

A SCIENTIFIC SUBJECT.

FOR THE FARMER, THE MILLER
AND BAKER.CITY BAKERY, Springville,
Sept. 2d, 1879.

Of all articles of food, bread is the most important, it is literally the staff of life. Entering into almost universal consumption, it is of the highest consequence that it should in its constituents and quality be both healthful and nourishing, and that it should serve in the fullest manner the food uses for which it was designed, not only is the introduction of deleterious and destructive mineral matter to be avoided, but the materials used should be manipulated according to the best known methods with enlightened regard to the chemical or other laws which are involved in its manufacture into bread, for nothing is more certain that there can be no high attainments in civilization, no illustration of the brightest qualities of human nature, when the food consumed is impure, or deficient in its best nutritive elements. The question of the source and the quality of the things we eat and drink is of supreme importance, not only hygienically, but in its relations also to domestic comfort and social development. In tropical countries where nature supplies infinite varieties of food without any intervention of human skill, such as in Ceylon, where the hungry may appease the clamor of appetite by plucking the fruit of the palmyra palm or the coconut tree, finding oil and wine in the latter as well as more substantial nourishment, or where, as in the Pacific Islands, the indolent housekeeper may gather from the bread-fruit tree, or the yack, a repast of bread and pudding already prepared for the table, the matter of food and drink can never occasion any great anxiety. Not so with the toiling millions of Europe and America who make wheaten bread the leading staple of diet, and to whom the commercial baker is an absolute necessity. Of all the small grains the wheat is the most wonderfully formed and the best and most nutritious bread is that made from wheat flour. It is one of the best gifts of God to man, and should never be murderously handled, neither by the farmer, the miller nor the baker. The gluten which is the flesh forming principle of the grain may be destroyed in the hands of the farmer through ignorance of its nature and carelessness in its proper management before coming to the hands of the miller. In a country such as Utah where a great many are driven to farming for want of other employment more suited to their taste in the various industries not yet created, such are not supposed to know all that they should know in regard to the proper management and preservation of wheat. The clerk of the weather has something to do with this, in the case of a wet and stormy harvest season. If the farmer has more irons in the fire than he can attend to, the wheat may lie on the ground until it gets thoroughly damp, hurriedly threshed and thrown into a bin from four to six feet deep. In this case it gets heated and sprouted and the most valuable part, the gluten of the grain, is destroyed, or partially so and is unprofitable, except for chop feed to the miller, and even when but a small portion of such wheat is mixed and milled with sound wheat it is not only unprofitable but a terror and a grievance to the practical commercial baker. If I knew anything about the preservation and proper treatment of the wheaten grain it should be conveyed in a sound dry state to a well aired granary, spread upon a clean, solid, wooden floor not more than two feet deep, with sufficient space at one end of the room to admit of its being turned completely over from end to end with a light wooden shovel as often as the variations of weather at the different seasons of the year require it. This operation I have performed on many thousand bushels of wheat many years ago, as often as twice a month, and consequently make the suggestion to small farmers who have small accommodation for storing their wheat as single individuals, that it would be more safe and advantageous to have one large two-story house built in the most central part of each settlement as a granary, where two grades of wheat could be stored and taken proper care of, the inferior in

the lower and superior on the upper floor, so that the miller would know exactly what he was grinding, and the best and most profitable use it can be put to in milling it. One other item before closing with the farmer, i. e. the selection of seed wheat, in the choice of which the farmer, as would naturally be supposed, would use that producing the heaviest crop regardless of quality. Although knowing next to nothing of farming myself I have always been led to believe that fall wheat, especially that grown in warm and mild climates is heavier in proportion to measure and contains more gluten than spring sown wheat, and that the proportionate weight to the imperial bushel measure, is the correct test. The red Essex wheat of old England will reach as high as 66 pounds to the bushel, and although the climate of Scotland is not adapted for wheat raising, yet in one farming district there, called the Carae of Gourie, I have seen wheat raised that stood 67 pounds to the bushel measure. So that wheat grown in cold climates, if it contains an extra amount of gluten, owes it to the nature of the soil and manner of cultivation, and is the exception, not the rule. Until quite recently fall wheat has always been preferred for grinding into flour for bread by the mass of commercial bakers. It grows the slowest and is longest in the ground, and the proportion of gluten is much greater than in spring sown wheat. It is altogether preferable in our southern American climates, and the flour made from it brings a much higher price, while it is said to keep sweeter and free from weevil much the longest, and if scientifically and skillfully manipulated in the hands of the miller, proves a profit to the baker, and health to the consumer. It is the gluten of the grain that makes it superior to all other grains for its manufacture into bread, macaroni, vermicelli, crackers, etc., and forms the basis of the strength and vigor of fermentation, and likewise the elastic, tenacious adhesive property that holds the water, in solution, when made into dough, and by its elastic adhesive properties, forms a strong coating to the air cells containing the carbonic acid gas generated by the yeast plant, in the process of fermentation. By this it will be seen that the more gluten the flour contains the more water it will stand and the higher it will raise the bread, providing always that the yeast be sound, fresh and vigorous, and scientifically prepared. Farmers take care of your grain, the time is not so far distant as many of us imagine, when there will be a cry in the land for bread and every bushel of wheat will be worth its weight in gold.

THE MILLER.—No. 2.

As the interests of the miller and the baker are closely identified and inseparably connected, and both are to some extent responsible to the consumer, so far as bread made for the market is concerned, for the production of a wholesome and nutritious article of food, it may be as well to first describe the formation of a wheaten grain. A grain of wheat is a vegetable berry, consisting of a seed and its integuments. All of the central part of the grain is occupied by cells full of a powdery substance, which contains nearly all the starch of the wheat; outside this central starchy mass is a single row of square-like cells filled with a yellowish material, rich in nitrogen, or flesh forming matter, then follows six coatings or coverings, which contains most of the mineral matter, such as phosphates and potash. In the process of milling the berry is rolled between the burrs and these cells broken up, most of the central mass of the starch cells is pulverized, while the cells surrounding being of a harder substance are merely disintegrated, and form what is termed fine middlings. It is the aim and object of the miller to approach the two outer coatings as near as possible in the operation of disintegrating the wheat, in order to avail himself of the valuable properties contained in the part of the berry nearest the bran. The product of this grinding or rolling goes to the reels where the fine flour is separated; this fine flour is almost wholly starch, and branded XX. In first class mills, where a large per centage of XXX and XXXX flour is made for the market, they have all the latest improvements in machinery for regrinding and purifying the fine middlings, which con-

stitute the very cream of the wheat. Thus the XX or first flour is robbed of its gluten and sold under the name of family flour. In first class mills where they command all the latest improvements in machinery adapted for regrinding and purifying the fine middlings, it is rebolted along with the first flour and sold as new process or patent as the case may be. In the old school mills with old worn-out and broken-down machinery, and there are many such in this Territory, principally owing to the fact that until the advent of the continental railroad the people of Utah were isolated a thousand miles from the frontiers of civilization, and milling machinery had to be freighted across on ox or mule teams at an enormous expense, even the few, what may be called first class mills, set in operation of recent date, could not produce an article of flour to compete with that made in France 25 or 30 years ago; I do not write this from mere hearsay, but from actual knowledge of the fact, and experience of its manipulation and manufacture into bread at that period, but the quality of wheat used in the two countries must be put in the balance, as all over Britain and I may include France, the lowest ruling standard quality of wheat is set at 62 pounds to the imperial bushel measure, whereas in Utah it is considered fair from 58 to 60 pounds to the bushel, and much of it below that figure. What is not in the wheat cannot come out of it, and as a further offset France is the land of millstones and fine bolting cloth. The nature of the rock from which these millstones made being hard, flinty and porous, is specially adapted for milling purposes and is sent to all parts of the civilized world. As I have already remarked, there are many old school mills in Utah, the machinery of which is not adapted for new process milling. The proper methods for treating the wheat grain are somewhat reversed; instead of making the largest amount of middlings, as is done by new process milling, the largest possible amount of fine flour is abstracted from the first grade, and the result is, much of the cream of the wheat passes through the reels along with the shorts and is sold to feed the cows and hogs, and the baker gets the starch and but a very small portion of the gluten. There may be some exceptions made in favor of millers possessing more than ordinary skill in the peculiar dress of the burrs, upon which there has been much argument and discussion among the milling fraternity of late on the best manner and methods of stone dressing, in order to get as much of the most valuable constituents of the grain as possible, but the skill and machinery contrived must be there or this cannot be accomplished.

It is well known all over creation that the irrepresible Yankee cannot be satisfied short of diving into the very guts of things in search of information on all topics, especially that affecting his stomach and the acquisition of the almighty dollar, and as no machine has yet been invented that will take the wheat kernel clean out of the hull, it may be interesting to give a brief abstract of the much discussed Jones process, as taken from *Leffel's Illustrated Milling and Mechanical News*: The process was patented in Great Britain in 1877, and in this country in July, 1878. The invention relates to the preliminary treatment of grain preparatory to the final manufacture of the same into flour, the object being to improve the color and general quality of the flour, and consists essentially in disintegrating the offal from the flour and middlings by first subjecting the grain to the action of two peculiarly dressed millstones, whereby the offal is completely cleaned of all flour properties, and consequently an increased amount of middlings is obtained at one operation; hence passing the grindings through a reel of graded bolting cloth, by means of which, the flour, offal and bran are successively separated from each other, and subsequently the bran is intermixed with the pure flour, preparatory to the bolting of the same in the graded reel, to prevent its adherence to the bolting cloth during the latter process, thus freeing the flour from all deteriorating substances before regrinding the same, whereby a whiter and in every respect superior quality of flour is obtained. The first part of the process is accomplished by the peculiar dress of the

millstones, and consists principally in providing the stone with a centrally inclined circumferential depression round the eye, and comprising one fourth more or less of the area of the stone. The area of the stone is divided into a number of lands, some terminating in an angle at the eye of the stone. These as well as the intermediate lands diminish in width from the curb inwards, so as to allow the offal to be completely cleaned of its flouring properties. The furrows are arranged at such relative pitch or draft, and gradually widen towards the centre of the stone, that the outer lands are caused to terminate. The adjacent surfaces of the contiguous stone may be formed with a corresponding central depression, and thus form with the same an outward wedging receptacle for the grain, in which it is granulated instead of ground, and gradually disintegrated from the offal before it reaches the lands or grinding surfaces proper. The middlings escape thence through the furrows to the curb, and the bran is completely cleaned by the whipping action created by the beveled grinding surfaces in conjunction with the wide furrows. Ordinary millstones have the land proportionately larger than the furrows, and consequently cause, by the increased friction of said surfaces, the grindings to become heated. Since this impairs the color and general quality of the flour, various devices, such as blast exhausts, etc., have been resorted to for the purpose of ventilating and cooling the same. But since the furrows in these stones were proportionately too small, it has been found difficult to accomplish the object sought. By this invention the ingress of air at the eye is enlarged by the central depression, and the area of the furrow surfaces is so predominant over that of the land as to give free vent to the air. Besides this the proximity of the adjacent surfaces of the two stones is less, and thus further facilitates the ventilation and accomplishing the desired object. For the purpose of preventing gumming and glazing of the surfaces of the stone and maintaining the natural grit of same, and thus promoting the operation of the invention, he applies to the whole surface of the stone an ingredient consisting of diamond quartz or corundum in sufficient quantity to cover the lands and furrows, which completely obviates the said deteriorating effects upon the stone. The second part consists in a bolting cloth graded so as to expel all the flour; and the second and similar portion of such so graded as to emit the offal, the bran escaping at the end of the reel, and thence either passes direct to a worm or encased conveyor, or through an interposed bran duster. The worm is located underneath the reel inside the conveyor, and is of proper length to convey the bran to the flour conveyor, where it becomes intermixed with the flour, and carried with the same to the graded flour bolt to be re-bolted. By this intermixture of the pure bran with the flour, the adhesion of the flour to the bolting cloth is prevented, and the color of the flour materially improved, producing a clear article.

By the foregoing description of Jones' improved method of milling, it will be seen that, next to the thorough smutting and perfect cleaning of the grain, preparatory to granulation or grinding, is the dress of the stones, presenting a wide field both for the would be professional and the novice to study, before undertaking the conduct of a flour mill, and that the man who adopts the milling business as his trade, if he would attain to any degree of proficiency in the art, will find it must be one thing at a time, and always remembering the words of Pope,

So wide is art, so narrow is human wit,
One science only will one genius fit.

THE BAKER. No. 3.

The antiquity of bread-making as an art, so far back as the days of Pharaoh, may be clearly established, although as to the various methods of its preparation in early historic times our information is comparatively scanty and indefinite, suffice it to say the art of cookery being brought to a high state of perfection in our flesh-eating nations of modern times, with them it would seem, the art of good wholesome bread making is an object of secondary importance. While the average American must have his flesh meat at all of the

three meals, the English laborer and mechanic can dine sumptuously on crusty bread and cheese and wash it down with a pot of ale; the laboring poor of Scotland, until a quarter of a century ago knew but little of the luxury of wheaten bread, their leading staple article of diet being oatmeal made in the form of mush and cakes for breakfast, and pearl barley or potato soup for dinner, boiled with a variety of vegetables. And only the well to do tradesman could afford meat at the dinner meal, and for the last half century the oatmeal fed mountaineers or Scottish Highlanders have furnished the backbone of the British army, a race of hardy men who have figured very prominently in all battles, for their prowess and bravery in taking strong forts and breaking up cavalry at the point of the bayonet. And of more recent times the potato fed Irishmen have furnished the bone and sinew for the hard labor in the construction of railroads. As it is on the manufacture of wheaten bread and the various methods of manipulation employed in its production that I wish to write, I may remark by the way, that the oatmeal, once the leading article of diet of the canny Scot, is now almost entirely displaced, except in the outlying farming districts, by the use of wheaten bread as a staple article of food. Some idea may be formed of the extent of its consumption by the laboring classes by reference to the bakery situated at Crossmyloof in Glasgow, said to be the largest in the world, which, at recent date, had 30 ovens in operation, each having a baking capacity of from 800 to 900 pounds of bread in a batch, and each of these ovens may be three times filled in the 24 hours. A number of bread vans are employed to ship the bread as soon as baked to all parts of the city, to retail stores and private customers, the people being entirely dependant, or almost, upon the practical baker for their supplies of bread cakes and pastry, is more reduced to a regular science in their manufacture, whereas with us in America every family does its own bread and pastry work, and from abundance of material at command, excels in quality, that of most American commercial bakers, especially for its purity in the absence of adulteration with deleterious drugs, although it may be shown that more destructive mineral matter is voluntarily swallowed in our American household economy than any people in the world, from the fact that baking powders are largely substituted for yeast in bread raising purposes. These powders are composed in most part of carboda, carbammonia and cream of tartar. Before the days of baking powder, and even now in many families, cream of tartar and soda were purchased separately from the grocer, and a baking powder extemporized in each kitchen, but the lack of skill in the blending of the materials, resulting in lumps, led manufacturers to ascertain the proper proportions of the two salts and to mix them, selling the compound as baking powder, the manufacturers claiming that the cream tartar sold in the shops is very variable, and that nothing short of a chemical analysis will determine the quality and strength of this article in each sample; this the householder is not able to do for himself and is therefore unable to combine with it the proper proportion of soda, but the manufacturers by no means confine themselves to the use of pure cream of tartar. In order to supply a cheap article, they generally introduce alum as an ingredient, some samples of which contain as high as 29 per cent of this adulterant. Alum, the sulphate of alumina, is a powerful astringent salt, and as found in bread after baking, its active principle after baking, remains in such a condition as to be easily dissolvable in the gastric juice after having entered the stomach; when taken internally, it produces constipation, griping, and in sufficient quantities, vomiting and inflammation of the gastric entric mucous surface. A healthy, growing boy or girl will eat, on an average, one pound of bread a day, or one hundred pounds in fourteen weeks, which, taking the amount of alum adulterant, at the very low rate of two per centum, we find that every child eating adulterated bread, has devoured two pounds of alum in three months. Any one who will hold a piece of alum on the tongue for a few minutes and