

Bone.—A very simple experiment will exhibit the composition of bone.

1. Take a bone from a ham, or a leg of mutton, or even so small as that of a rabbit, and place it in a drain pipe just big enough to hold it, stopping up the ends of the pipe with clay, so that no air can enter. Place the whole in a fire that will maintain it a red heat for several hours. On examination of the bone when cool, it will be found to be so brittle as to be easily crushed to a powder and to have lost weight. This powder consists almost entirely of phosphate, carbonate of lime, which, among the lot, contain the chemical elements calcium, phosphorus, carbon and oxygen, all of which are therefore necessary in the food.

2. Take a similar bone in a basin and pour in dilute hydrochloric acid. After several days, the bone will be found to have lost its rigidity and much of its weight, and can, therefore, be easily bent.

The nature of this soft, flexible material which remains can be demonstrated by boiling it for a long time in water, when it will yield a large quantity of *gelatin*, which is a nitrogenous compound.

These experiments prove that bone consists of a framework of animal matter, together with salts of lime. By burning, the animal matter is removed; by treating with acid, the mineral substance is dissolved.

Connective tissue, like bone, yields gelatin as the result of very long boiling in water. As the water cools, it forms a jelly.

Cartilage, or gristle, similarly boiled, yields what is known as *chondrin* which is not unlike gelatin.

The composition of gelatin and chondrin is shown below :

| | Percentage comp. of <i>Gelatin</i> and <i>Chondrin</i> . | |
|----------------|---|--------|
| Carbon | 50.76 | 47.73 |
| Oxygen | 23.21 | 31.04 |
| Nitrogen | 18.32 | 13.87 |
| Hydrogen..... | 7.15 | 6.76 |
| Sulphur..... | .56 | .60 |
| | 100.00 | 100.00 |

Flesh owes its red appearance partly to the blood which it contains, and partly to the natural colour of the muscular fibres of which it is made up.

When lean meat is "boiled to rags," the envelopes of connective tissue, which surround not only the entire muscles but the individual fibres of which they are built up, are destroyed. The separate fibres can be taken out with a pin.

The chief ingredient of muscular fibre is *myosin*, a nitrogenous substance, which forms a very large proportion of the compound, *syntonin*, which is obtained from lean meat by the use of dilute acids.

Minute quantities of other substances may be obtained from the muscles, the best known probably being *kreatin*, a nitrogenous, crystalline substance which is said to form most of the nitrogenous waste of living muscle, leaving the tissue before its conversion into *urine*. Muscle contains 75 o/10 of water so that 4 lbs of lean meat will yield 3 lbs of water.

Fat.—This material, as it is accumulated in the animal body, is made up of oily, fatty materials stored up in minute cells which are bound together by a network of connective tissue. Expose a piece of suet before the fire, and it will be seen that the fat drips and trickles off while the skinny material, or connective tissue, is left hanging.

The common fats found in the animal body are stearin, palmitin, and olein. The first is abundant in hard fats, such as mutton fat, and is used for making candles. The second occurs in palm oil, and olein is found in olive oil in large quantities.

These fats are found also in large quantities in milk.

A. H. PLUMMER,

Model-Farm, Compton Que.

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