THE CHEMISTRY OF ANIMAL SUBSTANCES.

Every person possesses an interest in knowing something about the chemistry of his own body. We have condensed the following from a chapter of Professors Brande & Taylor's Chemistry, a most clear and comprehensive work, recently published by Blanchard & Lea, Philadelphia.

The human body is partly composed of mineral substances, which are called inorganic; and are chiefly found in the bones. It is mostly built up however of organic substances which are the product of growth, and dependant upon life for their development. They are very peculiar in their character, and have received the name of nitrogenous substances, and nitrogenous principles, because nitrogen is one of their principal elements. Neutral nitrogenous substances are found in the vegetable and animal kingdoms; in the former they are represented by gluten, albumen, casein or legumin; and in the latter by fibrin, albumen, casein, and gelatin. In addition to carbon, hydrogen, and oxygen, they all contain nitrogen, and the greater number contain variable quantities of sulphur and phosphorus: but animal gelatine contains neither of these two elements. These nitrogenous principles are important as articles of food to animals, and are frequently described as flesh-forming substances, in order to distinguish them from the neutral compounds of the three elements—carbon, hydrogen, and oxygen, of which starch, gum, and sugar are composed, and which according to modern theory are only heat-producing. There is no material difference in the composition of these substances, whether they are direct from the animal or the vegetable kingdom. Albumen is composed of C 54.8: H 7.1: O 21.2: N 16.9 (carbon, hydrogen, oxygen, nitrogen). Casein is composed of C 54.9: H 7.1: O 22 2: N 15.8. Gluten C 55.2: H 7.5: O 21.4: N 15 9. Fibrin C 54 6: H 6.9: O 22.8: N 15 7. There is also about one per cent of sulphur and phosphorus in the above substances. All of these when out of the living body undergo spontaneous changes when exposed to moisture in the atmosphere. In a state of transition, offensive effluvias are evolved from them, and this change is called putrefaction.

Putrefaction of Animal Constituents.—The conditions of putrefaction should be generally understood. At very low temperatures animal substances do not putrefy, and it is the same with them at elevated temperatures. An elephant was found in a good state of preservation in Siberia, among ice, where it had remained perhaps for thousands of years. In the warm dry climate of South America, cattle are killed in the open air, and in a very short period the flesh dries, and may be kept in that state for months without becoming decomposed. A condition essential to putrefaction is moisture. When flesh is carefully dried by a current of warm dry air, it resists decay, and retains its nutritive powers. The various forms of gelatin and albumen when desiccated are imperishable, but in a solution of water, or in a moist state they are the most perishable of all animal proximate principles. Air promotes putrefactive changes, but flesh may be preserved fresh in some gases, such as the deutoxide of nitrogen for months. When meat is immersed in water that has been boiled to expel all the air from it, and is then covered with a layer of sweet oil, it may be kept fresh for a long time. In warm weather therefore meat should be kept in a dry cool place. The most favorable temperature for putrefaction ranges from 70° to 100° Fah.

Preserving Meats and Vegetables.—Partially boiled or roasted meat, free from all taint, and half dressed vegetables, are introduced into a tin canister, which is then soldered up, with the exception of a small hole in the lid. The canister is then placed in a bath of boiling salt brine, which is heated a few degrees above the boiling point of water, and when it is noticed that steam issues copiously from the aperture, the canister is lifted, and the hole in the lid instantly filled with a drop of solder, thus hermetically sealing the vessel. The success of this operation is indicated by the end of the canister becoming slightly concave by the pressure of the atmosphere upon it. Meat thus preserved has kept fresh for twenty years. Pure butter melted and brushed over the surface of fresh meat preserves it from contact with the air, and it will remain unchanged for a much longer period than when exposed to the air. Vinegar containing a few drops of creosote brushed over fresh meat, will also preserve it from decomposition for several days during warm weather.

Animal substances, such as birds, &c., may be preserved for scientific purposes for years in a solution composed of 4 ounces pure salt, 2 ounces alum, 2 grains corrosive sublimate, 1 quart water. This solution is poisonous. It is useful to taxidermists, and for those who wish to prepare skins without removing the fur.

Albumen.—This term is applied to an organic principle, which is most widely diffused in the animal body. It exists as a liquid in lymph, chyle, milk, and in the blood (of which it forms 7 per cent); in the salivary, and pancreatic fluids; the humors of the eye, and in the brain. As a solid, it is a constituent of the skin, brain, nerves, glands, and cellular membrane; and is the chief component of horn, the nails, hair, feathers, wool, and silk. Albumen also occurs in the juices of various vegetables, such as the potato, carrot, turnip, cabbage, &c. It is a constituent of seeds, grasses, almonds, and most of the oily nuts. It generally abounds in the shoots of young plants. The white of eggs is composed of albumen and water, contained in a very delicate membrane. It may be separated from the cellular membrane, by agitation, in 4 parts of cold water, and when filtered it becomes very clear. When heated to 160° Fah., it coagulates, and becomes white and hard. When 100 parts of egg-albumen are evaporated in vacuo, a residue of from 10 to 15 parts solid albumen remains. The white of egg is called globulin; the yelk vitellin. The latter contains 37.1 per cent of albumen; the former 12 per cent. A yellow oil, containing a little phosphorus, gives the yelk its yellow color.

Seralbumen.—This exists in the serum of the blood. It resembles the white of the egg in all its chemical properties. When heated to 170° Fah., it coagulates, forming a white substance, like that of a hard boiled egg. The cause of its coagulation by heat is not well understood. Before coagulation, it is soluble in cold water; but heat renders it insoluble. It is a remarkable substance, changing in an egg during incubation, from a soluble to an insoluble state; afterwards to be converted into feathers, beak, claws, and cellular membrane, in the chicken. Chemistry cannot account for this metamorphosis. Lime combines with albumen, forming a plastic cement, which is employed for luting the glass retorts of chemists, as it resists the action of acid fumes.

Serum, and the white of egg, are coagulated by a large number of metallic salts, such as those of iron, copper, lead, mercury, silver, and antimony. Hence, albumen is a valuable antidote in cases of poisoning by these substances—especially to corrosive sublimate.

Under the name of globulin, albumen constitutes the transparent humors of the eye, including the crystalline lens. It is also associated with the coloring matter of the blood. The substance called ptyatin, is a modification of albumen existing in saliva. It possesses the property of transforming starch, and dextrine, into grape sugar, when heated for a short period of time to 100° Fah. Pyin is an albuminous principle, found in pus. It is a formidable poison, as also is echidnine—the poison of snakes—which is similar in its chemical constitution. Albumen is a most remarkable organic substance. No other we believe, assumes so many forms and states. In the white of the egg, and in the human eye, it is transparent as the diamond; while in the hoof and horn of the animal, and the shell of the tortoise, it becomes harder than timber. In wool it forms the fiber which makes our broadcloth, and in feathers, the soft down that clothes the neck of the swan.

Vegetable albumen is generally associated with gum, sugar, starch, or oil, in the vegetable kingdom. It may be procured by macerating the succulent shoots of young plants, such as turnips, &c., in cold water; allowing the liquid to become clear, by subsidence; then filtering. It has all the properties of a weak solution of egg-albumen.

Casein.—This term is applied to the coagulable principle of milk; and forms cheese. A similar substance is occasionally found in the blood, and in the pancreatic liquids of the ox and sheep; it also occurs in vegetables. It can be procured from skimmed milk by heating it to 150° Fah., and adding a few drops of acetic acid. It is then thoroughly washed, and digested in boiling alcohol, to deprive it of oil. Thus obtained, it is white, and opaque; resembling coagulated albumen, but less firm. It is without odor or taste; and is insoluble in water or alcohol; but soluble in solutions of the alkalies, and common salt. Its compounds with the metallic bases are insoluble in water. Hence, milk is an antidote for poisoning by the salts of copper and lead; and it has been used successfully in some cases of poisoning with arsenic. Casein called legumin, is abundant in peas, beans, and the seeds of leguminous plants, being associated with starch, albumen and oil. It may be obtained from peas, by digesting these in a mealy state in tepid water, for two hours; then allowing the starch to subside, and filtering the liquid. It does not coagulate by heat; but forms a clear viscid solution. It usually contains about 0.36 per cent of sulphur. In making cheese, the milk should be heated to disseminate the oil through the mass, prior to curdling it; as cheese is tasteless and poor in quality, when the oil of the milk is separated from it. The deep, reddish color of some cheese, is no sign of richness; this being an artificial color imparted to it by annotto.

Gluten.—This is a term applied to the opaque, white, tenacious, and slightly elastic substance obtained from wheat flour, by washing and kneading it with cold water in a bag of cotton cloth. The starch in the flour is washed out with the water, leaving the gluten in the bag. It is capable of being drawn into long fibers, and when dry it becomes horny, forming the well known maccaroni. It is insoluble in water; in a partially decomposed state it forms yeast, and it induces alcoholic fermentation in saccharine liquids. The tenacious properties of dough and the paste of flour are due to it. It is more abundant in wheat and rye than other cereals, hence the flour of these grains is best suited for making raised or leavened bread. The quantity in wheat flour ranges from 7 to 14 per cent.

PERFUMES AND PERFUMERY.

Mr. Septimus Piesse, who has contributed many very interesting articles to the columns of the Scientific American, is one of the largest manufacturers of perfumery in England, in company with Mr. Lubin. Their establishment is in Bond street, London, and is a large and beautiful architectural structure, called the "Laboratory of Flowers." It has been lately visited by Charles W. Quin, F. C. S., who has given a description of his observations in the last issue of the *Chemist and Druggist*.

He states that the science of perfumery has greatly progressed of late years. Messrs. Piesse & Lubin have extensive flower farms near Nice, in the south of France, where they grow large quantities of roses, violets, and other odoriferous flowers, which are manufactured on the spot into greases, oils, ottos, and extracts. At Mitcham, in Surrey, England, they have large lavender gardens, besides an extensive bonded warehouse at the London Docks, where they make their perfumed spirits for foreign and colonial consumption. Their flower-gardens at Nice produce violets, roses, jasmine, tuberoses, jonquils, orange-blossoms, acacia, and numberless other fragrant flowers, from which scents are extracted principally by four processes—expression, distillation, maceration, and absorption or enfleurage.

The first process is used in the case of plants whose parts contain large quantities of odoriferous essential oil, such as lemon, orange, and citron peels. These portions of the plant are put into a press, consisting of an iron vessel of immense strength, fitted with a perforated false bottom, on which is placed the material from which the oil is to be expressed. A powerful screw, connected with a piston fitting into the vessel, and worked by a lever, squeezes out the liquid portions. The oil obtained is of course largely contaminated with watery extracts, from which it is separated by decantation. Distillation is adopted when the amount of essential oil is less than in the last instance. The distillation of oil of lavender may be taken as an example. The leaves are thrown into a still either heated by steam or by the