

when the dough is baked the escape of the carbonic acid gas vesiculates the bread. This process is worked in London under Dr. Daughlish's patent, and extensive machinery for making this bread has been erected by Messrs. Peak, Frean & Co., Dockhead. It is called Aërated Bread.

Both forms of vesiculated bread are adapted for general use. In certain morbid conditions of the stomach fermented bread undergoes changes which are productive of inconvenience, and which is prevented by unfermented bread.

#### BARLEY, (*Hordeum distichum*.)

Next in importance to Wheat amongst the cultivated grains of this country is Barley.

The barley-plant, like wheat and oats, belongs to the natural order of grasses (*Graminaceæ*). Although there are several species of the genus *Hordeum*, to which barley belongs, it is probable that all the varieties cultivated belong to the species *Hordeum distichum*. This plant appears to be a native of Asia, but it has a remarkable power of adapting itself to a great range of temperature, and it has a wider distribution than either wheat or oats. On the eastern continent its culture extends from 70° north latitude to 42° south, whilst in America its culture reaches as far as 20° to 62° north latitude.

Its use as an article of food is coeval with the history of man, and we learn from the Sacred Writings that it was cultivated and used as food by the Israelites from the earliest period of their history.

The grain of the barley is used in this and other countries of the world for two purposes; first for food, and second for making beer and distilled spirits. As a food barley is less rich in starch and nutritive matters than wheat. It contains a large quantity of ashes, and its meal makes agreeable cakes, which at one time were consumed largely as food by the population of Great Britain. Barley cakes are still eaten in Yorkshire; and the barley, deprived of its husks, is used in cookery under the name of "pearl barley."

The great consumption of barley in this country is in the making of malt. In this process the barley is allowed to germinate; the starch of the seed is changed into sugar, which is subsequently converted into alcohol by fermentation in the manufacture of beer. In this way upwards of 5,000,000 of quarters are annually consumed in Great Britain.

Barley yields a greater produce per acre than any other grain except rice. The counties in England in which it is chiefly cultivated are Norfolk, Suffolk, Cambridge, Bedford, Herts, Leicester, and Nottingham. In Spain, Sicily, the Canaries, Azores, and Madeira, two crops are produced in the year.

In chemical composition, Barley and Wheat are much alike; but Barley does not form such a fine and spongy bread as Wheat, although it is equally nutritive: 100 parts contain:—

Water .....	140	} or {	Water .....	140	} Carbon
Gluten .....	128		Flesh-formers .....	13.0	
Starch .....	480		Heat-givers .....	69.5	
Sugar .....	3.8		Mineral Matter .....	3.5	
Gum .....	3.7				
Fat .....	0.3				
Fibre .....	13.2				
Ashes .....	4.2				

The Case shows the quantities of these ingredients found in 1 lb. of Barley.

1. Barley containing 14 parts of water—1 lb.
1. a. Pot Barley got from 1 lb. of Barley—11½ oz.

2. Water obtained from 1 lb. of barley—2½ oz.
3. Gluten obtained from 1 lb. of barley—2½ oz.
4. Starch obtained from 1 lb. of barley—7½ oz.
5. Sugar obtained from 1 lb. of barley—½ oz.
6. Gum obtained from 1 lb. of barley—½ oz.
7. Fat obtained from 1 lb. of barley—⅓ oz.
8. Fibre obtained from 1 lb. of barley—2½ oz.
9. Ashes obtained from 1 lb. of barley—½ oz.
10. Carbon in 1 lb. of barley—6½ oz.

Barley Meal was formerly much used in England for making barley cakes, and at the present day barley flour is found to be a useful, nutritious food for children, on account of its laxative action.

#### OATS.

The Oat is largely consumed in Great Britain as food. Its preparations and analyses are exhibited with the following label:—

The most commonly cultivated species of Oat is the *Avena sativa*, a plant belonging to the natural order of grasses (*Graminaceæ*). Other species of oats are known by the names of *Avena nuda*, the naked Oat pilcorn, or peelcorn; *Avena orientalis*, the Tartarian Oat; *Avena brevis*, the short Oat; and *Avena strigosa*, the bristle-pointed Oat. Only the two last are found wild; and some writers suppose that all forms of oat have taken their origin in the last, which is found wild abundantly in corn-fields all over Europe.

The oat is a much harder plant than either wheat or barley, and ripens its fruit in higher northern latitudes. An insular climate is adapted to its growth, hence it has been extensively cultivated in the British Islands, more particularly Scotland where the best oats are grown.

The oat, like other cereal grains, is well adapted for human food, as it contains the mineral, flesh forming and heat-giving constituents, which are essential to food. The following comparison by Johnston of the composition of the oat with wheat and maize will show the relative quantities of the most important constituents of these plants.

	Wheat Flour.	Bran.	Oat meal.	Indian Corn Meal.
Water .....	16	18	14	14
Flesh-formers .....	20	18	18	12
Heat-givers {	Starch .....	2	6	8
	Fat .....	62	63	62
	100	100	100	100

Oatmeal is not so digestible as wheaten flour or whenen meal, hence persons whose occupations are sedentary prefer the latter; but for those who work or take exercise in the open air, oatmeal is a more economical and strengthening diet than wheaten flour. Oatmeal cannot be made into bread, and is usually eaten in the form of a cake or oatmeal porridge. The latter is usually eaten with milk, and is then a very nourishing and healthful article of diet.

Nearly twice as much oats as wheat is raised in the United Kingdom, but comparatively small quantities are imported. Their large consumption depends on their being used as the principal food for horses.

Oats, in the form of Oatmeal, are rich in flesh-formers and heat-givers, and serve as a nutritious