

agent at work in the moist periphery of the disease, and therefore such chemicals as nitrate of silver, sulphate of copper, lactate of lead, and permanganate of potassium were employed in Crocker's cases after the raised, surrounding border had been removed.

Prognosis.—The checking of the disease and restoration to health are at times very slow, but in the end the patient can well expect a complete recovery and need have no fear of subsequent relapse.

Charles J. White.

**DERMATITIS VENENATA.**—Under this title are embraced the various dermatitides resulting from irritation

of toxic agents belonging to the mineral, vegetable, and animal kingdoms. The dermatitis assumes various appearances; it may be erythematous, urticarial, papular, vesicular, pustular, bullous, or gangrenous in character. Among mineral substances the aniline dyes, which are used largely in the dyeing of wearing apparel, such as drawers, flannel shirts, colored undershirts, and the linings in hats and shoes, are very prone to produce an eczematous, pruritic eruption of the parts with which they come in contact. Usually the inflammation is papular; it may, however, be of a vesicular or pustular type, and excoriations and ulcerations may result. The disease is usually confined to a limited area, but it may extend to some distance beyond the parts first involved; it is attributed to the arsenic in the dye. Paper collars and cuffs are also at times a source of mischief to the skin owing to the sizing containing arsenic. Morrow has observed dermatitides of an eczematous character on the face which he attributes to the wearing of mourning veils of crepe.

Potassium bichromate, which is employed in certain trades, is apt to produce, in those who handle it and are employed in its manufacture, eruptions of various character. B. W. Richardson reports cases of poisoning with potassium bichromate resembling pityriasis rubra; in one case acute eczema of the arms and an eruption involving the palms, resembling psoriasis, occurred; the other cases bore a resemblance to psoriasis, eczema, or pityriasis. According to Richardson the nasal mucous membranes may ulcerate and perforation of the septum may result. He states that the inflammation at times becomes very marked and destructive and is accompanied by supuration and ulceration, which may extend to the bone.

An interesting case of this kind came under the author's notice in November, 1898, in a workman, employed in the manufacture of the drug, who exhibited three ulcers: two on the right index finger extended almost to the bone, while the other, more superficial in character, was on the index finger of the left hand. It is stated that, owing to the air being impregnated with the salt in buildings where it is manufactured, the poison gains entrance through the minutest excoriation. Crocker speaks of a French polisher who had repeated pustular eruptions, surrounded by an areola, on the palms. Unguentum hydrargyri, when used carelessly and too energetically, locally, occasionally produces an erythematous or vesicular eruption, "mercurial eczema," and even dermatitis exfoliativa universalis. The author has not infrequently observed an erythematous and vesicular eruption follow the too vigorous application of mercurial ointment for the purpose of destroying pediculi pubis. This eruption was not limited to the pubic region alone, but extended over the anterior part of the chest to the manubrium sterni, and was accompanied by symptoms of mercurial poisoning. The application of croton oil and tartar emetic for the purpose of counter-irritation may give rise to a vesicular and pustular eruption, and permanent scarring may result. Examples of this kind are seen when one makes examinations of the chest. Mustard, cantharides, turpentine, savin, and mezereon all possess the power of setting up cutaneous inflammation. The local use of tincture of arnica, formerly a popular remedy for slight injuries, may be followed by a papular and vesicular eruption similar to

rhhus poisoning. Inferior articles of soap not infrequently produce a dermatitis. Sapo viridis possesses caustic properties and acts as an irritant when injudiciously applied. Face powders and lotions for the complexion, containing lead or arsenic, and rouge, which is prepared from saffron, are apt to produce cutaneous irritation. There exists a form of dermatitis among workmen who handle paraffin; it affects principally the dorsum of the hands. Individuals who handle lime, flour, and sugar are very prone to develop an eruption, known as "trade eczema." The most frequent and severe form of dermatitis venenata is that occasioned by poisonous species of the rhus family. Rhus toxicodendron, known as poison ivy or poison oak, is very common in the United States; it grows along fences and hedge-



FIG. 1594.—Dermatitis Venenata. (Case of Dr. H. W. Stelwagon.)

rows, and around trees to which it is attached by rootlets; it is also met with as a shrub or low tree, when it is known as poison oak. All parts of the plant, particularly the leaves and root, contain a poisonous juice. As it is likely to be mistaken for the Virginia creeper, it is well to add that the poison ivy has but three leaflets, whereas the former has five leaflets.

Rhus venenata, poison ash (or elder, or sumach), swamp sumach, poison dogwood—a shrub or tree, varying in height from six to eighteen feet, and having a trunk from one to five inches in diameter—generally grows in swamps. It possesses more poisonous properties than rhus toxicodendron. The leaves are pinnate, the leaflets oblong or oval, entire or sometimes slightly sinuated and pointed, and number from one to thirteen. The poisonous principle is attributed to the presence of an oil, to which Franz Pfaff has given the name toxicodendrol.

Another very poisonous shrub is rhus diversiloba, the poison oak of the Pacific Coast. Although it resembles rhus toxicodendron to a marked degree, it differs from the latter by being provided with acuminate leaflets.

Rhus pumila, dwarf sumach, growing in North and South Carolina, is regarded by some as the most poisonous species. It is a low, procumbent shrub with from eleven to thirteen oval or oblong, acute, serrate leaflets.

Rhus vernix or vernicifera, known as walnut-leaved sumach, Japan lacquer, or varnish tree, looked upon by some as being identical with rhus venenata, grows in China and Japan. It furnishes Japan varnish and possesses poisonous properties.

Susceptibility to the poisons of these different plants varies greatly in individuals. There are well authenticated cases on record illustrating the susceptibility of certain persons; thus some individuals are even poisoned by passing the plants or when exposed to the smoke of burning vines. This is so well known that in the country even the poorer class of people refuse to burn the wood in their stoves or fire-places. Even the handling of Chinese lacquer work, the varnish for which is obtained from the rhus vernix, as stated above, produces a dermatitis venenata in some. The severity of an attack varies from an erythematous and vesicular condition to a severe eruption, which is frequently accompanied by swelling. The period of incubation varies from a few hours to several days. The symptoms which usher in the disease are burning, heat, and itching which may be very intense. These conditions are generally first observed on the face and hands (lateral surfaces of the fingers), as they are most exposed. From the hands the eruption may extend to the wrists and up the arms to other parts of the body. Not infrequently the swelling is so severe as to cause closure of the eyelids, and the genitalia are frequently involved, owing to the poison being conveyed by the hands to these parts. In very severe cases the oedema may be so great as to interfere with motion, and the subjective symptoms, consisting of itching and burning, may be so pronounced as to render sleeping impossible and to require the administration of narcotics. The eruption may be erythematous in character; the eczematous type, however, is most frequent. Vesicles, the size of a pin's head, situated on an erythematous base, develop rapidly; they may become pustules or may attain the size of blebs. The vesicles rupture spontaneously or are destroyed by scratching or rubbing and exude a yellowish, sticky fluid that dries into yellowish crusts. Usually the disease runs its course in a fortnight, but may be prolonged for several weeks. Very severe attacks are sometimes accompanied by slight rise of temperature, coated tongue, and constipation. Although rhus poisoning cannot, in the strict sense of the word, be regarded as contagious, there are cases on record in which the poison has been conveyed to others by persons who had come in contact with the plant without being poisoned themselves. The poison may be conveyed from the hands to the penis while urinating, which would explain the frequency with which the genitalia are attacked. There exists a popular belief that dermatitis venenata is apt to recur repeatedly during several years; but this, according to White, is due to renewed

exposure. Eczema is very prone to follow an attack of rhus poisoning.

DIAGNOSIS.—The diagnosis is generally not difficult, as it is nearly always possible to get a history of exposure to the poisonous plants. There are certain points by which rhus poisoning may be differentiated from vesicular eczema: the eruption is more irregular and more scattered, and it occurs in streaks or patches, suggestive of contact with poisonous plants.

PROGNOSIS.—The cutaneous eruption always has a favorable termination. Grave systemic effects are rare; a fatal case, however, attributable to the poison, has been reported.

TREATMENT.—The remedies brought forward for the treatment of this disease are very numerous. It will be sufficient to mention those which have proved useful. Sodium bicarbonate or borax (sodii boras) may be applied in powder form to the affected parts. Alkaline lotions will be found efficient, such as the saturated solution of sodium bicarbonate or solution of chlorinated soda (liquor sodæ chloratæ, also known as Labarraque's solution), to be applied in half strength on cloths. A saturated solution of sodium hyposulphite (R Sodii hyposulph. 3 i., aquæ dest. 3 i.), constantly applied, is a very good remedy. Liquor plumbi subacetatis, in the proportion of one part to three of water, is also serviceable. Its use, however, is contraindicated when the skin is broken. Black wash, lotio nigra, used on cloths, makes a very good application; it must, however, not be used over too large a surface, as it may be absorbed and produce symptoms of mercurial poisoning. Decoction of white oak bark will also be found serviceable. A very reliable remedy is grindelia robusta (extractum grindeliæ robustæ fluidum) 3 ij.—iv. to aq. dest. O i. The following formula, recommended by Hardaway, may be used advantageously:

R Zinci sulphatis ..... ʒ i.  
Aq. dest. .... O i.  
M. S. Apply on cloths and renew every hour.

The author has had good results with aristol, employed in powder form and as an ointment (ʒ ss.—ʒ i.).

Quite a number of other plants are capable of causing cutaneous inflammation. According to Dr. J. C. White not less than sixty domestic species possess irritant and poisonous properties when brought into contact with the skin. As it is impossible, owing to lack of space, to enumerate in detail these various plants, the reader is referred to Prof. J. C. White's excellent monograph, "Dermatitis Venenata," Boston, 1887.

Irritants Belonging to the Animal Kingdom.—A large number of insects, as the mosquito, flea, bedbug, wasp, bee, caterpillar, etc., are capable of irritating the skin by means of biting or stinging. Certain lower forms of marine life, as the jelly-fish, notably the Portuguese man-of-war, sea urchins, etc.; human secretions, viz.: urine, perspiration, nasal and aural secretions, may give rise to cutaneous inflammatory phenomena, more or less marked.

The author is indebted to Dr. Henry W. Stelwagon for the accompanying illustration. Emmanuel J. Stout.

**DERMATOL.**—The trade name for the subgallate of bismuth, BiC<sub>2</sub>H<sub>3</sub>O<sub>7</sub>, containing fifty-five per cent. of the oxide of bismuth. It is a fine, yellow powder, devoid of odor, quite insoluble in water or any of the ordinary solvents, free from irritating action, and non-poisonous.

It has been introduced to replace iodoform, on account of its freedom from many of the disagreeable qualities of that drug.

It is not a bactericide, but prevents the growth of these organisms, and in this way compares favorably with iodoform and aristol. Its beneficial action is said to be due to its neutralizing the ptomaines produced. It is not only insoluble but also repels water, thus rendering the part unfavorable to the growth of bacteria. Recently a compound has been formed by adding iodine to dermatol; it is known as *airol*.

It is not so suited to the treatment of sloughing or septic wounds as iodoform, nor is it sufficiently stimulating in chronic indolent ulcers. It is most serviceable as a means of promoting cicatrization in healing surfaces, and in affections of the skin; in burns, scalds, chancres, and eczema, particularly when characterized by much discharge, it has been used with marked success. In these cases the parts become dry on the second or third day after the drug has been first applied, and the relief is very marked. If the part is previously washed with an antiseptic lotion the action of the remedy is greatly assisted. It may be applied by dusting on the part, or in the form of an ointment of one part in ten. It may with advantage replace oxide of zinc, starch, etc., as a dusting powder for scalded and denuded surfaces. In chronic gonorrhoea the following emulsion has been used with success: Dermatomol, 2; gum acacia, 2; distilled water, 25 parts.

In doses of gr. xxx. to xc. it has been given internally, as a substitute for the subnitrate, for diarrhoea in children, in phthisis, typhoid, etc., with good results. It may be given in wafers or as an emulsion. *Beaumont Small.*

**DERMATOLYSIS.**—(Synonyms: Cutis laxa, pendula, pensilis; pachydermatocele; elephantiasis mollis; chala-zodermia.)

**DEFINITION.**—A soft, pendulous, benign tumor of the skin composed of hyperplastic, loosely connected fibrous tissue.

**SYMPTOMS.**—This variety of tumor is in reality a subdivision of the larger class of new growths known as soft fibromata. It occurs often as a single tumor or at times

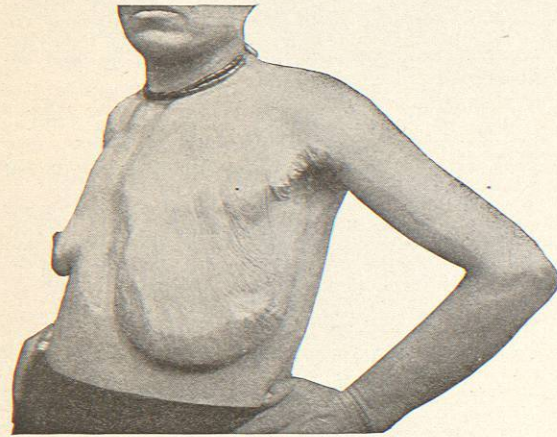


FIG. 1595.—Dermatolysis. (Author's case.)

in association with one or more smaller growths, and it has been observed arising from the face, the eyebrows, the occiput, the neck, the chest, the breasts, the axillæ, the back, the arms, the abdomen, the nates, the thighs, and the labia. It varies in size from its early microscopic origin to its final maximum growth, when it may completely hide the face or may involve and surround a whole extremity in its enveloping folds, or it may cover the whole back, as with an immense pack. The shape of the tumor varies with the position of the patient, for its consistence is so soft that it follows strictly the force of gravity. The soft, spongy consistence is, indeed, one of the most characteristic features of the disease and to the touch the tumor mass feels distinctly soft and yielding and simulates closely the "feel" of fibroma molluscum. The skin which covers the pendulous mass is almost always of a brownish hue and exhibits varying degrees of stretching, and thus we find the follicles far apart and their mouths patulous. At times we may find growing from the surface of the tumor one or more scat-

tered, marble-sized fibromata. A marked characteristic of the more extensive cases is their tendency to grow in folds, which writers have likened to the capes of an old-fashioned driving coat or to the flounces of a lady's dress. At other times the tumors hang in long straight bands—a form well illustrated in an example observed by Hyde.

The subjective symptoms are usually those of physical discomfort due to the presence and weight of the tumor mass, although a few instances of hyperæsthesia have been recorded.

**ETIOLOGY.**—With dermatolysis, as in all cases of new growths, writers are still in some doubt as to the origin of the new formation. Von Recklinghausen has done much, however, to unravel the mystery of all soft fibrous-tissue tumors and has demonstrated that they are direct outgrowths from the connective tissue surrounding the nerves, glands, hair follicles, vessels, or fat globules of the skin. What determines the hyperplasia in cases of dermatolysis the observer is usually at a loss to account for. Radcliffe Crocker has, on the other hand, described an instance in which one can undoubtedly attribute the origin to trauma. A man fell into the hold of a vessel and received severe injuries which resulted in a tedious ulcer of the nates, which in time yielded to treatment; but the subsequent history was that of a large, pendulous tumor growing from the seat of the original wound.

Instances have been recorded in which dermatolysis has occurred in several generations of the same family or again in members of the same generation, and thus heredity seems to play a definite rôle in a certain percentage of the cases. Sex has no important bearing upon the presence of the tumors.

The tissue change often makes its appearance for the first time in late childhood or the new growth may not develop until the patient is well advanced in years. In the writer's case (a Syrian woman of forty-five years) the tumor was first observed in the left breast at the age of fourteen, while the change in the right breast has existed but a few years (Fig. 1595). As the individual grows older the tumor increases in size, and, if let alone, continues enlarging often for many years, when it finally reaches its maximum size. Dermatolysis is usually a tumor of slow growth, and, if proper cleanliness is exercised, remains free from the intercurrent attacks of erysipelas incident to true elephantiasis, and, as a rule, escapes the ulcerations which appear in the later stages of sarcoma and of epithelioma.

**PATHOLOGY.**—The microscopical appearances of dermatolysis are characterized principally by changes in the derma and in the hypoderma, but there are, nevertheless, a few minor points to be noted in the epidermis. First, we find a slight disturbance of nutrition in the cells of the stratum spinosum, and secondly, a marked invasion of pigment granules in the stratum germinativum.

In the corium we find a decided increase of elastic fibres which occur in compact bundles distributed at intervals immediately below the epidermis. This hyperplasia of elastic tissue is not noticed in the deeper layers of the derma but is apparently confined to the subpapillary region. Below this line we come upon the tumor proper, which consists of loosely connected bundles of fibrous tissue, rich in cells (among which many mast cells appear) and enclosing in its meshwork many blood-vessels and lymph spaces, and it is the presence of these abundant nuclei, the loose formation of the connective tissue, and the interlying vascular and lymph spaces which render so marked the microscopical contrast between dermatolysis and keloid.

The connective-tissue fibres may possibly undergo a myxomatous degeneration, and at times large foci of jelly-like material may be formed within the tumor mass.

**DIAGNOSIS.**—The diagnosis of dermatolysis should be, therefore, an easy one. A single tumor of the skin, usually of long duration, arising from almost any part of the body, save the soles of the feet or the palms of the hands, hanging in one or more folds or simply pendulously from its point of support, distinctly soft and elastic in consistence, covered with a brownish, stretched in-

tegument, should suggest most strongly pachydermatocele.

The consistence, the absence of œdema, the rarity of intercurrent attacks of erysipelas and of other forms of dermatitis, the frequent seat of the lesion on parts of the body unknown as points of departure in true elephantiasis should render the differential diagnosis between dermatolysis and elephantiasis Arabum a comparatively positive one.

The large size, the dependence, the frequent occurrence in folds and convolutions should exclude the probability of lipoma.

The pendulousness, the brown rather than the dull red or purplish color, the continued good health of the patient, the absence of metastases or of ulcerations should exclude the possibility of sarcoma; and, finally, the fact that the tumor is large, that it is pendulous, and that its covering is usually brown should lead the diagnostician to place this new growth in a separate division from the more frequent cases of multiple fibroma which it so closely resembles histologically.

**PROGNOSIS.**—From the description of the disease already given we can see that dermatolysis should cause its unfortunate possessor no fear of serious results, for the tumor forms no metastases and undergoes ulceration but rarely. The patient has to dread, therefore, only the disfigurement when the disease exists upon the head, the face, or the neck, or the sense of weight when the tumor attains large size, and finally the rather remote possibility of transmission to his descendants.

It will be seen that the writer has made no mention in this article of cases of elastic skin—the so-called cutis elastica seu hyperelastica. This is an intentional omission, for the writer believes that this condition of the skin is quite apart from the consideration of dermatolysis and should be considered under its own heading.

**TREATMENT.**—There is only one form of treatment and that lies in the removal of the tumor with the knife.

*Charles J. White.*

**DERMOID CYSTS.** See *Cysts.*

**DERMOL.**— $\text{Bi}(\text{C}_{12}\text{H}_7\text{O}_4)_2\text{Bi}_2\text{O}_3$ —bismuth chrysophanate. This is an amorphous yellow powder obtained by precipitating a solution of chrysophanic acid neutralized by soda with a solution of bismuth nitrate. It combines the values of chrysoarobin and bismuth, and is used in ointment or powder in such parasitic skin diseases as pityriasis, favus, ringworm, etc. *W. A. Bastedo.*

**DES CHUTES HOT SPRINGS.**—Crook County, Oregon. These springs are located 8 miles north of Warm Springs. They issue from the base of the cliffs along the valley of the Wam-Chuck River. Their number is quite large, and some of them have a copious flow. The temperatures of two of them are respectively 143° and 145° F. Analysis by L. M. Dornbach and E. W. Horsford showed the following results:

ONE UNITED STATES GALLON CONTAINS:	
Solids.	Grains.
Sodium carbonate.....	34.50
Sodium sulphate.....	9.46
Calcium sulphate.....	1.82
Sodium chloride.....	20.42
Potassium chloride.....	2.00
Magnesium chloride.....	1.21
Sodium silicate.....	8.20
Iron.....	Trace.
Total.....	77.61
	Cubic inches.
Carbonic acid gas.....	22.56

This analysis shows a valuable combination of mineral ingredients. So far as we are able to learn, however, the springs have not been improved as a resort.

*James K. Crook.*

**DESMOID TUMORS.**—(Desmoid, tendon-like.) This designation has been applied to that variety of hard fibroma which on section creaks under the knife, and

shows a cut surface resembling more or less that of a tendon.

These growths form as a rule circumscribed tumors, varying in size from a mustard seed to a man's head or even larger; and are round, nodular, or lobulated. They usually possess a definite capsule, and grow entirely by expansion. Their consistence is very hard and firm. On section they show a white, glistening, tendon-like surface in which the whorled and interlacing bundles of coarse fibres of connective tissue are often visible to the naked eye. The cut surface is dry or but very slightly moist. Occasionally the color is pink or reddish. To the naked eye few blood-vessels are usually visible, but microscopically these growths may be found to possess a well-developed system of vessels. Occasionally the latter may become angiectatic, whereby the cut surface of the growth is mottled red and white.

The finer structure of these growths consists almost entirely of fibrous connective tissue, either arranged in coarse fibres or appearing almost hyaline and homogeneous. The intercellular substance far exceeds the cells in amount, the latter frequently being present in very small numbers and widely separated by the hyaline intercellular substance. In some portions of the growth the cells may entirely disappear, leaving only the hyaline intercellular substance, which eventually becomes calcified or undergoes liquefaction. Retrograde changes are very common in these growths: hyalin, calcification, necrosis, liquefaction following œdema or myxomatous degeneration, gangrene, etc.

Desmoid tumors are found most frequently in the subcutaneous tissue, intermuscular connective tissue, nerve sheaths, retroperitoneal tissues, serous membranes, etc., in which regions they may reach a large size. Small growths of a similar nature occur less often in the mammary gland, parotid, and kidneys, and more rarely in the ovaries, liver, and spleen. Uterine myofibromata containing but a small proportion of unstriped muscle assume the appearance of desmoid fibromata. The so-called desmoids of the abdominal wall are in reality spindle-cell fibro-sarcomata of slow malignancy, but differing from the fibromata in that they grow by infiltration. The true desmoid is malignant only by size, position, and tendency to necrosis. It does not infiltrate nor give rise to metastases. If removed with its capsule entire it will not recur.

*Aldred Scott Warthin.*

**DES MOINES, IOWA.**—Situated in the central portion of the State of which it is the capital, upon the Des Moines River. It is of considerable size and importance. The climate is indicated by the accompanying table:

CLIMATE OF DES MOINES, IOWA.—LATITUDE, 41° 35'; LONGITUDE, 93° 37'; PERIOD OF OBSERVATIONS, FIVE YEARS FIVE MONTHS.

Data.	January.	July.	Year.
Temperature (degrees Fahr.)—			
Average or normal.....	20.9°	73.8°	49.0°
Average daily range.....	19.2	19.4	
Mean of warmest.....	29.4	84.7	
Mean of coldest.....	10.2	65.3	
Highest or maximum.....	63	98.5	
Lowest or minimum.....	-26	52	
Humidity—			
Average relative.....	71.1%	71.2%	69.0%
Precipitation—			
Average in inches.....	1.06	3.37	41.35
Wind—			
Prevailing direction.....	N.W.	S.W.	S.W.
Average hourly velocity in miles.....	6.3	5.1	6.4
Weather—			
Average number clear days.....	11	10.6	111.2
Average number fair days.....	11	14.2	151.3
Average number fair and clear days.....	22	24.8	262.5

*E. O. Otis.*

**DETROIT.**—The chief city of Michigan, of over 200,000 inhabitants, is situated on the northern bank of the Detroit River, connecting Lake Erie and Lake St. Clair, and forming the boundary between the United States and

Canada. The climate of Detroit is represented by the following chart.

CLIMATE OF DETROIT, MICH.—LATITUDE, 42° 20'; LONGITUDE, 83° 3'  
PERIOD OF OBSERVATION, DECEMBER 1ST, 1870, TO DECEMBER  
31ST, 1883.

Data.	January.	July.	Year.
Temperature (degrees Fahr.)—			
Average of normal .....	24.8°	71.6°	47.9°
Average daily range .....	12.7	18.4	
Mean of warmest .....	31.3	81.4	
Mean of coldest .....	18.6	63	
Highest or maximum .....	65	100	
Lowest or minimum .....	-15	50	
Humidity—			
Average or relative .....	78.3%	70.0%	71.6%
Precipitation—			
Average in inches .....	2.14	4.14	35.41
Wind—			
Prevailing direction .....	S.W.	S.W.	S.W.
Average hourly velocity in miles .....	8.2	6.4	7.8
Weather—			
Average number clear days .....	3.8	9.8	85.9
Average number fair days .....	9.6	14.9	147.8
Average number of fair and clear days .....	13.4	24.7	233.7

E. O. Otis.

**DEXTRIN.**—“Artificial Gum.” (C<sub>6</sub>H<sub>10</sub>O<sub>5</sub>).—A polysaccharide, of the same formula as starch, cellulose, inulin, and lichenin. The name is applied to any one or all of the intermediate substances produced in transforming starch or cellulose into glucose. The first member of this series, *amylopectin*, yields a purple color with iodine, but all the others show no color with that reagent which could even carelessly be mistaken for that of starch. Commercial dextrin is a white or yellowish-white substance, powdery or compacted into lumps, with a specific gravity of 1.038 and soluble in water. It is produced by the action of either diastase or dilute mineral acids, aided by heat, upon starch. Dextrin itself does not admit of fermentation, but upon being converted into *dextrose* by the addition of a molecule of water, it does so and can then pass on into alcohol. Dextrin bears a close relation to gum and its chief use is to substitute that article, much of such use being fraudulent. It can be distinguished by its peculiar odor and by the test given under *Gum*. Alcohol precipitates it. It is highly adhesive but distinctly inferior to gum, its solution growing very dark with age. Dextrin is itself very prone to adulteration, especially with starch. Commercial dextrin often holds an excessive amount of water, as well as of dirt of various kinds. Dextrin has no medicinal properties but, being partly digested starch, it forms a common ingredient of artificial foods for infants. *Henry H. Rusby.*

**DIABETES MELLITUS.**—DEFINITION.—A diminution of the sugar-consuming power of the body tissues resulting in a more or less permanent glycosuria. Of the cause and nature of saccharine diabetes we are practically ignorant. We distinguish the symptom glycosuria from the disease diabetes, but the distinction is merely one of time, since we cannot refuse the title of diabetes to any long-standing glycosuria, no matter what the other symptoms are. The weakness of this position is obvious; we are making the distinction between a symptom and a disease one wholly dependent upon time.

Temporary glycosuria may be brought about by any one of a number of causes, among which perhaps the commonest are profound narcosis (whether produced by alcohol, ether, or any other drug), profound coma, however produced, poisoning by carbonic oxide, nitrite of amyl, or strychnine, and the active use of diuretics. Such glycosuria must be distinguished from the lactosuria which sometimes occurs toward the end of pregnancy and during lactation, as well as from the dextrosuria produced by large doses of chloral or chloralamide. Less frequent causes of glycosuria are traumatic neuroses, alcoholism, delirium tremens, hysteria, neurasthenia, chlorosis, Graves' disease, and the infectious fevers. I need hardly

say that glucose must be distinguished from other copper-reducing substances which are not very infrequently present in the urine when the latter is very concentrated and after the ingestion of certain poisons (see, below, tests for sugar). It must not be forgotten that the capacity of the individual for burning up grape sugar is never an unlimited one. Glycosuria may be produced in any one by the ingestion of a sufficiently large amount of glucose, and is then known as “*alimentary glycosuria*”; it can ordinarily be produced by taking 200 gm. of glucose upon a fasting stomach. In many persons the tolerance for sugar is less than this.

Although diabetes cannot be said to be a disease of any one organ, yet it is indubitably true that in a minority of cases some organic lesion is to be found. Thus a certain proportion of cases occurs in connection with diseases of the liver (especially cirrhosis) and with disease or trauma of the nervous system, especially cerebral tumors. Those pressing upon the floor of the fourth ventricle are not by any means the only tumors which are capable of being associated with diabetes. Other diseases of the brain occasionally associated with diabetes are cerebral hemorrhage, dementia paralytica, and the various forms of meningitis.

Of late years it has been shown that diabetes may occur in connection with any one of the various diseases of the pancreas. This connection is not, however, a very intimate one, since no lesion of the pancreas can be found in the majority of cases of diabetes and it is not at all uncommon to find pancreatic disease without diabetes. Finally, it should be mentioned that gout, obesity, and arteriosclerosis are very frequently present in cases of diabetes, though whether as cause or effect of the diabetes, or as a result of some deeper cause of which diabetes is another manifestation, we do not at present know.

The tendency to diabetes is in all probability capable of being inherited. Sometimes the morbid tendency shows itself in one member of the family as diabetes, as obesity in another, and as gout in a third. The occurrences of cases in husbands and wives are probably accidental. All ages and both sexes are affected.

All the etiological factors hitherto mentioned, except heredity, are concerned only in a minority of cases. For diabetes in a great majority of cases no cause, no associated disease, no inheritance can be assigned. The disease comes, as we say, of itself.

**SYMPTOMATOLOGY.**—Most of the symptoms of diabetes may be regarded as results of the glycosuria, but it is convenient to divide them into the more *direct* and the more *indirect* results. In the former class are hunger, thirst, polyuria, emaciation, and muscular weakness. The thirst in well-marked cases is so great that the patient goes to bed with a four-quart pitcher of water at his side and empties it before morning. It is related that a diabetic patient was paid to stay away from a hotel conducted on the American plan owing to the disastrous ravages which his hunger made upon the bill of fare. This anecdote, whether true or not, gives some idea of the voraciousness of a diabetic's appetite. Four or five quarts of urine are frequently passed in twenty-four hours and the amount may be much larger. As a result of this drain upon the tissues the patient is apt to emaciate rapidly and to notice great muscular weakness. This is especially the case when the disease occurs in persons under thirty-five years of age and in those whose habit of body is spare. In cases occurring in fat old people there may be little or no weakness or emaciation (see below).

In the presence of these symptoms: *thirst, voracious appetite, emaciation, muscular weakness, and polyuria*, or of any one of them, the examination of the urine for sugar is immediately suggested and imperatively demanded.

The test for sugar is best performed with Fehling's solution, the formula for which is as follows: Dissolve 34.64 gm. of pure CuSO<sub>4</sub> in 500 c.c. of water; dissolve 173 gm. Rochelle salts and 60 gm. sodium hydrate each in 200 c.c. of water. Mix and add water up to 500 c.c.

The copper solution must be kept in a separate bottle and not mixed with the alkali until we are ready to make the test. Equal parts of the two solutions are then mixed in a test tube and the mixture is boiled. Should any precipitate appear on boiling, the solution must be rejected and another portion freshly prepared. If no precipitate appears, add an amount of urine equal to the amount of the hot Fehling's mixture in the test tube. If sugar is present in the suspected urine a yellow precipitate will appear—usually within a few seconds, occasionally after the lapse of some hours. This precipitate is due to the reduction of the copper and can be produced in case reducing substances other than sugar are present in the urine; this, however, is very rarely the case. Large amounts of uric acid are capable of reducing copper, but only in a solution more concentrated than often occurs in urine. In any case of doubt the presence of sugar may be verified by the fermentation test (see below). In the vast majority of cases, however, Fehling's test is all sufficient for a qualitative examination for sugar.

Having satisfied ourselves that sugar is present, we proceed to estimate its amount. This is best performed by means of the fermentation test. First take the specific gravity of the urine; then to four or five ounces of urine add one-half cake of Fleischman's yeast in an open beaker, crumpling up the yeast into small pieces while adding it. Set the beaker aside in a warm place for thirty-six hours, then filter its contents and take the specific gravity of the filtrate. If sugar is present the filtrate will be found to be much lighter than before the addition of the yeast. To estimate the percentage of sugar, multiply the number of degrees of specific gravity lost by 0.237 and the resulting figure represents the percentage of sugar. Thus, if the specific gravity of the urine before fermentation were 1.040 and after fermentation 1.020 the resulting loss of specific gravity of 20 degrees multiplied by 0.237 gives us 4.74 per cent. of sugar. If the amount of urine passed in twenty-four hours is previously known, we can easily estimate the twenty-four hours' output of sugar, which is, of course, the essential point to be ascertained. For practical purposes these two tests, the qualitative test with Fehling's solution and the quantitative test by means of fermentation, are all sufficient. The tests for acetone, for diacetic acid, and for beta-oxybutyric acid will be described later.

**INDIRECT SYMPTOMS OF DIABETES.**—The drain upon the tissues produced by the excretion of large amounts of sugar which ought to be absorbed and utilized in the body is manifested directly in the symptoms already mentioned, viz., hunger, thirst, emaciation, muscular weakness, and polyuria. Indirectly the increased vulnerability of the body tissues manifests itself in some one or more of the following ways:

1. Lesions of the skin and mucous membranes.
2. Lesions of the nervous system.
3. Lesions of the respiratory system.
4. Lesions of the circulatory system. Each of these will now be taken up in detail.

1. *Lesions of the Skin and Mucous Membranes.*

(a) An abnormal *dryness* of the skin and mucous membranes is almost invariably present. The skin becomes rough and harsh and its appendages, the hair and nails, show the effects of malnutrition in dryness and brittleness.

(b) *Eczema* about the genitals is a very significant symptom and may be the first thing to suggest the diagnosis of diabetes. A red and angry eczema about the vulva should invariably suggest to us to test the urine for sugar. Balanitis and vulvitis are not so common, but they occasionally occur. Generalized eczema and other dermatoses are less common.

(c) *Furunculosis* and other staphylococcus affections of the skin manifest the diminished resisting power of the cutaneous tissues.

(d) *Carbuncle* is not infrequently associated with diabetes and the presence of such a suppurative process should always suggest a search for sugar in the urine. Diabetic gangrene is considered by some to belong in this category of changes, but it seems to me best to consider

it under the lesions of the circulatory system (see below).

2. *Lesions of the Nervous System.*

(a) *Diabetic Neuritis; Neuralgia.*—Sciatica, intercostal neuralgia, trigeminal neuralgia, and less frequently brachial neuralgia appear as results or complications of diabetes and may be the first indication of the disease. This is especially true of sciatica. (b) Muscular cramps, unusual muscular fatigue on slight exertion, and deep muscular pain are sometimes associated with diabetes. Twice patients have come to me complaining only of cramps in the calves and totally unaware of any underlying disease. (c) Loss of knee-jerk characterizes relatively late stages of the disease in the majority of cases and is probably due to a peripheral neuritis. (d) Facial paralysis of peripheral origin may be the first symptom which leads the patient to consult a physician. Other peripheral paralyses are less common. (e) Anæsthesia and paresthesia usually affecting relatively small areas are not at all uncommon. The inner and anterior aspects of the thigh are not infrequently affected and the disturbances of sensation may be associated with pain (meralgia paresthetica). (f) Perforating ulcer of the foot (mal perforans) is undoubtedly to be referred to a nervous lesion and is a fairly common manifestation of diabetes.

Lesions of the brain and cord are much less common than those of the peripheral nerves and when present are often to be explained as results of the arteriosclerosis with which diabetes is so frequently associated. In one of my cases there was for many months an intense generalized headache apparently of cerebral origin. Loss of sexual power is an important and sometimes an early symptom.

Lesions affecting the special senses are not frequent, if we except the eye. Among ocular lesions by far the commonest is *cataract*—a disease which may give us the first suggestion of the possibility of diabetes. Retinitis is not very uncommon. Paralysis of the abducens is not infrequent and many diabetics develop at an early age the far-sightedness which is so common in elderly people. Occurrences of hemiplegia, of convulsions, and of coma in cases of diabetes will be discussed later.

3. *Lesions of the Respiratory System.*

(a) Pulmonary tuberculosis complicates from seventeen to fifty per cent. of all cases of diabetes. Between these figures the statistics of different writers vary. It hardly ever occurs in elderly or obese diabetics and usually runs a rapid course to the fatal termination. Hemoptysis is notably rare and there is often but little expectation. In a young man who died after withstanding the disease for nine years under my observation, there was found at autopsy a pneumonic form of tuberculosis presenting solidification of the whole right lung from top to bottom without cavity formation. During life there were no sputa and practically no cough. As a result of the swallowing of sputa the intestine is not infrequently attacked by tuberculosis. (b) Pulmonary gangrene. About five per cent. in all cases of diabetes are attacked by gangrene of the lung which may run a rapid course or drag along for months and even years. (c) Croupous pneumonia. Diabetic cases of the severe type often end with an acute pneumonia. In all cases of pneumonia the urine should be examined for sugar; its presence greatly darkens the outlook. (d) The acetone odor of the diabetic breath is a very characteristic one and may sometimes be detected as soon as one opens the door of a patient's house; it has been variously compared to the odor of chloroform, of rotten apples, and of new-mown hay.

4. *Lesions in the Circulatory Apparatus.*

Arteriosclerosis with its manifold results includes all the circulatory complications of diabetes. Arteriosclerosis is probably to be regarded as a concomitant or a possible cause of diabetes (Naunyn) rather than as a result. Diabetic gangrene is usually, I think, to be regarded as a result of the arteriosclerosis rather than as a manifestation of simple malnutrition. The gangrene affects the extremities following the distribution