

shows a tracing such as we sometimes meet with. This is from an old woman with a dilated and irregular heart, but no murmurs. The venous tracing shows, as a rule,

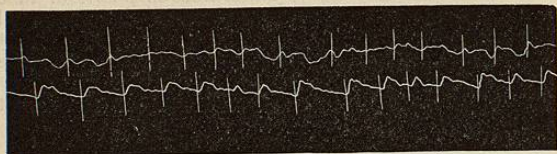


Fig. 3919.—Jugular Pulse (above), Radial (below). Corresponding points are marked.

the most pronounced collapse during diastole and resembles somewhat the ventricular pulse shown in Fig. 3918. There was no positive beat in the veins of the neck, however, and there were no heart murmurs, so I ascribed the condition to dilatation and threatening paralysis of the auricles without any serious amount of regurgitation. In this tracing a presystolic rise and systolic collapse are occasionally seen, so that the paralysis of the auricles was not absolute.

THE VENOUS PULSE IN IRREGULAR HEART ACTION.—A number of observers have recently been making use of the venous pulse as a means of deciding the primary seat of irregularity in the rhythm of the heart. One example will have to suffice. Fig. 3920 is a tracing taken from one of the cases referred to, in discussing the arterial pulse, of a father and son, both in good health and both with irregular pulses. This tracing is taken from the son. The venous pulse is small, as is usually the case

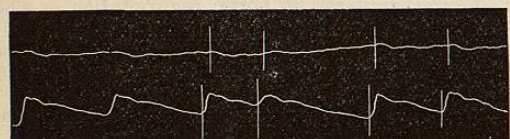


Fig. 3920.—Jugular Pulse (above); Radial (below). Corresponding points are marked.

in a healthy adult, but suffices for the purpose. An irregularity may be seen in both the arterial and the venous pulse of the nature of a premature beat. In the ordinary beats preceding and following the premature one, a faint wave may be detected in the venous pulse synchronous with the primary wave in the radial. This is the systolic wave. Just preceding the systolic wave a fainter one which is presystolic and due to the auricular systole may be seen. In the venous beat corresponding to the premature wave in the radial a systolic wave may also be seen, but the auricular wave follows it instead of preceding it, showing that the auricle in this case contracts after the ventricle, and therefore the anomalous stimulus causing the premature beat must have acted on the ventricle. If measurements be made it will be found that the pulse intervals on either side of the premature beat are together equal to the preceding and succeeding ones, or to two average pulses. This, according to Hering, Cushman, and

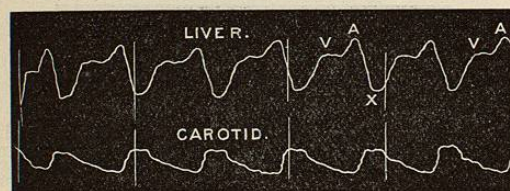


Fig. 3921.—Auricular Liver Pulse.

others, points to the auricle not being implicated in the irregularity. When the auricle is the primary seat of the disturbed rhythm, such a correspondence is not usually found. This rule is said by Gerhardt, however, to

be not without exceptions. The full importance of thus differentiating the seat of the irregularity is not fully worked out, but on the whole those cases in which the irregularity is confined to the ventricle are less serious than those in which the auricle is also irregular in its rhythm.

THE LIVER PULSE.—A pulsation can be felt and recorded in the liver in certain cases in which the right side of the heart and the veins are much distended. In some cases the tracing has the form corresponding to the auricular venous pulse. In these cases, according to Mackenzie, there are usually tricuspid stenosis and auricular hypertrophy, as the normally weak auricular waves have not force enough to make themselves felt in the liver.

In other cases the liver pulse has the characters of the ventricular venous pulse, and then we may be reasonably

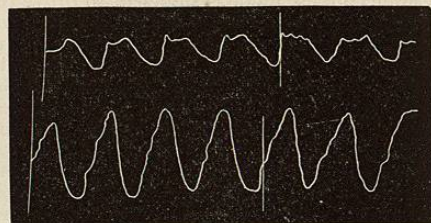


Fig. 3922.—Ventricular Liver Pulse. (Carotid above; liver below).

certain of the existence of tricuspid regurgitation. Tracings of these two forms of liver pulse taken from Mackenzie's book are shown in Fig. 3921 and Fig. 3922.

CAPILLARY PULSE.—This consists in alternate reddening and paling of an area of the skin with each heart beat. It is most frequently looked for in the bed of the finger nails, and may be brought out most distinctly by raising the arm. Quincke, who first described the capillary pulse, recommends rubbing gently a spot upon the forehead and looking for it there. The capillary pulse may be taken as an indication of aortic regurgitation with a strongly acting ventricle (hypertrophied).

William S. Morrow.

REFERENCES.

I desire to acknowledge my special indebtedness to the book on the pulse, by James Mackenzie, and warmly to recommend it to those desiring to read something more exhaustive than this article. I have also received help from the following: The Physiologies of Schaefer, Halliburton, Howell and Hall; Vierordt's "Medical Diagnosis"; Hutchison and Rainy's "Clinical Methods"; Gibson's "Diseases of the Heart"; Balfour's "Diseases of the Heart"; Fagge's "Practice of Medicine"; Green's "Examination for Life Insurance"; Ewart's "Heart Studies"; Hürthle's "Beiträge zur Häemodynamik" in Pfüger's Archiv, vol. xlix.; D. Gerhardt's "Klinische Untersuchungen über Venenpulsationen" and "Einige Beobachtungen an Venenpulsen" in Archiv für experimental Path. u. Phar., vols. xxxiv. and xlvii.; Karl Schmidt, Jr., "Herz-Kammer Systole und Pulsecurve," Pfüger's Archiv, 1902, Heft 5 u. 6; W. S. MacCallum, Johns Hopkins Hospital Bulletin, March, 1900; Cushman, "On Intermittent Pulse," British Med. Journ., September 29th, 1900. A good bibliography will be found in Gibson's "Diseases of Heart and Aorta."

PUMPKIN SEEDS.—*Pepo*, U. S. P. *Semen Peponis*. The dried ripe seed of *Cucurbita pepo* L. (fam. *Cucurbitaceae*).

The nativity of the pumpkin is not certainly known, though it was probably North American. It presents numerous varieties, and the squashes, at least some of them, have been regarded by some botanists as pertaining to the same species. Although squash seeds appear to possess similar properties, they are not included, as a drug, under the above title.

Pumpkin seeds are about 2 cm. (¾ in.) long, broadly ovate, flat, white, or whitish, nearly smooth, having a shallow groove near to and parallel with the edge; containing a short conical radicle and two flat cotyledons; inodorous; taste, bland and oily.

The active constituent is supposed to be a small amount of a soft, green, acrid, and bitter resin, which possesses the same properties as the entire drug. With this there

exists a yellow or somewhat reddish-yellow, bland fixed oil, to the extent of about thirty-five per cent., a little sugar, crystallizable albumin, and other unimportant constituents. The oil, which consists of glycerides of palmitic, myristic, and oleic acid, portions of which acids also exist in a free state, has been credited with the properties of the drug, but possibly, if pure, does not possess them.

Pumpkin seeds are markedly diuretic, but their medicinal use is as a pleasant and moderately certain tennicide. Only the kernel should be used, and it is commonly given in the form of an electuary or emulsion, the dose amounting to from 25 to 50 gm. (¾ to 1 iss.). Fifteen grains of the resin is an equally efficient dose, though not so pleasant.

Throughout the West Indies, Mexico, Central America, and many other countries, pumpkin seeds, as well as squash seeds, are largely consumed as food.

Henry H. Rusby.

PURGATIN.—Purgatol, anthrapurpurin diacetyl ester, is an odorless, tasteless, yellowish-brown powder recommended by von Hösslin as an agreeable laxative. It acts slowly, requiring thirteen to twenty-four hours, and produces a copious, non-liquid stool. The urine is colored red. Dose, 0.5-2 gm. (gr. viij.-xxx.).

W. A. Bastedo.

PURGATIVES, OR CATHARTICS, are medicines which are used to produce alvine evacuations. According to their activity and power, they are divided into laxatives and mild and drastic purgatives.

Purgatives which act very gently, producing soft, feculent stools without notable irritation, are called *laxatives*. This term is also applied to more powerful purgatives when they are given in small doses, so as to act mildly. (See *Laxatives* in Vol. V.)

Purgatives which operate briskly, usually producing more or less fluid evacuations, sometimes with griping and tenesmus, but without serious irritation, are called *mild or simple purgatives*. To this group belong some of the salts of magnesium, sodium, and potassium, which, from their resemblance in chemical and physical properties, and in physiological action, are termed *saline purgatives*.

The term *drastic* is applied to those purgatives which operate energetically, producing numerous evacuations, and, in excessive doses, more or less gastro-intestinal irritation.

Purgatives which produce watery stools, especially the salines and some of the drastics, are called *hydragogues*, and those which cause the evacuation of large quantities of bile, *cholagogues*.

MODE OF ACTION.—All purgatives accelerate the peristaltic movements of the intestines. Radziejewsky carefully observed the rapidity of peristalsis in dogs, both before and after the administration of purgatives. In the normal state the movements of the small intestine were rapid, those of the large intestine very slow. After the administration of purgatives, the movements of both became much accelerated, but most markedly those of the large intestine.

It was assumed that purgatives, especially the hydragogues, also induce a discharge of fluid from the intestinal mucous membrane. Experiments on animals at first seemed to show that this was an error. Thiry completely separated a portion of the small intestine from the rest of the bowel, without dividing its vessels and nerves, sewed up one end, which was returned into the abdominal cavity, and attached the open end to the wound in the abdominal wall. Into the cul-de-sac thus formed he introduced croton oil, senna, and Epsom salt. No accumulation of fluid took place. Schiff experimented in a similar manner with aloes, jalap, and sulphate of sodium, and Radziejewsky with croton oil and sulphate of magnesium, both with the same negative result. Radziejewsky also analyzed the feces before and after the administration of purgatives. The evacu-

ations produced by purgatives contained more water and sodium salts than normal feces, and sometimes products of pancreatic digestion, but never as much albumin as should have been present if transudation of fluid from the intestinal blood-vessels had taken place. It was therefore concluded by these investigators, and is still maintained by some recent authors, that purgatives do not induce either transudation or increased secretion, and that the watery character of the stools results only from the greatly accelerated peristalsis, which interferes with the absorption of the fluid normally secreted.

But subsequent investigations yielded different results. Moreau introduced sulphate of magnesium into a portion of intestine isolated by means of two ligatures, and after some hours found a decided accumulation of fluid. Brunton, experimenting in a similar manner, found that croton oil, gamboge, elaterin, and Epsom salt caused a decided accumulation of fluid. That the accumulated fluid was not a transudation was evident from the fact that it contained very little albumin. Brieger injected into an isolated portion of intestine very small quantities of colocyth. No accumulation of fluid took place, but the bowel was contracted and slightly reddened. Larger quantities of colocyth, as well as croton oil, caused an accumulation of bloody fluid, with decided inflammation of the mucous membrane. After injecting calomel, senna, rhubarb, aloes, and castor oil, Brieger found the bowel empty and firmly contracted. Sulphate of magnesium in very dilute solution caused no accumulation of fluid, but concentrated solutions of this salt, so also Glauber salt, caused very decided accumulation. That the fluid was a secretion, and not a transudation, was evident from the fact that it readily converted starch into sugar and dissolved raw fibrin.

Thus it has been found in experiments that sulphate of magnesium, sulphate of sodium, croton oil, gamboge, colocyth, and elaterin, not only accelerate the peristaltic movements of the intestines, but also induce a secretion of watery fluid from the intestinal mucous membrane; and that castor oil, rhubarb, aloes, senna, calomel, and minute quantities of colocyth accelerate peristalsis, but do not notably increase secretion.

Hess, in experiments on dogs, endeavored to determine the manner in which purgatives increase the peristaltic contractions. He made gastric fistulae a short distance from the pylorus, so that he could easily introduce purgatives into the duodenum. After paving determined the quantity of the purgative (sulphate of sodium, castor oil, croton oil, senna, colocyth, gamboge, and calomel) which would act briskly, he introduced into the duodenum a small, empty india-rubber ball, to which was attached a long, fine india-rubber tube. After this had been carried by the normal peristaltic contractions a certain distance, which varied in the different experiments, he filled it with water to such a degree as to obstruct the bowel. The purgatives which previously had acted briskly then completely failed. Hess therefore concluded that the peristaltic movements excited by purgatives are probably not propagated through long distances by means of nervous apparatus, or, according to Engelmann, from muscle to muscle, but that they are reflexly excited in each part of the intestine by direct stimulation of its mucous membrane.

MILD PURGATIVES.—Of the purgatives which act vigorously, without causing severe irritation of the intestines, the following are commonly employed: aloes, rhubarb, senna, castor oil, salines, and mercurials.

Aloes.—In large doses, from five to twenty grains, aloes produces semi-liquid or liquid stools. The first evacuation rarely occurs before six hours, and often not before ten or twelve hours. Some griping usually precedes the evacuations, and they are often attended by a feeling of heat in the anus, and by straining, especially if the medicine be repeatedly taken. From the slow action and the tenesmus, it is supposed that aloes influences the rectum more than other parts of the intestines.

In experiments on rabbits, Kohn found that aloes caused moderate hyperæmia of the stomach, intestines,

and kidneys. In various animals large doses of aloin, injected into the subcutaneous tissue, were followed by gastritis, sometimes with hemorrhage and ulceration, and in rabbits by degeneration of the epithelium of the kidneys.

According to the experiments of Rutherford, aloes increases the secretion of bile and renders it more watery. Various observers have found that it does not act when bile is absent from the intestines.

Aloes was formerly employed in large doses to produce brisk purgation, when acute disorder of any organ of the body supervened soon after the cessation of an habitual hemorrhoidal discharge. It was sometimes given to produce a revulsive effect in cases of congestion of the brain, apoplexy, hemiplegia, and insanity. At the present time it is rarely used, except in small doses as a laxative. According to G. B. Wood, it sometimes quickly cures jaundice when other remedies have failed.

Aloes is contraindicated in inflammatory affections of the intestines and kidneys, in irritable and bleeding piles, in uterine hemorrhage, and during menstruation.

It is generally administered in pillular form, and the official pills of aloes are preferable to other preparations. Each pill contains two grains of aloes.

Rheum.—In dose of thirty to forty grains, taken at one time, or ten to twenty grains, repeated several times at short intervals, rhubarb produces semi-liquid stools in from five to ten hours, usually with griping, but without severe irritation. Some constipation generally follows. Recent experiments have confirmed the ancient opinion that rhubarb increases the secretion of bile.

Rhubarb is a suitable purgative when the bowels require thorough evacuation in patients who are occasionally subject to diarrhoea. Sometimes it is preferred to other purgatives in catarrhal jaundice.

It may be given in the form of powder, fluid extract, tincture, or wine. Aromatics are generally associated with it to prevent its griping effect. \mathcal{R} Pulv. rhei, \mathfrak{D} ij.; pulv. aromatici, \mathfrak{D} i. M. Div. in pulv. iv. Sig.: One powder every two hours. They may be conveniently taken in syrup or molasses, or in wafers. The fluid extract is given in doses of fifteen to thirty minims, mixed with syrup and an aromatic water. \mathcal{R} Extr. rhei fluid., \mathfrak{z} ss.; syr. zingiberis, \mathfrak{z} ss.; aq. cinnam., \mathfrak{z} iss. M. Sig.: One tablespoonful every two hours till the bowels move. The tincture and wine are suitable for feeble patients, especially if they are accustomed to alcoholic beverages, and may be given in doses of half an ounce, repeated, if necessary, at convenient intervals.

Senna.—Senna operates gently and slowly in doses of fifteen to thirty grains, producing one or two pultaceous stools in from five to ten hours. Large doses act more briskly. Two or three drachms usually produce semi-fluid discharges in three or four hours. The evacuations are preceded by pretty severe tormina, and sometimes by nausea and eructations. Borborygmi and occasional small fluid stools often continue for from twelve to twenty-four hours.

Though it acts vigorously, and produces quite liquid stools, containing about eighty-five per cent. of water, senna never causes severe irritation or inflammation of the intestines. It is supposed, however, that large doses may influence the uterus, and, given during pregnancy, induce hemorrhage and abortion.

The watery character of senna stools is generally regarded as evidence of increased intestinal secretion; but in careful experiments Brieger found no accumulation of fluid in an isolated loop of intestine with which senna had been in contact some hours. That it greatly accelerates the peristaltic contractions of the small intestine appears from Radziejewsky's experiments. This investigator found that in dogs, normally from seven to nine discharges took place from a fistula in the ascending colon in three or four hours after a feeding; but when senna was administered the discharges began in ten or fifteen minutes, and numbered about thirty in four hours.

Cathartin, the active principle of senna, in doses of gr. iss.—iiss., produces thin stools with colicky pains in from

three to fourteen hours. An amount equal to two grains, injected into the subcutaneous tissue, was followed by copious evacuations in from eight to twelve hours.

As senna acts rapidly and efficiently, it is suitable when the contents of the intestines require speedy removal. Combined with Epsom salt, as in the official compound infusion of senna, it is frequently employed in the early stage of inflammatory diseases, except those of the alimentary canal. It is better adapted than rhubarb and some other mild purgatives for patients disposed to costiveness.

Senna, in large doses, is contraindicated in inflammation of the intestines, hemorrhoids, menorrhagia, threatening abortion, and prolapse of the uterus or rectum.

It is generally given in the form of the *infusum sennæ compositum*, which, in quantities of about two ounces, repeated several times at intervals of one or two hours, soon produces copious watery discharges. The fluid extract of senna may be given in doses of half a drachm to two drachms with syrup and an aromatic water. \mathcal{R} Extr. sennæ fluid., \mathfrak{z} ss.; syr. zingiber., \mathfrak{z} ss.; aq. cinnam., \mathfrak{z} ij. M. Sig.: A tablespoonful every hour until the bowels act. The syrup of senna is a convenient preparation for children in doses of from one to four drachms.

Oleum Ricini.—Castor oil, in doses of half an ounce to an ounce, usually produces semi-fluid evacuations in from three to six hours, generally with little or no griping or other symptoms indicating irritation of the intestines. Nausea and vomiting may occur in very susceptible persons, especially if the oil is rancid or the stomach disordered.

From its efficient and speedy operation, castor oil is well adapted to all cases requiring a thorough cleansing of the alimentary canal, as when the presence of poisons, undigested food, or products of decomposition in the intestines indicates the use of a brisk purgative. Its gentle, unirritating action renders it suitable when a purgative is required in inflammation of the intestines, inflamed hemorrhoids, fissure of the anus, metrorrhagia, and after parturition. For methods of disguising its taste, see article on *Laxatives*.

SALINE PURGATIVES.—The following saline purgatives are commonly employed: Sulphate of magnesium, sulphate of sodium, citrate of magnesium, tartrate of potassium and sodium, and bitartrate of potassium.

Large doses of saline purgatives produce copious watery stools. This peculiar action was explained by chemists as resulting from osmosis, the dense saline solutions within the intestines causing the less dense fluid of the blood to pass through the walls of the blood-vessels. But the fact that large doses of salines, when given in very dilute solution, so as to be less dense than the fluid of the blood, act as efficiently and often more speedily than concentrated solutions proved that this theory was untenable. Subsequently it was shown, by Buchheim and others, that only salts of low diffusibility are efficient purgatives, and that this property impedes their absorption in the intestines, causing them to pass nearly entire into the lower part of the large bowel and to excite purgation.

For a time it was supposed that the accelerated peristalsis resulting from the presence of saline solutions was sufficient to explain their rapid and peculiar action. But the investigations of Moreau, Brunton, Brieger, Hay, and others, have conclusively shown that dense saline solutions produce an active secretion of watery fluid from the intestinal mucous membrane. Brieger and Hay found that very dilute solutions, although they may purge rapidly, do not cause an increase of secretion; and Hay observed that when concentrated solutions are given, the quantity of fluid secreted depends upon the degree of concentration. Solutions containing less than five per cent. of a salt, produce little or no secretion, but stronger solutions always have this effect. Under ordinary circumstances, the amount of fluid secreted corresponds very nearly to the quantity required to form a five-per-cent. solution of the amount of salt administered. In consequence of the secretion of a large quantity of fluid,

when concentrated saline solutions are given, the fluid of the blood becomes proportionately diminished. This continues only a short time, as the blood absorbs fluid from the tissues until it has nearly regained the quantity lost by increased secretion.

Thus the mode of action of saline purgatives depends upon the quantity administered and the degree of dilution. Very dilute solutions excite no intestinal secretion, but rapidly produce watery stools; while concentrated solutions cause a decided increase of secretion, diminish the fluid of the blood, excite absorption of fluid from the tissues, and in a short time produce watery evacuations.

Saline purgatives are preferred to other mild cathartics for evacuating inspissated fecal masses. As a rule, they should be given in very dilute solution. In the early stage of inflammatory diseases, salines are often employed for the purpose of lowering temperature and blood pressure, and thus diminishing the inflammation. They are of little use in such cases unless given in concentrated solution, so as to excite a decided increase of the intestinal secretion. The utility of salines is most conspicuous in cases of ascites and general dropsy. Administered in very concentrated solution, they often in a short time produce a very notable effect, especially if the patient have entirely abstained from food and drink for some hours before taking the saline.

Magnesi Sulphas.—Epsom salt is generally preferred to other saline purgatives. In doses of half an ounce to an ounce it usually produces watery stools in several hours, the first discharge sometimes taking place in one hour. This rapid action is rarely attended by severe griping. As it is readily soluble in water, it may be given in very concentrated solution, a method strongly recommended by Hay in cases of dropsy. It is frequently associated with senna, as in the compound infusion of senna.

Its taste is somewhat improved and its activity increased by sulphuric acid. \mathcal{R} Magnesi sulph., \mathfrak{z} i.; aq. destill., \mathfrak{z} ij.; acid. sulph. arom., \mathfrak{z} ss.; syrapi, \mathfrak{z} i. M. Sig.: One or two tablespoonfuls every hour. The bitterness of Epsom salt may be disguised by strong coffee and aromatics, especially cinnamon water. \mathcal{R} Magn. sulph., \mathfrak{z} i.; aq. cinnam., \mathfrak{z} ij.; syr. aurant., \mathfrak{z} i. M. Sig.: A tablespoonful every hour.

Sodii Sulphas.—Glauber's salt has a still more repulsive taste than Epsom salt. It is therefore rarely employed when saline purgatives are indicated. According to recent researches, it causes a decided increase of the secretion of bile and renders it more watery. In all other respects its action closely resembles that of Epsom salt. The following substances have been employed to correct its disagreeable taste: Lemon juice, aromatic sulphuric acid, carbonated water flavored with syrup, and extract or fluid extract of licorice.

Sodii Phosphas.—This salt, although an effective purgative in doses of \mathfrak{z} ss.—i., is rarely employed in the diseases of adults. It is sometimes used in laxative doses, \mathfrak{z} ss.—ij., several times daily in catarrhal jaundice and other diseases supposed to indicate a cholagogue. On account of its not unpleasant taste, it is frequently used as a purgative in the diseases of children. The following is an agreeable mixture: \mathcal{R} Sodii phosphatis, \mathfrak{z} ij.; syr. rubi idæi, \mathfrak{z} ss.; aq. destill. q.s. ad \mathfrak{z} ij. M. Sig.: One teaspoonful every hour.

Liquor Magnesii Citratis.—The solution of citrate of magnesium has an agreeable taste, and is therefore often preferred to other saline purgatives for unloading the bowels in simple constipation. It is, however, less efficient than the sulphates of magnesium and sodium, sometimes operating briskly, sometimes producing no purgative effect. Usually a whole bottle, containing twelve ounces, taken in several portions at short intervals, is required. In cases of dropsy and inflammatory diseases other saline purgatives are preferable.

Potassii et Sodii Tartras.—In doses of half an ounce to an ounce, Rochelle salt usually produces liquid stools in a few hours. As it has a less disagreeable taste than

Epsom salt, generally agrees well with the stomach, and acts gently, it is often employed when a mild purgative is indicated in the diseases of children, females, and delicate persons. It somewhat increases the secretion of bile. From two to four drachms, dissolved in sweetened water, may be taken at intervals of two hours till the bowels respond.

Potassii Bitartras.—Large doses of cream of tartar, half an ounce to an ounce, are followed by watery stools, which are often preceded by flatulence and griping. It is rarely used alone, but frequently in combination with jalap. When given in large doses, it should be suspended in an aromatic water to prevent griping.

MERCURIAL PURGATIVES.—Of the preparations of mercury which produce catharsis, calomel and blue mass are frequently used. Metallic mercury is sometimes employed in obstruction of the bowels.

Hydrargyri Chloridum Mite.—Calomel, in doses of from five to ten grains, usually acts in about six or eight hours, producing copious semi-liquid, dark brown or green evacuations. As a rule, no marked incidental effects are observed; but sometimes, especially after the larger quantity, the evacuations are preceded by griping, nausea, and depression. Smaller doses, one to three grains, act more slowly and very gently. Accurate chemical analyses have discovered in calomel stools bile pigments, leucin, tyrosin, peptones, sulphide of mercury, and unchanged calomel, but no skatol and indol.

The presence of bile in the stools was formerly regarded as a certain evidence of an increased secretion of bile. But in numerous careful experiments on dogs, and in some observations made on patients having accidental biliary fistulae, it was found that purgative doses of calomel notably lessen the secretion of bile. To explain the presence of bile in the stools notwithstanding diminished secretion, it was then assumed that calomel greatly increases the peristaltic contractions of the small intestine, especially of the duodenum, and thus hurries the bile already secreted downward so rapidly that reabsorption cannot take place. The presence of leucin and tyrosin in calomel stools rendered this view very plausible. But the fact that some purgatives, which act more rapidly than calomel, and doubtless strongly accelerate the peristaltic contractions of all parts of the intestines, do not produce markedly bilious discharges seemed to show that this assumption was incorrect.

The recent experiments of Wassilieff show conclusively that calomel produces bilious stools, by arresting decomposition in the intestines. He divided fresh oxgall into three portions, each weighing 200 gm.; to one portion was added 3 gm. of calomel, to another 2 gm., and to the third none. They were kept in a warm room, and occasionally agitated. The portions containing calomel at once became green, and retained this color as long as the experiment was continued, which was six days. They readily responded to Gmelin's test for bile pigment, and showed no trace of decomposition. The portion not containing calomel had become brownish-yellow in one day, did not exhibit the reaction of bile pigment, and was soon putrid. Doubtless calomel exerts the same antiseptic influence in the intestines. Under ordinary circumstances the bile pigments, bilirubin and biliverdin, become converted into hydrobilirubin, and hence cannot be detected in the feces. Calomel prevents this decomposition, and by increasing peristalsis causes the unchanged bile pigments to be evacuated. In the same manner it prevents further changes of leucin and tyrosin, and the formation of skatol and indol.

Calomel is a very effectual purgative in the morbid state called biliousness—marked by a sallow complexion, yellowness of the white of the eyes, a bitter taste, defective appetite, and sometimes nausea; by headache, mental dulness, and depression; and sometimes by light-colored stools and sedimentary urine. By arresting decomposition and removing bile and other substances before they can be absorbed, it thoroughly relieves both the intestines and the liver.

In small doses calomel has been found useful in the

gastro-enteritis of children. Its utility is probably due chiefly to its antiseptic action.

Administered in doses of from five to seven grains, for one or two days, in the first week of typhoid fever, calomel somewhat lowers the febrile temperature and renders the disease milder. As other purgatives are less useful, it probably exerts a destructive influence upon the micro-organisms which cause the disease.

As a rule, calomel is indicated as a purgative in all acute affections of the intestines resulting from fermentation and putrefaction.

Together with jalap or rhubarb, calomel is sometimes administered in the early stage of inflammatory disorders of the internal organs. Though not useless, it produces very much less effect on the quantity of fluid in the blood-vessels and on the blood pressure than large doses of the saline purgatives.

Calomel should not be used in habitual constipation. It is usually ordered in powder with sugar, or with jalap, rhubarb, or bicarbonate of sodium. \mathcal{R} Hydrarg. chlor. mitis, gr. v.; sacch. albi, gr. x. M. Sig.: Take at once. \mathcal{R} Hydrarg. chlor. mitis, gr. iij.; pulv. jalapæ, gr. x. M. Sig.: Take at once in syrup or molasses. \mathcal{R} Hydrarg. chlor. mitis, gr. v.; sodii bicarbon., gr. xv. M. Sig.: Take in molasses or syrup. In all cases, if calomel have failed to act after eight or ten hours, a saline purgative or castor oil should be given.

Massa Hydrargyri.—Blue mass is a somewhat uncertain purgative when given in doses of from five to ten grains. It is, therefore, usually combined with rhubarb, aloes, podophyllin, or compound extract of colocynth, or, if given alone, a dose of castor oil, Rochelle salt, Epsom salt, a senna draught, or a seidlitz powder, is administered after eight or ten hours. It is held to be efficient in biliousness, and is usually given in the evening.

Hydrargyrum.—Metallic mercury in large doses quickly passes through the alimentary canal in consequence of its great weight. Probably the dragging and stretching of the mucous membrane, resulting from the presence of large quantities, excite very powerful peristaltic contractions, which rapidly carry the metal through the intestines.

Metallic mercury has been employed in intestinal obstruction when all other ordinary means had failed to give relief. Bettelheim (*Deutsches Archiv f. kl. Med.*, Bd. 32, p. 53) carefully studied seventy cases of obstruction, reported during the last fifty years, in which mercury was used. In fifty-seven cases a cure resulted, that is, the obstruction was relieved either temporarily or permanently. In no case did it cause rupture, inflammation, or gangrene of the bowel, while in some instances it saved life. Bettelheim therefore considers it proper to administer mercury in cases of obstruction due to feces, ascariæ, and even to intussusception or torsion, if other ordinary means have failed to give relief.

The dose of metallic mercury varies from one to ten ounces.

DRASTIC PURGATIVES.—Of the cathartics which operate violently and produce serious irritation of the intestines, when given in excessive doses, only the following are commonly employed: jalap, scammony, colocynth, podophyllum, gamboge, croton oil, and elaterin.

Jalap.—Jalap is the mildest drastic, and resembles senna in its action. In doses of fifteen to thirty grains it usually soon causes a feeling of discomfort in the epigastrium, and sometimes nausea. After two or three hours tormina and several liquid stools occur. Smaller doses, five to ten grains, act gently, producing one or two pulsaticeous evacuations. In very excessive doses jalap causes vomiting and profuse rice-water discharges, with great depression.

The resin of jalap, in doses of from one to three grains, acts as a laxative, but in larger doses, from five to fifteen grains, it produces watery stools in a few hours.

According to recent investigations, jalap does not act well when bile is absent from the intestines. In experiments on dogs it was found to increase moderately the secretion of bile.

On account of its rapid, safe, efficient, and hydragogue action, jalap is frequently employed when a brisk cathartic is indicated. In cases of acute constipation, and in inflammatory diseases, it is usually associated with calomel, and in ascites and anasarca with bitartrate of potassium. The official *pulvis jalapæ compositus*, consisting of thirty-five parts of jalap and sixty-five parts of cream of tartar, is generally preferred to other hydragogues in dropsy. In doses of half a drachm to one drachm, it usually produces watery discharges in a few hours.

The resin of jalap may be given in doses of from one to eight grains in powder or emulsion. \mathcal{R} Resin. jalapæ, pulv. acaciæ, aa gr. viij.; sacch. albi, ʒ ss. M. Div. in part. equal. iv. Sig.: One powder every two hours till the bowels move. \mathcal{R} Resin. jalapæ, gr. viij.; pulv. acaciæ, sacch. albi, aa ʒ i.; aq. menth. pip., ʒ iij. M. Sig.: One tablespoonful every two hours. Sometimes resin of jalap is given in combination with calomel. \mathcal{R} Resin. jalapæ, hydrarg. chlor. mitis, aa gr. iv.; sacch. albi, ʒ i. M. Div. in part. equal. iv. Sig.: One powder every two hours.

Jalap is contraindicated in inflammatory affections of the alimentary canal.

Scammonium.—Scammony resembles jalap in action, but is less certain, sometimes producing little or no effect, at other times acting harshly, with griping and tenesmus. Usually it is followed by watery stools in a few hours. The presence of bile in the intestines is necessary for its action. It is rarely used except in combination with other purgatives, as in the official *compound cathartic pills*. The dose of scammony, to act briskly, is from ten to twenty grains, and of its resin, from five to ten grains.

Colocynthis.—Large doses of colocynth produce numerous fluid evacuations, with griping and tenesmus. Excessive doses cause sanguinolent stools, great abdominal pain, intense depression, and sometimes death.

Small doses, one to three grains, act gently, producing loose stools without notable griping. But if frequently repeated, such doses soon cause tormina and tenesmus, and slimy stools.

According to Brieger, small quantities of extract of colocynth, 0.02 gm. dissolved in 2 gm. of water, injected into isolated portions of intestine, produce slight hyperæmia and peristaltic contraction, but no accumulation of fluid. But larger quantities produce decided inflammation and an effusion of bloody fluid.

In experiments on dogs Rutherford found colocynth to cause an increased flow of watery bile.

On account of its harsh operation, colocynth is rarely employed alone to produce brisk purgation; but in small doses, in combination with other laxatives, it is frequently given in habitual constipation.

The dose of the extract of colocynth, as a laxative, is one-sixth to two-thirds of a grain, and of the compound extract, from one to five grains. The latter preparation is sometimes given in doses of five to fifteen grains, to purge briskly. Usually the extract of hyoscyamus, or the extract of belladonna, is combined with it, to prevent griping. \mathcal{R} Extr. colocynth., gr. i.; aloes, gr. vi.; extr. hyoscyami, gr. vi. M. Ft. pil. vi. Sig.: One pill at bedtime. \mathcal{R} Extract. colocynth. comp., gr. xij.; extr. bellad., gr. ij. M. Ft. pil. vi. Sig.: One pill at bedtime.

Gambogia.—Gamboge is held to be still more irritant than colocynth. In experiments Rutherford found, after large doses, violent irritation of the duodenum and small intestine generally, with profuse catharsis, but no increase of the bile flow.

It is, perhaps, never given alone, but is sometimes added to other purgatives to increase their action, as in the compound cathartic pills. Very small doses, one-sixth to one-half grain, are said to produce pulsaticeous stools without much griping. Generally, doses of three to four grains cause some nausea and colicky pain, and several watery stools. Excessively large doses, one drachm, have caused fatal gastro-enteritis.

Formerly gamboge was frequently employed in obsti-

nate constipation, ascites, anasarca, paralysis, insanity, gout, and skin diseases. Generally it was given together with aloes, jalap, bitartrate of potassium, and calomel. \mathcal{R} Cambogiæ, gr. iv.; pulv. jalapæ comp., ʒ ij. M. Div. in pulv. iv. Sig.: One powder every two hours till the bowels act, in cases of dropsy.

Pilule Cathartice Compositæ.—The compound cathartic pills contain small quantities of aloes, scammony, colocynth, jalap, gamboge, and calomel. On account of their complex composition they are supposed to affect all parts of the intestines, and to increase the secretion of bile. One pill usually acts as a laxative, while three or four produce free purgation. They are suitable to acute constipation not complicated with inflammation of the intestines, but should not be employed in habitual constipation.

Podophyllum.—This purgative, even in large doses, usually acts slowly, from six to ten hours elapsing before the bowels move. Doses of ten grains rarely cause marked incidental effects, but twenty or thirty grains are usually followed by nausea, and sometimes vomiting and depression, and severe colicky pain. The evacuations sometimes have a dark color, from which it was assumed that they contain a large quantity of bile. In experiments on dogs Rutherford found that moderate doses of podophyllin cause an increased flow of bile.

The resin of podophyllum, commonly called podophyllin, is used as a laxative. Doses of one-eighth to one-half grain usually produce a gentle movement in eight or ten hours. Large doses, from two to four grains, cause nausea, sometimes vomiting, severe griping, and numerous stools, which may be slimy and bloody and followed by intense depression.

Podophyllin is not suitable in cases requiring brisk purgation. But in chronic constipation it is much used, because it continues to act for a long time without necessitating an increase of dose. It is frequently employed when symptoms are present which show that the secretion of bile is abnormal. Usually it is given in pillular form, with extract of hyoscyamus or extract of belladonna. \mathcal{R} Podophyllini, gr. ij.; extr. hyoscyami, gr. viij. M. Ft. pil. No. viij. Sig.: One pill at bedtime. It has also been given in solution as follows: \mathcal{R} Podophyllini, gr. ij.; alcohol. dil., ʒ ij.; tinct. zingiberis, ʒ ij. M. Sig.: A teaspoonful in a wineglassful of water.

Podophyllotoxin is said to act more regularly than the official resin. It has been given to adults in doses of one-sixth to one-fourth of a grain, and to children in doses of one-sixtieth to one-twelfth of a grain. Brun employed it in alcoholic solution as follows: \mathcal{R} Podophyllotoxini, 0.5 gm.; spir. vini rectif., 7.5 gm. M. Sig.: From five to fifteen drops in sweetened water.

Oleum Tiglii.—Croton oil is a very energetic drastic, a drop sometimes producing from five to fifteen watery evacuations. Often the first evacuation occurs in one or two hours.

The susceptibility of different persons to its action varies, in some one drop acting intensely, while in others it produces only a few semi-liquid stools. In rare instances purgation does not result from the dose mentioned, but there takes place general disorder, marked by palpitation of the heart, pain in the extremities, severe headache, giddiness, and prostration.

Frequently the action of croton oil is attended by symptoms indicating irritation of the stomach and intestines—a sensation of heat in the epigastrium, more or less nausea, sometimes vomiting, borborygmi, colicky pain, and tenesmus.

Excessive doses quickly induce vomiting and purging, and great prostration. Twenty drops have proved fatal.

Croton oil is used when a powerful purgative is indicated, and milder medicines have failed to act or cannot be administered. Sometimes this is the case in obstinate constipation, lead colic, and diseases of the brain and spinal cord. When brisk purgation is necessary, and swallowing is very difficult, the oil is preferred to more bulky cathartics, a drop being mixed with a little sugar,

or a little bread crumb, and placed on the back of the tongue.

The oil has been strongly recommended for the removal of tapeworm—one drop mixed with one drachm of chloroform and one ounce of glycerin, to be given early in the morning.

Croton oil is usually given in pillular form. \mathcal{R} Ol. tiglii, gtt. i.; mica panis, q. s. M. Ft. pil. iv. Sig.: One pill every hour. It is said that the oil acts more gently when combined with compound extract of colocynth and extract of belladonna. \mathcal{R} Ol. tiglii, gtt. i.; extract. colocynth. comp., gr. viij.; extr. bellad., gr. i. M. Ft. pil. iv. Sig.: One pill every two hours. Sometimes it is given mixed with sugar. \mathcal{R} Ol. tiglii, gtt. i.; sacch. lactis, ʒ i. M. Div. in part. aq. iv. Sig.: One powder every hour. It may also be mixed with castor oil, or made into an emulsion, as follows: \mathcal{R} Ol. tiglii, gtt. i.; pulv. acaciæ, ʒ ij.; syr. amygdalæ, ʒ ss.; aq. destill., ʒ iij. M. Ft. emuls. Sig.: One tablespoonful every hour.

Elaterinum.—Elaterin is the most powerful and drastic of all purgative medicines. The twentieth of a grain, given to an adult, will generally produce watery stools in one or two hours. Sometimes this speedy action is not attended by marked incidental effects; but often, especially if it is given alone, nausea, severe griping, borborygmi, and some prostration are produced. Excessive doses may cause intense gastro-enteritis and fatal collapse.

Elaterin is employed in ascites and anasarca, when gentler hydragogues have failed to act efficiently. As a rule, it is given only every other day, and not continued longer than a week or ten days, lest it excite serious intestinal inflammation. After an interval of a week its use, if necessary, may be resumed. It is contraindicated in dropsies complicated with intestinal irritation, and must be used with extreme caution in very young, aged, and feeble patients.

It may be ordered in solution, pill, or powder. \mathcal{R} Elaterini, gr. ss.; alcohol, ʒ ss.; acid. nitrici, gtt. ij. M. Sig.: From twenty to forty drops in an aromatic water. \mathcal{R} Elaterini, gr. ʒ; extr. hyoscyami, gr. vi. M. Ft. pil. vi. Sig.: One pill every hour till stools take place. \mathcal{R} Elaterini, gr. ʒ; sacch. albi, ʒ i.; ol. menth. pip., gtt. ij. M. Div. in part. equal. vi. Sig.: One powder every hour until the bowels act.

GENERAL INDICATIONS.—Purgatives are used (1) to evacuate the intestines; (2) to diminish hyperæmia of remote parts or organs; (3) to promote the absorption of exudations and transudations; and (4) to eliminate noxious substances.

1. *All purgatives evacuate the contents of the intestines;* but when this is the sole indication for their use, only laxatives and mild purgatives should be given. In chronic or habitual constipation those laxatives are most suitable which act slowly, producing normal or nearly normal fecal evacuations, without losing their activity in small doses after frequent repetition, and without interfering with general nutrition. Experience has shown that aloes possesses these properties in the most eminent degree. Podophyllin, cascara sagrada, rhubarb, and compound extract of colocynth are also eligible. The saline laxatives are sometimes used in habitual constipation; but as their prolonged use is followed by impairment of nutrition, they should not be given to feeble patients unless required by other indications.

In occasional or acute constipation any laxative or mild purgative may be employed. If hardened fecal masses are present in the intestines, the saline laxatives and castor oil are most suitable. Sometimes all the mild purgatives fail to act in acute constipation, especially when the cause of the constipation is still present, as in lead poisoning. Drastics, if carefully used, are then appropriate, and croton oil is usually preferred. Metallic mercury has been successfully used after all ordinary purgatives had proved ineffectual.

To remove poisons and irritating substances from the intestines, those purgatives which act speedily and gently

should be preferred, especially castor oil and salines. When irritation of the intestines results from decomposition or fermentation, calomel is the best purgative.

2. To diminish hyperæmia of remote parts or organs, purgatives which act rapidly and produce semi-liquid or watery discharges are required. Mild purgatives deplete indirectly by hastening the intestinal secretions and partially digested food downward so rapidly that absorption is impeded. Saline purgatives, in strong solution, excite a copious secretion of watery fluid, and thus directly deplete the blood. Drastics act in a threefold manner, accelerating peristalsis, increasing secretion, and exciting intestinal hyperæmia. The choice of a purgative will, therefore, depend upon the intensity and duration of the disease to be influenced, the organ affected, and the character of the general symptoms. In congestion of the liver, calomel, followed by a saline laxative, is the most suitable purgative. In congestion or inflammation of most organs, saline cathartics and compound infusion of senna are usually employed; but in very severe congestion or inflammation of very important organs—such as the brain and spinal cord—drastics are preferred, especially croton oil.

3. To promote absorption of exudations and transudations, the hydragogues are most suitable. Generally the saline hydragogues, given so as to produce copious watery stools, soon cause rapid absorption. In cardiac dropsy they often diminish the dropsical swelling very notably in a few hours. Of the drastic hydragogues the compound powder of jalap and elaterin are the most useful. Generally the former is preferred on account of its mild action. But when it fails to act efficiently, or when an effusion of serum occurs rapidly, and in such large quantity as to produce extreme distress, such as alarming dyspnoea in pleuritis, elaterin is usually given. Sometimes it so rapidly induces absorption of the effusion as to give decided relief in a few hours.

4. To eliminate noxious substances, calomel, salines, and drastics are used. The utility of calomel in biliousness and congestion of the liver is in part due to the rapid removal of irritating and decomposing substances from the alimentary canal. Saline laxatives, especially sulphate of magnesium, are indicated in chronic lead poisoning, to remove the poison from the intestines as fast as it is eliminated by the liver. They are also suitable in cases of uræmia, especially if at the same time it is necessary to induce absorption. In uræmic coma, croton oil is sometimes preferred to milder purgatives.

CONTRAINDICATIONS.—All purgatives are contraindicated in peritonitis, intestinal hemorrhage, perforation of the bowels, strangulated hernia, and extreme debility. Brisk purgatives are generally inappropriate during pregnancy, especially if previous abortions have occurred, and during menstruation. They should not be used if there exist severe rectal lesions, or a tendency to looseness of the bowels. Even laxatives are contraindicated in habitual constipation, until all other known means have failed to establish a normal habit of defecation.

Samuel Nickles.

PURPURA.—(Synonyms: *Hæmorrhœa petechialis*; Fr., *Purpura*; Ger., *Blutflecken*.) Purpura is a disease characterized by the extravasation of blood into the skin. In many instances, however, it is not limited to this organ and may be encountered in almost any structure of the body. The parts coming most readily under visual inspection are naturally the skin and mucous membranes, although in severe and fatal cases the autopsy shows that the internal viscera are likewise involved. It may be asked whether purpura is not rather a symptom complex than a well-defined affection *per se*. It occurs under so many apparently varied conditions that one is at a loss to ascribe to it definite limitations. In this connection, however, it will be considered from a dermatological standpoint, the skin being the organ most extensively involved. The clinical manifestations of purpura vary; hence several varieties have been described, although

the essential feature is the occurrence of hemorrhage into the structures surrounding the blood-vessels. In severity purpura likewise varies greatly, being in some instances an exceedingly mild affection with extravasation only in dependent parts, as the legs; or it may be an extremely severe and rapidly fatal disease. Between these extremes numerous grades, both in appearance and in severity, occur. Usually purpura is accompanied by constitutional symptoms which to a great extent depend upon the amount of cutaneous hemorrhage.

For convenience of description the various lesions have received distinct names. Thus we speak of *vibices* when the extravasation of blood into the skin assumes a streaked or elongated form. *Echymoses* are irregular extravasations of blood involving considerable areas, and giving

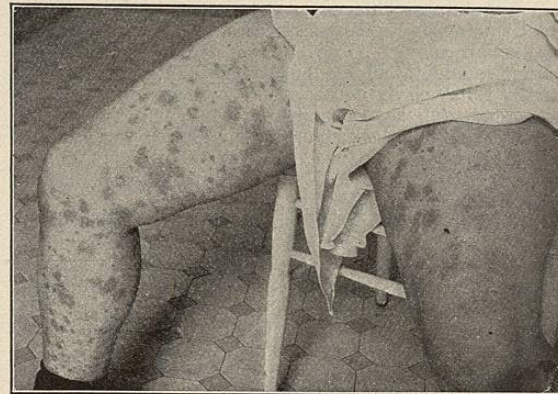


Fig. 3923.—Purpura Simplex. (Case of Dr. William T. Corlett.)

the appearance of bruises. *Echymomata* or *hæmatomata* are terms used to designate tumors formed by the extravasation of blood, usually occurring when a large vessel wall has given way. The term *purpura papulosa* is employed to designate pinhead-sized extravasations which are usually situated in the upper part of the derma. *Hæmorrhagic bullæ* are extravasations underneath or between the layers of the epidermis, while *hæmatidrosis* is a rare condition in which the sweat glands give forth a bloody exudate. *Petechiæ* are cutaneous areas of extravasation of various shapes and sizes.

The cutaneous lesions of purpura are characteristic in that they are symmetrically arranged, are of a dark bluish color, and do not disappear on pressure. At first they may be of a bright red or claret color, although at an early stage they take on a purplish hue; as absorption goes on the color undergoes various changes from a brown to a greenish-yellow tint, such as may be observed in an ordinary bruise. The cutaneous manifestations occur in successive crops; hence various shades of color may be seen at the same time. Most cases of cutaneous hemorrhage may be grouped under three heads, which will be treated as varieties of the disease.

Purpura Simplex represents the mildest form of the disease. This is commonly observed in the skin, and is frequently limited to this structure. As a rule, it is unaccompanied by constitutional symptoms. It usually makes its appearance suddenly, and is first seen on the dependent parts, as the legs (see Fig. 3923), although in children the arms, neck, and other parts of the body may be involved. The most usual sites are the inner aspect of the legs, the dorsum of the feet, and the posterior surface of the forearms. In this form the mucous membranes may be involved to a slight extent, that most frequently implicated being the mucous membrane of the mouth, although we have reason to believe that the hemorrhagic process is not limited to these structures, but that, on account of the mildness of the symptoms, it escapes notice when occurring in parts not easily inspected. In this variety the lesions consist of variously sized and shaped petechiæ

which are at first roundish or oval, and which sometimes extend to the periphery; at other times they remain stationary until absorption takes place. A more infrequent form, in which the lesions are punctate (*lichen lividus* of Willan) and surround the exit of a hair shaft, is also encountered. The lesions in purpura usually continue to appear for several days or weeks, although the disease is self-limited and as a rule terminates in recovery within one or two months. The cutaneous lesions soon undergo resorption and deposition of hæmatin which leaves an indelible stain in the tissue.

Purpura Rheumatica, *Peliosis Rheumatica*, *Toxic Purpura* (*Purpura exanthématique* of the French) is a more severe form of the disease, so called because of its association with vague pains which are usually referred to the joints or muscles, and are supposed by some to be closely related to acute articular rheumatism. In this variety constitutional symptoms are more marked. In some cases distinct swellings occur about the joints, there is a slight elevation of temperature, the tongue is frequently coated, and usually there is anorexia, sometimes with nausea and vomiting. Extravasation of serum alone may likewise take place, giving rise to urticarial lesions in the skin (*purpura urticaria*). In very rare instances the serous exudate occurs in the epidermis, giving rise to bullæ and œdematous plaques. Stelwagon ("Diseases of the Skin," 1902, p. 466) has observed swelling of the lips and throat which he describes as a *febrile, purpuric œdema*. Sometimes the eruption becomes associated with symptoms of a multiform erythema, the lesions varying in appearance, although always associated with cutaneous hemorrhage. From the foregoing it may be seen that this form of purpura is closely allied to the exudative erythemata.

This toxic form of purpura is sometimes associated with complications of a grave nature. Thus endocarditis and pericarditis, together with necrosis and sloughing of the mucous membrane of the mouth, have been observed by Osler.¹ It is sometimes recurrent and may appear annually throughout a period of several years. Henoch² has called attention to gastro-intestinal symptoms occasioned by hemorrhages into the intestinal mucosa; this has been accompanied by vomiting and diarrhoea, the stools not infrequently being tinged with blood. Hemorrhage may likewise take place to a slight extent into the bladder. This has been most frequently observed in children. In severe cases the kidneys are affected, giving rise to the symptoms of acute hemorrhagic nephritis. In these cases albumin is usually present in the urine. The spleen is sometimes easily palpable.

Purpura Hæmorrhagica, sometimes known as morbus maculosus Werlhofii (which see), and also as land scurvy. This is a more grave affection than the two preceding varieties. The severity of the disease, however, largely depends upon the cause as well as on the extent of the cutaneous hemorrhage. The onset of this variety varies; it may be insidious, appearing as a mild attack with few or no constitutional symptoms; soon gradual impairment of the health becomes manifest, and the patient becomes weak from loss of blood. The appetite disappears, assimilation is interfered with on account of intestinal hemorrhage, and diarrhoea with bloody stools finally occurs. The gums bleed easily, and there is not infrequently hæmaturia, epistaxis, or hæmoptysis. The lesions usually assume the form of large ecchymoses or ecchymomata, and the mucous membranes are apparently involved to an equal, if not greater, extent than the skin. In the latter the disease may appear on the more dependent parts, although the whole body soon becomes involved. In severe cases symptoms of collapse occur, and the disease may soon terminate in death (*purpura fulminans*). At other times the disease pursues an uninterrupted course for several months, when finally resolution takes place and the patient recovers. At other times extravasation of blood takes place into the brain or spinal cord, giving rise to symptoms referable to a tumor in these parts. There is usually but slight elevation of temperature in this form, although the disease is

sometimes noted to be ushered in with a slight fever, the temperature rising one or two degrees.

Cutaneous hemorrhage may also occur as a symptom of other well-recognized diseases, such as variola, the plague, and cerebro-spinal fever, and in cases of poisoning from the bite of poisonous reptiles.

ETIOLOGY.—The disease occurs in both sexes, and is met with at all ages. It is a fairly common disease in my experience, and has been most frequently encountered between the ages of sixteen and forty-five. The general health of the cases that have come under my observation, previous to the advent of the cutaneous hemorrhages, has been good, although, as has been stated, there is sometimes a tendency for the disease to recur from time to time during a period of several years. In a series of cases which I had the opportunity of observing a number of years ago, bad hygienic conditions with a defective food supply were undoubtedly the chief etiological factors in the disease. Of these the chief rôle must be given to the withdrawal of green vegetables from the dietary, most notably potatoes, cabbage, and greens; at any rate, on supplying these articles in moderation the disease disappeared from various families in which it had been observed to occur for a long time. Further, in my experience the disease has been met with more frequently in women than in men, the nationality most frequently affected being the Bohemian. It has occurred usually in people in the lower walks of life. Various drugs have been known to produce cutaneous hemorrhage, notably potassium iodide, chloral, belladonna, ergot, phosphorus, iodine, quinine, copaiba. These drugs do not produce the same effect in all people, there being in some individuals an idiosyncrasy by which the ingestion of certain substances, innocuous to others, gives rise to toxic effects. Again, toxic substances or their ptomaines, by acting on the nerve centres, are thought to be potent factors in the causation of purpura, notably in the erythematous or toxic form.

As malaria undermines the general health, it is thought by some to contribute to this condition. Other diseases contribute in like manner to purpura, most notably those which tend to profound anæmia, such as scorbutus, hæmophilia, pyæmia, sarcoma, nephritis, scarlatina, typhus fever, cerebro-spinal fever, variola, and rubeola, as well as various diseases of the nerve centres, such as locomotor ataxia and hysteria. The venom of serpents must likewise be mentioned in this connection. In new-born infants the sudden change to which the circulation is subjected may give rise to cutaneous hemorrhage, which should be looked upon as purely mechanical. Various micro-organisms have likewise been described as associated with purpura. Martin de Gimard,³ Letzerich,⁴ and Kolb⁵ have succeeded in producing the disease in animals by inoculating with pure cultures, and doubtless this accounts for some cases, especially among the severe forms. From the foregoing it will appear that the cause of purpura varies in different cases, and no one condition can be assigned as invariably producing the disease.

Stelwagon, in summarizing the various causes of purpura, believes that the etiological factors may be divided into classes, most conspicuous of which are the vasomotor, toxic, and infectious; and that some of the latter arise from auto-intoxications, which have their origin in the intestinal tract. This latter seems especially true in those cases which are marked by a multiform erythema and urticarial lesions. It is evident, therefore, that we have in purpura a condition of variable appearance and widespread distribution, affecting almost every organ and structure of the body and producing symptoms which vary according to the part attacked. What we know, therefore, is this: purpura is a symptom, in the broad sense of the term, of many conditions, many of which at the present time are wholly unknown.

PATHOLOGY.—The most constant findings in purpura are circumscribed areas of blood extravasation, which are usually found in the papillary layer of the derma. Less frequently the epidermis may be invaded, the latter occurring only when the blood extravasation has been