and put them into a dish before the fire, to let the moisture evaporate, stirring them frequently, that no part grows hard; when dry, rub them as fine as possible and add nine pounds of wheaten flour, and with a sufficient quantity of yeast and salt, knead it up as other dough; lay it a little while before the fire to ferment, and then divide

it into loaves and bake them in a very hot oven. Another method is the following:

4. Boil and peel the potatoes as for eating, reduce them without any water to a fine meal or stiff paste. Add to two parts by weight of the paste, one part of potatoe starch, and half a part of wheaten flour, and having added to it salt and yeast, suffer it to ferment; mould the dough into loaves, and bake them in the usual manner.

M. Parmentier found, from a variety of experiments, that good bread might be made from a mixture of raw potatoe-pulp and wheaten meal, with the addition of yeast and salt; and Dr. Darwin asserts, that if eight pounds of good raw potatoes be grated into cold water, and after stirring the mixture the starch be left to sub-

side, and when collected, mixed with eight pounds of boiled potatoes, the mass will make as good bread as that from the best wheaten flour.

Potatoe Rolls.

Bruise four pounds of boiled and skinned potatoes, with as much milk as will just produce a mass, which readily may be squeezed through a cullender, add this mass to wheaten flour paste of a middling stiffness, obtained from six pounds of wheaten flour ; put it before a fire to rise, make it into rolls, and bake them in a quick oven. The rolls thus made will be more porous and light than common rolls.

Apple Bread.

M. Duduit de Maizieres, a French officer of the king's household, has invented and practised with great success, a method of making bread of common apples, very far superior to potatoe bread. After having boiled one third of peeled apples, he bruised them, while quite warm, into two-thirds of flour, including the proper quantity of yeast, and kneaded the whole without water, the juice of the fruit being quite sufficient. When this mixture had acquired the consistency of paste, he put it into a vessel, in which he allowed it to rise for about twelve hours. By this process he obtained a very excellent bread, full of eyes, and extremely palatable and light.

Domestic Oven for Baking Bread.

The figure on the title page exhibits a convenient culinary oven for families who bake their own bread. It is usually erected on one side of the kitchen fire-place, and heated by a flue that passes from the fire-grate under the bottom of the oven. Although this is in many respects a convenient and neat way of heating the oven, yet the manner of managing the fire renders it only economical in families where a large fire is always kept up in the kitchen-grate. In small families it is far more economical to heat the oven by means of a separate fire-place built underneath it. A fire-place six inches wide, nine inches long, and six inches deep, is sufficient to heat an

oven eighteen inches wide, twenty-four inches long, and from twelve to fifteen inches high, which is a convenient size for the baking of bread. The grate should be placed at least twelve inches below the bottom of the oven when the fuel employed is pit-coal; and, in order to prevent the fire from operating with too much violence upon any part of the oven, the brick-work should be sloped outwards and upwards on every side, from the top of the burning fuel, to the ends and sides of the bottom of the oven, that the whole may be exposed to the direct rays of the fire. If the fire-place be built in this manner, and properly managed, it is almost incredible how small a quantity of fuel will answer for heating the oven, and keeping it hot. In this small fire-place there is always a very strong draft of air passing into it, and this

circumstance, which is unavoidable, renders it necessary to keep the fire-place door constantly closed, and to leave but a small opening, for the passage of the air, through the ash-pit. If these precautions are neglected, the fuel will be consumed very rapidly, the bottom of the oven will be burnt, and the oven get chilled as soon as the fire-place ceases to be filled with burning fuel. In an oven of this description, I have baked two loaves, each weighing five pounds, and fifteen rolls weighing two pounds, by means of half a peck (ten pounds) of coal.

The figures on the plate facing the title-page exhibit an oven to be heated with pit-coal for baking bread, now generally employed in this metropolis.

The oven from which this design has been made, is eight feet wide, and seven deep. The fire place, called by the bakers, the

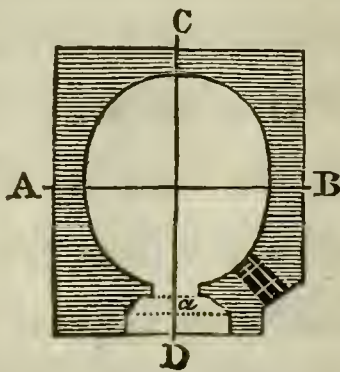
furnace, for heating the oven, is placed at the side, and enters the oven diagonally; it is furnished with a grate, ash holes, and iron door, similar to a common fire place for heating a boiler, but having a partition to separate it from the oven, and to allow the fire to enter into the oven; it, therefore, forms a canal, by which the flame is directed into the oven. Over the fire place or furnace is erected, and lets into the brick-work, a boiler furnished with a pipe, to supply warm water as occasion may require.

When the oven is required to be heated, the boiler is filled with water, and the fire being kindled in the furnace, the flame passes into the oven, and the smoke escapes into the chimney.

The sides of the oven are nearly straight, and turned as sharp as possible at the shoulder, for this form has been found

better calculated to retain the heat than any other.

The flues to carry off the smoke is over the entrance door, as shown by the dotted line *a* of the figure here exhibited, exhibiting the plan of the oven.



A piece of cast iron covers the space before the door of the oven, exactly level with its floor; the opening underneath is applied to no particular use, but is generally made a receptacle for coal.

Fig. 1, is an *elevation* of the oven. The mouth is closed with a cast iron door,

in which is a small sight-hole with a slide valve. To heat the oven, the door is thrown back, and a *blower* is applied to the mouth, so contrived, as not only to cover the mouth of the oven completely, but to enclose also the throat of the chimney; by this contrivance the draft is quickly so much increased, that the oven becomes speedily heated, and if at any time it is too hot, it is only necessary to throw open the door of the fire place, and to put up the *blower* for a few minutes; the current of cool air which is thus made to pass through it, soon lowers the heat to the temperature required. In the *blower* is also an opening of the same kind as that in the oven door, which may be opened and shut at pleasure; the course of the flue is described by the dotted lines at (b).

Fig. 2, is the *blower* before mentioned for regulating the heat of the oven.

Fig. 3, is a transverse section from *A* to *B* on the plan, looking towards the opening, the fire place entering the oven at *c*, the crown of the oven is turned with the bricks on end, and in building the oven instead of centering the arch, the whole space is filled with sand, which is well trod down and shaped to the shape which it is intended the crown of the oven shall be of. When the upper work is finished, the sand is dug out at the mouth of the oven.

Fig. 4, is a longitudinal section of the oven from *C* to *D*. In this sketch the situation of the flue is evident, and the sectional line of the *blower*, *fig. 2*, when in its place, is shown by the dotted line *d*, the open space *a*, under the oven, has been before spoken of.

Popular Errors concerning the Quality of Bread.

The great advantage of eating pure and genuine bread must be obvious. Every part of the wheat, which may be called flour, was not only intended to be eaten by man, but it really makes the best bread. The delusion, however, by which so many persons are misled to think that even the whole flour is not good enough, obliges them to pay much dearer for their bread than they need, to gratify a perverted and fanciful appetite. Had it not been for the custom of eating whiter bread than the whole of the *flour* can make, the miller and baker would not have employed their art to render the bread as white as possible, and to make the consumer pay for the artificial

whiteness. The average quantity of flour, from an unvaried series of experiments, made from age to age, through the course of many hundred years, appears to be three-fourth parts in weight of the whole grain of wheat, taking all wheats together, being more in the finer sorts, and less in the coarser; and the bread made from this flour has always been deemed the standard of the food of bread corn. But, by insensible degrees, the manufacture of bread became separated into two distinct employments.

In consequence of this alteration, the baker, having no further connexion with the market for corn, became dependant solely on the mealman for supplying him with flour, who, not considering himself amenable to the then existing assize laws, made different kinds of flour, some ex-

tremely fine and white, while others were very coarse and unpalatable. These artificial whites, when made into bread, were so pleasing to the eye and taste, that, in the course of a few years, they got into such general use that the people refused any longer to purchase the bread made of the whole of the grain.

“ Our forefathers * never *refined* so much : they never preyed so much on each other ; nor, I presume, made so many laws necessary for their restraint, as we do.”

* The great advantage of eating pure and genuine bread, comprehending the heart of the wheat with all its flour. Shewing how this may be a means of promoting health and plenty, preserving infants from the grave, by destroying the temptation to the use of alum and other ingredients in our present wheaten bread. By an advocate for the trade. London, 1773. See also Important considerations upon the act of the thirty-first of George II. relative to the assize of bread. London: T. Becket, Strand, 1768.

“In looking back, for some hundred years, it appears that they adopted a certain plan, supposing that nature had given nothing in vain, and that every part of the wheat which may be called flour, was not only intended to be eaten by *men*, but that it really made the best bread, as that might be called the *best*, which is best adapted to general use, and in itself so fine, as to contain no parts of the coat, or husks of grain.”

“The inference which I mean to draw from what is premised, is to remind my fellow citizens of the unfortunate delusion of thinking that even the *whole flour* of the wheat is not good enough for *them*; that part of it must be taken away, and given to *birds* or *beasts*.”

“By this delusion, supposing a certain quantity of wheat appropriated to their use,

(and this is the view they should see it in,) they lose one third part of the flour, and consequently have so much the less bread to supply their wants.”

“Is it not then monstrous to hear them complain? Is it not absurd to talk of poverty, and yet pay a *seventh* or *eighth part* more than they need, to gratify a fantastic appetite? Had it not been from the custom of eating whiter bread than the whole flour of the wheat will make, should we have thus imposed on ourselves? Would the miller or baker employ all his art to make the bread as *white* as possible, and oblige us to pay for this *artificial* whiteness? They tell the consumer, the *whiter it is*, the *finer*; and the finer, the more nutritive. Thus we become *dupes* so far as to overlook the essential good properties of genuine bread, made of all the

flour of the wheat, and likewise the difference in the price.”

“We are taught to favour a gross delusion at the suggestion of interested persons, against our own substantial welfare. It is the interest of every one to be *honest*, and say nothing contrary to his real sentiments, as it is the duty of those who have knowledge, to inform such as are ignorant. Those who have never eaten bread of all the flour in a pure state, with the native taste of wheat, and the moisture which it preserves, can know nothing of the comparative excellence of it with respect to the whitened city bread which they have been accustomed to eat all their lives.”

“The dictates of the understanding will ever yield to the pleasures of the imagination: and the provident will be attentive to take the advantage of the extravagant.

Thus it happens that the poor have been bewildered, and deprived of the object they sought."

"The event depends on the good sense of masters and mistresses of families, and their right understanding of what they mean to eat, *that is*, of what parts of the wheat the bread they consume is made. If they are satisfied that the bread is more pure than what they used to eat, and *sufficiently fine*, we may presume, if they are in their right minds, they will prefer it for domestic use. Every family of fourteen or fifteen persons, consuming at the rate of one pound each, in a day, pays near 16s. a week: if they can save 2s. 6d. or 1s. 6d. it is an object: to a poor man who spends 5s. in bread, if he can save eight or ten pence, it may purchase two or three pounds of animal substance towards making one feast in a week."

“In regard to the patriotic miller, he does not pretend to consult our good in preference to his own; on the contrary, he reasons very deeply, as if it were best for us to live on the essence of a leg of mutton, brought within the compass of a pint, than feed on such porterly food as the mutton prepared in the ordinary way of roasting or boiling. He maintains, that the finer the bread, though the quantity be smaller, the more nutritive.”

“The wheaten bread, of the London baker, is acknowledged to be whitened by a mixture of alum, which serves to keep the loaf in better shape, renders it the whiter, and causes it to imbibe the more water to increase the quantity of the bread. Thus he consults his interest, without regard to the consumer: the whiter it is, the more adulterated; and,

as constant experience proves, such bread, after it is two days old, becomes dry and husky.”

“ If bread, made in a private family, of the same flour as the baker uses, will not be so white, we must suppose that there is an art of whitening; and that this would be no secret, if it were not pernicious.”

“ The bread recommended, made of all the flour of the wheat, retains all the good properties of bread; it is eatable at the distance of eight or ten days: is it not on this account the most eligible?”

“ Take a loaf of the wheaten London bread, made by the baker in his usual way; let the same baker make another with all the flour of the wheat, without any attempt to whiten or otherwise adulterate it. Let him keep both in the same temperature of air, and produce a specimen of each at

any reasonable distance of time, and it will be easily seen what the difference is. This arises not only from *mixtures*, but the *peculiar manner of raising the sponge.*”

“ In regard to the difference of consuming new bread of the first day, and that which has been made for three, four, or five days, it is computed to be at least a fourth part. If our present wheaten bread cannot be eaten with pleasure beyond the second day, it is not wonderful to discover at last that we are lighting our candle at both ends.”

“ That the vitiated bread agrees with some people, whether by the force of habit, or the mixtures it contains, is not disputed; but in general it is very hurtful.”

“ Great numbers of our fellow-subjects eat their bread much coarser than the Londoners: are they weaker? they are

generally stronger. Some part of the advantage must be carried to this account.”

“ Let us have time to subdue our prejudices, and we shall find that bread of all the flour of the wheat, for the general use, is better both in quality and price than the present wheaten bread.”

“ In regard to the *London baker*, ask him of what parts of the wheat his bread is made, and he frankly acknowledges he cannot tell; and how should he? He can buy only what is to be sold; and the quality is not ascertained with any such precision as to enable him to answer the question. He, *poor man*, does the best he can, not to give a sweet wholesome aliment, but something which is *white*. He knows that bread made of a proper proportion of the wheat, not only differs in colour, but is moister at the end of eight

days than *his* the third day; he likewise knows that it is sweeter, and has the native grateful flavour of the wheat, as the God of Nature hath given it, and not as it hath been adulterated."

"If the parliament had required us to eat plum-cake, seed-cake, or sugar-cake, we should have known that plums, seed, and sugar, constituted the difference; but from the moment the law made distinctions in the division of the flour for three different kinds of bread for common use, we were exposed to the mercy of the miller to give the baker what he pleased, and call it by what name he pleased; we could only judge whether the bread pleased us or not. The miller and the baker divide and subdivide; and instead of flour for bread, and the bran that remained, according to ancient practice, whereby the begger as

well as the prince was pleased, *bread* became a mystery, and we no longer knew what we were eating.”

“ Our misfortune, in regard to bread, is, that we eat it too fine ; we decline the use of barley in bread, having hardly enough for beer. Oats and pease are rejected : at length we reject even *wheaten flour*,— unless we are supplied with the finest parts only !—What will befall us in the end ?”

“ *Custom* often makes a law more forcible than *Law-givers*, and we have now to contend with *custom*.—The first consideration should be, that the *flour* which represents *three-fourths of the wheat*, shall be really such, and brought to market in sacks, marked *Standard*: the value of it may be more easily ascertained, than that of which is made the *wheaten bread* we now eat.”

“The baker may be a little the more reluctant to come into this salutary proposal, as knowing that if he is to decline the use of alum, flour that is in any degree musty, or made of wheat that has grown or vegetated before gathered in, as sometimes happens, he cannot work it up so advantageously in the bread now proposed to be made, as in the wheaten bread.—Be this as it may, as soon as the baker finds this *standard* flour is vendable in bread, he will buy it; and knowing what part of the wheat it ought to be, he will work it into bread with so much the more satisfaction; and being sensible that we mean to eat *genuine* bread; he will cease to *whiten* it by any hurtful art. We shall all understand what we eat, and the trade will be familiar to us; we shall be so much happier as we become so much the more honest, and more healthy than we were before. Such is the

serious light in which I see the subject before me.”

“Every occupation hath its mystery ; and the professors are gratified in thinking themselves wiser than the rest of the world in their own way. Every professed *cook* of the first rate can melt down a large ham into the contents of half a pint. The confectioner uses bitter almonds, which are poisonous; the oil-man colours his pickles with *copper*, to render them green ; and the baker uses alum to *whiten* his bread, and make his flour imbibe the more water, by which he makes the more bread out of the same quantity of flour. This, and other *occasional* mixtures of the flour of different grains, renders his bread husky, dry, and disagreeable the third day.—Are we the *better* for any such mysteries ?”

“Whether the wheat be all of one kind, or *married*, which is the phrase for mixing of wheats of different kinds, it will be easy for people of condition, by experiment, or by the comparison with genuine bread made in their families, to know whether justice be done; though we may easily discover that the baker for the *public*, is generally a better master of his trade than most housewives are. The *mystery* may be thus developed; our health and pleasure promoted; and our bread be as much cheaper than it is now, as the gain on the *flour* will make it, by using *all* that the wheat produces.”

“Every one may try by grinding and bolting his own grain, and baking his own bread, and the manufacturers of bread may find nearly as good account in bread of all *the flour*, which can be so easily ascer-

tained ; as they do in the wheaten, which is involved in difficulties.”

“The public have administered to their own delusion, their eyes are shut to their own advantage. If the wealthy will adopt the use of the bread in question, the labouring part of our fellow-subjects will certainly follow the example ; and as to *paupers*, they will gladly comply.”

“Common sense, in all ages, has achieved wonders.”

Laws prohibiting the Adulteration of Bread and Bread Flour.

The adulteration of bread and bread flour is forbidden by law, as is obvious from the following acts of parliament :---

“ No person shall put into any corn,* meal, or flour, which shall be ground, dressed, bolted, or manufactured for sale, any ingredient or mixture whatsoever, whereby the same may be adulterated, or shall sell any flour of one sort of grain as for the flour of another, but shall only sell the real genuine meal or flour of the grain the same shall import to be, under the penalty of five pounds for every such offence.”

“ If any person have cause to suspect that any miller † who grinds, dresses, or bolts any grain for toll or reward, or manufactures any flour for sale, or that any baker mixes up with his flour any mixture or ingredient, not the genuine produce of the grain, so that the purity of the meal in any wise be adulterated, and reports the

* 31 Geo. 2. c. 29. p. 883. † 31 Geo. 2. c. 29. p. 888.

same on oath to a magistrate, then, in that case, such magistrate, or a peace-officer duly authorized by him, shall enter the premises of such suspected person, and search or examine whether such mixture or ingredient, not the genuine produce of the grain, is in the possession of such miller, mealman, or baker; and such meal and flour as shall be deemed to have been adulterated may be seized, together with the base mixtures; and if seized by a peace-officer, it is to be carried before a magistrate, but if seized by the magistrate, he may immediately dispose of it as he shall think fit. And the person on whose premises such mixture or ingredient shall be found, and adjudged to be intended to be used in adulterating the flour, shall forfeit a sum not exceeding ten pounds, and have his name, offence, and place of abode

published in some newspaper that is printed or circulated near his place of abode, unless he shall make it appear, to the satisfaction of the magistrate, that the same was not lodged there with the intention of adulterating the flour, but for some other lawful purpose.”

“ That if any person shall wilfully obstruct* or hinder any search being made for such mixtures as are designed to adulterate the meal or flour, or shall oppose their being carried away, such person shall forfeit a sum not exceeding five pounds, nor less than forty shillings.”

“ And that the good design of these regulations may be more effectually accomplished, it shall be lawful for the several wardmote † inquests of the city of London,

* 31 Geo. 2. c. 29. p. 889. † 37 Geo. 3. c. 98. sec. 22.

or any magistrate *, or peace-officer authorized by a warrant from such magistrate, without the jurisdiction of the city of London, to enter into any bake-house or shop, at all seasonable times, to search for and weigh all the bread therein ; and if any of the loaves are found wanting in the goodness of the stuff of which they should be made, or deficient in the due baking or working thereof, or shall be wanting in the weight, or shall not be truly marked, such persons may seize such bread ; and, if a magistrate is not present, it shall be taken before one, who may dispose of it as he shall think fit.”

“ That if any person shall wilfully † obstruct or hinder any such search, or prevent the carrying the same away, he shall,

* 31 Geo. 2. c. 29. p. 890. † 31 Geo. 2. c. 29. p. 890.

on conviction before a magistrate, be fined a sum not exceeding five pounds, nor less than twenty shillings.”

“ That it shall be lawful for any magistrate *, or peace-officer, authorised by a warrant, and accompanied by one or more master bakers, to enter, at seasonable times, any shop or bake-house within the city of London, or within ten miles of the Royal Exchange, to search and examine whether any alum, or other ingredients, shall have been mixed up with, or put into, any meal, flour, dough, or bread, in the possession of any such baker, and also to search for alum, or any other ingredients, which may be intended to be used for the purpose of adulterating the bread ; and if, on enquiry, they find any alum, or other unlawful ingredients, or that any flour,

* 38 Geo. 3. c. 55. sec. 14 and 15.

meal, dough, or bread, contains any preparation of alum, such shall be immediately seized, and carried before some magistrate within whose jurisdiction the baker lives, and who shall dispose of it as he shall think fit. And if the magistrate is satisfied that such pernicious ingredients were put into the bread with the consent or privity of the baker, or if he acknowledges it himself, or one or two credible witnesses certify, on oath, that they know he uses alum, such baker shall forfeit any sum of money not exceeding twenty pounds, or be committed to, and kept at hard labour in, the house of correction, or some other prison, for six calendar months, unless he can prove, to the satisfaction of the magistrate, that the alum, or other ingredients, were designed for some lawful purpose. And further, the magistrate is expressly required to cause

the offender's name, place of abode, and offence, to be published in some newspaper which shall be printed or published in or near the city of London, or the liberties thereof."

"That if any person or persons shall wilfully obstruct* or hinder such search or seizure, as above described, he or they shall, for every offence, forfeit and pay any sum not exceeding ten pounds, nor less than five, at the discretion of the magistrate before whom the offender or the offenders shall be convicted."

"That where any baker † shall make a complaint before a magistrate, and make it appear that any offence he was charged with, and paid the penalty of, was occa-

* 38 Geo. 3. c. 55. sec. 16.

† 31 Geo. 2. c. 29. p. 891. and 38 Geo. 3. c. 55, sec. 17.

sioned by the wilful neglect or default of his journeyman, or other servant, the magistrate shall issue his warrant for apprehending the party, and if, on examining into the matter, it appears that such was the case, such journeyman, or other servant, shall be directed immediately to pay to his master a reasonable recompence in money, and, on non-payment thereof, he shall be committed to the house of correction, or some other prison, and kept to hard labour, for any time not exceeding one calendar month, unless payment be sooner made.”

“ And, for the better and more easy recovery of the several penalties * incurred by disobedience to the several acts, all offences may be heard and determined in a

* 31 Geo. 2. c. 29, p. 892. and 38 Geo. 3. c. 55. sec. 19.

summary way, by the Lord Mayor, or any other magistrate or magistrates, within their several jurisdictions, who shall summon the offenders before them, and if they do not appear, or offer a reasonable excuse, they may cause them to be apprehended; and when the matter is enquired into, and the party convicted, if he does not pay the penalty within twenty-four hours, such magistrate shall issue a warrant of distress and sale on the goods of the offender; and, should the goods of the party be removed into another jurisdiction, the magistrate thereof is to back the warrant, and the distress, if not redeemed within five days, is to be appraised and sold, and all expences thereby incurred are to be deducted thereout. And if the offender is possessed of no goods or chattels that can be seized, then he shall be committed to the house of

correction, or some other prison, for one calendar month, unless payment be sooner made.”

“ That if information *, on oath, is offered to any magistrate, that any one within his jurisdiction is likely to offer or give material evidence in behalf of the prosecutor of any offender, and refuses voluntarily to come forward, such magistrate shall issue a summons to cause him to appear, and if he still refuses, to grant a warrant to compel his attendance, and then if he refuses to be examined, he may be committed to some public prison for fourteen days.”

“ That no certiorari †, letters of advocacy, or of suspension, shall be granted, to remove any conviction or other proceed-

* 31 Geo. 2. c. 29. p. 894. † 31 Geo. 2. c. 29. p. 895.

ings had therein ; but if any person is punished, and he thinks himself aggrieved by the judgment of a magistrate, he may appeal to the next quarter sessions, and, in such case, the execution of the judgment shall be suspended, upon his entering into a recognisance, with two sufficient sureties, in double the sum such person shall be adjudged to forfeit, to prosecute the appeal, and abide the determination of the justices at the said quarter sessions ; and if he makes good his appeal, he shall be discharged the conviction, and reasonable costs awarded him, which shall be paid by the person who lodged the information.”

“ That no person shall be convicted * of any offence under these acts, unless the prosecution shall be commenced against

* 37 Geo. 3. c. 98. sec. 28.

him within fourteen days after the offence is committed, except in cases of perjury* ; and no person who shall be prosecuted to conviction for any offence done or committed against these acts, shall be liable to be prosecuted for the same offence under any other law."

" That all penalties, when recovered in pursuance of these regulations, shall be disposed of in the manner following : that is to say, one † moiety thereof to be paid to the informer, and the other moiety to the poor of the parish where such offence shall be committed ; and, in case there is no informer, then the whole sum shall be given to the poor of the parish, or applied in such a way as the magistrate, in his discretion, shall think fit."

* 38 Geo 3. c. 55. sec. 20. † 31 Geo.2. c. 29. p. 897.

Economical Application of Yeast.

It frequently happens, in the summer season, that the brewers, in order to render their beer less liable to spoil, use more hops than usual; the consequence of which is, that the yeast becomes very bitter, and gives a disagreeable flavour to the bread. To obviate this inconvenience, Mr. Stone has recommended the following method of raising a bushel of flour with only a tea-spoonful of yeast.

Suppose a bushel of flour be put it into the kneading trough, then take about three quarters of a pint of warm water, and one tea-spoonful of yeast. Stir it in till it is thoroughly mixed with the water; and make a hole in the middle of the flour, large

enough to contain two gallons of water. Pour in the yeast and add some of the flour until it is a thick liquid paste ; strew some of the dry flour over it, and let it stand an hour. Then take a quart more of warm water, and pour it in : in about an hour it will be seen that the small quantity of yeast has raised the mixture so, that it will break through the dry flour placed over it ; and when the warm water has been added, take a stick and stir in more flour until it is as thick as before ; then shake again some dry flour over it, and leave it for two hours more, the mass will rise and break through the dry flour again ; you may then add three quarts or a gallon of water, and stir in the flour, and make it into a soft paste, taking care to cover it with dry flour again, and in about three or four hours more the dough may be mixed up, and

covered up warm; and in four or five hours more it may be made up into loaves, and put in the oven; and in this manner may be produced as light a bread as though a pint of yeast had been used. It does not take above a quarter of an hour more than the usual way of baking, for there is no time lost but that of adding the water at three or four times. The author of this method assures us that he constantly bakes in this way. In the morning, about six or seven o'clock, he puts the flour in the trough, and mixes up the spoonful of yeast with the warm water; in an hour's time he adds more flour, in two hours, again more, and about noon makes up the dough, and about six in the evening it is put into the oven: he has always good bread.

Economical Preparation of Yeast.

The following economical method of making yeast is recommended by Dr. Lett-som.

Thicken two quarts of water with four ounces of fine flour, boil it for half an hour, then sweeten it with three ounces of brown sugar; when almost cold, pour it with four spoonfuls of baker's yeast into an earthen jug, deep enough for the fermentation to go on without running over; place it for a day, near the fire, then pour off the thin liquor from the top, shake the remainder, and close it up for use, first straining it through a sieve. To preserve it sweet, set it in a cool cellar, or hang it some depth

in a well. Keep always some of this to make the next quantity of yeast that is wanted. Mr. I. Kerby recommends the following method of obtaining yeast from potatoes.

Potatoe Yeast.

Boil potatoes of the mealy sort, till they are thoroughly soft, skin and mash them very smooth, and put as much hot water on them as will make a mash of the consistency of common beer yeast, but not thicker. Add to every pound of potatoes, two ounces of treacle, and when just warm, stir in for every pound of potatoes, two large spoonfuls of yeast. Keep it warm till it has done fermenting, and in twenty-four hours it will be fit for use. A pound of potatoes will make near a quart of yeast, which

has been found to answer the purpose so well, as not to be able to distinguish the bread made with it, from bread made with brewer's yeast.

Method of Preserving Yeast.

When yeast is plentiful, take a quantity and work it well with a whisk until it becomes thin ; then procure a large wooden dish or platter, clean and dry, and with a soft brush lay a thin layer of yeast on the dish, and turn the top downwards to keep out the dust, but not the air, which is to dry it. When the first coat is dry, lay on another, and let that dry, and so continue till the quantity is sufficient ; by this means it may soon be made two or three inches

thick, when it may be preserved in dry tin canisters or stopped bottles, for] a long time, good. When used for baking, cut a piece off and dissolve it in warm water, when it will be fit for use.

FINIS.

NOTICE.

The Public are respectfully informed, that a new Edition, considerably enlarged (price 9s.), has lately been published,

OF

ACCUM'S Treatise on Adulterations of Food, AND CULINARY POISONS;

Exhibiting the fraudulent Sophistications of Bread, Beer, Wine, Spirituous Liquors, Tea, Coffee, Cream, Confectionary, Vinegar, Mustard, Pepper, Cheese, Olive Oil, Pickles, and other Articles employed in Domestic Economy; and Method of detecting them.

(Copied from the British Review, No. XXIX. p. 171.)

Mr. Accum seems determined that even the outside of his book shall awaken our fears. The cover of our copy bears a death's head emblazoned upon a pall, and, underneath, the motto "there is death in the pot." The pall is supported by the point of a dart. Four other darts support the four corners of the device. Twelve serpents, with forked tongues and tails entwined, form a terrific wreath around; while the middle is occupied with a large cobweb, delineated with much attention to detail, in the centre of which a spider, full as large as a moderate sized hazel nut, and so frightful that more than one young lady of our acquaintance would think it necessary to scream at the sight of it, holds in its envenomed fangs an ill-fated fly, which is sinking under the loss of blood, and buzzing in the agonies of death.

We are by no means desirous to raise or maintain a popular clamour; but Mr. Accum certainly advances some weighty charges, and his work comes with an advantage in bearing a name not unknown to the scientific world. Of the adulterations specified, some are deleterious, and others merely fraudulent. Accordingly, we shall offer a few extracts, both from the original matter of Mr. Accum, and from his citations drawn from previous authors.

"Among the number of substances used in domestic economy which are now very generally found sophisticated, may be distinguished,—tea, coffee, bread, beer, wine, spirituous liquors, salad oil, pepper, vinegar, mustard, cream, and other articles of subsistence. Indeed it would be difficult to mention a single article of food which is not to be met with in an adulterated state. And there are some substances which are scarcely ever to be procured genuine." (P. 3.)

But we pass on from the general statements at the beginning of the work to particulars.

Water, by standing in leaden reservoirs, acquires a highly deleterious property.

In some particular cases, the consequences have been most fatal.

“ ‘ A gentleman was the father of a numerous offspring, having had one and twenty children, of whom eight died young, and thirteen survived their parents. During their infancy, and indeed *until they had quitted the place of their usual residence, they were all remarkably unhealthy*, being particularly subject to disorders of the stomach and bowels. The father, during many years, was paralytic; the mother, for a long time was subject to cholics and bilious obstructions.’ ” (P. 78, 79.)

These effects were traced to a leaden pump, in the cylinder of which there were found several perforations, while the cistern “ was reduced to the thinness of common brown paper, and was full of holes like a sieve.” (P. 79.)

We now come to the adulteration of wine; to many of our readers, probably, a far more interesting concern than that of water.

“ All persons moderately conversant with the subject are aware, that a portion of alum is added to young and meagre red wines, for the purpose of brightening the colour; that Brazil-wood, or the husks of elderberries and bilberries, are employed to impart a deep rich purple tint to red port of a pale, feint colour; that gypsum is used to render cloudy white wines transparent; that an additional astringency is imparted to immature red wines by means of oak-wood saw-dust, and the husks of filberts, and that a mixture of spoiled foreign and home-made wines is converted into the wretched compound frequently sold in this town by the name of *genuine old Port* A nutty flavour is produced by bitter almonds; fictitious Port wine is flavoured with a tincture drawn from the seeds of raisins, and the ingredients employed to form the *bouquet* of high-flavoured wines, are sweet brier, orris-root, clary, cherry-laurel-water, and elder flowers. The flavouring ingredients used by manufacturers, may all be purchased by those dealers in wine who are initiated in the mysteries of the trade. And even a manuscript receipt-book for preparing them, and the whole mystery of managing all sorts of wines, may be obtained on payment of a considerable fee.” (P. 95,—97.)

“ The particular and separate department in this factitious wine-trade, called *crusting*, consists in lining the interior surface of empty wine-bottles, in part, with a red crust of super-tartrate of potash, by suffering a saturated, hot solution of this salt, coloured with a decoction of Brazil-wood, to chrySTALLIZE within them.” (P. 101, 102.)

But the crusting is not confined to the bottle.

“ A correspondent operation is performed on the wooden cask; the whole interior of which is stained artificially with a chrySTALLINE crust of super-tartrate of potash, artfully affixed in a manner precisely similar to that before stated. Thus the wine-merchant, after bottling off a pipe of wine, is enabled to impose on the understanding of his customers, by taking to pieces the cask, and exhibiting the beautiful dark-coloured and fine chrySTALLINE crust, as an indubitable proof of the age of the wine; a practice by no means uncommon to flatter

the vanity of those who pride themselves in their acute discrimination of wines." (P. 103, 104)

This our readers will excuse, for it is pleasing to read of impositions which are practised on the sagacious. But, says Mr. Accum,

"Several well-authenticated facts have convinced me, that the adulteration of wine with substances deleterious to health is certainly practised oftener than is, perhaps, suspected." (P. 104, 105.)

Presently follows the story of the passengers by the coach, who dined at Newark. Half a bottle of port made them all ill, one dangerously. Part of the other half caused the death of an inhabitant of the place, on whom an inquest was held, and a verdict returned, of—*Died by poison.*

A gentleman having been taken severely ill on two successive days, after drinking each day a pint of Madeira from the same bottle, his apothecary ordered that it should be examined.

"The bottle happened to slip out of the hand of the servant, disclosed a row of shot wedged forcibly into the angular bent-up circumference of it. On examining the beads of shot, they crumbled into dust, the outer crust (defended by a coat of black lead with which the shot is glazed) being alone unacted on, whilst the remainder of the metal was dissolved. The wine, therefore, had become contaminated with *lead and arsenic*, the shot being a compound of these metals, which no doubt had produced the mischief." (P. 113, 114.)

For detecting the presence of lead or any other deleterious metal in wine, Mr. Accum recommends the *wine test*.

We now come to that part of the subject, which, as *some persons* have thought, is *merely the business of ale-drinkers*, and their brethren, the porter-drinkers.

"The fraud of imparting to porter and ale an intoxicating quality by narcotic substances, appears to have flourished during the period of the late French war. For, if we examine the importation lists of drugs, it will be noticed that the quantities of *cocculus indicus* imported in a given time prior to that period, will bear no comparison with the quantity imported in the same space of time during the war, although an additional duty was laid upon this commodity. Such has been the amount brought into this country in five years, that it far exceeds the quantity imported during twelve years anterior to the above epoch. The price of this drug has risen within these ten years from two shillings to seven shillings the pound. . . . It was at the period to which we have alluded that the preparation of an extract of *cocculus indicus* first appeared, as a new saleable commodity, in the price-currents of *brewers' druggists*. It was at the same time also that a Mr Jackson, of notorious memory, fell upon the idea of brewing beer from various drugs, without any malt and hops. This chemist did not turn brewer himself, but he struck out the more profitable trade of teaching his mystery to the brewers for a handsome fee. From that time forward, written directions and receipt books, for using the chemical preparations to be substituted for malt and hops, were respectively sold. And many adepts soon afterwards appeared every where to instruct brewers in the nefarious practice first pointed out by Mr. Jackson. From that time, also, the fraternity of brewers' chemists took its rise. They made it their chief business to send

travellers all over the country with lists and samples exhibiting the price and quality of the articles manufactured by them for the use of brewers only. Their trade spread far and wide, but it was amongst the country brewers chiefly that they found the most customers. And it is among them up to the present day, as I am assured by some of these operators, on whose veracity I can rely, that the greatest quantities of unlawful ingredients are sold." (P. 157—160.)

Part of these evils the porter-drinkers bring upon themselves.

"One of the qualities of good porter, is, that it should bear a *fine frothy head*, as it is technically termed: because professed judges of this beverage, would not pronounce the liquor excellent, although it possessed all other good qualities of porter, without this requisite.—To impart to porter this property of frothing when poured from one vessel into another, or to produce what is also termed a *cauliflower head*, the mixture called *beer-heading*, composed of common green vitriol (sulphate of iron) alum and salt, is added. This addition to the beer is generally made by the publicans." (P. 182, 183.) It is added in a note:—"Alum gives likewise a smack of age to beer, and is penetrating to the palate."—*S. Child on Brewing*, p. 18." "The great London brewers, it appears, believe that the publicans alone adulterate the beer." (P. 211.)

"Capsicum and grains of paradise, two highly acrid substances, are employed to give a pungent taste to weak insipid beer. Of late, a concentrated tincture of these articles, to be used for a similar purpose, and possessing a powerful effect, has appeared in the price-currents of brewers' druggists. Ginger root, coriander seed, and orange peels, are employed as flavouring substances chiefly by the ale brewers." (P. 184, 185.)

We find the following articles, in a list of illegal ingredients, seized at various breweries and brewers' druggists.

"Mulum, 84 lbs.; cocculus indicus, 12 lbs.; colouring, 4 galls: honey, about 180 lbs.; hartshorn shavings, 14 lbs.; Spanish juice, 46 lbs.; orange powder, 17 lbs.; ginger, 56 lbs.; grains of paradise, 44 lbs.; quassia, 10 lbs.; liquorice, 64 lbs.; carraway seeds, 40 lbs.; mulsum, 26 lbs." "Capsicum, 88 lbs.; copperas, 310 lbs.; colouring and drugs, 84 lbs.; mixed drugs, 240 lbs.; coriander seed, 2 lbs.; beer colouring, 24 gallons." (P. 186—189.) [The list which includes these articles is copied from the minutes of the committee of the House of Commons.]

Some of the substances above enumerated may be thought comparatively harmless. But others are absolutely poisonous.

"To increase the intoxicating quality of beer, the deleterious vegetable substance, called *cocculus indicus*, and the extract of this poisonous berry, technically called *black extract*, or by some, *hard mulsum*, are employed. Opium, tobacco, nux vomica, and extracts of poppies, have also been used.—This fraud constitutes by far the most censurable offence committed by unprincipled brewers. And it is a lamentable reflection to behold so great a number of brewers prosecuted, and convicted of this crime. Nor is it less deplorable to find the names of druggists, eminent in trade, implicated in the fraud, by selling the unlawful ingredients to brewers for fraudulent purposes." (P. 205, 206.)

Then follows a list of thirty-four convictions of brewers, for receiving or using illegal ingredients.—We perfectly agree with the following observations.

"That a minute portion of an unwholesome ingredient, daily taken in beer, cannot fail to be productive of mischief, admits of no doubt: and there is reason to believe that a small quantity of a narcotic substance (and cocculus indicus in

a powerful narcotic), daily taken into the stomach, together with an intoxicating liquor, is highly more efficacious than it would be without the liquor. The effect may be gradual; and a strong constitution, especially if it be assisted with constant and hard labour, may counteract the destructive consequences perhaps for many years. But it never fails to shew its baneful effects at last." (P. 209, 210.)

We now come to the business of another small portion of the community, namely, the *tea-drinkers*. Perhaps the following descriptions will assist them in forming a diagnosis.

"All the samples of spurious green tea (nineteen in number) which I have examined, were coloured with carbonate of copper, (a poisonous substance), and not by means of verdigrise, or copperas." (P. 240.) "Mr. Twining asserts, that 'the leaves of spurious tea are boiled in a copper, with copperas and sheep's dung.'" (P. 240. Note.) "Tea rendered poisonous by carbonate of copper, speedily imparts to liquid ammonia, a fine sapphire blue tinge. It is only necessary to shake up in a stopped vial, for a few minutes, a tea-spoonful of the suspected leaves, with about two table-spoonstul of liquid ammonia, diluted with half its bulk of water. The supernatant liquid will exhibit a fine blue colour, if the minutest quantity of copper be present. Green tea, coloured with carbonate of copper, when thrown into water impregnated with sulphuretted hydrogen gas, immediately acquires a black colour. Genuine green tea, suffers no change from the action of these tests." (P. 241.)

The following extracts may perhaps prove interesting to *brandy-drinkers*.

"It is a custom among retailing distillers, which I have not taken notice of in this directory, to put one third or one fourth part of proof molasses brandy, proportionably, to what rum they dispose of; which cannot be distinguished, but by an extraordinary palate, and does not at all lessen the body or proof of the goods; but makes them about two shillings a gallon cheaper; and must be well mixed and incorporated together in your retailing cask. But you should keep some of the best rum, not adulterated, to please your customers, whose judgment and palate must be humoured.—When you are to draw a sample of goods to show a person that has judgment in the proof, do not draw your goods into a phial to be tasted, or make experiment of the strength thereof that way, because the proof will not hold except the goods be exceedingly strong. But draw the pattern of goods either into a glass from the cock, to run very small, or rather draw off a small quantity into a little pewter pot, and pour it into your glass, extending your pot as high above the glass as you can without wasting it, which makes the goods carry a better head abundantly, than if the same goods were to be put and tried in a phial.—You must be so prudent as to make a distinction of the persons you have to deal with. What goods you sell to gentlemen for their own use, who require a great deal of attendance, and as much for time of payment, you must take a considerably greater price than of others; what goods you sell to persons where you believe there is a manifest, or at least some hazard of your money, you may safely sell for more than common profit; what goods you sell to the poor, especially medicinally, (as many of your goods are savative), be as compassionate as the cases require.—All brandies, whether French, Spanish, or English, being proof goods, will admit of one pint of liquor (water) 'to each gallon, to be made up and incorporated therewith in your cask, for retail, or selling smaller quantities. And all persons that insist upon having proof goods, which not one in twenty understand, you must supply out of what goods are not so reduced, though at a higher price.'" (P. 267—270.)

Some of the adulterations of spirituous liquors are exceedingly pernicious.

“ Another method of fining spirituous liquors, consists in adding to it, first, a solution of sub-acetate of lead, and then a solution of alum. This practice is highly dangerous, because part of the sulphate of lead produced, remains dissolved in the liquor, which it thus renders poisonous.” (P. 284.) “ The cordial called shrub frequently exhibits vestiges of copper.” (P. 285.)

Gloucester Cheese has been found contaminated with red lead. The article used in colouring cheese is anotto. In one instance, the anotto, being inferior, had been coloured with vermilion; and the vermilion adulterated by a druggist, (who little thought that it would ever enter into the composition of cheese,) with red lead. The account of the whole transaction as given by Mr. Accum, is worth reading, but too long to be extracted.

Cayenne pepper, “ is sometimes adulterated with red lead, to prevent its becoming bleached on exposure to light.” (P. 305.) Pickles “ are sometimes intentionally coloured by means of copper.” (P. 306.) “ Mrs. E. Raffald directs, ‘ to render pickles green, boil them with halfpence, or allow them to stand twenty-four hours in copper or brass pans.’ ” (P. 309.) “ Vinegar is sometimes largely adulterated with sulphuric acid, to give it more acidity.” (P. 311.) “ Red sugar drops are usually coloured with the inferior kind of vermilion. This pigment is generally adulterated with red lead. Other kinds of sweetmeats are sometimes rendered piousonous by being coloured with preparations of copper.” (P. 315, 316.) “ The foreign conserves . . . are frequently impregnated with copper.” (P. 317.) “ Quantities” of catsup “ are daily to be met with, which on a chemical examination, are found to abound with copper.” (P. 319.) “ The quantity of copper which we have more than once detected in this sauce, used for seasoning, and which, on account of its cheapness, is much resorted to by people in the lower walks of life, has exceeded the proportion of lead to be met with in other articles employed in domestic economy.” (P. 320.) “ The leaves of the cherry-laurel, *prunus laurocerasus*, a poisonous plant,” are used to flavour custards, *blanc-mange*, and other delicacies of the table. (P. 324.) An instance is given of the dangerous consequences of this practice. (P. 325, 326.) “ The water distilled from cherry-laurel leaves is frequently mixed with brandy and other spirituous liquors.” (P. 327.) Several samples of anchovy sauce “ have been found contaminated with lead.” (P. 328.) It is not unusual to employ, in preparing this sauce, “ a certain quantity of Venetian red, added for

the purpose of colouring it, which, if genuine, is an innocent colouring substance. But instances have occurred of this pigment having been adulterated with orange lead, which is nothing else than a better kind of minimum or red oxid of lead." (P. 328, 329.) In lozenges, "the adulterating ingredient is usually pipe-clay, of which a liberal portion is substituted for sugar." (P. 330.) Dr. T. Lloyd says, "'I was informed,'" (at a *respectable* chemist's shop in the city) "'that there were two kinds of ginger lozenges kept for sale, the one at three-pence the once, and the other at six-pence; and that the article furnished to me by mistake was the cheaper commodity. The latter were distinguished by the epithet *verum*, they being composed of sugar and ginger only. But the former were manufactured partly of white Cornish clay, with a portion of sugar only, with ginger and Guinea pepper. I was likewise informed, that of Tolu lozenges, peppermint lozenges, and ginger pearls, and several other sorts or lozenges, two kinds were kept; that the *reduced* prices, as they were called, were manufactured for those very clever persons in their own conceit, who are fond of haggling, and insist on buying better bargains than other people, shutting their eyes to the defects of an article, so that they can enjoy the delight of getting it cheap: and, secondly, for those persons, who being but bad paymasters, yet as the manufacturer, for his own credit's sake, cannot charge more than the usual price of the article, he thinks himself therefore authorized to adulterate it in value, to make up for the risk he runs, and the long credit he must give.'" (P. 332, 333.)

Well—there is then some honesty left in the world. What a pleasure it is to have to deal with a *respectable* man. But we return to the practices of the *knaves*.

Olive oil "is sometimes contaminated with lead." (P. 334.) The dealers in this commodity assert that lead or pewter "prevents the oil from becoming rancid. And hence some retailers often suffer a pewter measure to remain immersed in the oil." (P. 336.) "The beverage called soda water is frequently contaminated both with copper and lead." (P. 351.) Mr. Johnston, of Greek Street, Soho, was the first who pointed out the danger to the public. "Many kinds of viands are frequently impregnated with copper, in consequence of the employment of cooking utensels made of that metal. By the use of such vessels in dressing food, we are daily liable to be poisoned." (P. 352.) "Mr. Thiery, who wrote a thesis on the noxious quality of cop-

per, observes that ‘ our food recieves its quantity of poison, in the kitchen by the use of copper pans and dishes. The brewer mingles poison in our beer, by boiling it in copper vessels. The sugar-baker employs copper pans. The pastry-cook bakes our tarts in copper moulds. The confectioner uses copper vessels. The oilman boils his pickles in copper or brass vessels, and verdigrise is plentifully formed by the action of the vinegar upon the metal.’ ” (P. 353, 354.) Moreover, “ various kinds of food, used in domestic economy, are liable to become impregnated with lead.” (P. 359.)

Mr. Accum, speaking on the subject of Beer, says,

“ It will be noticed that some of the sophistications are comparatively harmless, whilst others are affected by substances deleterious to health.” (P. 185.)

We think, however, that the candour of Mr. Accum leads him to make too much allowance for this consideration throughout. Surely, though many articles of food be not absolutely poisonous, a diet consisting of drugs and chemical compounds and articles never intended by nature to be eaten or drunk, articles for which, presented simple, the hungriest stomach would feel no appetite or inclination, cannot be wholesome. Brick and mortar are not poison; yet we cannot, like the dragon of Wantley, swallow a church, and pick our teeth with the steeple. Many can eat oysters, but few could manage the oyster-knife. Even the Welshman of King Arthur’s court, fond as he was of toasted cheese, would inevitably have been choked by the mouse that ran down his throat to eat it, had he not “ pulled him out by the tail.”

We could give farther extracts; but must refer the reader to the work itself, which contains much interesting matter, besides what we have selected. **THE MONEY THAT IS OFTEN LAID OUT IN THE PURCHASE OF COOKERY BOOKS, WHICH TEACH THE ART OF EXCITING DISEASE AND PAIN BY DUBIOUS COMBINATIONS AND CULINARY POISONS, MIGHT, WE THINK, BE MUCH BETTER EXPENDED UPON A BOOK LIKE THE PRESENT; EVERY PAGE OF WHICH GIVES WARNING OF SOME DANGER, OF WHICH WE OUGHT ALL TO BE AWARE.**

Treatise on Adulterated Provisions.

By FREDRICK ACCUM.

THERE IS DEATH IN THE POT.

II. KINGS—CHAP. VI. VERSE XI.

(From *Blackwood's Edinburgh Magazine*, No. XXXV. Page 542.)

Mr. Accum, it appears, is one of those very good-natured friends, who is quite resolved not to allow us to be cheated and poisoned as our fathers were before us, and our children will be after us, without cackling to us of our danger, and opening our eyes to abysses of fraud and imposition, of the very existence of which we had until now the good fortune to be entirely ignorant. His book is a perfect death's head, a memento mori, the perusal of any single chapter of which is enough to throw any man into the blue devils for a fortnight. Mr. Accum puts us something in mind of an officious blockhead, who, instead of comforting his dying friend, is continually jogging him on the elbow with such cheering assurances as the following. "I am sorry there is no hope; my dear fellow, you must kick the bucket soon. Your liver is diseased, your lungs gone, your bowels as impenetrable as marble, your legs swelled like door-posts; your face as yellow as a guinea, and the doctor just now assured me you could not live a week."

Mr. Accum's work is evidently written in the same spirit of dark and melancholy anticipation, which pervades Dr. Robison's celebrated "Proofs of a Conspiracy, &c. against all the crowned heads of Europe." The conspiracy disclosed by Mr. Accum is certainly of a still more dreadful nature, and is even more widely ramified than that which excited so much horror in the worthy professor. It is a conspiracy of brewers, bakers, grocers, wine-merchants, confectioners, apothecaries, and cooks, against the lives of all and every one of his majesty's liege subjects. It is easy to see that Mr. Accum's nerves are considerably agitated, that—

"Sad forebodings shake him as he writes."

Not only at the festive board is he haunted by chimeras dire of danger—not only does he tremble over the tureen—and faint over the flesh-pot: but even in his chintz night-gown, and red morocco slippers, he is not secure. An imaginary sexton is continually jogging his elbow as he writes, a death's head and cross bones rise on

his library table; and at the visionary tomb-stone of the best end of his sofa he beholds a granite—

ON WHICH ARE INSCRIBED THE DREADFUL WORDS—



Hic Jacet,
FREDRICK ACCUM,
 Operative Chemist,
 OLD COMPTON STREET,
SOHO.

Since we read his book, our appetite has visibly decreased. At the Celtic club, yesterday, we dined almost entirely on roast beef; Mr. Oman's London-particular Madeira lost all its relish, and we turned pale in the act of eating a custard, when we recollected the dreadful punishment inflicted on custard-eaters, in page 326 of the present work. We beg to assure our friends, therefore, that at the present moment they may invite us to dinner with the greatest impunity.— Our diet is at present quite similar to that of Parnel's hermit, "Our food the fruits, our drink the crystal well;" though we trust a few days will recover us from our panic, and

enable us to resume our former habits of life. Those of our friends, therefore, who have any intention of pasturing us, had better not lose the present opportunity of doing so. So favourable a combination of circumstances must have been quite unhopèd for on their part, and most probably will never occur again.* V. S.

Since, by the publication of Mr. Accum's book, an end has been for ever put to our former blessed state of ignorance, let us arm ourselves with philosophy, and boldly venture to look our danger in the face; or, as the poet beautifully expresses it, in language singularly applicable,

* To save some trouble, we may announce that we are already engaged to dinner, on the 23d, 27th, and 28th of this month, and to evening parties, on the 22d, 23d, 26th, 28th, and 29th, and 3d of March.

“Come, Christopher, and leave all
meaner things,
To low ambition and the pride of kings;
Let us, since li.e can little else supply;
Than just to swallow poison and to die;
Expatriate free o'er all this dreadful
field,
Try what the brewer, what the baker
yield;
Explore the druggists' shop, the but-
chers' stall;
Expose their roguery, and—damn
them all!”

POPS.

Melancholy as the details are, there is something almost ludicrous, we think, in the very extent to which the deceptions are carried. So inextricably are we all immersed in this mighty labyrinth of fraud, that even the venders of poison themselves are forced, by a sort of retributive justice, to swallow it in their turn.—Thus the apothecary, who sells the poisonous ingredients to the brewer, chuckles over his roguery, and swallows his own drugs in his daily copious exhibitions of Brown stout. The brewer in his turn, is poisoned by the baker, the wine-merchant, and the grocer. And, whenever the baker's stomach fails him, he meets his *coup de grace* in the adulterated drugs of his friend the apothecary, whose health he has been gradually contributing to undermine, by feeding him every morning on chalk and alum, in the shape of hot rolls.

Our readers will now, we think, be able to form a general idea of the perils to which they are exposed by every meal.

Mr. Accum's details on the adulteration of wine are extremely ample, and so interesting, that we regret our limits prevent our making more copious extracts, and oblige us to refer our readers for farther information to the work itself.

Having thus laid open to our view the arcana of the cellar, Mr. Accum next treats us with an expose of the secrets of the brew-house. Verily, the wine-merchant and brewer are *par nobile fratrum*; and after the following disclosures, it will henceforth be a matter of the greatest indifference to us, whether we drink Perry or Champagne, Hermitage or Brown stout. *Latet anguis in poculo*, there is disease and death in them all, and one is only preferable to the other, because it will poison us at about one-tenth of the expense.

“Malt liquors, and particularly porter, the favourite beverage of the inhabitants of London and of other large towns, is amongst those articles, in the manufacture of which the greatest frauds are frequently committed.

“The practice of adulterating beer appears to be of early date. To shew that they have augmented in our own days, we shall exhibit an abstract from documents laid lately before Parliament.

“Mr. Accum not only amply proves, that unwholesome ingredients are used by fraudulent brewers, and that very deleterious substances are also vended both to brewers and publicans for adulterating beer, but that the ingredients mixed up in the brewer's enchanting cauldron are placed above all competition, even with the potent charms of Macbeth's witches :

‘Root of hemlock, digg’d i’ the dark,
 * * * * *
 * * * * *

For a charm of pow’rful trouble,
 Like a hell-broth boil and bubble;
 Double, double, toil and trouble,
 Fire burn, and cauldron bubble.’

Mr. Accum very properly gives us a list of those miscreants who have been convicted of adulterating their porter with poisonous ingredients, and want of room alone prevents us from damning them to everlasting fame, by inserting their names along with that of the Rev. Sennacherib Terrot, in the imperishable pages of this miscellany.

Mr. Accum gives us a long dissertation on counterfeit tea, and another on spurious coffee; but as these are impositions by which we are little affected, we shall not allow them to detain us. The leaves of the sloe-thorn are substituted for the former, and roasted horse beans for the latter. These frauds, it appears, are carried to a very great extent.

We must now draw our extracts to a close; but we can assure our readers, that we have not yet introduced them to one tythe of the poisonous articles in common use, detected by Mr. Accum. We shall give the titles of a few to satisfy the curious:—Poisonous confectionary, poisonous pickles, poisonous cayenne pepper, poisonous custards, poisonous an-

chovy sauce, poisonous lozenges, poisonous lemon acid, poisonous mushrooms, poisonous ketchup, and poisonous soda water! Read this, and wonder how you live!

While we thus suffer under accumulated miseries brought upon us by the unprincipled avarice and cupidity of others, it is surely incumbent on us not wantonly to increase the catalogue by any negligence or follies of our own. Will it be believed, that in the cookery book, which forms the prevailing oracle of the kitchens in this part of the island, there is an express injunction to “*boil greens with halfpence* in order to improve their *colour*?”—That our puddings are frequently seasoned with laurel leaves, and our sweatmeats almost uniformly prepared in copper vessels? Why are we thus compelled to swallow a supererogatory quantity of poison which may so easily be avoided? And why are we constantly made to run the risk of our lives by participating in custards, trifles, and blancmanges, seasoned by a most deadly poison extracted from the *prunus lauro-cerasus*? Verily, while our present detestable system of cookery remains, we may exclaim with the sacred historian, that there is indeed “*Death in the Pot.*”

A Treatise on Adulterations of Food, AND CULINARY POISONS,

Exhibiting the Fraudulent Sophistications of Bread, Beer, Wine,
Spirituous Liquors, &c. and Methods of detecting them.

BY FREDRICK ACCUM.

(*From the Edinburgh Review, No. LXV. Page 131.*)

It is curious to see how vice varies its forms, and maintains its substance, in all conditions of society;—and how certainly those changes, or improvements as we call them, which diminish one class of offences, aggravate or give birth to another.—In rude and simple communities, most crimes take the shape of violence and outrage—in polished and refined ones, of Fraud. Men sin from their animal propensities in the first case, and from their intellectual depravation in the second. The one state of things is prolific of murders, batteries, rapines, and burnings—the other of forgeries, swindlings, defamations, and seductions. The sum of evil is probably pretty much the same in both—though probably greatest in the civilized and enlightened stages; the sharpening of the intellect, and the spread of knowledge, giving prodigious force and activity to all criminal propensities.

Among the offences which are peculiar to a refined and enlightened society, and owe their birth, indeed, to its science and refinement, are those skilful and dexterous adulterations of the manifold objects of its luxurious consumption, to which their value and variety, and the delicacy of their preparation, hold out so many temptations; while the very skill and knowledge which are requisite in their formation, furnish such facilities for their sophistication. The very industry and busy activity of such a society, exposes it more and more to such impostures;—and by the division of labour which takes place, and confines every man to his own separate task, brings him into a complete dependence on the industry of others for a supply of the most necessary articles.

The honesty of the dealer, and of the original manufacturer, is the only security to the public for the genuineness of the article in which he deals. The consumer can in general know nothing of their component parts; he must take them as he finds them; and, even if he is dissatisfied, he has in general no effectual means of redress.

It will be found, that as crimes of violence decrease with the progress of society, frauds are multiplied; and there springs up in every prosperous country a race of degenerate traders and manufacturers, whose business is to cheat and to deceive; who pervert their talents to the most dishonest purposes, preferring the illicit gains thus acquired to the fair profits of honorable dealing; and counter-working, by their sinister arts, the general improvement of society.

In almost every branch of manufacture, there are fraudulent dealers, who are instigated by the thirst of gain, to debase the articles which they vend to the public, and to exact a high price for what is comparatively cheap and worthless. After pointing out various deceptions of this nature, Mr. Accum, the ingenious author of the work before us, proceeds in his account of those frauds, in the following terms.

‘ Soap used in house-keeping is frequently adulterated with a considerable portion of fine white clay, brought from St. Stephen’s in Cornwall. In the manufacture of printing paper, a large quantity of plaster of Paris is added to the paper stuff, to increase the weight of the manufactured article. The selvage of cloth is often dyed with a permanent colour, and artfully stitched to the edge of cloth dyed with a fugitive dye. The frauds committed in the tanning of skins, and in the manufacture of cutlery, and jewellery, exceed belief.’ pp. 27-29.

What is infinitely worse, however, than any of those frauds, sophistications, we are informed, are carried on to an equal extent in all the essential articles of subsistence or comfort. So long as our dishonest dealers do not intermeddle with these things, their deceptions are comparatively harmless; the evil in all such cases amounting only to so much pecuniary damage. But when they begin to tamper with food, or with articles connected with the table, their frauds are most pernicious: in all cases the nutritive quality of the food is injured, by the artificial ingredients intermixed with it; and when these ingredients, as frequently happens, are of a poisonous quality, they endanger the health and even the life of all to whom they are vended. We cannot conceive any thing more diabolical than those contrivances; and we consider their authors in a far worse light than ordinary felons, who, being known, can be duly guarded against. But those fraudulent dealers conceal themselves under the fair show of a reputable traffic—they contrive in this manner to escape the infamy which justly belongs to them—and, under the disguise of wealth, credit, and character, to lurk in the bosom of society, wounding the hand that cherishes them, and scattering around them poison and death.

It is chiefly for the purpose of laying open the dishonest artifices of this class of dealers, that Mr. Accum has published the present very interesting and popular work; and he gives a most fearful view of the various and extensive frauds which are daily practised on the unsuspecting public.

‘ Among the number of substances used in domestic economy, which are now very generally found sophisticated, may be distinguished—tea, coffee, bread, beer, wine, spirituous liquors, salad oil, pepper, vinegar, mustard, cream, and other articles of subsistence.—Indeed, it would be difficult to mention a single article of food which is not to be met with in an adulterated state; and there are some substances which are scarcely ever to be procured genuine.—Some of these spurious compounds are comparatively harmless when used as food; and as, in these cases, merely substances of inferior value are substituted for more costly and genuine ingredients, the sophistication, though it may affect our purse, does not injure our health. Of this kind are the manufacture of factitious pepper, the adulterations of mustard, vinegar, cream, &c. Others, however, are highly deleterious; and to this class belong the adulterations of beer, wines, spirituous liquors, pickles, salad oil, and many others.’ pp. 2—4.

There are, it appears, particular chemists who make it their sole employment to supply the unprincipled brewer of porter and ale with drugs, and other deleterious preparations; while others perform the same office to the wine and spirit merchant, as well as to the grocer and oilman—and these illicit pursuits have assumed all the order and method of a regular trade.

‘ The eager and insatiable thirst for gain’ (Mr. Accum justly observes), ‘ which seems to be a leading characteristic of the times, calls into action every human faculty, and gives an irresistible impulse to the power of invention; and where lucre becomes the reigning principle, the possible sacrifice of a fellow-creature’s life is a secondary consideration.’

Mr. Accum having exhibited this general view of his subject, proceeds to enter into an examination of the articles most commonly counterfeited, and to explain the nature of the ingredients used in sophisticating them. He commences with a dissertation on the qualities of good water, in which he briefly points out the dangerous sophistications to which it is liable, from the administration of foreign ingredients.

But in the case of water, the adulteration is purely accidental, which cannot be said of the other articles specified by Mr. Accum. In the making of Bread, more especially in London, various ingredients are occasionally mingled with the dough. To suit the caprice of his customers, the baker is obliged to have his bread light and porous, and of a pure white. It is impossible to produce this sort of bread from flour alone, unless it be of the finest quality. The best flour, however, being mostly used by the biscuit-bakers and pastry-cooks, it is only from the inferior

sorts that bread is made; and it becomes necessary, in order to have it of that light and porous quality, and of a fine white, to mix alum with the dough. Without this ingredient, the flour used by the London bakers would not yield so white a bread as that sold in the metropolis.

Wine appears to be a subject for the most extensive and pernicious frauds.

‘ All persons (Mr. Accum observes) moderately conversant with the subject, are aware, that a portion of alum is added to young and meagre red wines, for the purpose of brightening their colour; that Brazil wood, or the husks of elderberries and bilberries, which are imported from Germany, under the fallacious name of *berry-dye*, are employed to impart a deep rich purple tint to red port of a pale colour; that gypsum is used to render cloudy white wines transparent; that an additional astringency is imparted to immature red wines by means of oak-wood and sawdust, and the husks of filberts; and that a mixture of spoiled foreign and home-made wines is converted into the wretched compound frequently sold in the metropolis by the name of *genuine old Port*.’

Other expedients are resorted to, in order to give flavour to insipid wines. For this purpose bitter almonds are occasionally employed; factitious port wine is also flavoured with a tincture drawn from the seeds of raisins; and other ingredients are frequently used, such as sweet brier, orris root, clary, cherry-laurel water, and elder flowers.

In London, the sophistication of wine is carried to an enormous extent, as well as the art of manufacturing spurious wine, which has become a regular trade, in which a large capital is invested; and it is well known that many thousand pipes of spoiled cider are annually sent to the metropolis for the purpose of being converted into an imitation of port-wine.

Innumerable are the tricks practised to deceive the unwary, by giving to weak, thin, and spoiled wines, all the characteristic marks of age, and also of flavour and strength. In carrying on these illicit occupations, the division of labour has been completely established; each has his own task assigned him in the confederate work of iniquity; and thus they acquire dexterity for the execution of their mischievous purposes. To one class is allotted the task of *crusting*, which consists in lining the interior surface of empty wine bottles with a red crust. This is accomplished by suffering a saturated hot solution of super-tartrate of potash, coloured red with a decoction of Brazil wood to crystallize within them. A similar operation is frequently performed on the wooden cask which is to hold the wine, and which, in the same manner as the bottle, is artificially stained with a red crust; and on some occasions, the lower ex-

tremities of the corks in wine bottles are also stained red, in order to give them the appearance of having been long in contact with the wine. It is the business of a particular class of wine-coopers, by means of an astringent extract mixed with home-made and foreign wines, to produce 'genuine old port,' or to give an artificial flavour and colour to weak wine; while the mellowing and restoring of spoiled white wines is the occupation of another class called refiners of wine. Other deceptions are practised by fraudulent dealers, which are still more culpable. The most dangerous of these is where wine is adulterated by an admixture of lead.

Mr. Accum justly observes, that the 'merchant or dealer who practises this dangerous sophistication, adds the crime of murder to that of fraud, and deliberately scatters the seeds of disease and death among those customers who contribute to his emolument.'

Spirituous liquors, which in this country form one of the chief articles of consumption, are subjects of equally extensive fraud with wine. The deceptions which are practised by the dealers in this article, are chiefly confined to fraudulent imitations of the peculiar flavour of different sorts of spirits; and as this flavour constitutes, along with the strength, the value of the spirit, the profit of the dealer consists in imitating this quality at a cheaper rate than it is produced in the genuine spirit. The flavour of French brandy is imitated, by distilling British molasses spirit over wine lees; previous to which, however, the spirit is deprived of its peculiar disagreeable flavour, by rectification over fresh-burnt charcoal and quicklime. This operation is performed by those who are called brewers' druggists, and forms the article in the *prices-current* called *Spirit Flavour*. Wine lees are imported into this country for the purpose, and they pay the same duty as foreign wines. Another method of imitating the flavour of brandy, which is adopted by brandy merchants, is by means of a spirit obtained from raisin wine, after it has begun to become somewhat sour. 'Oak sawdust,' (Mr. Accum observes), 'and a spirituous tincture of raisin stones, are likewise used to impart to new brandy and rum a *ripe taste*, resembling brandy or rum long kept in oaken casks, and a somewhat oily consistence, so as to form a durable froth at its surface, when strongly agitated in a vial. The colouring substances are burnt sugar, or molasses; the latter gives to imitative brandy a luscious taste, and fulness in the mouth.' Gin, which is sold in small

quantities to those who judge of the strength by the taste, is made up for sale by fraudulent dealers with water and sugar; and this admixture rendering the liquor turbid, several expedients are resorted to, in order to clarify it; some of which are harmless, while others are criminal. A mixture of alum with subcarbonate of potash, is sometimes employed for this purpose; but more frequently, in place of this, a solution of subacetate of lead, and then a solution of alum,—a practice reprobated by Mr. Accum as highly dangerous, owing to the admixture of the lead with the spirit, which thereby becomes poisonous. After this operation, it is usual to give a false appearance of strength to the spirit by mixing with it grains of paradise, guinea pepper, capsicum, and other acrid and aromatic substances.

In the manufacture of malt liquors, a wide field is opened for the operations of fraud. The immense quantity of the article consumed, presents an irresistible temptation to the unprincipled dealer; while the vegetable substances with which beer is adulterated, are in all cases difficult to be detected, and are frequently beyond the reach of chemical analysis. There is, accordingly, no article which is the subject of such varied and extensive frauds. These are committed in the first instance by the brewer, during the process of manufacture, and afterwards by the dealer, who deteriorates, by fraudulent intermixtures, the liquor which he sells to the consumer. ‘The intoxicating qualities of porter (he continues) are to be ascribed to the various drugs intermixed with it;’ and, as some sorts of porter are more heady than others, the difference arises, according to this author, ‘from the greater or less quantity of stupifying ingredients’ contained in it. These consist of various substances, some of which are highly deleterious. Thus, the extract disguised under the name of *black extract*, and ostensibly destined for the use of tanners and dyers, is obtained by boiling the berries of the *cocculus indicus* in water, and converting, by a subsequent evaporation, this decoction into a stiff black tenacious mass, possessing in a high degree the narcotic and intoxicating quality of the poisonous berry from which it is prepared. Quassia is another substance employed in place of hops, to give the beer a bitter taste; and the shavings of this wood are sold in a half torrifed and ground state, in order to prevent its being recognised.

Not only is the use of all these deleterious substances strictly prohibited to the brewer under severe penalties, but all drug-

gists or grocers convicted of supplying him with any of them, or who have them in their possession, are liable to severe penalties; and Mr. Accum gives a list of twenty-nine convictions for this offence, from the year 1812 to 1819. From the year 1813 to 1819, the number of brewers prosecuted and convicted of using illegal ingredients in their breweries, amounts to thirty-four. Numerous seizures have also been made during the same period at various breweries, and in the warehouses of brewers'-druggists, of illegal ingredients, to be used in the brewing of beer, some of them highly deleterious.

Malt liquors, after they are delivered by the brewer to the retail-dealer, are still destined to undergo various mutations before they reach the consumer. It is a common practice with the retailers of beer, though it be contrary to law, to mix table-beer with strong beer; and, to disguise this fraud, recourse is had to various expedients. It is a well known property of genuine beer, that when poured from one vessel into another, it bears a strong white froth, without which professed judges would not pronounce the liquor good. This property is lost, however, when table-beer is mixed with strong beer; and to restore it, a mixture of what is called *beer-heading* is added, composed of common green vitriol, alum, and salt. To give a pungent taste to weak insipid beer, capsicum and grains of paradise, two highly acrid substances, are employed; and, of late, a concentrated tincture of these articles has appeared for sale in the prices-current of brewers'-druggists. To bring beer forward, as it is technically called, or to make it hard, a portion of sulphuric acid is mixed with it, which, in an instant, produces an imitation of the age of eighteen months; and stale, half-spoiled, or sour beer, is converted into mild beer, by the simple admixture of an alkali or an alkaline earth; oyster-shell powder, and subcarbonate of potash, or soda, being usually employed for that purpose. In order to show that these deceptions are not imaginary, Mr. Accum refers to the frequent convictions of brewers for those fraudulent practices, and to the seizures which have been made at different breweries of illegal ingredients—a list of which, and of the proprietors of the breweries where they were seized, he has extracted from the Minutes of the Committee of the House of Commons, appointed to Inquire into the Price and Quality of Beer. It may be observed, that while some of the sophistications of beer appear to be perfectly harmless, other substances are frequently employed for this purpose which are highly deleterious, and which must gradually undermine the health of those by whom they are used.

Many other of the most ordinary articles of consumption are mentioned by our author as being the object of the most disgusting and pernicious frauds. Tea, it is well known, from the numerous convictions which have lately taken place, has been counterfeited to an enormous extent; and copper, in one form or another, is the chief ingredient made use of for effecting the imitation.

The practice of adulterating coffee, has also been carried on for a long time, and to a considerable extent, while black and white pepper, Cayenne pepper, mustard, pickles of all sorts, have been all of them debased by an admixture of baser, and, in many cases, poisonous ingredients. Ground pepper is frequently sophisticated by an admixture from the sweepings of the pepper warehouses. These sweepings are purchased in the market under the initials P. D., signifying pepper dust. ‘An inferior sort of this vile refuse (Mr. Accum observes), or the sweepings of P. D., is distinguished among venders by the abbreviation of D. P. D., denoting dust, or dirt of pepper dust.’

Of those various frauds so ably exposed in Mr. Accum’s work, and which are so much the more dangerous, as they are committed under the disguise of an honourable trade, it is impossible to speak in terms of too strong reprobation; and in the first impulse of our indignation, we were inclined to avenge such iniquitous practices by some signal punishment. We naturally reflect, that such offences, in whatever light they are viewed, are of a far deeper dye than many of those for which our sanguinary code awards the penalty of death—and we wonder that the punishment hitherto inflicted, has been limited to a fine. If we turn our view, however, from the moral turpitude of the act, to a calm consideration of that important question, namely,—What is the most effectual method of protecting the community from those frauds?—we will then see strong reasons for preferring the lighter punishment. We do not find from experience, that offences are prevented by severe punishments. On the contrary, the crime of forgery, under the most unrelenting execution of the severe law against it, has grown more frequent. As those, therefore, by whom the offence of adulterating articles of provision is committed, are generally creditable and wealthy individuals, the infliction of a heavy fine, accompanied by public disgrace, seems a very suitable punishment: and if it be duly and reasonably applied, there is little doubt that it will be found effectual to check, and finally to root out, those disgraceful frauds.

POISONING OF FOOD.

A Treatise on Adulterations of Food, AND CULINARY POISONS;

Exhibiting the Fraudulent Sophistications of Bread, Beer, Wine, Spirituous Liquors, Tea, Coffee, Cheese, Pepper, Mustard, &c. &c. And methods of detecting them.

BY FREDRICK ACCUM.

(*From the Literary Gazette, No. CLVI. 1820.*)

One has laughed at the whimsical description of the cheats in Humphrey Clinker, but it is really impossible to laugh at Mr. Accum's exposition. It is too serious for a joke to see that in almost every thing which we eat or drink, we are condemned to swallow swindling, if not poison—that all the items of metropolitan, and many of country consumption, are deteriorated, deprived of nutritious properties, or rendered obnoxious to humanity by the vile arts and merciless sophistications of their sellers. So general seems the corruption, and so fatal the tendency of most of the corrupting materials, that we can no longer wonder at the prevalence of painful disorders, and the briefness of existence (on an average) in spite of the great increase of medical knowledge, and the amazing improvement in the healing science, which distinguish our era. No skill can prevent the effects of daily poisoning; and no man can

prolong his life beyond a short standard, where every meal ought to have its counteracting medicine.

Mr. Accum acts the part of Dionysius with us; only the horse-hair by which he suspends the sword over our heads allows the point gradually to enter the flesh, and we do not escape, like Damocles, with the simple fright: yet it is but justice to acknowledge, that in almost every case he furnishes us with tests whereby we can ascertain the nature of our danger; and no man could do more towards enabling us to mitigate or escape from it.

Advising our readers to abstain from perusing the annexed synopsis till after they have dined, that they may have one more meal in comfort ere they die, we proceed to the various heads under which the author ranges his dread array,

Devoted to disease by baker, brewer, grocer, &c. the physician is called to our assis-

tance ; but here again the pernicious system of fraud, as it has given the blow, steps in to defeat the remedy.

It is so horribly pleasant to reflect how we are in this way be-swindled, be-trayed, be-drugged, and be-devilled, that we are almost angry with Mr. Accum for the great service he has done the community by opening our eyes, at the risk of shutting our mouths for ever.

His account of water is so fearful, that we see there is no wisdom in the well ; and if we then fly to wine, we find, from his analysis, that there is no truth in that liquid : bread turns out to be a crutch to help us onward to the grave, instead of the staff of life ; in porter there is no support, in cordials no consolation ; in almost every thing poison, and in scarcely any medicine, cure.

The work contains a great many excellent observations on the various sorts of water, and the modes of conveying and preserving them for use : it appears generally that leaden pipes and cisterns, and copper vessels are highly dangerous.

Good heavens ! we think we hear it exclaimed, is there no end to these infamous doings ? does nothing pure or unpoisoned come to our tables, except butcher's meat, which has been rendered far less nutritive than formerly, by new methods of

feeding ? Why, we must answer, hardly any thing : for our author proceeds to shew that *cheese* (Gloucester he mentions) has been contaminated with red lead, a deadly poison mixed with the colouring anotto, when that article was scarce : that *pepper* is adulterated with factitious pepper-corns "made up of oil-cakes (the residue of linseed, from which the oil has been pressed), common clay, and a portion of Cayenne pepper, formed in a mass, and granulated by being first pressed through a sieve, and then rolled in a cask ;" and further, that "ground pepper is very often sophisticated by adding to a portion of genuine pepper, a quantity of pepper dust, or the sweepings from the pepper warehouses, mixed with a little Cayenne pepper. The sweepings are known, and purchased in the market, under the name of P.D. signifying pepper dust. An inferior sort of this vile refuse, or the sweepings of P.D. is distinguished among vendors by the abbreviation D.P.D. denoting, dust (dirt) of pepper dust."

As we read on, we learn the method of manufacturing adulterated vinegar, adulterated cream, adulterated lozenges, adulterated mustard, adulterated lemon acid, poisonous Cayenne, poisonous pickles, poisonous confectionary, poi-

sonous catsup, poisonous cuscards, poisonous anchovy sauce, poisonous olive oil, poisonous soda water; and, if not done to our hands, of rendering poisonous all sorts of food by the use of copper and leaden vessels. Suffice it to record, that our pickles are made green by copper; our vinegar rendered sharp by sulphuric acid; our cream composed of rice powder or arrow root in bad milk; our comfits mixed of sugar, starch, and clay, and coloured with preparations of copper and lead; our catsup often formed of the dregs of distilled vinegar with a decoction of the outer green husk of the walnut, and seasoned with all-spice, cayenne, pimento, onions, and

common salt—or if founded on mushrooms, done with those in a putrefactive state remaining unsold at market; our mustard a compound of mustard, wheaten flour, cayenne, bay salt, raddish seed, turmeric, and pease flour; and our citric acid, our lemonade, and our punch, to refresh or to exhilarate, usually cheap tartareous acid modified for the occasion.

Against all these, and many other impositions, Mr. Accum furnishes us with easy and certain tests: his work, besides, contains many curious documents and useful recipes; and it is replete with intelligence, and often guides to the right while it exposes the wrong.

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