

rial twigs and which bleeds freely, can be effectually destroyed by nitric acid. The pile should be exposed, usually through a speculum, and the strong nitric acid be applied on a pine stick freely, followed by an abundant application of olive-oil to prevent the extension of the escharotic action to the surrounding parts. Small, superficial *nævi* are treated successfully in the same way.

Sulphuric acid penetrates more deeply than nitric, and its escharotic action is not so easily limited; hence, it is not so frequently employed for the destruction of sloughing and ill-conditioned ulcers. It is sometimes used in the form of Ricord's paste to chancres, sloughing or phagedenic. The paste is made by the addition of sufficient charcoal to strong sulphuric acid to give it the proper consistence. This is spread on a piece of muslin of a size equal to the sore, and is allowed to remain on until an eschar is produced, when an ordinary poultice may be applied.

A favorite liniment of Sir Benjamin Brodie for counter-irritation of diseased joints is made by the addition of sulphuric acid to olive-oil (3j of the acid,  $\frac{3}{4}$ iv of olive-oil).

A general bath in, or sponging the body with, a solution of nitromuriatic acid—one ounce to a gallon—is very serviceable in the case of cachectic children who present these symptoms: a dry and wrinkled skin, sallow complexion, capricious appetite with a taste for dirt-eating, and whitish, pasty motions. Applying to the surface of the body an acid solution must affect the constitution of the blood, for an acid solution on one side of an animal membrane and an alkaline fluid on the other are the conditions most favorable to osmosis.

Lately, Dr. Lombe Atthill, of Dublin, has called attention to the "use of nitric acid in the treatment of uterine disease." He applies the fuming nitric acid to the interior of the uterine cavity after previous dilatation with sponge or laminaria tents. In order to protect the cervix and cervical canal he introduces an intra-uterine speculum with expansive blades. The cavity is first mopped out and dried with cotton; then a probe, wrapped with cotton, is dipped in fuming nitric acid and applied thoroughly to the mucous membrane. This practice is very effective in the treatment of intra-mural fibroids and fungous granulations, to restrain hæmorrhage, and after the removal of polypi. He almost invariably employs nitric acid in the treatment of granular cervicitis and endo-cervicitis, "with the best results." When decided tenderness of the uterus exists, he advises that this be first removed by suitable measures.

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OILS AND FATS.

*Adeps.*—Lard. *Saindoux*, Fr.; *Schweineschmalz*, Ger.—Below the temperature of 86° Fahr. a soft solid.

*Adeps Benzoinatus.*—Benzoinated lard.

*Sevum.*—Suet. *Suif de mouton*, Fr.; *Schöpsentalg*, Ger. The prepared suet of *ovis aries*.

*Oleum Amygdalæ expressum.*—Almond-oil. *Huile d'amandes*, Fr.; *Mandelnöl*, Ger. The fixed oil obtained from the kernel of the fruit of the *Amygdalus communis*.

*Oleum Theobromæ.*—Cacao-butter. *Beurre de cacao*, Fr.; *Cacao-butter*, Ger. The concrete oil of the kernels of the fruit of *Theobroma cacao*.

*Oleum Lini.*—Flaxseed-oil. *Huile de lin*, Fr.; *Leinöl*, Ger. The fixed oil obtained from *Linum usitatissimum*.

*Oleum Olivæ.*—Olive or sweet oil. *Huile d'olive*, Fr.; *Olivenöl*, Ger. The fixed oil obtained from the fruit of *Olea Europæa*.

*Oleum Gossypii Seminis.*—Cotton-seed oil. A fixed oil expressed from the seed of *Gossypium herbaceum*, and subsequently purified. (Used in the preparation of linimentum ammoniæ; linimentum calcis; linimentum camphoræ; linimentum plumbi subacetatis.)

COMPOSITION.—The above-mentioned oils and fats differ in the quantity of olein, stearin, and margarin which they respectively contain, and hence differ in physical qualities. Lard is composed of 38 per cent of stearin and margarin and 62 per cent of olein, and olive-oil of 72 per cent of olein and 28 per cent of margarin. The more solid fats, as suet, contain much stearin. These neutral fats are, chemically, combinations of an acid (stearic, palmitic, margarin, oleic) with a base, glycerin. The olein of linseed-oil appears to differ from ordinary olein by furnishing a different acid—linoleic—when saponified.

*Oleum Morrhuæ.*—Cod-liver oil. *Huile de morue*, Fr.; *Leberthran*, Ger. The fixed oil obtained from the fresh livers of *Gadus morrhua* and other species of *Gadus*.

COMPOSITION.—Cod-liver oil contains a peculiar principle, *gaduin*, and yields, by distillation with ammonia, *propylamin*. It also differs from the fats and oils above described in containing various biliary



principles and traces of iodine, bromine, phosphorus, sulphuric and phosphoric acids, lime, magnesia, soda, and iron. It agrees with the other oils in being composed for the most part of olein and margarin. It is the latter constituent which gives the white cloudiness of cod-liver oil in cold weather, and which is, by the "British Pharmacopœia," directed to be separated by artificial cooling. According to Winkler, cod-liver oil does not yield glycerin, but oxide of propyl, when saponified.

There are three varieties of oil, due, not to differences in composition, but to modes of preparation: the *pale*, the *light-brown*, and the *dark* oil. The pale oil is freest from the products of decomposition and empyreuma, and is the best for internal administration.

In order to obtain more positive therapeutical results, certain medicinal substances are frequently added artificially to the cod-liver oils of commerce. Iodine, bromine, phosphorus, and iron, are thus added. Not only are such compounds bad, chemically considered, but the addition of such ingredients gives great opportunities for sophistication, and impure brown and other fish-oils may be substituted for the pure cod-liver oil.

It has been supposed that any oil or fat, even glycerin, may be used in place of cod-liver oil, and cream has been prescribed in this belief. Linseed-oil has been considered to have some special efficacy in wasting diseases, more particularly in phthisis, because of the large amount of vegetable albumen which it contains. These notions are erroneous. Cod-liver oil has special therapeutical virtues because it contains gaduin, propylamin, the constituents of bile, iodine, phosphorus, bromine, etc., in addition to the ordinary ingredients of an animal fat.

PHYSIOLOGICAL ACTIONS.—An oil or fat applied by friction to the epidermis will disappear, and, as a positive gain may thus accrue, it is reasonable to suppose that not only absorption, but assimilation, also, has taken place.

Fat plays an important part in the metamorphosis of animal fluids. As was long since shown by Lehmann, a small quantity of fat is essential to the digestion of nitrogenous articles of food. Cod-liver oil, as well as other oils, when taken in the proper quantity, has the power to facilitate gastric digestion, and therefore promotes the appetite. Oil is a very important material in intestinal digestion—constitutes the molecular basis of the chyle, which consists chiefly of finely-divided fatty matter, each globule of fat being surrounded by a thin layer of albumen. The fat taken in with the food undergoes the emulsionizing process, chiefly in the small intestine, and by the aid of the pancreatic and biliary secretions. Cod-liver oil is, above all other fats, adapted to form the molecular basis of the chyle. All fats do not penetrate into the veins and lacteals with the same facility, and the presence of

certain substances is necessary to the process. Fats are not crystalloidal but colloidal substances, and have, therefore, but a feeble power of osmosis; but, notwithstanding this fact, the blood of the portal vein is much richer in fat than the blood of the arteries and systemic veins. The diffusion of fats is accomplished by the action of the bile. It was long since shown, by Wistinghausen, that in capillary tubes moistened by bile, oil will rise much higher than in tubes not so moistened, or when moistened with water or a saline solution. He also showed that oil will pass through membrane saturated with bile much more readily than through similar membrane saturated with water. It has been ascertained that, in dogs with biliary fistulæ, the amount of fat in the chyle is much below the normal, and in the fæces much greater than normal (Day). Hence it must be concluded that the presence of bile is necessary to the absorption of fats, and that cod-liver oil must be peculiarly adapted to form the molecular basis of the chyle. It is for these reasons that, during a course of cod-liver oil, the body-weight is increased, the red blood-globules become more numerous, and a greater amount of fat is deposited in the tissues. It promotes the constructive metamorphosis. The important rôle performed by the oils and fats in the organism is shown by a variety of considerations. Wherever tissue-changes, physiological or pathological, are taking place, fat accumulates and enters largely into the formation of the resulting products. Newly-formed plasma contains much free fat, and all plastic exudations more than the non-plastic (Lehmann). Fat is the most abundant constituent of pus.

Food is intended ultimately for two objects: first, to build up the tissues in the growing state and to reconstruct the tissues wasted by use; second, to supply force, nervous, muscular, and digestive, to the different parts of the organism requiring it. The part performed by the fats is important as regards both objects. As already stated, they are essential to the construction of tissue; modern researches have shown that they have a necessary office in the evolution of force. The well-known experiment of Fick and Wislicenus demonstrated that, on a diet of hydrocarbons, great muscular effort can be undergone with but little destruction of muscular tissue, and without increased urea-discharge. Turkish porters, who are remarkable for their great muscular strength and endurance, live on a diet composed of fat and rice. The acrobats of Japan, who live on a similar diet, grow to an enormous size, and accomplish feats of strength and agility to which the athletes of Western nations are hardly equal.

If a muscle is made to contract under a bell-jar, an extraordinary evolution of carbonic-acid gas takes place, just as in violent muscular exercise the amount of carbonic-acid gas exhaled from the lungs is increased.

THERAPY.—Oils and fats are used by inunction in the treatment of



the *scaly skin-diseases*. In this case, the normal amount of oil in the skin being deficient, it is supplied artificially.

Inunctions of oil or fat promote constructive metamorphosis in such chronic wasting diseases as *phthisis*, *scrofula*, *chronic dysentery*, etc. The best oil for this purpose is cod-liver oil, but, as it stains the skin yellow and has a disagreeable odor, it is often strongly objected to. Sebum or suet may be used, and may be perfumed to the taste of the patient. The best time for practicing the inunctions is just before retiring. A warm bath should first be taken, and then from one to two ounces may be rubbed into the skin. A thick night-garment should be put on to prevent injury to the bedding.

*Badly-nourished infants*, *rickety*, or *scrofulous*, or suffering from *chronic intestinal disorders*, who have a dry and scaly skin, are often materially benefited by the tepid or warm bath, followed by inunctions of lard, suet, or almond-oil. *Chlorotic girls*, with or without disorders of menstruation, are improved in condition by the same means. *Spare women*, who wish to gain flesh and roundness of form, may have their wish gratified by warm baths and inunctions of oil. The improvement which results from this practice is partly due to the general gain in bodily nutrition.

*Rubeola*, *scarlatina*, *roseola*, *erysipelas*, and other febrile diseases, are benefited by oil inunctions. These applications are grateful to the patient; they allay the burning heat of the skin, and in this way diminish restlessness and excitement. It is said that inunctions of oil reduce the temperature, but the decline in fever-heat is probably the result of the calmative influence which these applications have over one of the chief sources of distress. Inunctions of oil have a special utility in the *desquamative stage* of *scarlet fever*. It is the author's observation that inunctions of oil are serviceable in *fevers* generally, when there is much heat of skin and high temperature, with restlessness. Cocoa-butter is the most elegant of these preparations for external use. In the infectious diseases, a little carbolic acid may be added to the inunction oil or fat, with the view of destroying disease-germs.

Those who experience frequent *catarrhal attacks*, and take cold on slight exposure, may have their susceptibility diminished by a daily application of oil to the whole surface of the body.

In many maladies, the patients experience a notable distaste for fatty food in any form. This is especially the case with *scrofulous* and *phthisical* subjects, and, as fat in some form is necessary to digestion, assimilation, and heat-producing, it is obvious that by the use of cod-liver oil an essential element of nutrition may be supplied in the best form. In cases in which there exists a condition of faulty assimilation of fats, cod-liver oil, by reason of the fact that it contains in intimate association the bile elements, is especially adapted to form

the molecular basis of the chyle. In *scrofula*, *rickets*, and other disorders of the nutritive functions belonging to this group, cod-liver oil is the best agent for promoting constructive metamorphosis.

After *scarlet fever* in many children, especially in those with strumous diathesis, there occur *discharges from the nose and ears*, *feeble digestion*, and *general emaciation*. These *sequelæ of scarlet fever* are best removed by the internal use of cod-liver oil.

As a remedy in *phthisis*, cod-liver oil holds the first place, but it is not adapted to all forms and all stages of that disease. It is especially a remedy for the chronic forms of *phthisis*—*fibroid lung* and *chronic tuberculosis*—and is not serviceable in caseous pneumonia and acute *phthisis*. It is more useful in the chronic forms of *phthisis* because these afford the time and opportunity to reconstruct the tissues of the body—to build up the tissues from the molecular basis of the chyle. Cod-liver oil is not well borne when there is much fever, and can not be well assimilated when the stomach has undergone the alterations which belong to acute inflammatory affections. This remedy is too often prescribed without any reference to the condition of the patient's digestive functions. The power of the stomach and intestines to digest fat is limited, and, if the quantity which can be disposed of is exceeded, the patient is incommode. Rarely is it proper to prescribe more than a teaspoonful three times a day, and few patients can digest a tablespoonful. As the secretion of gastric juice, bile, and pancreatic juice, takes place most abundantly during the digestion of food, the time for the administration of oil in *phthisical* cases is after eating. When it is not well borne, the digestion and assimilation of the oil may be aided by combining it with liquor potassæ, lime-water, the compound tincture of gentian, tincture of nux vomica, or strychnine, or other correctives according to the indications in individual cases. When the oil is not well digested—although stomach disorder may not have occurred—and it is seen to float on the stools, it may be combined with ether, since Bernard has demonstrated that ether increases the production of pancreatic fluid.

If continued for a sufficient length of time, cod-liver oil is of the greatest service in *chronic bronchitis* and *emphysema*. It should be given in the same way and under the same conditions as in *phthisis*.

*Chronic rheumatism* and *rheumatic arthritis*, maladies for the relief of which cod-liver oil was first prescribed, when occurring under bad hygienic influences in cachectic subjects, may be much relieved by this agent. In addition to the internal use of the oil, it may be applied with advantage locally to the affected joints. This combined use of the oil, systemically and by local inunction, is to be commended in the so-called *rheumatic gout* with deposits about the joints. On the same principle, cod-liver oil is beneficial in cases of *strumous synovitis*, *caries*, and *necrosis* of bone dependent on a constitutional state.



It does not have, it must be admitted, any direct influence over these morbid processes; but it enters most usefully into constructive tissue-metamorphosis.

As a reconstituent, cod-liver oil is a very useful remedy in certain chronic affections of the brain and nervous system. One of the most common conditions with which we have to deal in middle and advanced life, and also one of the most important as regards the integrity of the brain, is *atheroma of the arteries*. This condition is represented by increased hardness of the radial pulse, the *arcus senilis*, irregular action of the heart, giddiness, vertigo, partial loss of vision, and failure of the memory and other intellectual faculties. Used to obviate these degenerative changes, and to prevent failure in the nutrition of the brain, we have in cod-liver oil a remedy of real value. It should be given in small quantity, and continued for a long time. As a phosphorized fat plays an important part in the structure and functions of the cerebral tissues, we may imitate the processes of Nature and administer the phosphates, the hypophosphites, or the lactophosphate of lime, in combination with cod-liver oil. The author has seen excellent results from such a combined use of these agents. Dr. Anstie much insists on the use of fats, especially cod-liver oil, as a part of the diet of those suffering from *neuralgia*, *paralysis agitans*, *epilepsy*, *mercurial tremor*, and *chorea*. Dr. Radcliffe had previously pointed out the utility of fats and oils in the same affections, and all practical physicians familiar with the subject are now pretty well agreed as to the value of this practice. The special indications for cod-liver oil in these affections are faulty assimilation and a low condition of the nutritive functions. Fats and oils are, of course, contra-indicated in these nervous disorders when they occur in plethoric and overfed subjects, but such a state of things is exceptional.

In *diseases of the skin of strumous origin*, cod-liver oil is, as Dr. Tilbury Fox remarks, "our sheet-anchor." Among these diseases are *lupus*, *ecthyma*, *psoriasis*, *scleroderma*, etc. The constitutional state requiring cod-liver oil is a lowered condition of the assimilative functions dependent on the strumous cachexia. The local use of the oil is certainly advantageous in these cases. Dr. Hughes Bennett strongly recommends the free application of the oil to *favus* and *eczema impetiginodes*.

The condition of debility and faulty assimilation which results from the prolonged treatment of *syphilis* with mercury and iodine is frequently remarkably improved by cod-liver oil. The *syphilodermata*, when occurring in cachectic subjects, are benefited by a persistent use of the same remedy. With the internal use of the oil may be conjoined inunctions. These are especially beneficial in the *squamæ* of syphilitic origin.

MODE OF ADMINISTRATION OF COD-LIVER OIL.—As cod-liver oil is

extremely repugnant to many patients, it is desirable to prescribe it in as agreeable a form as possible. Washing out the mouth with raw whisky or brandy so far blunts the sensibility of the nerves as to permit the oil to be swallowed without difficulty as regards its taste. Quickly stirred up in a hot whisky-punch, it may be swallowed without appreciation of the taste of the oil. It may be taken on beer, the oil covered with the foam, and carefully prevented touching the glass. A wine-glass may be thoroughly moistened with ale or beer, and the dose of oil just enveloped in the beer, when it may be tossed into the throat without perceiving the taste of the oil; or the oil may be taken in sufficient lemon-juice in the same way. It may also be taken in black coffee. A very good disguise is that of Carlo Paresi, by which it is made to have the odor and taste of coffee. To 400 parts of cod-liver oil are added 10 parts of animal charcoal and 20 parts of ground roasted coffee. The mixture is digested in a water-bath at a temperature of 50° to 60° C., and after standing three days is filtered and put in well-stoppered bottles. It is said that 10 drops of chloroform to 100 grammes of the oil will render it palatable. One part of essential oil of eucalyptus to 100 parts of pale oil makes a mixture in which the odor and taste of the oil are entirely extinguished. Two drachms of cod-liver oil may be mixed with a drachm each of compound spirits of lavender and brandy. Emulsions of cod-liver oil are now prepared with glycerin and yolks of eggs, and suitably flavored. The various emulsions with lime are also much prescribed. Cod-liver oil saponified by lime has been brought forward by Prof. Van den Court, of Brussels, as a remedy of especial efficacy in phthisis. Lastly, cod-liver oil has been used instead of lard or butter in the preparation of rolls, which are readily eaten by children. The addition of ether to cod-liver oil promotes its digestion. Bernard long ago made the observation that ether stimulates the pancreas and increases its secretion, thus contributing to the emulsification of the fats. The combination of ether and cod-liver oil has been especially urged by Dr. B. Foster. The committee of the New York Therapeutical Society report that the addition of fifteen minims of ether to each half-ounce of oil enables the patient to take it, if it had previously disagreed.

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## PHOSPHORUS AND SOME OF ITS COMPOUNDS.

**Phosphorus.**—*Phosphore*, Fr.; *Phosphor*, Ger. A translucent, nearly colorless solid, resembling wax, without taste, but having a peculiar smell. Its specific gravity is 1.8.

*Oleum Phosphoratum.*—Phosphorated oil. Prepared by dissolving phosphorus in ether and almond-oil. One part of phosphorus to 100 parts of the menstruum. Dose,  $\pi i$ — $\pi v$ .

*Pilulæ Phosphori.*—Phosphorus pills. Each pill contains about  $\frac{1}{100}$  grain. Phosphorus is dissolved in chloroform, and then mixed with powdered althea and acacia, glycerin, and water. The pills are coated with balsam of tolu.

*Tinctura Phosphori* (not official).—Phosphorus, one grain; absolute alcohol, five drachms; glycerin, one ounce and a half; spirit of wine, two drachms; spirit of peppermint, two scruples. "Dissolve the phosphorus in the alcohol with a little heat; at the same time warm the spirit and glycerin together. Mix the two solutions while hot, and add the spirit of peppermint on cooling. Dose, one half to one drachm."

*Tinctura Phosphori Ætherealis* (not official).—Solution of phosphorus in ether. Dose, five to ten drops in sirup. A solution of phosphorus in chloroform, or bisulphide of carbon, may also be prepared for internal administration. Pills of phosphorus may be extemporaneously made by mixing the bisulphide of carbon solution with some inert powder. The evaporation of the bisulphide leaves the phosphorus in a finely-divided state intimately incorporated with the powder.

*Zinci Phosphidum.*—Phosphide of zinc. Dose, one twentieth to one tenth of a grain. It is best administered in pill-form made with conserve of roses.

**SYNERGISTS.**—Oils and fats favor the absorption of phosphorus, and should never, therefore, be employed in cases of poisoning by this agent. Arsenic, and in a feeble degree sulphur, are synergistic.

**ANTAGONISTS.**—The chief chemical antidotes to phosphorus are hydrated magnesia, lime-water, powdered charcoal, and sulphate of copper. To this list must be added turpentine of a certain kind. Phosphorus is now frequently taken in the form of matches, the particles of which do not readily dissolve in the stomach and intestinal juices. When pure phosphorus, in the sticks or cylinders in which it

occurs in commerce, is swallowed, large masses may remain imbedded in the folds of mucous membrane, or, escaping solution, descend with the other contents of the canal. Considerable time may thus elapse from the ingestion of the poison until its action begins. Emetics, therefore, assume a high degree of importance, and the most serviceable emetic is sulphate of copper, which is at the same time a chemical antidote (Eulenburg and Guttmann). Bamberger has shown that phosphorus reduces sulphate of copper to the metallic state, the first step in the process being the formation of phosphide of copper, and that the masses of phosphorus are surrounded by a layer of copper, preventing its evaporation. He therefore advises that an emetic dose of sulphate of copper be first administered. Emesis may be facilitated by giving hydrated magnesia, diffused in a quantity of tepid water. As catharsis is next in importance, the bowels should be thoroughly evacuated. After the emetic dose of sulphate of copper has acted efficiently, this antidote should be given in small doses as frequently as possible—about one twelfth of a grain every twenty minutes. As the irritability of the stomach may prevent sufficient retention of the sulphate, the carbonate of copper has been proposed as a substitute, although Eulenburg and Landois, in their experiments on animals, have been unable, by the exhibition of the latter, to prevent death in cases of phosphorus-poisoning.

Unquestionably the most important chemical antidote is *turpentine*, the French acid turpentine, especially. Letheby was the first to note that the vapor of turpentine prevented the toxic action of the vapor of phosphorus, and that workmen employed in the match-factory at Stafford, who were protected by vials of turpentine worn about the neck, escaped necrosis of the maxillary bones and other deleterious effects. Dr. P. C. Andant next published cases indicating the antidotal power of turpentine, and M. Personne submitted the subject to experimental demonstration and confirmed the observations of Andant. As turpentine destroys the luminosity in the dark and arrests the escape of the vapor of phosphorus, M. Personne infers that it acts similarly as an antidote, that is, prevents the combustion of phosphorus in the blood and the consequent consumption of the oxygen. The author has collected forty-six cases of poisoning by phosphorus, in which turpentine was employed as the antidote, and of this number but four were unsuccessful (Köhler, Sorbets, Laboulbene, Schimpff, Lichtenstein, Rommeleare, Berthold, etc.). Rectified oil of turpentine is not antidotal. The acid French oil is the preparation which has been used with success. The experiments of Vetter on animals fully confirm the results of clinical experience, for he found that, while the rectified oil of turpentine had no effect, the crude, acid, French turpentine was very efficient as an antidote. The action of the crude turpentine is a process of oxidation and combination by which phos-