

which not only the indigestible cellulose has been removed but part of the starch and sugar and a large proportion of the gluten, which is the proteid material of the grain. Brown or Graham bread contains nearly all the nutritive elements of wheat and is much more nutritious than white bread. *Rye* is a valuable grain, containing nearly the same proportions of starch, sugar, fat and proteid as wheat. *Rice* contains more starch than the others and its starch is very digestible, but it has practically no fat and only the smallest quantity of proteid. Its nutritive value is small, and it requires an oil and some albuminoid to be taken with it in order to make it a suitable diet. *Maize* is more nutritious than rice, but is less digestible. It contains much starch and some fat, but is deficient in proteid material (gluten). *Oats* are rich in fat but contain less starch than the other grains, and require prolonged cooking to render them digestible. *Barley* ranks about as wheat, contains rather more proteid and is rich in phosphates and iron. It is highly nutritious and was the principal diet on which the Grecian athletes were trained. The *Potato* contains about 20 per cent. of a very digestible starch, is rich in salts and its juice is highly acid. It is an excellent antiscorbutic and is extensively used for food. *Arrow-root*, *Sago* and *Tapioca* consist almost entirely of starch, without fat or proteid, and are readily digested. *Peas* and *Beans* contain about 50 per cent. of starch and sugar, also 22 per cent. of legumin or vegetable casein, albumin, etc.—a very large proportion of proteid material, more in fact than exists in any kind of meat. They are rich also in fat and salts, and form the best vegetable substitute for animal food. They are somewhat indigestible and require prolonged cooking before being eaten; but they are an excellent food, alone nourishing both men and beasts for a long time.

The excessive consumption of starchy food delays tissue-metamorphosis, produces a superabundance of adipose tissue, and often causes acidity and flatulence. Undigested starch passes into the feces and the urine becomes saccharine in many cases. Profound disease does not necessarily follow, but if decided corpulence is produced the muscular fibres of the heart and many voluntary muscles decrease in size, the cardiac action becomes enfeebled and the usual results thereof are manifested. The deprivation of starch can be borne well for a long time if fat is taken with the food, but if both starch and fat are excluded and nitrogenous material is alone supplied, illness results in a few days. [See the article entitled ALBUMIN, page 94]

THERAPEUTICS.

The principal affections in which the carbo-hydrates are imperatively required are gastric disorders, diarrhea, dysentery, excessive secretion of bile and other hepatic disorders, Bright's disease, alcoholism, gout and rheumatism. In acute and continued fevers there is often an almost complete inability to take and digest any kind of food. This may last for weeks, the result being that the patient dies from so-called exhaustion, in reality starvation due to want

of fuel-food, the human fire going out in the absence of material to feed it. In such cases the need of soluble carbo-hydrate food must be supplied. Well-baked flour which contains much soluble dextrin, also milk-sugar or grape-sugar, should be added to the beef-teas which are so much used in the sick-room. Grape-sugar is digested starch and a very soluble carbo-hydrate; it may therefore be administered in lemonade or any other drink which the patient fancies. In gastric disorders accompanied by much acidity an uncrystallizable sugar like grape-sugar is preferable to cane-sugar or beet-sugar, the latter being crystallizable sugars and readily undergoing the acetous fermentation. In diarrheal conditions the proper food is milk with some digestible carbo-hydrate, as arrow-root, sago, or tapioca. Rice-water makes an excellent drink in diarrhea and dysentery, and has often arrested these conditions without medicinal aid. In the treatment of Bright's disease and chronic alcoholism a diet of carbo-hydrates should be inculcated and animal food reduced to a very small quantity. The same rule is imperative in the management of gout, especially when this disease occurs in persons of sedentary habits. In acute rheumatism the diet should be wholly non-nitrogenous, except for broken-down and debilitated subjects, or where serious nervous or cardiac complications exist.

Starch is medicinally inert. It is employed as a vehicle for medicated enemata, as an antidote in poisoning by iodine or bromine, and as a protective and absorbent powder applied by dusting over the skin. Mixed with glue it makes an excellent stiff bandage for surgical purposes.

Malt Extract, containing good food elements, is directly nutritive, and indirectly so from the presence of the ferment Diastase, which converts the starch of bread or other farinas into sugar. It is usefully employed in wasting diseases, and mixed with milk or oleaginous foods it aids their digestion and assimilation. It may be used to form a syrupy mixture with preparations of Iron or Cinchona.

Cetraria is nutrient, demulcent and feebly tonic. It has a popular reputation in pulmonary affections and is of value in chronic catarrhs, chronic bronchitis, purulent discharges from mucous surfaces generally, also in chronic diarrhea and dysentery.

ANIMAL EXTRACTS.—The organs, tissues and secretions of animals were extensively employed as medicinal agents in ancient times, and many of them were official in the pharmacopœias of the last century. At present the only ones recognized in the U. S. Pharmacopœia are the digestive ferments (pepsin and pancreatin), ox-gall (*fel bovis*), the secretion of the preputial follicles of the musk-ox (*moschus*), and the suprarenal and thyroid glands of the sheep. The first definite attempt in recent regular practice to apply animal tissues to the cure of disease was made in 1852 by Dr. Jackson of Philadelphia, who used as a tonic the blood of bullocks carefully dried *in vacuo*, giving 5 to 10 grains thereof at a dose. Since then the drinking of fresh bullocks' blood has become a common practice in certain diseases. Raw meat was administered as a remedy for diabetes at St. Bartholomew's Hospital in London in 1874. The powdered Russian cockroach (*Blatta orientalis*) is still used as a diuretic

in dropsies, and preparations of the bodies of various spiders and toads, also bee and serpent venoms, are recognized remedies in homeopathic practice.

The use of glandular extracts as remedies in disease is very old. It was revived in 1889 by Brown-Séguard's advocacy of orchitic (testicular) extract for impotence and several nervous affections, and was profoundly stimulated by the results of Dr. Murray's suggestion in 1891 of thyroid extract for the cure of myxedema. According to the theory promulgated by Brown-Séguard, all glands, in addition to their ordinary secretions, elaborate certain materials of unknown chemical composition, which pass into the blood and perform therein definite functions of some kind. We now know that such is the case with the thyroid gland, we suspect that it is equally true of the thymus, the spleen and the adrenals, and we have reason to believe it highly probable that the other glands of the body exert influences heretofore unsuspected over distant parts of the organism.

The effect of the entire removal of the thyroid, the pancreas or the adrenal glands is to produce the symptoms of characteristic and fatal disorders; but if a portion of either gland be left behind these toxic symptoms do not develop, and the same is true of the thyroid and pancreas if, after their entire ablation, a portion be engrafted upon the peritoneum. It is evident therefore that the disorders so produced are of auto-toxic origin, the result of chemical poisons in the blood which were previously neutralized, destroyed or eliminated by the removed gland or some of its secretions. It has also been shown that the subcutaneous injection of an aqueous extract of the dead gland will dispel the toxic phenomena which follow the removal of that gland, proving that the active principle thereof is a chemical substance existing in the gland itself, and that the previous immunity was not due to any action of its living cells other than that required to produce the active agent. The discovery that ablation of the testicles causes retrogression of the hypertrophied prostate, and that removal of the ovaries will cure osteomalacia, as also the long-known facts that castrated individuals usually grow very obese and develop massive skeletons, while giants are generally endowed with atrophied testicles,—clearly point to the same conclusion.

The animal extracts form a group of active medicinal agents which are worthy of careful investigation both physiologically and clinically. The study already given to them has yielded much new knowledge, and has shown indubitably that their employment as therapeutic agents rests on a scientific basis; but most of them are as yet on trial, and the limits of their utility in medicine are by no means defined. They contain leucomaines, extractives and other chemical substances, all of which possess physiological powers, many proving distinctly poisonous when their excretion is prevented. Excepting thyroid extract and perhaps some others, the animal extracts are active medicinally only when injected subcutaneously or by the rectum, as most of them are destroyed or altered in the stomach, or prevented by the liver from entering the

general circulation. Physiological chemists are endeavoring to separate their active principles, a line of research which promises more accurate and positive results. It is already demonstrated that some of their principles are the most powerful of all alteratives, and that others possess the most energetic action upon the muscular fibres in the walls of the arterioles.

The initial doses of many animal extracts should be very small, in order to avoid the possible systemic disturbance which has been frequently noticed by clinical observers as following on their administration.

Sodium Phosphate in solution, administered hypodermically, is considered by Luton and Crocq, of Rheims, to be equally effective in reconstructive power with the animal extracts. (See under the title PHOSPHORUS).

Thyroid Gland and its preparations are the most efficient as medicinal agents of the entire class, especially in the treatment of myxedema, which a few years ago was classed among the incurable diseases, but is now considered curable by thyroid feeding, or by the use of an extract of the thyroid gland of the sheep. Myxedema is a combination of symptoms due to thyroid absence or inadequacy, and occurs as a result of the removal of the gland or of disease impairing its functional activity. It is characterized by imperfect oxygenation of the blood, lowered body-temperature, impairment of intellect, memory and speech, also increase and subsequent mucoid degeneration of fibrous tissue, with thickening of the skin, drying of the surface and shedding of the epithelial structures. When caused by ablation of the thyroid the disease is fatal to cats and dogs in a very few days, but their life has been saved by engrafting a portion of the removed gland in other situations, and also by intravenous injections of thyroid extract. This treatment of the idiopathic form of myxedema was suggested and commenced by Professor George R. Murray, of the University of Durham, in 1891, and has since proved remarkably successful. At first the remedy was administered hypodermically, but it was soon found that the raw gland fed to the patient was equally efficient, or that a dry extract may be used. The latter represents the entire thyroid, divested only of its water, is easily administered and proves very efficient, improvement being usually noticed within a few days, and going on steadily to apparent perfect recovery if the remedy is continued. The thickening of the skin disappears, the normal body heat returns, and speech, memory and intelligence are restored. In mild cases recovery is effected in a few weeks, but in severe ones several months of treatment are necessary; and in most cases the symptoms of the disease return when the thyroid treatment is stopped, disappearing again when it is resumed. It is probable that the subjects of this disease will require to take a certain quantity of the remedy regularly and continuously for many years, perhaps for life.

A large dose of thyroid extract gives rise to marked constitutional symptoms, and several cases are recorded in which it has caused death. Nausea, vomiting, neuralgic pains in the back and limbs, cardiac irritability and weakness even to syncope, slight pyrexia, dyspnea, progressive emaciation, head-

ache, diarrhea, nervousness, tremor, pruritus, and insomnia, are the principal manifestations of *thyroidismus* produced by its excessive use. It powerfully stimulates metabolism and elimination, increases largely the secretion of urine and the excretion of urea and other urinary constituents, and acts as a specific vaso-dilator, thus inducing perspiration and lowered blood-pressure. In one case all the symptoms of diabetes developed under its continuous administration for psoriasis (James). In another instance a typical attack of gout came on, but subsided when the extract was stopped, and reappeared when it was again administered (Harris).

Thyroid extract has produced great amelioration in cretinism (congenital myxedema) which is a thyroid disease, and the improvement has been steady and progressive in many cases while the remedy was used, but ceased as soon as it was discontinued. In psoriasis, eczema, ichthyosis, pityriasis rubra, lupus, universal alopecia and some other skin affections, it has been employed as a stimulant of the cutaneous functional activity with most satisfactory results; several cases of psoriasis treated with this remedy alone recovering completely in the course of a few weeks (Bramwell). In the insanity of the adolescent, climacteric and puerperal periods, the thyroid treatment has seemed to be especially beneficial (Bruce); but in several cases of insanity where there was parenchymatous (not cystic) enlargement of the thyroid, the extract was used without result upon the mental affection though it diminished the size of the goitre and caused a marked loss of weight (Reinhold). It is beneficial in simple goitre, but is contraindicated in the exophthalmic form. In many cases its continued administration has produced emaciation, which fact suggested its employment for the reduction of obesity, and it has been successfully used for this purpose in many cases (Guttmann). A loss of weight at the rate of from 2 to 11 pounds per week is produced in some cases; but after a time a limit is reached, beyond which further loss does not occur. Thyroid extract has given satisfaction in several other affections, including lupus, ozena, obstinate ulcers of the leg, progressive myopathy, endometritis, menorrhagia, uterine fibroma and carcinoma, and some forms of syphilis. It has been successfully used to promote consolidation in obstinate fractures, having well-recognized effects in disordered nutrition of osseous tissue (Gauthier). It has seemed to act as an efficient galactagogue in some cases, increasing both the flow and the quality of the milk (Stawell). It is contraindicated in diabetes mellitus, also in cases presenting much emaciation.

Iodothyryn is a proteid substance existing in the gland, and is probably the chief active principle, though not the only one. It contains iodine in varying amount and a large proportion of nitrogen, also sulphur and phosphorus. So far as studied it appears to represent the physiological and therapeutic powers of the gland. It is administered in tablet form and in doses of gr. j-v thrice daily. *Thyreo-antitoxin*, isolated by Fränkel, contains no iodine, and seems to be inactive.

Preparations.

Glandulæ Thyroideæ Siccæ, *Dessicated Thyroid Glands*,—the thyroid glands of the sheep, freed from fat, cleaned, dried and powdered. Dose, gr. iij-x, [av. gr. iv.]

Thyroid Extract (Unofficial),—one grain equals ten grains of the crude gland, or one-sixth of a dessicated thyroid. Dose, gr. ss, thrice daily, gradually increased to gr. v.

Thyroid Tablets (Unofficial),—each tablet contains two grains of dessicated thyroid equal to ten grains of the fresh gland. Dose, j to ij thrice daily.

Adrenal Extract.—Ablation of the suprarenal glands in guinea-pigs and frogs is followed by serious nervous disturbances, shown by lowering of the body-temperature and progressive paralysis, and culminating in convulsions and death by failure of respiration. Brown-Séquard made these observations in 1856, and later showed that the subcutaneous injection of extracts of the healthy glands in such cases restored the animals to almost a normal state for a time. In 1895 Schäfer and Oliver demonstrated that the secretion of these glands strongly stimulates the muscular system by direct action, especially affecting the vaso-motor apparatus and the cardiac muscle, causing contraction of the arterioles and an extraordinary rise of blood-pressure, followed by slowing and strengthening of the heart's action through the vagus and the cardiac motor ganglia. These effects are of short duration and are produced by a very small quantity, the $\frac{1}{10}$ th of a grain of the dried gland causing a maximal result on the heart and arteries in a dog of twenty pounds weight. The rise of blood-pressure is greater than that produced by any other known substance. Locally, the extract is a powerful constrictor of the blood-vessels. The active principle is rapidly eliminated by the kidneys, and is largely oxidized in the liver.

Epinephrin, a principle isolated by Abel, is found only in the medulla of the gland, and in very small quantity, but it is very active, the $\frac{1}{30000}$ of a grain per kilo of body-weight producing a distinct effect on the blood-pressure. Takamine has isolated another principle, named *Adrenalin*, which is said to manifest all the properties of the gland substance in greater concentration, being the most powerful hemostatic and astringent known, and a cardiac stimulant of great energy. It is claimed to be 600 to 1,000 times more powerful than the extract, the $\frac{1}{200000}$ of a gramme ($\frac{1}{130000}$ of a grain), administered intravenously, producing a distinct effect upon the adult man; and the fraction of a drop of a solution of 1 in 10,000 blanching the normal conjunctiva within 30 to 60 seconds. Its intravenous administration acts powerfully on the muscular system, especially the muscle of the heart and blood-vessels, causing an enormous rise of blood-pressure. It is non-irritant, non-toxic, non-cumulative, devoid of injurious properties, and has little or no effect upon the cerebrum. It has no anesthetic power in itself, but when used in connection with cocaine, holocaine, etc. it prolongs the duration of the anesthesia produced by them.

By internal administration this extract has given good results in nasal, pulmonary and gastric hemorrhage, acute and chronic bronchitis, bronchial asthma, congestion and edema of the lungs, edema of the glottis and diabetes insipidus. Internally and locally it has proved of very great benefit in the treatment of

hay-fever. It has been employed in pernicious anemia and diabetes mellitus with some benefit in a few cases; also in Addison's disease when the lesion was not cancerous or tuberculous. It will be found useful in chronic muscular affections, especially those involving loss of tone or degenerative changes, and will probably be found valuable in all conditions in which the vaso-motor tone is impaired. Being a powerful but temporary stimulant of the heart it may be used cautiously in cardiac weakness, in failure of the heart from any cause and in valvular diseases of that organ.

By local application the angiostenotic properties of suprarenal extract have been successfully utilized in the treatment of local congestions, inflammations and hemorrhages, especially those of the eye, ear, nose and throat. It is an excellent hemostatic for hemorrhage following operations on the nose, and is used as an application to inflamed tissues prior to their being anesthetized by cocaine, also to the mucous membrane of the turbinated bodies in ulceration or hypertrophy thereof.

Adrenalin has been employed with great satisfaction in all affections to which adrenal extract is applicable. Its powerful angiostenotic properties are utilized for bloodless operations on the nose and throat, in epistaxis, menorrhagia, and other forms of hemorrhage, in asthma, laryngitis, conjunctivitis, coryza, and many other affections. Its prompt and powerful stimulation of the heart and vaso-motor system will be found invaluable in collapse during anesthesia and surgical shock, before cocainization to prevent cocaine intoxication, in opium and morphine poisoning, and in sudden failure of the circulation from any cause.

Preparations.

Glandulæ Suprarenales Siccaë, *Dessicated Suprarenal Glands*,—the suprarenal glands of the sheep, freed from fat, cleaned, dried and powdered. Dose, gr. iij-vj, [av. gr. iv]. For local use 4 to 50 per cent. sterile aqueous solutions of a glycerin extract are applied, as a spray or by cotton swab or a brush; but they should not be used hypodermically, as they readily become putrid and may be septic.

Adrenalin Chloride (Unofficial),—is not stable in its dry form, but is so in solution, if protected from heat, light, and oxidation. It is marketed in a 1 to 1,000 solution, containing 0.65 per cent. of sodium chloride, and 0.5 per cent. of chloretone. This solution is diluted for local medication, to 1 in 5,000, or 1 in 10,000. Dose, internally, $\mu\text{v-x}$, every 4 hours; equal to gr. $\frac{1}{100}$ — $\frac{1}{100}$ of the chloride itself.

Orchitic Extract, *Didymin*, *Testicular Juice*, (Unofficial)—was the subject of a communication to the Société de Biologie at Paris, in 1889, from Professor Brown-Séquard, in which the aged and distinguished writer declared that he himself had experienced a wonderful degree of rejuvenescence after its use, and recommended it as a general tonic for the aged and for subjects of impotence or a debilitated nervous system. In subsequent communications made to the Académie des Sciences by Brown-Séquard and his assistant D'Arsonval, it was claimed that general paralysis, locomotor ataxia, contractures, and certain forms of insanity, also affections due to organic lesions of the nervous system or impairment of its functions, are cured or ameliorated by injections of testicular juice; and that organic or constitutional diseases

due to defective nutrition of the organs, as anemia, glycosuria and tuberculosis, may be arrested by this procedure. Its remedial effects they held to be due to the action of a ferment or diastase contained in the fluid, which replaces the natural ferments produced by normal testes and other glandular organs of the body.

Testicle Extract is fully noticed in the "*Sepladium or the Druggist's Shop Opened*," by W. Salmon, published about 1685. In this book the author describes the testicles taken from man or beast as consisting of "a Flegm, Spirit, Sulphur and Volatile Salt joined with some Earthy Particles; the chief used are from Bull, Horse, Goat, Ram, Boar and Buck," which were cut out, carefully dried, and used to make a tincture, a spirit, an oil and a volatile salt. Salmon further says that "their virtues are very great, for they refocillate the Spirits,—Natural, Vital and Animal,—comfort the Head, Brain and Nerves, and resist all Diseases afflicting them, . . . they restore in Consumptions, . . . are also good against the Collick, and particularly strengthen the Instruments of Generation and provoke Lust." The same extract was also recommended by J. Fr. Leaulté, who wrote in 1717. According to Pliny the ancient Greeks and Romans ate the testicle of the ass for the purpose of curing impotence.

Testicular extract injected into the human subject is said to produce a steady increase of oxyhemoglobin in the blood, the cardiac force is strengthened, the vascular tone is exalted, and the oxygenation of waste products is promoted, as shown by the increased excretion of urea and the lessened amount of phosphoric acid in the urine. Intestinal peristalsis is slightly stimulated, the mind becomes clearer and more active, and the body temperature is usually raised but may remain unaffected. The crude extract is said to be mildly bactericidal. These effects closely coincide with those produced by *Spermine* (see p. 134), and this substance is believed by Poehl to be the active principle of the juice, but it does not possess the powerful reconstructive properties of the latter, and cannot be efficiently substituted therefor.

This extract has been employed by many physicians in several diseases, often with beneficial results. It is claimed to be a powerful tonic, especially in the decrepit subject of old age or exhaustion from wasting disease, as it stimulates the tissues and organs to renewed activity and endows the body with greater strength and with a feeling of increased well-being. It has been used in general adynamia, anemia, atonic gastro-intestinal affections, scurvy, malaria, epilepsy, cancer, nymphomania, perverted sexual habits, impotence, neurasthenia, hysteria, melancholia, diabetes, tuberculosis, hemiplegia, paralysis agitans and locomotor ataxia, with more or less benefit according to the reports of its administrators. No specific action is claimed for it in any of these affections, but all observers agree that it acts by stimulating functional activity. Many of the results observed have been ascribed to mental suggestion, but after the application of check experiments in similar cases the weight of evidence seemed to be in favor of the remedy. Later clinical results have not confirmed the claims made for it, and it is now rarely used in medicine.

The composition of the emulsion prepared by D'Arsonval's process is very complex, but it is supposed to include at least four active principles, viz.—*Phosphorized Albumins*, in large quantity, *Lecithin*, known as phosphorized

fat, *Spermine*, and *Nuclein*. The first two have undoubted value as nerve foods, the third is believed to increase the oxygen-carrying power of the blood corpuscles, and the last possesses bactericidal properties.

D'Arsonval prepared this extract or emulsion in the following manner. The testicles of bulls, enveloped in their membranes, washed in a 10 per cent. solution of sublimate, and again with sterilized water, are each divided into five or six parts, placed in aseptic glycerin (a pint to the pound of testicle) and allowed to macerate therein for 24 hours. An equal quantity of a 5 per cent. solution of common salt in boiled water is then added, the mixture is filtered and sterilized by being subjected to a pressure of 30 atmospheres of carbon dioxide. The dose is 10 to 20 minims, hypodermically once daily or every other day, with strict aseptic precautions as to the syringe used and the site of injection; the latter should be washed with a 1 to 1000 sublimate solution or a 2 per cent. solution of carbolic acid. The extract seems to have little or no effect when given by the mouth, but is efficient when used by the rectum.

Phospho-Albumen, (Unofficial). Under this trade-name and the sub-title *Syrup of Di-Oleyl-Lecithin*, an animal extract is prepared in Chicago, which is said to be derived solely from the testes, spinal cords and brains of bulls. The juice is sterilized by D'Arsonval's carbon dioxide process, and is mixed with simple syrup as a preservative menstruum and some flavoring material. It is supposed to contain lecithins, spermine, nuclein, and phosphorized albumins, and is apparently a favorite tonic with many physicians. It is not patented, copyrighted or advertised, is sold only on physicians' prescriptions, and its manufacturers assure the profession that so far as their methods of promotion are concerned it will remain practically inaccessible to the laity.

Spermine (Unofficial) has been found in the form of a phosphate in the thyroid and thymus glands, the spleen, the ovaries and the blood, as well as in the testes. Poehl believes it to be an alkaloidal product of the retrogressive metamorphosis of albumins (a leucomaine), and a most powerful intraorganic restorative of the oxidizing properties of the blood. He states that it should not be regarded as a specific for any particular malady, but should be used as a means of promoting oxidation in the body. It has been employed with decided benefit in ataxia and delirious epilepsy (Poehl), as a tonic in tuberculosis (Upenski), also in senile marasmus and the nervous affections of the aged (Victoroff). The Hydrochlorate is used hypodermically, in doses of $\frac{1}{2}$ grain twice daily, in the morning and at noon, avoiding evening administration, as it may cause insomnia. No reaction follows its injection.

Brain Extract, *Cerebrinin* (Unofficial),—is obtained from the gray matter of the sheep's brain by digestion in 5 times its weight of pure glycerin and then adding an equal quantity of a 12 per cent. solution of common salt. Its effects are almost identical with those of orchitic extract, the most noticeable being increased strength and a feeling of well-being, regulation of the organic functions and increase of the cardiac force. It has been employed with benefit in locomotor ataxia, neurasthenia and allied affections, nymphomania, perverted sexual habits of cerebral origin, hysteria, melancholia, insomnia, the general debility of malaria, chlorosis and even more profound anemias (C. Paul); also in cases of defective development of the spinal apparatus, as Friedrich's ataxia. Mental derangement is not helped by it, or at most but temporarily. Febrile reaction, cardiac weakness, and prostration, have followed its administration.

The dose is 16 minims (1 Cc.) once daily or every other day, administered subcutaneously.

Cerebrine (Unofficial) an extract of the entire brain of the ox, was prepared by the late Dr. Hammond of Washington, by digestion for six months in a mixture of glycerin, alcohol, and a saturated solution of boric acid, and filtration through porous stone. The dose is 5 minims diluted with an equal quantity of distilled water at the time of administration by hypodermic injection. Hammond prepared similar extracts of the spinal cord

(*medulline*), the heart (*cardine*), the pancreas (*pancreatine*), etc., and advocated their use medicinally on the organopathic theory that they are curative of depressed conditions of the corresponding human organs.

Bone Marrow Extract (Unofficial).—Red bone marrow has been long known to be one of the sources of the red blood corpuscles, and it is probable that it contains chemical ingredients which may stimulate the production of blood cells by other blood-forming organs in which such natural stimulus may be lacking. In pernicious anemia the marrow of the long bones shows characteristic changes, which fact suggested the administration of red bone marrow as a remedy for that disease. This treatment has proved remarkably successful in some cases which were apparently hopeless. It was first suggested by Dr. Dixon Mann, who administered a glycerin extract thereof in cases of hemophilia, chlorosis, profuse hematemesis and other anemic affections, with good results. It has been used in leucocythemia, with no great success; but it is indicated in disorders characterized by hyperfluidity of the blood, from whatever cause; and it may render good service in any debilitating or blood-impoverishing affection, and in convalescence after severe osteitis. The raw marrow, freed from spicules of bone, may be administered to the amount of about 3 ounces daily in divided doses; or it may be given as a paste made with wine, glycerin, and gelatin. Tablets, containing from 1½ to 5 grains each of the dried marrow, are on the market and may be used if preferred. *Carnogen* is a proprietary preparation containing red bone marrow and hemoglobin.

One of the most striking cases of pernicious anemia recorded is that of the gardener patient of Professor Fraser of Edinburgh. Under the use of raw bone marrow by the stomach his blood corpuscles increased in number from less than 900,000 to over 4 millions per cmm., the proportion of hemoglobin rose from 18 to 35 per cent., and the man became well enough to resume his occupation.

Splenic Extract (Unofficial).—Excision of the spleen, or its serious impairment by disease, is usually followed by marked tissue changes and great susceptibility to alterations of temperature, especially in malarial subjects. The possession of bactericidal power by some secretion of the spleen is strongly indicated by certain facts, among which are the evident incompatibility of tuberculosis and malaria and the enlargement of the spleen in acute infectious diseases, as though working against pathogenic germs. It has therefore been suggested that the splenic substance of animals naturally immune against certain of these diseases be employed as a remedy in tuberculosis, malaria, and typhoid fever, and it has been used in the latter affection with great benefit. Some relation between the spleen and the thyroid body is suggested by the frequent enlargement of the former organ in myxedema and cretinism. Splenic substance has been used medicinally in various disorders of the blood, with the idea of supplying to that tissue some material which may be necessary to its health; and Dr. H. C. Wood has used the extract in exophthalmic goitre with results which indicate that it is worthy of trial in this intractable disorder. It has also been found useful in cases of insanity due to physical exhaustion,

as in puerperal weakness or anemia. Given by the mouth in sufficiently large doses it is apt to cause nausea, and when used hypodermically it frequently produces local abscesses.

Thymus Extract (Unofficial). The thymus gland is active only during the developmental period of life, and becomes atrophied about the age of two years. The suggestion has been made that an extract thereof may prove useful in diseases characterized by defective development, as rachitis and pseudo-hypertrophic paralysis. It has been used with reported benefit in leucocythemia, chlorosis, idiopathic and pernicious anemia, and in Paltauf's so-called "status thymicus." It appears to be useless in exophthalmic goitre, but beneficial in the other form. Of 30 cases of goitre treated with it 20 were improved but only 2 were cured (Kinnicut). A saccharine extract, named *Pertussin*, has given brilliant results in whooping-cough and all forms of bronchial trouble associated with asthma (Fischer).

Pancreatic Extract (Unofficial).—In many cases of diabetes decided structural changes have been observed in the pancreas after death, and the ablation of this gland in animals is followed by emaciation and glycosuria; but these symptoms will not occur if a portion of the pancreas is left, or if part of it be engrafted on the peritoneum after its removal from its proper location. These facts have suggested the probability of the possession by the pancreas of power over carbohydrate metamorphosis, through the action of some substance elaborated by the peculiar, vascular epithelioid tissue which occurs in isolated patches throughout its substance, and which is not found in any other duct-bearing gland in the body. Upon this theory the pancreas, both in substance and extract, has been administered as a remedy for diabetes, but the results have been negative in nearly all the cases. A few instances are recorded in which its use was followed by some temporary amelioration of the symptoms of the disease.

Pineal Extract (Unofficial).—The pineal gland is present during the entire life of the individual, and its removal has been followed in animals by structural changes in the central nervous system. It is thought that the substance of this gland may act remedially in organic and functional affections of the brain attended with failure of cerebral nutrition, as chronic softening, chronic mania and dementia.

Pituitary Extract (Unofficial).—The complete removal of the pituitary body (or gland) gives rise to symptoms which occur in a definite order, beginning with lowered temperature and loss of appetite, then twitchings, tremors and nervous phenomena, and finally dyspnea and death. Many of these symptoms have abated considerably after the administration of pituitary gland substance or an extract thereof. This organ has been found enlarged in cases of myxedema in which the thyroid was functionally absent, and other observations point to some connection between it and the disease known as acromegaly. Internally administered it causes increase of the cardiac force, and a rapid rise of blood-pressure due to direct contraction of the vessels and slowing of the pulse; also increased elimination of phosphates without corresponding increase of the nitrogenous elements. It has been administered with the view of reestablishing perverted brain nutrition and function, also with the object of supplying tone and structural growth to the entire nervous and muscular systems, on which its secretion seems to act as an alterative. Of 13 cases of acromegaly treated with pituitary preparations 7 showed varying degrees of improvement, 5 none, and 1 became worse. In 2 cases the violent headache and neuralgic pains in the limbs were diminished, and in one case decrease of the affected extremities occurred (Kinnicut). It has been tried in epilepsy, but with no benefit, and there is no condition known in which it is of therapeutic use (Wood).

Parotid Extract (Unofficial).—An extract of the parotid gland has been employed by Dr. Robert Bell of Glasgow with good results in ovarian disorders, particularly enlarged and tender ovaries associated with dysmenorrhea, metrorrhagia, chronic endometritis and subinvolution of the womb.

Ovarian Extract (Unofficial).—The substance of the ovaries has been administered with some benefit in the nervous manifestations and pathological conditions which occur when the ovarian functions are partially or wholly arrested, as in cirrhosis or malignant disease, or after the operation of ovariectomy. It is said to be a serviceable remedy in cases of depression or other mental disturbance coincident with the climacteric, to relieve ovarian congestion and neuralgia, and to be remarkably efficient in the treatment of delayed or scanty menstruation.

Uterine Extract (Unofficial).—The substance of the uterus has been employed as a remedy in those disorders and cachexiæ which seem to be consequent on the removal of this

organ and its appendages. The available data are not, however, sufficient to enable any conclusions to be formed as to its efficacy.

Mammary Gland Extract (Unofficial), has given satisfaction in fibroma and carcinoma of the uterus, also in menorrhagia, dysmenorrhea and enlarged and sensitive womb (Bell).

Nuclein (Unofficial),—is a proteid substance, possessing a large proportion of Phosphorus in the form of *Nucleinic Acid*, which is combined with a highly complex base, the latter being different in the various tissues. Nucleins are the chief chemical constituent of cell nuclei, and their number is limited only by the varieties of the cells. They are found in both animal and vegetable tissues; wherever there is a nucleus we find a nuclein. They are generally insoluble in dilute acids, but are soluble in dilute alkalies, and resist peptic digestion. Their functions in the organism are supposed to be (1) that of a natural antiseptic, to destroy toxic products which may accumulate through faulty elimination, and (2) that of a natural bactericide, to resist microbic invasion. Two nucleins only have been clinically studied in this country, that obtained from yeast-cells and that from the thyroid and thymus glands.

Nuclein is harmless, causing no functional derangement when administered by the stomach or subcutaneously, even in very large doses. When injected hypodermically its principal effect is to produce a very marked increase of leucocytic activity (an artificial leucocytosis), both in healthy and in tuberculous subjects. The increase is observed to affect chiefly the polynuclear leucocytes; it varies in degree with the individual, appears within three hours after administration of the nuclein, and disappears after forty-eight hours or thereabouts (Huber). The effect is to energize any existing inflammation, or to awaken such when comparatively quiescent, as in latent tuberculosis (Sée).

Nuclein was introduced into medicine by Professor Vaughn of the University of Michigan. Its employment as a therapeutic agent is based on the assumption that for immunity against and the cure of bacillary diseases we should look to non-toxic germicides of cellular origin, and to substances which stimulate the activity of those organs whose function it is to protect the body against such invasion. As the nucleins apparently fulfil these requirements they have excited considerable attention among the advocates of animal extracts. Nuclein has been successfully used in diphtheria, suppurative tonsillitis and other suppurative disorders, also in chronic rheumatism and malaria, chronic bronchial catarrh and neurasthenia, and has been employed in tuberculosis with encouraging results (Vaughn). In one case an ulcer of twenty years' standing was cured in four months by the local application of nuclein. A physician reports his own case, one of genito-urinary tuberculosis, as apparently cured by nuclein injections. In simple anemia, chlorosis, typhoid fever, debility from any cause, and convalescence from acute diseases, such as pneumonia and influenza, the beneficial results of nuclein medication are prompt and permanent (Aulde). As bactericides the nucleins may prove useful by reason of their harmlessness to the human subject.

Nucleins are prepared from separate animal tissues and glands, as the thy-