

DIGITALIS.

The leaves of *Digitalis purpurea*, Linné (Nat. Ord. Scrophulariaceae), carefully dried and preserved away from light, in close containers. Europe; cultivated in Europe and to some extent in America. *Dose*, 1 to 2 grains.

Common Names: Foxglove, Purple Foxglove.

Principal Constituents.—The glucosides *digitoxin* (very toxic and cumulative), *digitalin*, *digitalein*, *digitonin*, and digitin (inert); digitalic and antirrhinic acids, volatile oil, etc. There are no positively determined alkaloids in digitalis.

Preparations.—1. *Specific Medicine Digitalis*. *Dose*, 1/5 to 1 drop.

2. *Infusum Digitalis*. Infusion of Digitalis. (A cinnamon-flavored, 1 1/2 per cent, infusion). *Dose*, 1 to 2 fluidrachms.

3. *Tinctura Digitalis*, Tincture of Digitalis (10 per cent of drug). *Dose*, 1 to 10 drops.

Doses of Digitalis Glucosides:—Digitoxin, 1/300 to 1/64 grain; digitalin (crystallizable), 1/300 to 1/100 grain, (amorphous and German), 1/100 to 1/30 grain, (digitalin is so variable that it should not be used; it may be very actively poisonous, or may be nearly inert); digitalein (water soluble), 1/200 to 1/100 grain.

Specific Indications.—Weak, rapid, and irregular heart action, with low arterial tension; broken compensation; weak, rapid, flaccid pulse; weak heart sounds; dusky countenance, with dyspnoea, cough, jugular fullness, and weak cardiac action; edema, anasarca, or ascites with scanty supply of dark-colored urine, with weak heart action; renal congestion; irritable heart with weak action; heart made to beat rapidly but feebly by slight excitement; continuous labored breathing with weak pulsation; renal and cardiac dropsy; desquamative nephritis, with weak heart; capillary hemorrhage; poisoning by aconite, muscarine, or the nitrites.

Action.—The dominant action of digitalis is upon the circulation, but it has no perceptible effect upon the blood. Full or even moderate doses may excite nausea and vomiting, and a greenish or yellowish diarrhoea. These effects are preceded by considerable prostration. If the stomach is already irritated, or there is gastro-intestinal irritation, these disturbances are more certain to occur. Only in toxic amounts does digitalis affect the respiration, first slowing and deepening, and finally accelerating the breathing. Neither do other than poisonous

doses impress the nervous system, and then it lessens reflex activity through stimulation of Setschenow's center of inhibition in the medulla, and is followed by depression of the spinal cord and motor nerve trunks and by eventual paralysis of the muscles. These extreme effects on the nervous and respiratory systems have only been noted in animals; apparently they do not take place in man. Therapeutic doses, however, stimulate the cardiac inhibitory and vasomotor centers of the medulla. Digitalis, in moderate doses, has little or no effect upon temperature, but poisonous doses lower it. When fever is present, however, it actively reduces the body heat, yet it is not a good nor safe antipyretic. It has been conclusively proved that high temperature prevents digitalis from slowing the pulse.

In moderate doses digitalis slows the heart-action, increases the force of the pulse, and from these effects chiefly, raises blood-pressure. The diastole is prolonged and the systole is increased in vigor. The result of the stronger systole is to reduce the number of pulsations. Not only does the retarded diastole give more rest to the heart, but it is followed by a better contraction of the heart-muscle and some constriction of the arterioles, so that the blood-current is reduced in size and the quantity of blood sent out through the systemic arteries is lessened. The narrowed arterial resistance and the stronger systolic contraction are the chief causes of increased blood-pressure, though to a limited extent, especially when larger doses are given, the vaso-motor apparatus exerts some control, as does also a direct impression of the drug upon the walls of the vessels. All of the above effects are those of *stimulation*, never of depression, and digitalis, in such doses, is therefore a heart stimulant and heart tonic. When carried to extremes the tonic effects may be overreached, and then the condition verges into exhaustion from over-stimulation of the heartmuscle and from a failure of the normal impulse conduction from auricle to ventricle. This is particularly evident when a person taking full and repeated doses of digitalis suddenly collapses when raised from a recumbent to a sitting posture. So powerful is the effect upon the heart-muscle that tetanic contraction may occur and prevent a passage of blood through the heart, the tonic spasm resulting in syncope; and the exhaustion and syncope are so great as sometimes to prove fatal.

The effects of digitalis may be conveniently studied under three heads, or stages, representing, however, but continuous action under normal and increased dosage rather than three actually separate conditions:

(1) The therapeutic; (2) the toxic; and (3) the extreme toxic or lethal stages.

(1) In the therapeutic stage the rhythm is slowed and the ventricles empty themselves more perfectly and by their increased force pump more blood into the vessels. The diastole being greatly prolonged and the force of the systole increased, there is produced a larger though less frequent pulse wave. The auricles are less affected than the ventricles, but on the whole the heart does more work, and were it not for the increased resistance in the vessels and lessened number of contractions more blood would be propelled into the body. As it is, the current is carried more completely to the extremities of the capillaries, and altogether the circulation is improved.

(2) The second stage is sometimes absent. It takes place when the drug is given in overdose or for a continuous period without rest. The pulse becomes very slow and irregular. The ventricle dilates more completely, thus prolonging the diastole; the systole becomes erratic in force, the auricular contractions approach failure, or become greatly at variance in rhythm with those of the ventricles. The action is rapidly going through the transitional passage from the therapeutic to the extreme toxic stage. Now follows interference with the normal transmission of impulse and contractile wave from the sino-auricular node by way of the bundle of His. Some or all of the waves fail to pass from the auricles to the auriculo-ventricular junction (heart-block) and thence to the ventricles, the result being that incoordinate action develops. The ventricles, failing to receive the normal impulse, may fail to contract; or if they contract, do so by originating their own impulse. This, then, being at variance, both as to origin and time, with that of the auricle, causes one or more skipped beats (dropped beats), the ventricles usually contracting about half as many times as the auricles. This action progressing and increasing, the third or deeply toxic stage sets in.

(3) The third stage is marked by rapid ventricular action and consequent racing of the pulse, which becomes extremely irregular and often shuttle-like in action. This is due to increased excitability of the heartmuscle to such a degree that centric nervous inhibition no longer has any control over the heart. The arrhythmia between auricle and ventricle is exaggerated and double, and triple extra-systoles spontaneously are developed. The final result is such a disorganized

coordination or confusion of action that the circulation cannot be maintained—a state well named *delirium cordis*—and the heart finally stops in extreme dilation.

The effects of the first stage are due largely to vagal inhibitory activity and to direct action of the drug upon the heart-muscle itself. The second stage is due to excessive inhibition, while the heart-muscle seems to play a minor part; the third stage is attributed solely to spontaneously increased excitability of the heart-muscle, which rapidly increases the arrhythmia, occasions the extra-systolic beats, and lastly fibrillation. Throughout digitalis intoxication the ventricles contract in unison, as do also the auricles, but the disparity in action between the auricles and ventricles displays a great variation from each other in rhythm.

Having the foregoing effects of digitalis in view, it is clear that it acts directly upon the heart-muscle, affecting the rate and rhythm of its action. It regulates contractility, irritability, and directs the conductivity of the contractile impulse by way of the aurico-ventricular bundle of His, whenever these functions are faulty. It also influences the nutrition of the heart permanently by allowing a more perfect supply of blood to the walls of the organ itself through the coronary circulation. The slowing of the diastole is due to stimulation of the vagus, both at its origin in the medulla and at its termination in the heart. The increased blood pressure is due chiefly to causes named above and to the vaso-motor control and the effects of the drug upon the vascular walls. Therefore we may sum up the medicinal action of digitalis upon the circulation as one of stimulation, giving both power and rest to the heart by prolonging the intercontractile period, and making its action more deliberate, and in its inhibition of the pneumogastric, slowing and strengthening the pulse.

Digitalis often increases the flow of urine, but many affirm that digitalis has no direct diuretic power. In health it is known to generally lessen the secretion of both the solid and fluid constituents of the urine. Some contend that it slightly increases the flow of urine. It is more than probable that, when diuresis is the result, it is in cases in which a diminished secretion of urine is due to debility or some other form of cardiac embarrassment. Others, however, maintain different views, and Brunton asserts that diuresis produced by it in dropsy is due to a special action of the drug upon the Malpighian bodies, and not to

augmented blood pressure alone. In overdose digitalis may cause spasm of the renal vessels, with consequent anuria and symptoms of cumulation. In woman, digitalis, like ergot, causes contraction of the uterine fibers of an enlarged or gravid uterus, thereby arresting hemorrhage; in man it primarily lessens the supply of blood to the erectile tissues of the penis, preventing or enfeebling erections and consequently diminishing the venereal desires.

The manner of elimination of digitalis is unknown, it being the general belief that it is taken up by some tissue in the body or becomes oxidized. At any rate none can be detected in the urine. Nor is there unanimity as to the question of tissue waste, some declaring it to increase, others to decrease the output of urea.

Digitalin, digitalein, and digitoxin are powerful heart-muscle stimulants; digitalin also stimulates the vagus; all three cause a rise in blood pressure through vaso-motor action. Digitonin seems to oppose these glucosides, acting as a check, for it depresses both the heart-muscle and the vagus.

Toxicology.—In connection with the toxic symptoms above noted, attention may be directed to the special signs of digitalis poisoning. These are, first, a slow, full pulse reduced to about half the number of normal beats, followed shortly by a tumbling or hobbling dicrotic pulse, or a shuttle-like action, with tumultuous heart-beat. In short of lethal doses the pulse may remain full and slow as long as the patient remains recumbent, but immediately upon rising it becomes rapid and irregular. There is nausea, occasionally anxiety and salivation, a sense of weight, or constriction, obtuse pain in the head, giddiness, disordered vision, mental disturbance, and rarely spectral illusions; not unfrequently a huskiness of the voice is present, the result of irritation of the fauces, trachea, etc. The nausea produced by digitalis, and more quickly by digitalin and digitoxin, is preceded by malaise, faintness, and depression, and is exceedingly distressing. Vomiting temporarily relieves it, the vomited material being first darkgreen, afterward yellow. Prostration becomes so great that the individual can not stand without help, and an intense disgust for food is experienced. Familiar objects are unrecognizable a disturbed vision with yellowness or blueness supervening. Persons are recognized only by their voices. These effects, if not fatal, may last several days, the sleep being disturbed by nightmare and general unrest. Finally sound sleep and a

voracious appetite quickly restore the individual to normal health. Exophthalmos occurs in many instances and the sclerotic is said to take on a peculiar bluish, pearl-like appearance. Death, when it occurs, is usually preceded by coma. Poisoning from cumulative doses early recognized usually clears up upon discontinuing the use of the drug.

Poisoning by digitalis may be produced by 1/16 grain of digitalin (equal to 8 grains of good powdered digitalis leaves), and Taylor (*Medical Jurisprudence*, page 229) states that doses of from 1/4 to 1/2 grain would probably produce death. If a true and uniform digitalin could always be obtained there would be much less uncertainty concerning its strength and value. Cold, belladonna, ergot, etc., increase the activity of digitalis, while aconite opposes its action. The latter is now considered the best and most available physiologic antagonist. According to Bartholow, the most complete antagonist to digitalis, physiologically speaking, is saponin. Strychnine is also a physiological antagonist.

The poisonous effects of digitalis are best counteracted by first evacuating the stomach by the free use of warm liquids and mechanical emetics, if any of it is supposed to remain in the stomach, and then administering brandy, wine, opium, black coffee, ammonia, ammonium carbonate, or other stimulants, with sinapisms to the wrists and ankles. Both external and internal heat should be used. A solution of tannic acid is of service, by forming an insoluble tannate of digitalin. Preparations containing tannin, such as tea, etc., may be given. After death from digitalis the gastric membranes were found partially inflamed and the meninges of the brain much injected (Taylor).

Therapy.—External. A poultice prepared from bruised digitalis leaves and warm water, or the tincture incorporated into a warm flax-seed poultice, has given relief in renal congestion and urinary suppression. It is a dangerous procedure, however, as there is no way of determining the quantity absorbed, and death has been known to result from excessive urination and exhaustion.

Internal. William Withering, in 1785, after ten years of experimentation—and clinical uses of digitalis in dropsies—begged leave to submit, among others, the following “inference”: “That it has a power over the

motion of the heart to a degree yet unobserved in any other medicine, and that this power may be converted to salutary ends." Thus was digitalis prophetically introduced into legitimate practice as a heart medicine.

Digitalis is preeminently the foremost heart medicine of to-day. It slows and strengthens the contractions, prolongs the intercontractile period, and thus gives both rest and power to that organ. It also contracts the capillaries to some degree, and chiefly through a more forceful output raises arterial tension, or as more commonly stated, raises blood pressure. There is also good reason to believe that through the influence of the vagi, which are probably trophic as well as inhibitory nerves, it improves the coronary blood supply and nutrition of the heart-muscle, though in this respect it has little or no advantage over cactus. Digitalis also has some value as a diuretic in disease, but it probably does not so act, to any degree at least, in health. Digitalis is the remedy for rapid and feeble heart action, with lack of propulsive power, lowered arterial tension, and deficiency of the urinary secretion. Therefore it is extremely valuable where there is a loss of, or broken, compensation, in moderate and acute dilatation, with mitral insufficiency, or in dilatation of the right heart, resulting from valvular, (tricuspid) insufficiency, in weakness of the heart due to shock, injury, hemorrhage, aconite or mushroom or other poisoning, and in the heart weakness following low and septic fevers and pneumonia, in mitral stenosis, and regurgitation, and in debility of the heart-muscle.

The true remedial power of digitalis is displayed in the treatment of asthenic heart diseases. It is one of the few drugs that act upon and correct organic changes in the heart structure; for among the other effects it will make the human pump fit its valves. Its power to cause strong and steady contractions of the cardiac muscle with consequent adaptation of the rings, or auriculo-ventricular orifices, its ability to raise blood-pressure, and in many instances its capability of increasing the renal function, make it by far the most generally useful of heart remedies. Locke was right when he declared digitalis "the true opium for the heart." It sedates (through stimulation) and gives comfort, steadies the heart-action, relieves dyspnea, gives rest and sleep when disturbed by faulty circulation, and in dropsical conditions due chiefly to cardiac inefficiency assists in reducing edema. The indications are distinct and must be followed: the weak, rapid, and irregular heart, feeble propulsion and low arterial tension. Harm nearly always comes

from its use, even when used in ordinary doses, when there is a strong, vigorous heart action, with high blood pressure. Digitalis is therefore a remedy for cardiac asthenia and organic debility. A caution worth mentioning is that physicians often judge heart action merely by “taking the pulse”, and are thereby deceived as to the true condition of the heart. There are times when the pulse may be almost imperceptible, and yet, when the ear is placed to the chest wall it will detect a hard-working heart, which has all or more contractile force than it can maintain. Vaso-motor control is at fault and then digitalis will do harm rather than good.

Digitalis is of great value in chronic valvular cardiac disease, with failing or broken compensation, but it must be used with judgment, observing the need in the weak, fast, and irregular pulse, deficient urination, and dropsy. When hypertrophy of the heart overbalances dilatation, and evidences of arterial hyperaemia are present, digitalis is likely to aggravate the condition, or otherwise do harm.

Digitalis medication is most effective probably in mitral insufficiency, with regurgitation, provided there are no pericardial adhesions restraining its effects, or advanced myocardial degeneration. It overcomes the ventricular strain dependent upon pulmonic vascular resistance, and helps, by contracting the ventricle rings, to attain a more perfect closure of the mitral valves.

In mitral stenosis, so often associated, as it is, with degeneracy of the heart structure, digitalis is a less useful remedy and may even cause harmful effects. When a failure of the right ventricle can be ascertained, and there is dropsy with anuria, it may be used, and probably to good effect. Theoretically the drug should do good in mitral stenosis, for it gives, under normal structural integrity, more power to the ventricular contractions, and by prolonging its relaxation allows a greater time for the blood to pass from the upper to the lower chamber, but the diseased myocardium may prevent it doing good work.

In tricuspid stenosis and insufficiency, with regurgitation, it is regarded as less useful than in mitral affections, but when the valves are not diseased and there is simply ventricular dilatation, it may be of use. In these conditions, when the cardiac action is weak and rapid, pressure low, and there is cough, shortness of breath, dusky countenance, pulsating jugulars, scant, high-colored urine, and

general edema, it may be used to advantage. Sometimes it has induced pulmonary hemorrhage.

Digitalis is generally regarded as less useful, rarely indicated, and even generally harmful in aortic stenosis. If, however, there is dropsy and evidence of back pressure in the lungs, it may sometimes do good.

In aortic regurgitation it is generally held to be harmful, but there are conditions which require nice discrimination as to its use. If there is great ventricular dilatation giving rise to mitral insufficiency, and when sudden dilatation with symptoms of venous stasis appears, and there is praecordial pain, dyspnea, and great anxiety, the drug is held by some to do good, though it must be tentatively given and its effects carefully watched. In all varieties of aortic valvular disease, the greatest of care and vigilance should be exercised in the giving of digitalis. The indications of heart weakness and irregular pulse should be strictly observed.

In the treatment of all valvular disorders less therapeutic value is attached to the consideration of valves affected than to the condition of the heart-muscle itself. When so weak as to cause dilatation, and this effect has been brought about by valvular insufficiency, the drug is generally indicated.

Digitalis has long been the best remedy for rapid and unequal circulation, with a confusion of weak and vigorous but rapid pulsations. The cause, however, of this state has only recently been determined. This is now familiar as "auricular fibrillation," a condition exhibiting an exceedingly irregular and fast pulse, varying greatly in rhythm and power. Some of the ventricular contractions prove too feeble to force the blood-current into the aorta, while others are so vigorous as to cause large and full pulses. All of this occurs in the greatest confusion and without any regulated sequence. A rollicking, tumbling and jumbled irregularity of the radial pulse is the clinical evidence of this state. Fibrillation is caused by a disturbance of conductivity and is the result of the occurrence of a multitude of impulses generated in the auricle, throwing that chamber into a continual condition of incoordination, preventing the normal discharge of blood into the ventricle. These erratic impulses proceed downward into the ventricle with discordant irregularity, and thus cause an interchange of weak and strong pulsations and a badly

confused action of the whole heart. Not immediately fatal, the general health after some time may become undermined unless relief be given, and sudden and alarming rapidity of the pulse, and grave danger to the circulation and to life ensues.

Digitalis is the best-known remedy for this state, being practically specific, and this control of conditions under the drug is one of the most certain of therapeutic effects. Fibrillation is not due to vagal inhibition, but evidently originates in the cardiac muscle. Most likely it is occasioned by extreme malnutrition of the heart. Full doses of digitalis are required, and under them the pulsations are rapidly reduced to less than half in number, and they become augmented in power and volume and are more uniformly timed. This action of digitalis is one of control and not always curative, for the determining causes of fibrillation may persist through life and the drug must consequently be frequently and long invoked to maintain a fairly regulated circulation. It must be known, however, that over doses of digitalis sometimes bring on a state similar to if not identical with auricular fibrillation, when the heart has shown no such disturbance before the drug was taken. In such cases the dose must be lessened or the drug entirely withdrawn and strophanthus or convallaria substituted for it.

Digitalis is of value in irritable heart with palpitation from overwork, heart strain, and the arrhythmia of simple dilatation, in moderate degrees of ventricular dilatation, and cardiac asthenia. It is especially commended for the irritable heart of soldiers brought on by long marches and fighting whereby the inhibitory-control is lost or lessened and exhaustion of the heart-muscle is imminent. When palpitation is purely nervous, it is of little value; cactus is then a better remedy. It also fails often in paroxysmal tachycardia, which is also mostly a nervous phenomenon. In Grave's disease, it is not curative, but sometimes rectifies the cardiac irregularity. In functional palpitation arising from imperfect digestion it sometimes controls the heart symptoms, but gives little or no relief if the trouble is purely nervous, nor does it aid the stomachic disorder.

Cardiologists agree quite generally that digitalis is contraindicated in beginning or partial heart-block, which it tends to increase; that it is useless, and may be harmful in sinus arrhythmia; that it is of doubtful value in pulsus alternans, especially doing harm if there is

myocarditis, with sclerosis of the coronary arteries; and in paroxysmal tachycardia, in which, however, it may benefit by retarding conduction if the beats are of sinus node or auricular origin, but is bad medication if they are of ventricular inception. Digitalis is also of questionable value in auricular flutter. In fact, in our own opinion, in all forms of arrhythmia great care must be had in the use of this powerful drug, and in most of them it had better be withheld, except in auricular fibrillation, in which its effects are all that may be desired.

The dictum, so much heard at present, to “digitalize your patient”, must be followed with judgment, for digitalis cases, it must be remembered, are those which are helped greatly or moderately, those in which no good effect may be expected, and those in which it is dangerous, or at least harmful. One should not use digitalis indiscriminately, but with rare judgment and according to the specific indications, especially taking into account primarily the condition of the heart-muscle and its ability to meet the conditions imposed upon it.

To sum up its cardiac therapy, digitalis is useful in the following conditions: In structural heart lesions, as dilated heart with mitral incompetence, in mitral stenosis and regurgitation, and in dilated right heart with tricuspid incompetence, and in relative or positive debility of the cardiac muscle. The mechanical trouble in most instances is a state of ischaemia, or lack of sufficient arterial blood in the left heart, while in the right heart and the entire systemic and pulmonic circulation there is venous stasis. Digitalis increases the power of the auricles and ventricles to empty them-selves; prolongs the inter-contractile intervals, thus allowing the auricles sufficient time to more perfectly send the blood current into the ventricles. It restores and regulates a mechanical compensation or balance in the circulatory organs. It controls fibrillation by inhibiting conductivity. The general symptoms leading to its selection are a weak, rapid, and irregular pulse, low arterial tension, cough, dyspnoea, pulsation of the jugular veins, a cyanotic countenance, deficient urination, the secretion being high-colored, and edema.

We have herein named many of the faulty anatomic conditions of the heart in which digitalis is useful, but as exact physical diagnosis is not always easy it is better for the practitioner to depend upon the symptoms of weak action than to attempt hair-splitting anatomic

diagnoses. *Lack of propulsive power due to heart debility* is the best indication for digitalis. This, together with *threatened or actual failure of compensation*, covers in brief the great need of digitalis therapy. One should never lose sight of the fact that the *integrity and relative power of the heart-muscle* are of paramount consideration over that of the condition of the heart valves.

Digitalis is generally considered contraindicated in simple compensatory hypertrophy, aortic stenosis, extensive fatty, fibrous, or other degenerations of the heart-muscle, aneurism, and atheromatous or other structural changes in the arteries. As a rule it should not be employed in the heart affections of old age, or when dilatation is excessive, and particularly when there is a flabby state of the heart-muscle with suspected degenerative changes.

Cushny (*Pharmacology*) takes issue with some of the usual cautions given above, declaring that, while digitalis often fails in excessive degenerative conditions, it has no deleterious effect upon them. Neither does he fear rupture of the arterial walls or the presence of high blood pressure in renal and arterial diseases. He believes a greatly increased blood pressure is not likely under digitalis, nor is its occurrence to be regarded as a bar to the use of the drug, provided the special indications of "venous stasis, edema, or deficient urine" are present. He presumes that, in some cases, the high blood pressure "arises from excessive activity of the vaso-constrictor center inducing mesenteric contraction in an attempt to maintain the blood supply to the brain; this involves an abnormal resistance to the circulation and imperfect nutrition of various organs. Digitalis by increasing the efficiency of the heart improves the blood supply of the brain, and the activity of the vaso-constrictor center is abated, leading to a more normal state of the circulation and often to a lower arterial tension." Notwithstanding this optimistic reasoning, physicians will do well to be extremely careful in the administration of digitalis in myocardial and vascular degenerations.

Bastedo (*Materia Medica*, etc.) declares that "the drug's efficiency is not to be estimated by its effects on arterial pressure", and that it is not contraindicated in aortic aneurysm, aortitis, or arteriosclerosis, but that "its use would depend upon the needs of the heart."

Under some circumstances digitalis proves a most certain but slow

diuretic. It is most generally held that the diuretic effect of digitalis is the result of its secondary action. If, however, the view entertained by some that it has also a special action upon the renal glomeruli be true, the reason for its well-earned reputation as a remedy in dropsy will be more apparent. Digitalis has long been known as an efficient eliminant where the dropsical condition was dependent upon cardiac irregularities and upon renal congestion. When the trouble is cardiac in origin, it relieves by strengthening the heart action and producing capillary contraction. When of renal origin, obstructing the circulation, it relieves at least the tension of the renal capillaries, thus lessening engorgement and bringing about absorption and diuresis. In general dropsy it is indicated by the distressing dyspnea, especially when in the recumbent posture, fullness and pulsation of the jugulars, pale or dusky countenance, scanty and high-colored urine, and quick, feeble, fluttering, and irregular pulse. When known to be associated with the cardiac lesions in which digitalis is indicated, it seldom fails to remove the dropsical effusion. It relieves chronic nephritis by lessening vascular tension in the renal capillaries, and in granular degeneration of the kidneys it is said to benefit by lessening the proportion of solids excreted, while the quantity of fluid is increased. While of doubtful utility in scarlatina, it is very serviceable in the anasarca condition sometimes following that disease. Many, however, regard it of doubtful safety in nephritis, and this is probably true of chronic nephritis without great cardiac impairment, but when the heart is greatly at fault and contributing to the intensity of the malady then digitalis should be of some service. Digitalis has no influence for good upon dropsy of hepatic origin, or in pleural effusion.

Rheumatism, with threatened heart failure, is sometimes relieved by digitalis. Owing to its power of preventing erections, by limiting the supply of blood to the erectile tissues, it has rendered good service in nocturnal seminal pollutions, particularly when the extremities are cold, the erections feeble, and the emissions oft-occurring.

Digitalis is not valued by us as a febrifuge. Its effect upon the gastrointestinal tract is so unpleasant as to make it of doubtful value to lower temperature. As a sedative, therefore, in fevers and inflammations, its use is not to be commended. It has been claimed that it is of great service in scarlatina, both for the purpose of producing sedation and keeping the kidneys active, thus tending to avert post-scarlatinal dropsy and uremia. That it will do this without some heart

debility being present also, is by no means well established, while, on the contrary, its unpleasant, nausea-provoking properties make it an undesirable remedy. It is better after dropsy has set in. The same is true of it in typhoid and other fevers, though it may be used to strengthen a weak heart following these infections.

Digitalis is of value in the second stage of lobar pneumonia to preserve the integrity of the heart and circulation, when through swelling and exudation in the respiratory tract venous stasis is set up in the capillaries and the right heart dilates and the ventricle is incapable of forcing the blood current through the pulmonic vessels. Signally useful when this stage attains, it is a mistake to give it before such an accident occurs on the presumption that it will forestall the catastrophe. No drug, and certainly no potent drug, should be administered for any purpose until the indications show the need of it. Under similar conditions it is sometimes of value in acute bronchitis and bronchopneumonia in children.

As an antihemorrhagic digitalis has no special advantages, while it is open to the objection of forcibly pumping the blood; though in capillary bleeding from large surfaces it is sometimes said to be useful.

Digitalis is useful as an antidote to aconite poisoning, but is very slow in action, having to be first preceded by rapidly acting stimulants. It may also be used to antidote the nitrites, and with atropine in muscarine (agaricin) poisoning.

Administration.—When given in large or in overlapping doses, digitalis may suddenly precipitate alarming conditions. This is due to inequality in the rate of absorption and elimination or destruction of the drug in the body. This state is the much feared “*cumulative action*,” the possibility of which should never be forgotten when administering digitalis. The moment the appetite fails and the urinary secretion becomes diminished and the pulse becomes very slow and irregular, and headache, faintness and extreme prostration supervene, with sometimes nausea and vomiting, the drug at once should be discontinued. To avoid cumulative effects of digitalis it is customary to skip a day or two out of every week in its administration. Digitalis is slowly absorbed, and often much of it is destroyed in the gastrointestinal tube. When through failure to be largely destroyed, or when through irritation of the tract more is absorbed than is apparent, the

balance between absorption and the usual slow elimination is overweighted and cumulation occurs. When full doses of digitalis are being administered the patient should be kept recumbent in bed and not allowed to arise even to respond to the calls of nature. Failure to observe this precaution has resulted in sudden death from syncope.

When the desire is both to impress the heart and eliminate dropsical effusion the infusion of digitalis is the preferred preparation, as it is also in auricular fibrillation. Sometimes, however, a good digitalin, which should be employed only subcutaneously, is preferred when a quicker action is desired, but the variability of this product should always be taken into consideration.

Digitalis contains no alkaloid. At least five glucosides are present, some of which are intensely poisonous; some relatively negative; while one, so far as the matter is understood, antagonizes the other four. Besides two acids, the other constituents are those of plants in general.

Under the name digitalin, the glucoside said to most nearly resemble in action the whole plant, several preparations have appeared in the drug mart from time to time which have little agreement either in action or qualities. Discordant views of the value of such preparations, or of such preparations of the whole plant as are standardized to contain a certain percentage of certain of its active glucosides, illustrate forcibly that the experiences of careful clinicians should weigh more in the selection of a preparation of digitalis than should the dictum of the laboratory man with test-tube and guinea pig records, valuable as they may be in some directions. That preparation of digitalis which gives the desired therapeutic results with the least toxic impression is the safest and most sensible agent to employ, regardless of its glucosidal constituents and percentage.

Only such digitalins as are prepared by the processes of Schmiedeberg are favored by the best clinicians; the so-called German and French digitalins are unreliable, as they are all more or less mixtures of digitalin and other glucosides while the first is probably devoid of digitalin altogether, and is said to be in reality digitonin (saponin). Homolle's and Nativelle's digitalins are no longer favored by the majority of physicians. It is asserted that the "digitalone" devised by Houghton is a fat-free, standardized composite of all the properties of digitalis; each ampule for hypodermatic use, equaling 16 minims, and

each tablet from 3 to 16 minims, of tincture of digitalis. Digifolin, also representing the whole drug, acts very effectively in some cases when the tincture or infusion cannot be employed. However, for most purposes the crude drug in infusion, and the tincture, are the preferred preparations; in Eclectic medicine the specific medicine is most largely used and is fully representative of the best therapeutic virtues of good digitalis leaves, though less toxic than some other alcoholic preparations of the drug. The tincture made from the green drug, though less toxic than that made from the dried drug, is preferred by some.

DIOSCOREA.

The rhizome of *Dioscorea villosa*, Linné (Nat. Ord. Dioscoreaceae). A vine found throughout the United States. *Dose*, 5 to 60 grains.

Common Names: Wild Yam, Colic Root.

Principal Constituents.—An acrid, alcohol-soluble resin, and a substance closely allied to saponin.

Preparations.—1. *Decoctum Dioscoreae*, Decoction of Dioscorea (Dioscorea, 1 ounce; Water, 16 fluidounces). *Dose*, 2 to 6 fluidounces.

2. *Specific Medicine Dioscorea*. *Dose*, 5 to 60 drops.

Specific Indications.—Bilious colic; other spasmodic colicky contractions; skin and conjunctivae yellow, with nausea and colicky pain; tongue coated, stomach deranged, and paroxysmal pain in the abdomen; twisting or boring pain, radiating from the umbilical region, with spasmodic contraction of the belly-muscles; colic with tenderness on pressure, which gives relief to the spasmodic action.

Action and Therapy.—The decoction of dioscorea has been wonderfully effective in some cases of bilious colic and has signally failed in others. If it does not give relief in a half hour it is not likely to succeed. The specific medicine administered in hot water has the same effect. Dioscorea is probably less anodyne than antispasmodic, and it is due to the latter action that colic is relieved. Not alone does it succeed in cases of bilious colic, but it acts similarly in paroxysmal pain, with contraction of the muscular tissues, in cholera morbus, indigestion, and dysenteric tenesmus. Ovarian neuralgia and spasmodic dysmenorrhea sometimes yield quickly to it. In all disorders

it seems best adapted to irritable and excitable conditions and is less efficient when due to atony. Though dioscorea has been used largely for nearly a century, its true place in therapeutics is still undetermined, probably because so many impossible claims have been made for it. Hepatic colic depends upon so many different conditions that it may help some cases quickly while others are unaffected by it. When large gall-stones are attempting to pass it is probably without power to relieve. Morphine is a better relaxant and is anodyne. Dioscorea seems best adapted to paroxysmal pain due to contraction of the nonstriated musculature of tubular organs, when brought on by any irritant or form of irritation. It does not dissolve calculi. Usually, while there is much tenderness in cases requiring dioscorea, the distress is gradually relieved by pressure.

DRACONTIUM (Sympllocarpus).

The rhizome, roots and seeds of *Symplocarpusfoetidus*, Linné (Nat. Ord. Araceae). A peculiar plant found in moist grounds in the United States. *Dose*, 10 to 40 grains.

Common Names: Skunk Cabbage, Skunk Weed, Pole Cat Weed, Meadow Cabbage.

Principal Constituents.—A peculiar evanescent volatile substance, resin and volatile oil.

Preparation.—*Tinctura Dracontii*, Tincture of Dracontium (fresh root, 8 ounces; Alcohol, 16 fluidounces). *Dose*, 1/2 to 2 fluidrachms.

Action and Therapy.—In large doses dracontium will cause nausea and vomiting, dizziness, headache, and impaired vision. In small doses it is a stimulant, expectorant, and antispasmodic. It very markedly relieves nervous irritation with tendency to spasmodic action, making it a remedy of some value in nervous irritability, asthma, and whooping cough, and in chronic coughs and catarrhs. The drug needs restudy from a therapeutic standpoint, for it undoubtedly possesses a marked action upon the nervous system. Only preparations from the fresh root are of any value. Skunk cabbage was an ingredient of many early Eclectic medicines, and is still a constituent of *Acetous Emetic Tincture*, *Compound Emetic Powder*, and *Libradol*, the magma representing the latter compound.

DROSERA.

The herb *Drosera rotundifolia*, Linné (Nat. Ord. Droseraceae). A small plant of the fly-trap family found in boggy situations of Eastern North America and Europe.

Common Names: Sundew, Round-leaved Sundew.

Principal Constituents.—Probably citric acid and a ferment capable of converting albumens into peptones.

Preparation.—*Specific Medicine Drosera.* *Dose*, 1/10 to 10 drops.

Specific Indications.—Expulsive or explosive spasmodic cough, with dryness of the air passages; cough of measles; whooping cough; uncontrollable, irritating cough.

Therapy.—Drosera, preferably in small doses, is of great value in the spasmodic dry cough characteristic of measles, and to a lesser extent for that of whooping cough and the irritability of the larynx following the latter. There may be simple irritation, particularly centered in the larynx, or inflammation may be present. It also relieves the tickling sensation in that organ giving rise to spasmodic cough. To a lesser extent it is useful in the coughs of bronchitis, incipient phthisis, spasmodic asthma, and in nervous or sympathetic cough occurring reflexly from other diseases. It probably acts upon the vagus.

DUBOISINA.

Duboisine.

The alkaloid obtained from the leaves of *Duboisia myoporoides*, Robert Brown (Nat. Ord. Myoporaceae), the Corkwood elm or Ngmoo of Australia and New Caledonia. *Dose*, 1/100 to 1/50 grain.

Preparations. -1. *Duboisinae Sulphas*, Duboisine Sulphate. *Dose*, 1/100 to 1/50 grain.

2. *Duboisina Hydrochloridum*, Duboisine Hydrochloride. *Dose*, 1/100 to 1/50 grain.

Action and Therapy.—External. The sulphate of this alkaloid is sometimes used as a substitute for atropine as a mydriatic. Like atropine, it is contraindicated by glaucoma and diseases of the fundus

of the eye on account of its power to increase intraocular tension. It is a more rapid mydriatic and paralyzes accommodation more quickly than atropine and is less irritant to the conjunctivae.

Internal. Duboisine is very similar to, if not identical with, hyoscyamine, and the physiological effects of it are practically the same as those of the alkaloids of belladonna, hyoscyamus and stramonium. Sulphate of duboisine is an effective antagonist of muscarine and has been successfully employed in poisoning by mushrooms. It also checks colliquative sweating. It is reported prompter in action than atropine, and is said to be a better calmative and hypnotic in states of mental excitement. The morphine habit, paralysis agitans, and especially the excitability and insomnia of the insane have been treated with it. Administered in the smaller doses twice a day it is said to produce quiet, refreshing sleep. It frequently causes gastric disturbances, especially vomiting without previous nausea, and undoubtedly decreases the secretion of urine, hence it should be used with care and judgment.

DULCAMARA. (*Solanum dulcamara*)

The young branches of *Solanum Dulcamara*, Linné (Nat. Ord. Solanaceae). A vine common in Europe and the United States. **Dose**, 1 to 30 grains.

Common Names: Bittersweet, Woody Night-Shade, Scarlet-Berry, Violet-Bloom.

Principal Constituents.—The alkaloid *solanine* and the glucoside *dulcamarin*.

Preparation.—*Specific Medicine Dulcamara*. **Dose**, 1 to 30 drops.

Specific Indications.—Scaly skin affections; acute disorders due to cold and dampness; deficient capillary circulation; depressed secretions of the skin with urinous odor; coldness and blueness of the extremities; fullness of tissues with tendency to edema.

Action and Therapy.—Dulcamara is an active agent capable of producing poisonous effects. These are those of the belladonna type, differing only in minor particulars. Cutaneous redness and congestion of the kidneys are especially apt to result from immoderate doses. Children are sometimes poisoned by eating the berries of the plant. Scudder suggested dulcamara in small doses in “cases of chronic disease in which the circulation is feeble, the hands and feet cold and

purplish, with fullness of tissues and tendency to edema.” Locke advised it in acute disorders brought on by cold, dampness, and exposure. Using it in fractional doses he suggested its value in acute catarrhal disorders proceeding from cold or suspended cutaneous function; in suppression of the menses with nausea, headache, and chilly sensation, the flow having been arrested by a cold; in vesical catarrh, aggravated by dampness; catarrhal headache from acute colds; nasal catarrh; retrocession of eruptions, or primarily to develop the eruptions; and in dyspnoea, cough and pain in the chest due to exposure. Those who dwell or work in damp or cold quarters, especially children, are frequently the victims of catarrhal diarrhoea, and acute and chronic rheumatism. Such patients are benefited by dulcamara given in fractional doses. Larger doses (medium) are effective in some cases of acute mania, nymphomania and satyriasis, acting as do the more powerful of the group of solanaceous drugs. It will be observed that the therapeutic uses of dulcamara are closely allied to those of belladonna, minus the profound impression derived from atropine.

Dulcamara should be remembered as a possible remedy in chronic skin diseases of a pustular, vesicular or scaly type, particularly the latter. It may also be tried in pudendal itching.

monographs extracted from
The Eclectic Materia Medica, Pharmacology and Therapeutics
by Harvey Wickes Felter, M.D. (1922)

NOTE: Throughout these monographs are references to “Specific Medicines”. In some respects Specific Medicines are the single reason that Eclecticism survived so long in the face of “Organized Medicine” and were still being manufactured for the surviving Eclectic M.D.s as late as the early 1960s. Using up to eight organic solvents and the Lloyd Extractor, Specific Medicines represented the strongest possible concentration of the bioactive aspects of botanicals that would stay in a colloidal solution.

Perfected over four decades by John Uri Lloyd, each Specific Medicine was prepared according to the nature of THAT specific plant. You cannot translate a Specific Medicine into “tincture” or “fluidextract”. The latter are GENERIC or standard strengths applied across the board to ALL botanicals. A Specific Medicine represented the greatest strength, without degradation, for a PARTICULAR plant, using anywhere from several to all of the solvents to achieve this. The Eclectic physician was trained to use botanicals in an oftentimes rural setting, and these medicines had to resist breakdown in the deepest winter and the hottest summer. Since they needed to contain even the most ephemeral constituents of a plant remedy, Lloyd approached each plant separately.

The amazing quality of these preparations assuredly maintained the Eclectic Movement long after others had faded. Lloyd’s recipes were Patent Medicines, were not “official”, and when relatives finally closed down the Lloyd Brother’s Pharmacy in Cincinnati, these formulae disappeared. One of the hottest topics for many years amongst professional herbalists in North America and Europe has been “So who has the Lloyd Formulas, already?” Since we cannot access them, the best approach is the use of well made tinctures, capsules or tea. I might suggest the preparations and doses recommended in my Herbal Materia Medica 5.0 as a starting place...in many respects I am perhaps a “Neo-Eclectic” at heart, and have tended to follow the later Eclectics in my approach to plants and dosages.

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