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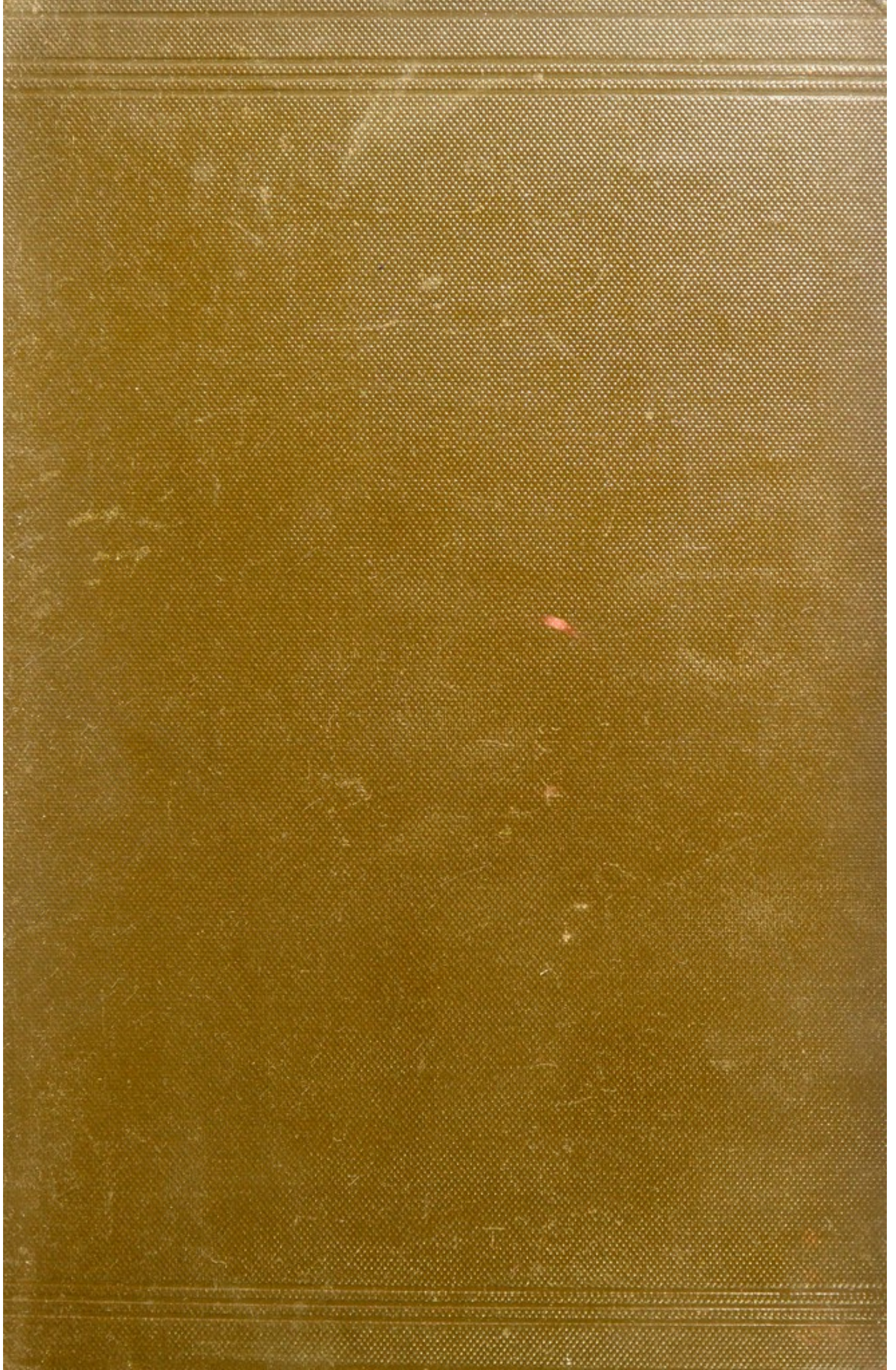
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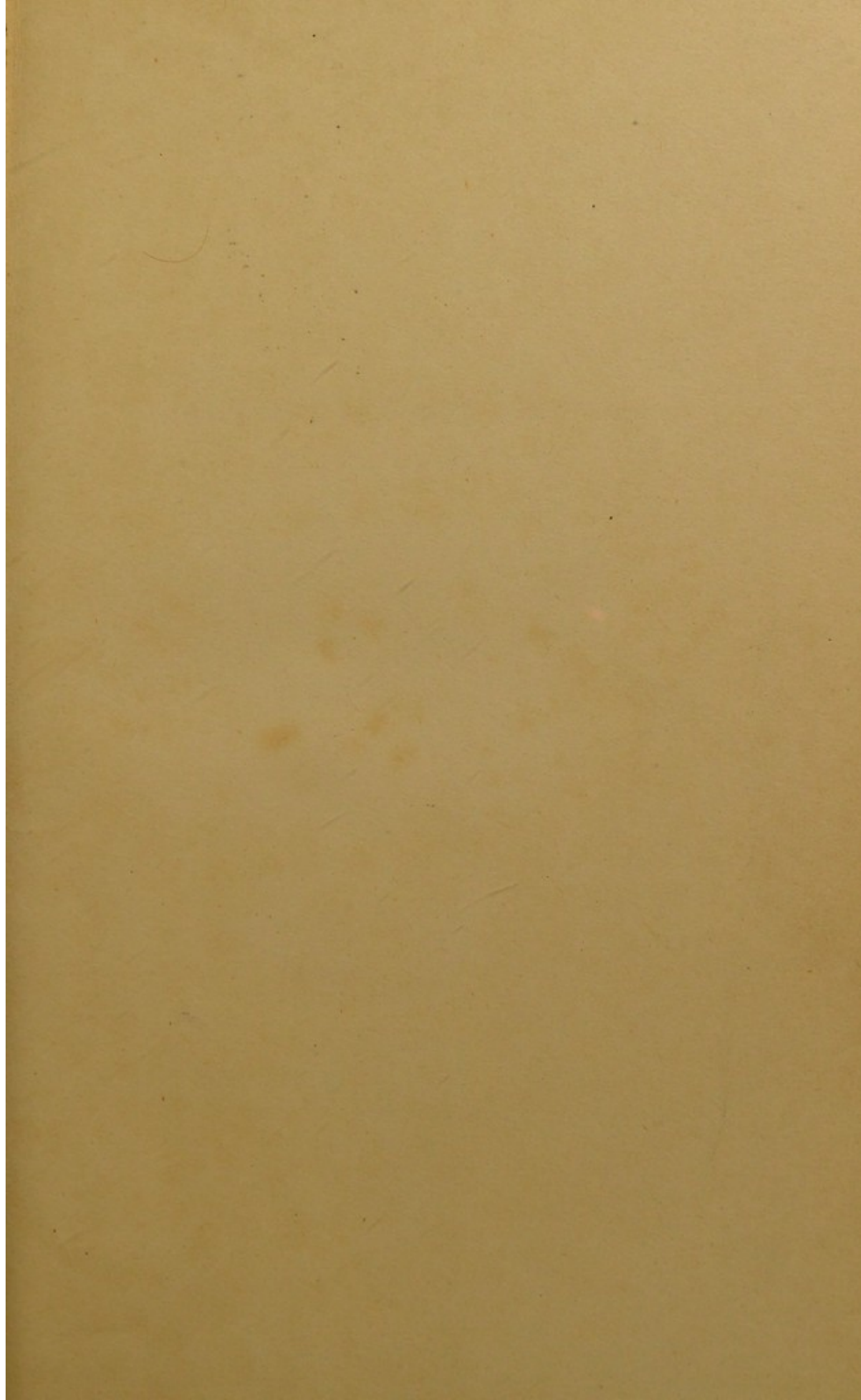
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DERMATITIS VENENATA:

AN ACCOUNT

OF

THE ACTION OF EXTERNAL IRRITANTS UPON
THE SKIN.

BY

JAMES C. WHITE, M.D.,

PROFESSOR OF DERMATOLOGY, HARVARD UNIVERSITY; PHYSICIAN TO OUT-PATIENT DEPARTMENT
FOR SKIN DISEASES, MASSACHUSETTS GENERAL HOSPITAL.

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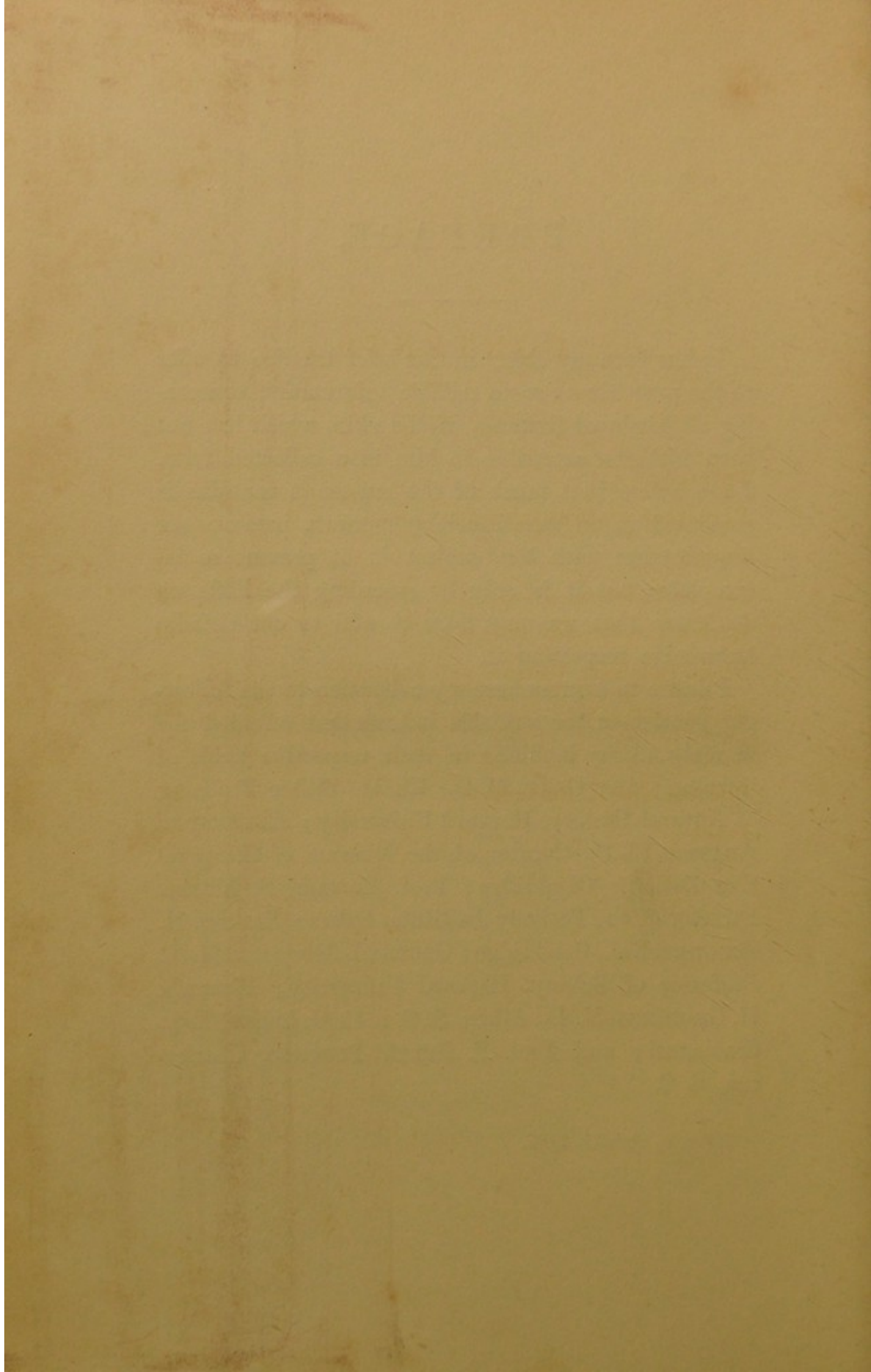
James Shakespeare

P R E F A C E.

It has been my object in this brief treatise to offer to the practitioner some reliable information concerning all kinds of irritants of the skin, which has not been hitherto accessible to him in a collected form. I am aware that much of the matter it contains is presented in an unsatisfactory manner, because our acquaintance with the subject is at present so incomplete; but it is only by recording the little we do know that we may hope to add to our definite knowledge respecting it.

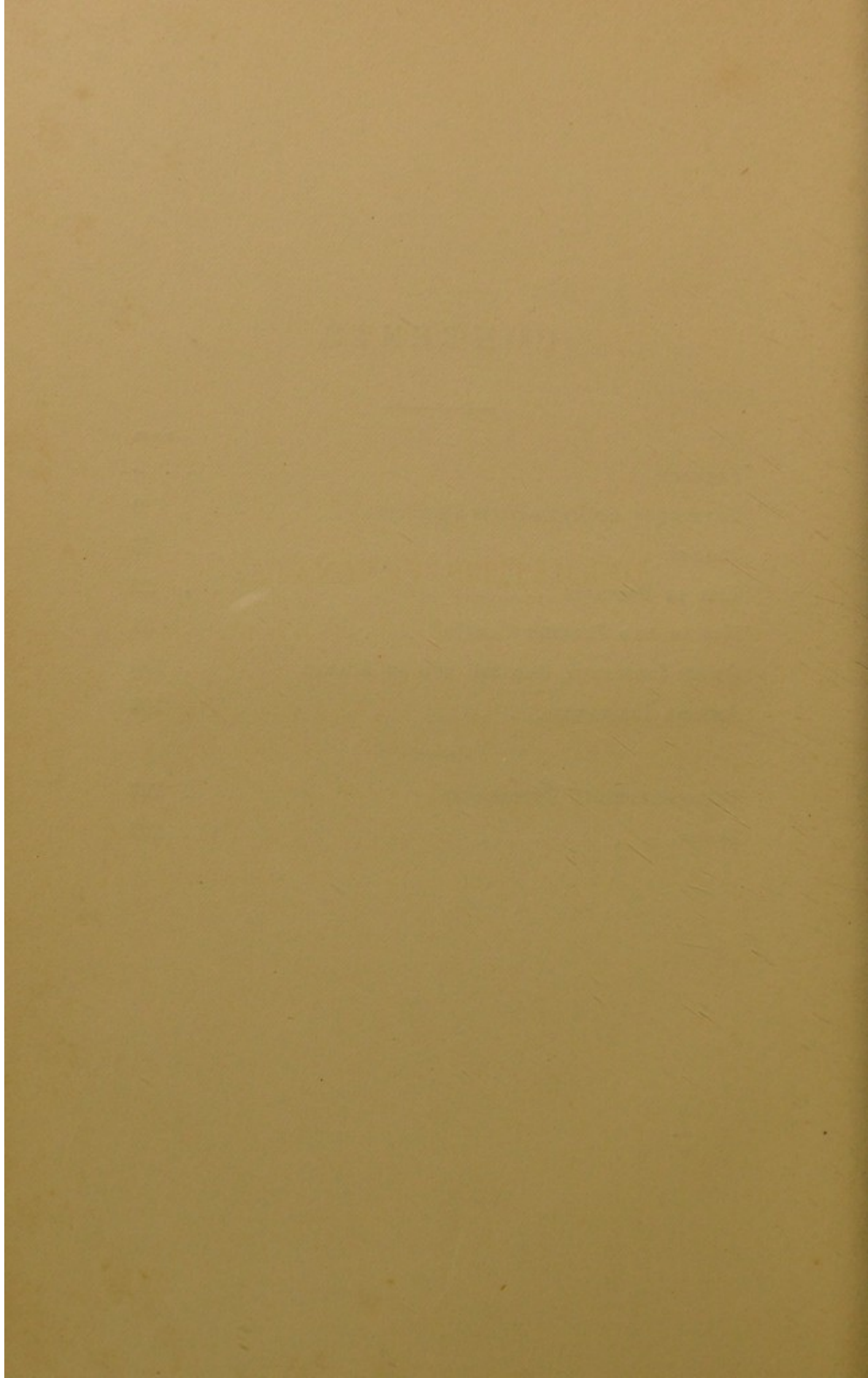
I desire to express here my obligation to the following gentlemen for valuable information afforded me in reply to my inquiries in their respective fields of learning: ASA GRAY, M. D., LL. D., Fisher Professor of Natural History, Harvard University; ALEXANDER AGASSIZ, LL.D., Curator of the Museum of Comparative Zoölogy, Cambridge; Prof. EDWARD S. MORSE, Director of the Peabody Institute, Salem; SAMUEL H. SCUDDER, Esq., Cambridge; GEORGE L. GOODALE, M.D., Professor of Botany, Harvard University; WILLIAM H. GEDDINGS, M. D., Aiken, S. C.; C. G. LLOYD, Esq., Cincinnati; and Prof. F. PEYRE PORCHER, Charleston, S. C.

BOSTON, *April 1, 1887.*

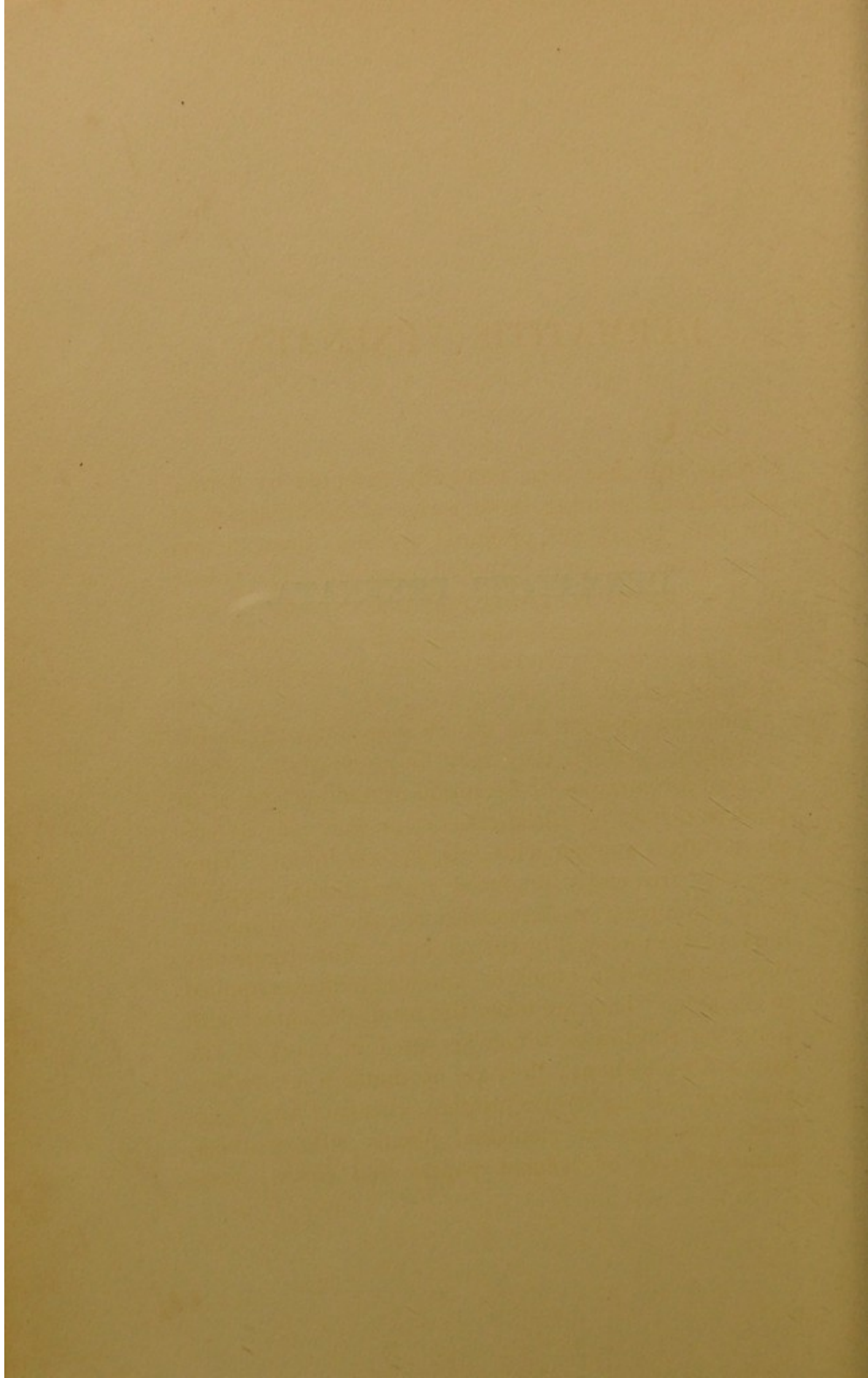


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DERMATITIS VENENATA.



James Shakespeare

DERMATITIS VENENATA.

THIS title has been generally accepted by dermatologists as meaning those forms of inflammation of the skin which are produced by the direct action of irritating agencies externally applied. The nature of these agents is various, and their number is very large. They belong to the vegetable, the animal, and the mineral worlds, and to other classes of matter not so easily defined.

Their action upon the skin is sometimes the result of design: that is, they may be used by the person affected for purposes of deception or malingering, or to produce certain beneficial effects; or they may be employed upon another with mischievous intent. They are very frequently produced by medicinal applications improperly recommended by the physician, or improperly employed by the patient. More frequently they are caused by quack or domestic remedies applied to the skin. They are often the result of contact with irritating substances which are used in many of the arts and professions; they are of common occurrence, therefore, among dyers, printers, chemists and druggists, collectors of medicinal plants, silk weavers, manufacturers of colored papers and cloths, soap-

makers, etc. They are caused by the use of improper cosmetics and by clothing colored by poisonous dyes, and by the attacks of certain insects and other animals. Most frequently they are produced by plants possessing irritating properties.

The effect produced by these various agents is to excite an inflammatory process in the cutaneous tissues, of all possible degrees of intensity. Under the impression produced upon them by the irritant, either by insertion within them, by surface contact, or in some cases by the influence of emanations alone, the capillaries immediately surrounding such point of contact enlarge, and produce a visible hyperæmia, thus establishing a local *erythema*. This, the first stage of the inflammatory process, may affect only a minute area, forming a small red point, a *macule*, or extend over a considerable area, and present a uniform and extensive field of redness. It may be fugitive, lasting but a few minutes, or continue for hours or days, and finally disappear without the production of any other apparent tissue change. But an erythema cannot exist for any considerable time without a slowing of the current of circulation in the enlarged capillaries, and the consequent escape through them of some of the elements of the blood. The serum transudes and permeates the interspaces between the fibrous bundles of the corium, and, pressed upwards through the papillary layer, distends and forces apart the cells of the rete. This results necessarily in an increase in the bulk of their tissues, or, in other words, a swelling is produced. This serous transudation is called *œdema*, and this condition is in some degree inseparable from an erythema of more than evanescent duration. Red-

ness and swelling, then, are the earliest phenomena of dermatitis.

Sometimes these changes are limited to very circumscribed areas. Under peculiar forms of irritation an erythema is rapidly excited, which is followed by a sudden œdema, so violent as to distend such portions of the skin in the form of abrupt elevations with sharply defined borders, and to compress in turn the capillaries of such areas so as to occlude them, and thus produce lesions characterized by flat, strikingly white prominences, which are generally surrounded by a halo of erythema. These lesions are called *wheals*. They may exist for but a few minutes, or for one or more hours, but they are always of brief duration. The capillaries in the stage of involution begin to absorb the effused serum, the swelling sinks down, the redness returns to the area, and finally the hyperæmia disappears. The whole process is one of the most sudden and striking exhibitions of morbid action to which the skin is liable. It is a frequent phenomenon in dermatitis venenata.

But in addition to the escape of serum consequent upon a hyperæmic state of the skin, when prolonged beyond a brief duration other changes ensue; the cell elements of the blood escape through the vessels and add to the previous swelling or œdema. They are deposited in the upper layers of the corium about the superior capillary plexus in vast numbers, so as to give the papillary layer the appearance by the microscope of a cell structure. Owing to their presence the skin offers a firmer resistance to pressure than that caused by the simple œdema, and presents in time a decided thickening. This change may affect considerable areas

uniformly, producing a general thickening and elevation of the part affected, or it may concentrate itself within the papillæ especially, the exudation from their vascular loops causing them to enlarge either singly or in groups, and forcing them, with their epidermal coverings, above the general surface of the integument in the form of sharply pointed or hemispherical elevations, red in color, and varying in size from a pin's head to a small pea. This form of efflorescence is called a *papule*. It may last a few days, or much longer, and slowly sink down, as the effused elements, serum and blood cells, are reabsorbed by the vessels, and leave no later sign of its existence, or at most a slight scale, the result of the changes in its epithelial covering, due either to the stretching or devitalization of the cells through inflammation. On the other hand the epithelial covering of the tip of the softened tissues may be easily removed by violence, and thus the elongated papillæ be exposed, allowing the contents of the papule to escape, or the enlarged capillaries may themselves be ruptured; in either case, an excoriation and crust are formed upon its summit, thus complicating the process of involution.

If the tip of such an inflammatory papule be carefully pricked with a needle, so as not to open one of its blood-vessels, a minute quantity of clear serum or lymph will exude, showing the abundant presence of fluid in it. Under the continuance or greater intensity of the inflammatory process this is poured out with such force, or in such quantity, as to tear apart the soft plastic cells in the lower layers of the rete, and thus form chambers filled with clear fluid, which are traversed by upright columns or threads,

composed of the elongated epithelial cells. Such collections of serum are called *vesicles*, or blisters. Their roofs consist of the hard and flattened cells of the horny layer, which resists the pressure from below of the escaping fluids, and appear as a translucent covering, through which the nature of their contents may be recognized. If the vesicles exceed a certain size they are called *bullæ*, or blebs. Their fluid contents may after a few hours or days, with a diminution of the cutaneous excitement, be gradually reabsorbed, and the roof sink down, forming a thick scale, which after a short time falls off, leaving the skin still red for a while; this redness in turn disappears, and leaves no permanent mark. But vesicles are not always thus formed by a transformation of preceding papules. They may arise suddenly upon a previously healthy area, or follow quickly upon a slightly erythematous macule of the briefest duration. If their roofs are broken by violence, or ruptured by the fluids exuding beneath, their fluid contents escape freely upon the surface and form crusts, beneath the protection of which the process of repair goes on, with the formation of new epithelial cells.

But vesicles are not the highest stage in this progressive formation of surface lesions in dermatitis. If it advance, their clear fluid contents are invaded by multitudes of migrating round cells pushing up from the corium below, so that they appear no longer transparent beneath their epidermal coverings, but milky or turbid; in other words, they have been transformed into *pustules*. These also may disappear by the absorption of their contents, or, if they be ruptured, the process of involution will complete itself beneath a

crust or scab. Pustules, however, may form as such without a preceding vesicular stage. These are generally deeper seated than the superficial forms of inflammation thus far considered, and are often seated primarily about the glandular structures, or even in the subcutaneous tissues. Larger and deeper forms of the pustular or suppurative inflammation are represented by lesions called furuncular and ecthymatous.

Such are the so-called primary lesions of acute dermatitis. They may be only progressive steps of the inflammatory process, marked by certain well-defined stages, — the hyperæmic macule, papule, vesicle, and pustule; or any one of them may arise independently as such, and disappear without undergoing further evolutionary change. Several or all of them may be present at the same time, or any one of them may represent the whole process in any case.

The secondary lesions which occur in dermatitis are the changes in the primary forms of eruption, either incidental to the decline of the inflammatory process, or the result of accidental interference with their natural course. The simple erythematous stage may disappear without the formation of any; but if intense, or of long duration, the overlying epithelium becomes modified in its condition so as to form a *scale*. The scale results, too, directly from the natural subsidence of the papule or vesicle, and as the final stage or remnant of nearly all forms of inflammatory eruption, the epithelial layers being the last tissue to show indications of the retreating disturbance in the skin.

The *excoriation* is produced by the removal of the cuticle from any of these forms of inflammatory lesion, or from the normal integument. It is followed by the

immediate exudation of serum or lymph, or, if the vessels of the papillæ be wounded, by hemorrhage, and the subsequent formation of crusts by their coagulation. Large areas of inflamed corium may be thus denuded, and present surfaces oozing with these fluids, or pus, for considerable periods, or they may be laid bare by the intensity of the inflammation itself, the epithelial layers being washed away and prevented from reforming until this has subsided.

Over all such excoriated surfaces, however produced, a *crust*, or scab, must form sooner or later by the coagulation of serum, pus, or blood, according to the nature of the primary lesion, varying in appearance and consistence according to its composition, to be detached possibly and formed again, and beneath which the new epidermis will eventually form when the conditions for repair become favorable.

Should the papillary layer as well as the epidermis be removed by violence or the destructive intensity of the inflammatory process, we shall have formed a suppurating and granulating surface, a possible *ulcer*, over which also a crust may form, but over which can no longer be created a normal cuticle. The fibrous structures of the corium may be restored in small or excessive measure, but for their final covering only a thin layer of modified epithelium is formed. This result is the *cicatrix*.

These are the lesions, eruptions, efflorescences, as they are called, which characterize the changes in the cutaneous tissues in dermatitis venenata. Any one form may largely predominate in any of its many varieties, or most of them may be present, and in their successive stages of evolution and involution exhibit a great diversity of appearance.

The *subjective symptoms* which accompany them are such as are ordinarily experienced in other inflammatory affections of the skin in which they occur, but somewhat intensified perhaps. They are burning, itching, tingling, pain, and sometimes numbness.

The *constitutional disturbances* which accompany some forms of dermatitis venenata vary greatly in character and intensity, sometimes being very severe, occasionally proving fatal; but they cannot be considered in any general way in this connection. As a rule, they are wholly absent.

The *seat* of the inflammation is generally those parts of the integument most likely to come in contact with irritating substances, — those parts which are left unprotected by clothing, — the face and hands especially. In some of the professional forms of the affection the particular craft or trade determines the seat; in other varieties it is selected by will, or depends upon previous disturbances in the skin. This is often an important element in diagnosis.

The *course* of many forms of the affection is most acute; indeed, the suddenness of the onset, and the rapidity with which so intense an inflammation of the cutaneous tissues can pass through so many grades of evolution and involution, are one of its most characteristic features. Nevertheless, in some cases the process is so severe, and penetrates the corium so deeply, that its duration must be measured by weeks rather than days. It is possible, moreover, that the acute specific results of the irritant may pass into ordinary forms of dermatoses, which may last indefinitely. Thus chronic eczema is a very frequent sequel of many forms of the affection. The course may be stated, therefore, as

varying from the evanescent erythema or urticaria of a few minutes' stay, to ulcerations which may require months to heal, but as a rule it is self-limited.

Diagnosis. — It would be difficult to state how a dermatitis venenata may be distinguished from other inflammatory affections which it most closely resembles, or with which it is in fact identical except in its etiology. There are certain distinct types in which the skin expresses its disturbances, whether they are caused by external irritants, or are the result of influences impressed upon it from within itself or other parts of the economy, of the nature of which we know little or nothing, and this range of expression is very limited. Thus a very large proportion of the forms of dermatitis produced by individual irritants, which we are about to consider in detail, are eczematous in character, and can be distinguished from ordinary idiopathic acute eczema only by the most experienced eye in many cases. They are in fact eczema excited by external agencies. Erythema and urticaria are also forms frequently assumed. What difference can there be between a wheal produced by the application of the stinging-nettle to the surface of the skin, and that caused by the circulation through its tissues of irritating substances either introduced through the stomach or derived from abnormal conditions of the economy? The lesion in one case cannot be distinguished from that in the other. There are certain features, however, which the dermatosis artificially created presents, by which it may be distinguished in the great majority of cases from other forms, whether they be identical processes or not. So far as they may be described in words, they are mainly a sudden

onset, a rapid evolution of primary lesions, some peculiarities in their situation within the cutaneous tissues, an unusual color in their fluid contents, a greater intensity of inflammatory action and continuity of development within given areas, the localities attacked and the sharply defined limitations of the regions affected, a marked asymmetry and an artificial appearing configuration in the eruption, their occurrence in those employed in certain arts and professions, and other unusual, extraordinary appearances at times which cannot be defined,—these are some of the most striking peculiarities of the affection. Yet the most experienced dermatologist will often be unable to determine in the individual case whether he has one of artificial origin before him, even if he suspect it to be such, and sometimes, no doubt, treats it without even suspecting its true nature.

Prognosis. — So far as the cutaneous process alone is concerned, it is often self-limited, generally brief, and always terminates in recovery. Its effects upon the general system are seldom serious, but the action of the irritant itself upon the economy by absorption through the skin is sometimes very powerful, and in some cases either immediately or slowly fatal. These effects, on the other hand, may appear very threatening at first, and quickly disappear.

Treatment. — The treatment of dermatitis venenata differs but little from that required for similar grades of cutaneous inflammation in other affections of the skin. As the source of irritation is extraneous, however, it may generally be removed when recognized, and its future action prevented. In a few instances antidotes may be usefully employed, in case we are

dealing with alkalies or acids, the chemical antagonists of which can be safely and early used. Internal remedies exercise no specific control over any of its forms, and are demanded on the general principles of cutaneous therapy only. Neutral alkaline salts and saline laxatives are sometimes of benefit in allaying the intensity of the inflammatory process, and any constitutional disturbances which occasionally accompany the latter should of course receive the attention proper to each case. Generally, however, local applications are the essential element in treatment. They should be selected for the direct purpose of soothing and reducing the cutaneous inflammation, with reference, of course, to the nature of the lesions present in each case. Some of the most useful of them may be mentioned.

Evaporating lotions of warm or cold water, or of water and alcohol where the last would not be too stimulating, are of service in early hyperæmic stages of inflammation, applied constantly or with interruptions. Should much pruritus accompany, the addition of carbolic acid, in the proportion of a drachm to the pint of liquid used, will give relief. Weak alkaline lotions, solutions of saleratus or carbonate of soda, always at hand in the household, may be substituted for the above in the first stages, if the irritant be an acid.

If the skin be denuded of its epithelial covering over extensive areas, the emollient gelatine preparations may be used with advantage, as gelatine 10, glycerine 40, water 50, melted, and painted with a soft brush frequently over the surface. This preparation may be medicated in any way, as the cutaneous condition may suggest.

Washes of many kinds may be used. Black wash is one of the most valuable :

Calomel ʒj, lime-water Oj, \bar{m} .,

applied upon thin cotton or linen cloths as an evaporating lotion, two or three times daily, for twenty or thirty minutes. It should not be employed, however, over any extensive surfaces longer than a few days, on account of the danger of possible absorption.

A perfectly harmless and therefore more useful wash is the following :

Zinc oxide ʒj, lime-water Oj, \bar{m} .,

to which may be added carbolic acid ʒss to relieve itching, or glycerine ʒss upon dry surfaces. This may be sopped with a bit of soft rag, freely and at frequent intervals, upon all forms of primary lesions, with advantage. It is always well borne, and leaves a bland protecting powder over denuded surfaces.

Other washes are :—

Liq. plumb. subacet. dil. ʒviij, glycerine ʒij, \bar{m} ., applied upon cloths ; or, —

Pulv. calaminis ʒj, glycerine ʒij, water ʒviij, \bar{m} ., sopped on freely with a bit of cloth ; or, —

Sulphate of zinc ʒj, water Oj, \bar{m} ., may be substituted in individual cases with advantage, but I prefer the zinc wash in most cases.

Powders are often of service dusted upon oozing surfaces. The best are oxide of zinc or calamine, mixed with starch in varying proportions. In the crevices of joints and between cutaneous folds they sometimes cake, and cause irritation.

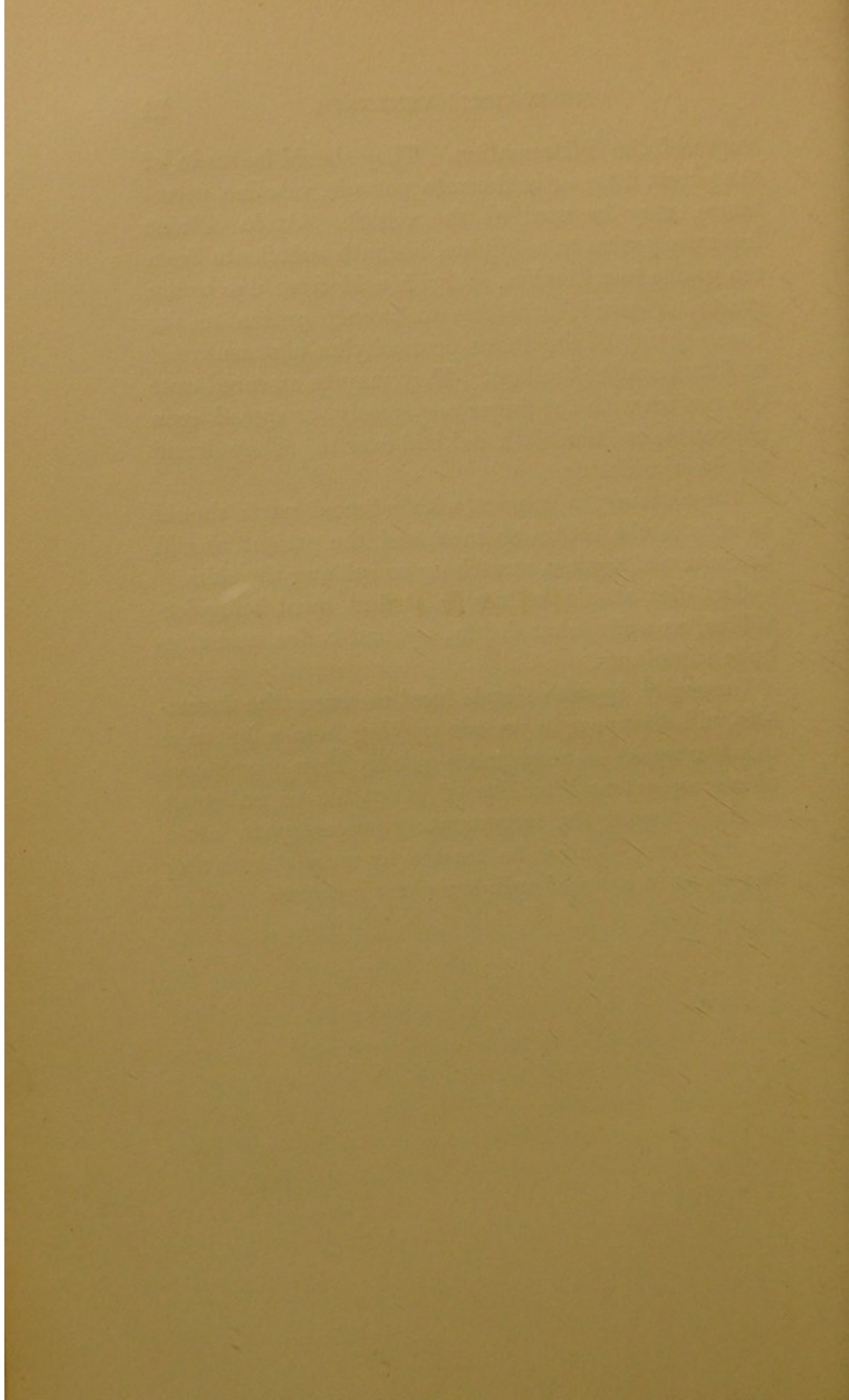
Ointments are generally useful in all but the earliest

stages of the inflammation. They should be made of the purest fats; or cold cream pomade, vaseline, petrolatum, may be used as the vehicle. Oxide of zinc from ten grains to a drachm, bismuth subnitrate from ten grains to a drachm, salicylic acid from five to ten grains, or tannic acid five to twenty grains to the ounce of any of the above, or diachylon ointment, will be found among the best. They may be smeared over the surface with the finger very gently, or spread upon old cotton or linen cloth and laid over it. They should not be stimulating.

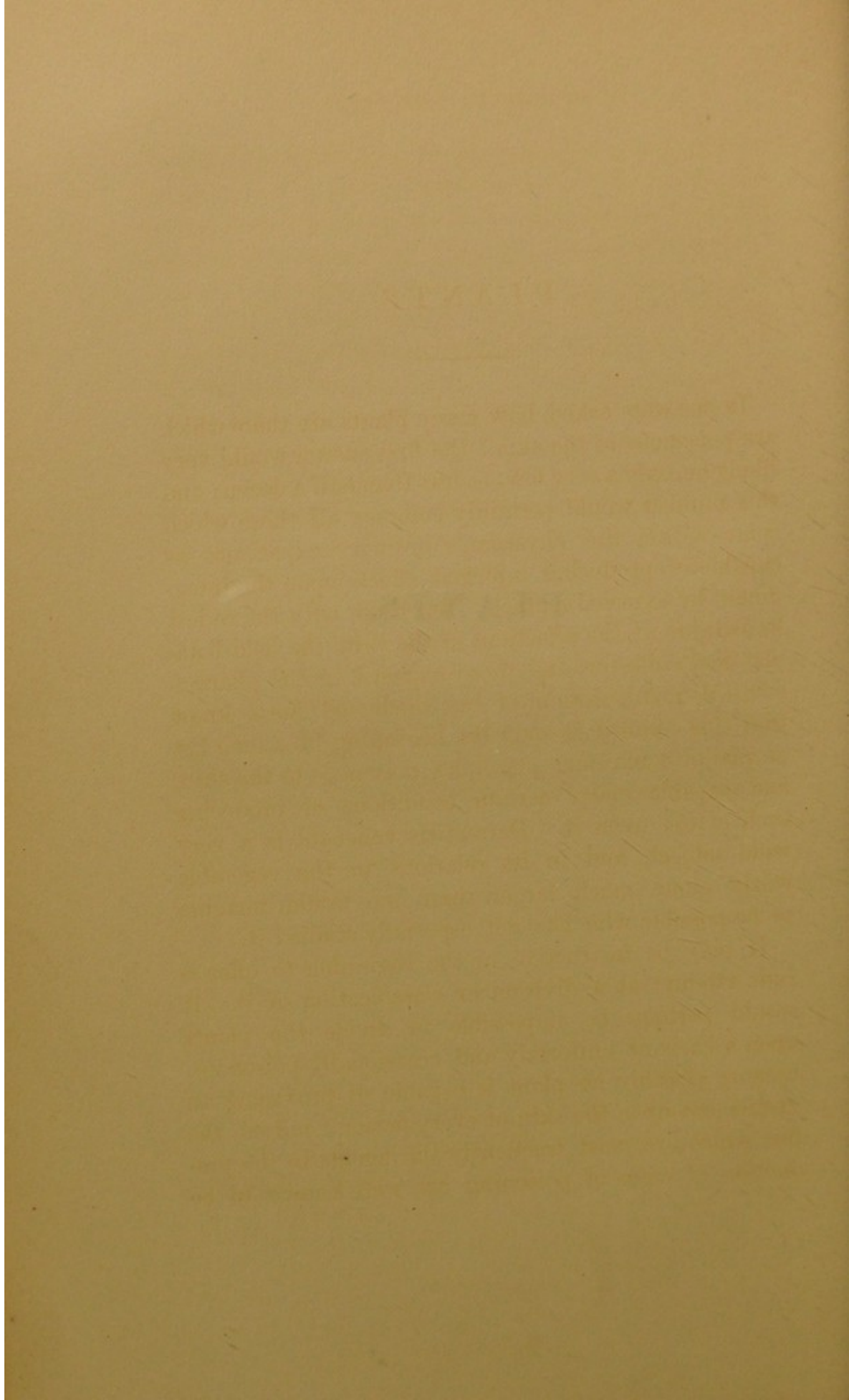
The clothing in contact with affected parts should be of soft old cotton or linen, and the patient should be cautioned against scratching or rubbing the skin.

The diet should be simple at first, meat being forbidden, as well as hot drinks, tea and coffee, and alcoholic stimulants.

Generally, by such simple local measures the dermatitis will disappear in periods varying from a few days to a few weeks,—much more quickly than dermatoses of corresponding intensity of idiopathic or unknown origin. Should the inflammatory process pass into a chronic form, it must be treated by more stimulating means, as in cases of ordinary chronic eczema.



PLANTS.



P L A N T S.

IF one were asked, how many plants are there which are poisonous to the skin? the first answer would very likely be, only a very few, — less than half a dozen; and this number would certainly embrace all those which come within the physician's ordinary experience as capable of producing injurious effects upon the integument by external contact. But those with the widest knowledge of the affections of the skin, the field botanist and collector, and those engaged in the pharmaceutical manipulation of our medicinal flora, know that this number is only the beginning of a long list of plants containing principles poisonous to the skin, and capable under certain conditions of producing such action upon it. *Dermatitis venenata* is a very wide subject, and in its relations to the vegetable world alone much larger than one would imagine to be possible who has not especially studied it.

It may be instructive in the beginning to offer a rude attempt at a division or classification of it. It would perhaps be impossible to divide the plants upon a basis of uniformly and occasionally poisonous, because possibly no plant is capable of producing an excitement upon the skin of every person; indeed, the few which are most frequently the agents in the production of cases of poisoning are well known to be

entirely powerless over the skins of a large proportion, if not the majority, of mankind individually, and the reason of the frequent mischief they give rise to is the abundant prevalence of their growth in the vicinity of man. We may distinguish, —

1. Those plants which are capable of producing injurious effects while growing, either by direct contact or near approach.

2. Those which act only when some part is purposely applied to the skin.

3. Those which are active only in a concentrated form, or through some principle artificially extracted from them.

The occasion for such action is afforded by accidental, unconscious, or unadvised contact with the plants in the field; by the necessary handling on the part of cultivators and collectors; by the manipulations incident to their mercantile and chemical relations; and by their medicinal use. The method of their action is, —

1. By mechanical irritation; for example, the hairs of *Mucuna*.

2. By special poison organs, as the stinging glands of the *Urticæ*.

3. By emanations; the volatile principle in *Rhus*, for illustration.

4. By contact with so-called acrid or poisonous elements contained in various plants.

The nature of the toxic principle varies. It may be in the form of an oil, an acid, an alkaloid, a resin, etc.; but its true chemical character, and the reason of its peculiar action upon the cutaneous tissues, are in the majority of cases wholly unknown.

The number of native plants, or those introduced into the United States, which are capable in some degree of injuring the skin, is, as above stated, far greater than is generally known. Sixty may be set down in this list, to which such action has been attributed on good authority, and their effect varies from the mildest degree of the most fugitive erythema to the highest grades of the inflammatory process. No distinction can be recognized in point of malignity and benignity, whether they be called upon by the physician to exert their peculiar action upon man for his relief, or make of him an unwilling victim of their power; the simple rubefacient and the most venomous poison-plant must both be included in the same list.

An inquiry into the *raison d'être* of such plants, or, if we choose to recognize a more independent or a more elevated nature in the vegetable kingdom, into their motive of action, would be of extreme interest, if there were a possible way of conducting it. Already we are almost disposed to admit that the carnivorous plants act with consciousness. They spread a tempting bait, they make voluntary movements and entrap, and they consume their prey and nourish themselves therewith. How can the animal do more? We were at first satisfied with a descriptive and anatomical botany; within a few years there has grown up a science of vegetable physiology; the psychology of plants has yet to be studied. We have been satisfied to regard all living objects as designed solely for man's special use, and as under the spell of some blind impulse stupidly called instinct, which kept their beings in action for that end alone. Lately we have been compelled to grant reason and individual inde-

pendence to the animal, as the result of more honest and less superstitious observation on our own part. Shall we come also to admit a certain degree of intelligence, of sentient action, in the vegetable world as well? If so, a belief in personal responsibility in plant action would necessarily follow.

It is difficult to see on what selfish grounds the poisonous action of most of the plants we are to consider can be based, which should not apply as well to the whole vegetable kingdom. If self-preservation is the first law of the plant, why should this peculiar means of protection be granted to so few? Why are the tissues and fluids of three species of *Rhus* amongst us, for instance, capable of inflicting an injury upon the only being for whom they are supposed to have been created, while the other species growing by their side, and innumerable genera of other plants around them, are harmless to his touch? They accomplish nothing apparently by the exercise of this power except to draw upon themselves a more rapid destruction. They remind one of certain classes among mankind, which exist, we say, for no good, but because animal nature so called is sometimes evil. So we may believe that the poison plants are the criminal class, because vegetable nature is sometimes evil. The existence of the one is as easy or difficult of explanation under the doctrine of design as the other.

A list of the plants to which such action has been attributed, arranged by families, follows.

FAMILIES.

Alismaceæ.

Alisma plantago.

Anacardiaceæ.

Rhus venenata.

Rhus toxicodendron.

Rhus diversiloba.

Semecarpus anacardium.

Apocynaceæ.

Nerium oleander.

Araceæ.

Arisæma triphyllum.

Symplocarpus fœtidus.

Araliaceæ.

Aralia spinosa.

Artocarpaceæ.

Antiaris toxicaria.

Aurantiaceæ.

Citrus vulgaris.

Berberidaceæ.

Podophyllum peltatum.

Bignoniaceæ.

Catalpa bignonioides.

Borraginaceæ.

Borago officinalis.

Cactaceæ.

Cactus grandiflorus.

Compositæ.

Anacyclus pyrethrum.

Arnica montana.

Bidens frondosa.

Erigeron Canadense.

Lappa officinalis.

Leucanthemum vulgare.

Maruta Cotula.

Xanthium strumarium.

Coniferæ.

Abies Canadensis.

Abies excelsa.

Juniperus Virginiana.

Juniperus Sabina.

Thuja occidentalis.

Crassulaceæ.

Sedum acre.

Cruciferæ.

Lepidium sativum.

Nasturtium Armoracia.

Sinapis alba.

Sinapis nigra.

Sisymbrium officinale.

Cucurbitaceæ.

Bryonia alba.

Droseraceæ.

Drosera rotundifolia.

Ericaceæ.

Chimaphila umbellata.

Oxydendrum arboreum.

Euphorbiaceæ.

Buxus sempervirens.

Croton tiglium.

Euphorbia corollata.

E. ipecac., et al.

Hura crepitans.

Hippomane mancinella.

Jatropha urens.

Stillingia sylvatica.

Fungi.

Ustilago.

Iridaceæ.

Iris florentina.

Leguminosæ.

Andira Araroba.

Mucuna pruriens.

Liliaceæ.

Allium sativum.
Asparagus officinalis.
Urginia scilla.

Linaceæ.

Linum usitatissimum.

Loasaceæ.

Mentzelia oligosperma.
Mentzelia Lindleyi.

Lobeliaceæ.

Lobelia inflata.

Loganiaceæ.

Gelsemium sempervirens.

Melanthaceæ.

Colchicum autumnale.
Veratrum sabadilla.

Myrtaceæ.

Eugenia pimenta.
Myrcia acris.

Orchidaceæ.

Cypripedium pubescens.
Vanilla planifolia.

Papaveraceæ.

Chelidonium majus.
Sanguinaria Canadensis.

Phytolaccaceæ.

Phytolacca decandra.

Piperaceæ.

Piper nigrum.

Polygonaceæ.

Polygonum hydropiper.
Polygonum acre.

Ranunculaceæ.

Aconitum napellus.
Actæa spicata.

Anemone nemorosa.

Anemone patens.

Clematis Virginica.

Delphinium consolida.

Delphinium staphisagria.

Helleborus niger.

Ranunculus.

Rubiaceæ.

Cephaelis ipecacuanha.
Cinchona.

Rutaceæ.

Ailanthus glandulosa.
Ruta graveolens.
Pilocarpus pennatifolius.

Salicaceæ.

Populus candicans.

Scrophulariaceæ.

Verbascum thapsus.

Solanaceæ.

Capsicum fastigiatum.
Datura stramonium.

Thymeleaceæ.

Daphne mezereum.
Dirca palustris.

Tropeolaceæ.

Tropeolum majus.

Umbelliferæ.

Ferula galbaniflua.
Heracleum lanatum.
Thapsia garganica.

Urticaceæ.

Laportea Canadensis.
Urtica chamædryoides, di-
oica, gracilis, purpuras-
cens, urens.

NATIVE AND FOREIGN PLANTS.

*ALISMACEÆ.**Alisma plantago.**Water Plantain.*

This common water plant, which grows abundantly in all parts of the country, bears an innocent reputation in works on botany ; but the National Dispensatory states that its leaves contain an acrid principle strong enough to irritate the skin.

*ANACARDIACEÆ.**Rhus toxicodendron.**Poison Ivy.**Rhus venenata.**Poison Sumach.**Rhus diversiloba.**Poison Oak.*

There are three species of plants growing abundantly in the United States, which have long been known to produce a so-called poisonous action upon the skin of persons touching or approaching them.¹ These are *Rhus toxicodendron*, *Rhus venenata*, and *Rhus diversiloba*, a genus familiar to every one in the form of our common sumach, belonging to the family

¹ This account of the action of *Rhus* is based upon an article written fourteen years ago, which was published in the *New York Medical Journal*, March, 1873. The writer's experience since then suggests some additions to the information therein given, but only trivial alterations or corrections.

Anacardiaceæ. The first, *R. toxicodendron*, by earlier botanists called *R. radicans*, is a vine of very common occurrence, running over stone fences and along waysides, or climbing trees to a considerable height, and attaching itself to these surfaces by lateral rootlets. It is popularly called poison ivy, poison vine, poison oak, mercury. The second species, *R. venenata*, *R. vernix* of Linnæus, commonly known as poison sumach, poison dogwood, poison elder, poison ash, is a tree growing mostly in swampy places, and reaching the height of twenty feet or thereabout. *R. diversiloba* is the common poison oak of the Pacific coast, and closely resembles *R. toxicodendron*. Their botanical characters may be found in all works on our native sylvia and flora; but, as these descriptions are often very brief, and not sufficiently explicit to present a characteristic picture of the plants to the general reader,¹ and inasmuch as cases of poisoning by them are often the result of ignorance of their appearance,

¹ Extract from Gray's Manual: —

“4. *R. venenata*, DC. (Poison S. or Dogwood.) Smooth, or nearly so; leaflets 7-13, obovate-oblong, entire. Swamps. June. — Shrub 6°-18° high.

“5. *R. toxicodendron*, L. Climbing by rootlets over rocks, etc., or ascending trees; leaflets 3, rhombic-ovate, mostly pointed, and rather downy beneath, variously notched, sinuate, or cut-lobed, — or else entire, then it is *R. radicans*. — June.”

Torrey and Gray give in their Manual the following description of *R. diversiloba*: “Nearly glabrous; stem scarcely climbing with short, leafy branches; leaves 3- (rarely 5-) foliate; leaflets very obtuse, in the pistillate plants slightly, in the staminate rather deeply pinnately lobed; lobes very obtuse, the incisions acute; panicles axillary, racemose; drupes subglobose. It differs from *R. toxicodendron* by having acuminate leaflets and almost sessile panicles. It abounds throughout the Coast Range, and is the *Hiedra* of the Spanish colonists. It is *R. lobata* of Hooker.”

and many perfectly harmless plants are, moreover, avoided on suspicion that they are either one or the other of these, I prefer to give in this connection, in brief, the more graphic and popular descriptions of the first two species to be found in the second edition of Bigelow's "Florula Bostoniensis," published in 1824, and long out of print, — a book as fresh and charming still to lovers of wild-flowers as when its gifted author, some sixty years ago, first gathered and painted them.

"*Rhus vernix*. L. Poisonous Sumach or Dogwood. — This species grows in swamps, where its fine smooth leaves give it the air of a tropical shrub or tree. The trunk is from one to five inches in diameter, branching at top, and covered with a pale grayish bark. The wood is light and brittle, and contains much pith. The ends of the young shoots and the petioles are usually of a fine red color, which contributes much to the beauty of the shrub. The leaves are pinnate, the leaflets oblong or oval, entire, or sometimes slightly sinuate, acuminate, smooth, paler underneath, nearly sessile, except the terminal one, from seven to thirteen in number. The flowers, which appear in June, are very small, green, in loose axillary panicles. The barren and fertile flowers grow on different trees. The fruit is a bunch of dried berries, or rather drupes, of a greenish white, sometimes marked with slight purple veins, and becoming wrinkled when old. They are roundish, a little broadest at the upper end, and compressed, containing one white, hard, furrowed seed.

"*Rhus radicans*. Poison Ivy. — A hardy climber, frequently seen running up trees to a great height, supporting itself by lateral roots, and becoming nearly buried in their bark. The leaves are ternate, and grow on long, semicylindrical petioles. Leaflets (3), ovate or rhomboidal, acute, smooth, and shining on both sides, the veins sometimes a little hairy beneath. The margin is sometimes entire, and sometimes variously toothed

and lobed, in the same plant. The flowers are small and greenish white. They grow in panicles or compound racemes on the sides of the new shoots, and are chiefly axillary. The berries are roundish, and of a pale green color, approaching to white. Common about the borders of fields. — *June.*"

Rhus toxicodendron, or the poison ivy, might readily be taken to be our common woodbine, or Virginia creeper (*Ampelopsis quinquefolia*), from the manner of its growth, locality, and the brightness of its tints in the autumn. It will be seen, however, at a glance, as its specific name implies, that the number of leaflets in the latter is five, while in the poison vine there are but three. This will always serve as a distinguishing mark between them, even if the difference in the shape of the leaflets be not observed, though the very great variation in form in those of *R. toxicodendron* should be carefully borne in mind. It should be remembered that this species also grows in bush form of considerable size, and covers uniform areas thickly as a low shrub, presenting none of the appearances of a vine.

Rhus venenata, the shrub or tree, bears some resemblance, as will be seen on comparison, in the shape of its pinnate leaves, to those of the elder (*Sambucus*) and sumach (*R. typhina*, or *R. glabra*). The serrate edges of these, as well as their more pointed tips, should be sufficient to distinguish them from this dangerous associate, even for persons not observant of less conspicuous details. At a little distance, however, the common sumach might readily be confounded with small-leaved specimens, and considerable variation in the size and breadth of the leaves of the poisonous species, as may be seen, prevails. It may be safely

said, however, that several common and harmless shrubs and trees are feared and shunned for this a hundred times where the true poisonous sumach is once mistaken for other and innocuous plants by persons unacquainted with it; for, although by far the more virulent of the two, it is of far less common occurrence, and grows in less frequented localities, than *R. toxicodendron*.

The peculiar action of these plants upon the human skin has long been known and dreaded, but very few accurate descriptions of its effects are to be found either in books of medicine or botany. Writers have generally regarded the inflammatory affection of the skin provoked by contact with the plants, or their emanations, as of an erysipelalous nature, an opinion quite as erroneous as many of the fanciful notions prevalent concerning its character. Bazin, for instance, in his "Affections Cutanées Artificielles," says: "Je dois enfin vous dire quelques mots des singuliers effets produits par deux plantes que croissent en Amérique, le *Rhus radicans* et le *Rhus toxicodendrum*. De ces arbustes se dégagent incessamment, si l'on en croit les auteurs, des émanations irritantes et toxiques au plus haut degré; malheur à l'imprudent qui s'abandonne au sommeil sous leurs ombrages! son corps se couvre presque aussitôt d'un exanthème vésiculeux, avec gonflement énorme, et en même temps se déclarent des symptômes généraux qui prennent la forme d'un véritable empoisonnement aigu, et dont la violence peut entraîner la mort dans un temps très court."

After this there should be no doubt either as to the existence or habitat of the fabled upas tree.

Van Hasselt, in his "Giftlehre," speaks of the effects of the poison as a painful dermatitis, either in the form of an urticaria, erythema, or erysipelas bullosum, which may terminate in an extensive and protracted suppuration.

Observation of a few cases, as they present themselves in the practice of every physician, will satisfactorily establish the changes in the skin to be those of a dermatitis of eczematous type, although so severe in some cases as to produce quite as marked deformity of parts as true erysipelas. As the character of these changes can be best studied by daily observation throughout their *whole* course, and as such opportunities are not often afforded, I preferred to create one for my purpose. In the study of botany and ornithology I have spent a good deal of leisure time in woods and fields during the past thirty years, and have always collected without gloves. I had never, however, been poisoned by ivy, although I had never specially shunned or sought contact with it.

CASE I. — On September 28 I picked a large bunch of the gorgeously tinted leaves of *Rhus venenata* from a tree some ten feet high, growing in a swamp in Dedham. It was a warm and sunny afternoon, and, my botanical box being filled with other specimens, I brought them home in my hand, from the palm of which the epidermis had been torn in several places a few minutes before by falling upon the uncut, splintered portion of a stump. They were carried in this hand at least an hour and a half, and during the evening were repeatedly handled while arranging

them for the herbarium. Some of the still green and unchanged leaves were also picked. The conditions were thus as favorable as possible for the absorption or action of the poison. Not the slightest effect was produced upon the skin, however. I thought I felt during the evening, while working over them, directly beneath the heat of an argand gas-burner, a sensation of irritation or acidity about the eyes and throat. They were subsequently handled freely for ten days every morning, while changing the driers in the press.

October 6. — I picked at Fresh Pond a large quantity of *R. toxicodendron*, specimens changed to autumn tints, and others still of a glossy green, from plants running over stone walls and climbing high trees. Both leaves and stems were collected. These, too, were handled freely on a warm afternoon, and repeatedly afterward in the press. It was absolutely inactive upon my skin.

October 10. — I again visited the swamp where the poison sumach, or dogwood, grows in abundance, after specimens of the fruit, but failed to obtain them. I picked many of the brilliant leaves, however, and twigs, and branches, with foliage still unchanged in color. The juice, which exuded freely from the broken wood, was rubbed upon my hands in several places and allowed to dry there, and the leaves touched my face repeatedly while gathering them. I again thought I perceived in my air-passages and eyes at the time, and later in the evening again while pressing the specimens, the same impression of acidity. Nothing was noticed upon the skin indicating any action upon its tissues until, two days later

(October 12), a single vesicle, with the peculiar thick cover and somewhat dark look so often seen, appeared upon the back of a finger, but accompanied by no sensation.

October 13. — The third day, a single and similar, though somewhat larger, vesicle appeared upon my left wrist; to which two others joined themselves on the following or fourth day, thus making a very small group. At the same time — that is, the 14th — a single additional vesicle showed itself some three quarters of an inch from the first-comers upon the finger and wrist.

October 17. — One of the vesicles which appeared last upon the knuckle, without any external irritation, increased to three times its original size, with burning and itching sensations. The other efflorescences quiescent or receding.

October 19 (no specimens having been handled for a week). — A new and very large vesicle of irregular shape appeared on the back of the last phalanx of the right thumb, covered with so thick a roof as to appear untransparent, as if the effusion had taken place in the lowest layer of the rete mucosum.

October 21. — Two new vesicles, one on the back of the left forefinger, the other on the thumb near its base.

October 23. — All the groups, old and new, have become enlarged by the appearance of new vesicles at the peripheries (excepting those upon the wrists, which had been opened for the purpose of an experiment described below), and one new cluster appeared on the back of the right middle-finger. All itch and burn extremely.

October 26. — The original vesicles and papules have, in many of the clusters, resolved themselves apparently into two or three times their number of smaller efflorescences, the whole patch flattening down and assuming a darker brown tinge.

October 27. — A large single vesicle, with the thick and opaque covering peculiar to its seat, has struggled up into distinct prominence in the palm of the right hand, near its ulnar border; a fresh one also at the base of the nail of the left thumb. At this date there are seven single or groups of efflorescences on different parts of the hands, in all stages of development or involution.

November 1. — Another small vesicle has appeared in the right palm, half an inch from that of October 27. The earlier vesicles have nearly all flattened down to the level of the general surface.

November 3. — A single vesicle shows itself upon the internal lateral surface of the left thumb. This was the last to appear, and from this date all the efflorescences gradually subsided, and after a fortnight were no longer perceptible. At the present time, November 26, their seats are still defined by the more glossy look of the new epidermis which covers them.

This may be taken as a description of the effects of the poison upon the human skin in its mildest form. The changes, however, as described, are typical of the peculiar efflorescence in all cases. In what respects it falls short of the manifestations in its severest forms may be learned by comparison with the histories of the following cases.

CASE II. — Several years ago I was called to see a young lady, who a few days previously had come in contact with poison ivy while gathering autumn leaves. Her whole head was greatly swollen, and the features were so distorted that no one could recognize her. On close inspection, the skin of the face and neck was felt to be deeply œdematous, and was largely covered with vesicles of all sizes, many of which were seated on an erythematous base, others being still in their papular stage of development. There were also numerous large excoriations, from which fluid was freely exuding, stiffening in places on drying and forming soft crusts. The ears were much thickened, and were dripping with the escaping serous exudation. The hands were also affected, being thickly covered upon their backs with groups of small vesicles, while upon the palms numerous vesicular exudations were dimly seen beneath the thickened epidermal coverings, trying to push themselves above the level of the general surface. The other parts of the body were unaffected. The subjective symptoms were great itching and burning of the parts affected, with the feeling of local discomfort consequent upon so great swelling of the features. The eyes were nearly closed. There was a slight general febrile action.

New efflorescences continued to appear for several days; but the course of all the cutaneous manifestations was abbreviated, and the œdema immediately reduced, by the local treatment which was employed.

The following year, the same patient, then nineteen years old, was bathing at the sea-shore in August, and, while climbing up from the water over the rocks, her

bare knee and leg came in contact with the poisonous vine. I saw her a few days afterward. There was then a long strip of reddened skin, several inches in width, covered with vesicles and a few papules, running upward and downward from the knee. The chin was occupied by a large group of papules, a few of which had already advanced to the vesicular stage. The skin beneath one eye was also puffed and reddened. The further progress of the affection was quickly checked by local applications, and, as in the previous attack, the effects of the poison at the end of some two weeks had entirely disappeared.

Three years afterward, at New Year's time, I was again called to see this young lady. Her face and hands were affected in a manner similar to that first described, though the inflammatory process was less severe. The parts were less swollen, but there was an abundant eruption of the vesicles and flow of serous exudation from the excoriated parts. The appearances were wholly characteristic of ivy poisoning, yet she had not been out of the city, and it was midwinter. On inquiry, I found that a box of Christmas greens had been received from the country, which she had used in decorating the house. Among them were sprigs of poison ivy leaves, the cause and explanation of the attack.

CASE III. — Late in October, 1871, I was called to see a gentleman who, in cleaning up his grounds at the sea-shore a few days previously, had handled the poison vine which grew upon the place in great abundance. His hands, especially the lateral surfaces of the fingers, were then thickly covered with vesicles,

and his face and genitals were badly swollen. The following day the eruption appeared upon the arms, and about the thighs and abdomen, and continued to spread for several days, until at last it presented the following appearances.

The face and ears were of a lurid red color, greatly swollen, and dripping with fluid exudation. The neck, chest, and abdominal wall were also reddened, and occupied by large patches of flattened papules and vesicles, and by moist excoriations. The genitals were enormously distended by œdema, and the scrotum was running with serum. The arms and legs were also œdematous, and largely occupied by fields of the peculiarly characteristic vesicles of the affection. The patient was of a highly nervous temperament, and suffered tortures from the severe itching which accompanied the eruption. The skin was so universally irritable that no clothes could be worn for forty-eight hours when the affection was at its height, and a sheet or blanket was the only covering tolerated during this time. Sleep without powerful anodynes was impossible for several nights in succession. There was but little fever or constitutional disturbance, however. Applications were almost constantly made to the whole surface, and after the seventh or eighth day from the first appearance of the eruption there were no new manifestations, and the skin rapidly returned to its natural state.

These cases may be taken as representatives of the severer forms of poisoning, as they ordinarily occur, and they are among the severest of my own experience. To what further development they might have ex-

tended without treatment it cannot be said. There are reports, however, of still graver effects. Dr. Bigelow, in his "Medical Botany," quotes Kalm as saying, in his Travels, that he had known persons to be so swollen by the exhalations of *Rhus venenata* as to be as stiff as a log, and capable of being turned about only in sheets; and Dr. Thacher's report of a case in which the head and body were swollen to a prodigious degree, so as to occasion loss of sight for some time, as well as the loss of the hair and nails. Dr. Bigelow adds, that he had been told of cases in which death appeared to be the consequence of this poison, although he had never known a fatal case.¹

Whether these extraordinary results thus mentioned

¹ I am permitted to publish in this connection the following account of a case which occurred many years ago in the family of a Professor in our University.

"My wife's brother, of Brookline, a child of six years, died of poison by ivy in the autumn of 1819, having been twice before poisoned during the previous summer. The circumstances were these.

"A servant-boy living in the family, being insusceptible of poison by ivy, had been employed in pulling up all the vines of that plant found growing in the grounds about the house. When his task was finished, he was made to wash his hands thoroughly with hot water and soap, and afterward with vinegar. Mrs. ———, who feared that the boy, notwithstanding his supposed invulnerability, might possibly be injured by so much handling of the poisonous stuff, stood by to enforce the operation. In the afternoon, at his own request, he was allowed to take little R—— to Jamaica Pond for a bath. Having stripped the child, he immersed him, holding him with his hands under the armpits, and afterward rubbed his back with his open palm.

"After two or three days the child was taken ill, and grew rapidly worse. Deep ulcers made their appearance under the armpits, and the skin of the back exhibited in aggravated form the usual marks of poisoning by ivy. He died at the end of the third week of his sickness. The attending family physician was the late Dr. Wilde.

"The child had been healthy, although not robust. Perhaps the two previous poisonings, from which, however, he seemed to have perfectly recovered, had weakened the power of resistance in the constitution, and so contributed to the fatal result of the last attack. He died on the 6th of October.

"Cambridge, December 24, 1872."

by Dr. Bigelow are to be referred to the legitimate action of the poison, or to some peculiar and exceptional condition of the persons when exposed to it, cannot now be determined. However, they in no way affect the conclusions to be drawn from the history of the cases I have cited in relation to the character of its cutaneous manifestations. In these, and in the hundreds I might quote from personal observation, the pathological changes of the skin are identical, differing only in degree of intensity and extent of distribution. In the mild case, a slight erythema, a papule or vesicle, and a small underlying infiltration or exudation. These are all the phenomena observed, whether we have a single efflorescence or several individuals grouped together. Variations in the course and development of the different lesions do occur.

Taking the simple vesicle, with scarcely any erythema surrounding it or any very perceptible infiltration of the underlying tissues, as the type of the eruption, whether occurring singly or in groups, we may have in a small percentage an abortive attempt at vesiculation, and an arrest of development at the papular stage, — a failure, that is, of the free exudation to force apart the layers of epithelial cells; or a considerable infiltration into the papillary layer may elevate a cluster of the vesicles noticeably above the general surface; or they may be surrounded by a well-defined erythema or congestion of the tissues immediately surrounding them, in consequence mainly of the scratching provoked by the local burning and itching, which are the only subjective symptoms present.

In the severe cases, we have greater areas of simple erythema, a multiplication of the number of vesicles, —

either single or massed in close contiguity, and covering large surfaces, or by fusion forming blebs, — a greater infiltration into the underlying corium, with proportionate distention of the capillaries and external redness, and a free exudation of serum into the cutis. The overfilling of the vesicles causes a rupture of some of their epidermal coverings, and the discharge of their fluid contents upon the surface, forming moist, excoriated surfaces, covered in part with crusts.

These, it will be seen, are the well-recognized lesions that characterize the inflammatory process of the skin which we call eczema, and, if opportunity were afforded for fine dissection, we should no doubt find the same pathological changes of tissue which constitute the infiltration, papule, and vesicle formation of the progressive stage of idiopathic eczema. It may be that there are skins so peculiarly constituted, or conditions of such intense virulence of the poison, that a deep-seated dermatitis or phlegmonous erysipelas may be excited under its influence; but I have never seen them, and doubt their occurrence. The constancy of type in the tissue changes, in every case and of all grades observed by me, is satisfactory evidence that the affection is always of an eczematous type.

If, then, the cutaneous manifestations of ivy poisoning are mainly those of eczema, have they no individuality, no characteristic marks by which they may be distinguished from those of the idiopathic affection? There are differences to be recognized by the practised eye, but they are more easily detected than described. First, with regard to peculiarities in the seat of the eruption upon the hands, the parts naturally the most frequently affected. It appears most easily, one may

say, and therefore generally first, upon the lateral surfaces of the fingers, or along their edges, later upon the dorsal surfaces, and latest upon the thickened palms. It is more scattered, more irregular in its distribution, than the eruption in ordinary eczema. The character of the efflorescence, too, is strikingly peculiar, though indescribable. It is more uniformly vesicular than vesicular eczema. The vesicles seem to be born vesicles without having gone through an intermediate papular stage of development. They appear somewhat less transparent, as if the effusion had taken place in the lowest cells of the rete Malpighii, and have generally a peculiar tinge of color, which can only be called lurid. Upon the palmar surface their epidermal coverings are so dense that they look and feel more like papules, but the fluid character of their contents may yet be dimly seen and brought to the surface by puncture with a needle. Some peculiarities, too, may be noticed in the distribution and configuration of the eruption. It often occurs in sharply defined patches, elongated streaks, or irregular shapes, as marked out by the original contact with the plant. The genitals are almost always affected, in both sexes, when the hands are the original seat of the disease, as their vicinity is the natural resting-place of the latter during sleep, and patients often fail to wash them sufficiently, or at all, before going to bed, after handling the plant during the day. These are some of the differences, minute it is true, but still sufficiently characteristic to an experienced observer, by which a case of Rhus poisoning may generally be recognized and distinguished from idiopathic eczema. In some mild cases, however, it is impossible to deter-

mine positively whether we have a case of the one or the other before us.

In its later stages, those of retrogression or involution, the skin returns to its natural state without any marked change in the character of the eruption. In the mild cases, the process of inflammation is seldom carried so far as to transform the vesicle into a pustule, and after reaching its height its serous contents are slowly absorbed, and it flattens down, leaving a fugitive, dull-colored stain to mark its seat at times. In the severer forms, the œdema and erythema rapidly subside under treatment, and the excoriations, crusts, and infiltration disappear in the same manner as in an ordinary case of acute eczema.

The duration of these alterations of the skin, according to their severity, varies less than would be believed without close observation. In my own case (one of the mildest and untreated), vesicles continued to appear from October 12 to November 3, and the whole period of development and involution was from five to six weeks. In the severest attacks, where the changes of tissue reach their highest possible development and affect large surfaces of the body, the duration is seldom, if ever, more protracted than this, and the individual efflorescences run as rapid a course as those of the same degree of development in the former. The duration of an attack depends largely upon the protraction of the period during which fresh efflorescences manifest themselves. Under local treatment constantly applied, this period, without reference to what may be called the sequelæ, which will be spoken of below, according to my own experience, generally lasts from ten to fourteen days from the appearance

of the eruption. To this is to be added the necessary time for the natural involution of the efflorescences last to appear, according to the degree of development to which they severally attain, from ten to fourteen days more, and we have for the ordinary course of the affection a period of from three to four weeks. How long it might continue without treatment in severe cases I have no means of knowing, except the observation of my own very mild case, in which fresh vesicles were developed for twenty-two days. On the other hand, mild cases occasionally run through their whole course within ten days or a fortnight.

Sequelæ. — The question of duration leads us naturally to consider that of other possible effects of the poison upon the skin or general economy, subsequent to what we may call its primary action above described. There are several popular beliefs bearing on this point, which have perhaps some foundation in facts improperly observed and illogically used. An opinion prevails, for instance, that in a year after the first attack there will be a repetition of the original manifestations upon the skin, which may be repeated for several seasons. Another is entertained, that a variety of cutaneous affections are developed in consequence of its action, at indefinite periods, and even long after the first attack. If there be any apparent ground for the former, it is mere coincidence in point of time, misapplied to circumstances which have given rise to the latter; for no elements of periodicity in any subsequent possible manifestations of the poison have been established, so far as I know. There may be some reasons, however, for the belief that cer-

tain diseases of the skin sometimes follow Rhus poisoning. I have had many patients who have ascribed the development of various of these affections to such cause. They say, "I always had a healthy skin until I was poisoned by ivy, and afterward it was affected in this way," after an interval of weeks, months, or, it may be, years. In the existing impossibility of determining the cause of diseases of the skin except in very rare instances, it is not strange that people should refer subsequent affections of its tissues to the continued or intermittent action of an agent capable of producing at first such striking and severe changes as they have once experienced, and that they in many instances should ascribe as a cause what is only an irrelevant preceding event. Yet there are, I think, good grounds for the belief that certain affections of the skin do follow poisoning by Rhus in some cases, which would not otherwise have occurred. This, however, by no means authorizes the conclusion that they are directly caused by its action, or are in any way specific in their character. There is no evidence, I think, of a continuance or renewal of the operation of the poison, after its primary impression upon the skin has exhausted itself. The characteristic features of the cutaneous manifestations of this period do not repeat themselves in the subsequent affections, which, I think, may be fairly referred to the prior poisoning as an indirect cause. They are forms of ordinary eczema, and, in rarer instances, of acne only, so far as my observation teaches. I have already referred to the many patients with these common diseases of the skin who have ascribed them to having been at some previous time poisoned by ivy.

I prefer to use in this connection, however, for confirmation, another class of cases, those, namely, in which I have seen these affections develop subsequent to such attacks of poisoning as have also occurred under my personal observation.

1. A young lady, having been badly poisoned in October upon the face, after a rapid recovery, had in the following January an attack of facial eczema.

2. Another young lady, after severe poisoning of the face and hands, had in a few months an outbreak of facial acne.

3. An old gentleman, whose hands had been a short time previously poisoned, had, immediately following his recovery, an eruption of eczema covering his arms.

4. A young man, after being severely poisoned in the face, was immediately attacked by acne of the part, which lasted a long time.

5. A gentleman of middle age was poisoned upon the hands and forearms. A few months afterward he had an obstinate subacute eczema of the legs.¹

In all these cases, it is to be understood, the secondary affection mentioned occurred for the first time in the patient's history, and after the specific primary manifestations of the poisoning had disappeared. It is impossible to say that just the same affections might not have appeared at just these times, even if the subjects of them had not been previously poisoned, because they are of such frequent idiopathic occurrence; but,

¹ Dr. Bigelow, in his "Medical Botany," states that Dr. Pierson, who was badly poisoned while assisting him in the experiments with the juice of *Rhus venenata*, had eczema of his hands for a year afterward.

considering that eczema and acne are pathological conditions of the skin of such a nature as might readily follow the disturbance in its tissues and glands necessarily consequent upon severe poisoning by *Rhus*, it should not be considered illogical to refer their appearance under such circumstances to the morbid impression it may have left upon them. These, however, are the only possible sequelæ in my experience that might be so interpreted.

Susceptibility to its action seems never to diminish in the same individual, however often affected by the poison. On the other hand, I have observed that persons who have always handled *Rhus toxicodendron* with impunity become more susceptible to its influence after having been poisoned by the more virulent *Rhus venenata*. Such is my personal experience.

Chemical Nature of the Poison. — What the real nature of the poisonous principle contained in these plants, capable of producing such peculiar and severe effects upon the human skin, might be, was largely a matter of conjecture, in spite of many attempts to reach it by chemical processes, until a few years ago. Knowledge that its emanations were often as active as contact with the plant, of course, suggested its volatile nature, but all attempts to isolate and fix it were in vain. The yellowish, milky juice which exudes from the broken or bruised parts of the plant possesses, as is well known, the property of changing to a brilliant black after a short exposure to the air, and of producing an indelible black stain upon cellulose. The beautiful lacquer of the Japanese is made from the juice of a species of *rhus* closely allied to our native plant. Professor Gray, in his interesting

address on "The Sequoia and its History," to the American Association for the Advancement of Science, says: "Our *Rhus toxicodendron*, or poison ivy, is very exactly repeated in Japan, but is found in no other part of the world, although a species much like it abounds in California. Our other poisonous *Rhus* (*R. venenata*) is in no way represented in Western America, but has so close an analogue in Japan that the two were taken for the same by Thunberg and Linnæus, who called them both *Rhus vernix*." Of the history of the preparation of this celebrated varnish of Japan, and its effects upon the workmen engaged in its manufacture and use, very little is known. As early as A. D. 701, artificial plantations of *Rhus vernicifera* were established. Every farmer in certain parts of the country was obliged to plant, and taxes were paid in lacquer. Sap is first taken when the trees are three years old, but the best quality is not obtained until they have attained the age of fourteen or fifteen. They bear sap until they are thirty or forty. The wild trees are tapped when five years old, from the end of May until the end of October, incisions being made in the bark extending about one quarter of the trunk's circumference, and just deep enough to reach the wood. A clear sap flows out, mingled with a very white milky substance, which darkens very soon when exposed to the air, and gradually assumes a dark brown, and almost black color. The best quality is of a light yellowish hue, and is gelatinous. It is preserved in bamboo tubes to prevent its turning black. The lacquer is taken from the incisions as soon as they are filled, with an iron spatula. After three or four days new incisions are made, and the

process is continued in this way until the end of the season, when the tree is cut down. Several varieties of lacquer are made, one of the best forming a brilliant transparent coating of a yellowish tint, allowing the grain of the woods to which it is applied to be seen through it. The darker varieties are made by frequent stirring for several days with a little water, or with the smudge which is caught in the trough under a grinding-stone. Others are mixed with preparations of iron, cinnabar, charcoal, gold-leaf, and other substances.¹

In Kaempfer, "*Amœnitatum Exoticarum*" (1712), I find, through the kindness of Prof. Gray, an allusion to the action of the varnish upon those engaged in its use, as follows: "*Vernix exsperat halitum, ex quo labia tumescunt, et caput dolet; unde in deliniendo artifices strophio os et nares obligant.*"

I have heard of a person who had been poisoned by the presence of imported lacquered ware in apartments, but I report the case only on "hearsay" evidence. Some of the embossed Japanese papers, which have been used so much upon the walls of our houses recently, have produced severe inflammation of the hands of the hangers, presumably in consequence of the abundant lacquer with which they are covered. Dr. H. N. Allen, of Korea, writes to the "*Journal of Cutaneous and Genito-Urinary Diseases*," January, 1887, from that country, that many foreigners, as well as natives, in the East are often troubled by

¹ For accounts of the preparation of the lacquer, see *Transactions of the Asiatic Society of Japan*, Vol. IX. Part I., and the official Catalogue of the Japanese Section of the International Exhibition at Philadelphia, 1876, — references for which I am indebted to Prof. Morse of Salem, author of "*Japanese Homes*."

“varnish poisoning,” which is in some cases so distressing that the person cannot pass a furniture shop where articles are being varnished, without being poisoned. With others it comes on after actual contact with furniture freshly varnished. He has noticed that comparatively old articles possess the poisonous property during the rainy season, when everything is covered with dampness. He himself had had an attack in Nanking, and another in Shanghai. The treatment there advised was constant bathing with an infusion of fresh camphor-wood shavings.

In 1857 Dr. Khittel made an analysis of the constituents of *Rhus toxicodendron*, a translation of which appeared in the “American Journal of Pharmacy,” 1858. He came to the conclusion that its active principle depended on a volatile alkaloid, obtained by distilling an infusion of the dried leaves. As the active principle is so volatile that the leaves give up a large part of their poison while drying, it is evident that boiling down an infusion of them would, as Professor Maisch says, be the best method for obtaining the least possible quantity of the poisonous principle, if, indeed, it could be obtained by this process at all.

In 1865 Prof. John M. Maisch published the first satisfactory account of the chemical nature of this poison in the proceedings of the American Pharmaceutical Association. He began his investigation by attempting to extract and preserve this alkaloid, but satisfactorily demonstrated that it does not exist, even in the fresh plant. He then enclosed some fresh leaves in a tin box and introduced some moistened test-papers. The next morning the curcuma and red litmus-papers were

unaffected, but the blue litmus-papers had been colored strongly red, proving that the exhalations contained a volatile acid. This acid was extracted by two different processes, which it is unnecessary to repeat here. It was colorless, strongly affected blue litmus, and neutralized bases, the salts with the stronger bases giving a distinct alkaline reaction. With a great variety of reagents it gave reactions identical with those of formic and acetic acids, but its behavior with oxide of silver, nitrate of silver, oxide of mercury, and corrosive sublimate proved its individuality, and established its character as a new organic acid, for which Prof. Maisch proposed the name toxicodendric acid.

“That it is the principle to which the poison-oak owes its effects on the human system, was proved to my entire satisfaction,” he says, “by the copious eruption and the formation of numerous vesicles on the back of my hand, on the fingers, wrists, and bare arms, while I was distilling and operating with it. . . . I may state here,” he tells us in the early part of his communication, “that I have frequently collected the leaves, flowers, and fruit of *Rhus toxicodendron* without ever experiencing any ill effects. I have handled all parts of the plant with impunity, and have even spread the juice over my hands, without feeling more than a slight itching upon the upper side of the hand, which immediately disappeared on washing the hands with water. In a word, I considered myself so little subject to its influence that I collected the leaves for all these experiments myself. I could hardly expect to try the efficacy of the poisonous principle, when isolated, upon my own person; the result, however,

proved to be very different. Several persons, coming into the room while I was engaged with it, were more or less poisoned by the vapors diffused in the room; and I even transferred the poisonous effects to some other persons, merely by shaking hands with them." (Whether after washing hands?) "The dilute acid, as obtained by me, and stronger solutions of its salts, were applied to several persons, and eruptions were produced in several instances, probably by the former, though not always, which was most likely owing to the dilute state of the acid. Whenever this was boiled, I always felt the same itching sensation in the face and on the bare arms which I experience on continual exposure of my hands to the juice of the plant. . . . Whether the toxicodendric acid is, to a greater or less extent, lost in drying, I am as yet unable to say." As regards its isolation it is easily effected, and the expressed juice, preserved by alcohol, he believes to be the best preparation. Prof. Maisch closes his interesting communication with the promise that, if time permits, he may attempt to prepare the acid in more concentrated form, and to determine its composition. It is to be regretted that, as he states in a letter to me, he has thus far been unable to make further researches concerning it. There can be little doubt, I think, of the correctness of these views with regard to the chemical nature of the poison, as they are entirely consistent with our knowledge of its action upon the human system.

How far this volatile principle may be carried in the air in a sufficiently concentrated form to produce its peculiar effects upon the skin, cannot be exactly stated, but it must vary with the degree of individual

susceptibility. I have been assured by persons well acquainted with the plant, and so easily acted upon as to have been repeatedly poisoned by it, that they have been affected by driving along a narrow road, the stone walls on either side of which were covered with the flowering vines of *Rhus toxicodendron*. Many persons who carefully shun contact with it are frequently poisoned when they approach it even. That very slight contact is sufficient to produce very severe action upon the skin at times, is certain. The measure of the extent of its power can be learned by experience alone, — some persons being entirely unaffected by ordinary handling of specimens, who are yet susceptible in some degree to its action in a concentrated form. My own case, and the experiments of Prof. Maisch above quoted, illustrate this.

The two species differ only in the degree of their action, — *Rhus venenata*, the tree, being much more powerful than the creeping *R. toxicodendron*; and many persons are able to handle the latter with impunity, who are readily poisoned by contact with the former. It is evident, then, that cases of poisoning would be much more frequent and severe were poison-sumach of as common occurrence about dwellings as the poison-ivy, for the majority of persons are, no doubt, unaffected by the latter. As it is, cases occur very frequently. The number treated at the outpatient department of the Massachusetts General Hospital in 1885 was twenty-five; and during the month of July of this year ten patients applied there for relief who had come in contact with one or the other species. In California Dr. Canfield, in an article published in the "Pacific Medical and Surgical Jour-

nal," estimates that from five hundred to one thousand persons are constantly suffering from the poisonous action of *R. diversiloba*.

Poisoning takes place, in my experience, mostly in the following ways: by plucking leaves while walking along fences and roadsides, in ignorance of their nature; by brushing against the plants while strolling through woods; in processes of husbandry,—clearing away vines from walls, etc., digging up roots, mowing, chopping wood, and the like; by going in swimming and passing through plants while naked, or undressing in the midst of growths, along edges of beaches or streams; and by gathering the most brilliant autumn foliage that occurs in our flora.

Great quantities of *R. toxicodendron* are gathered for medicinal purposes in all parts of the United States. One dealer in North Carolina offers in his stock of native drugs over three hundred pounds of poison-oak leaves; and a wholesale manufacturer of medicinal preparations in Boston informs me that the workmen in his laboratory are often poisoned by its fumes.

With regard to the influence of season upon the virulence of the poison, there is an impression that it is most active in the flowering season, and the emanations at such times may be especially so, while the skin on hot days, and when perspiring, may be most ready to absorb it. This may be correct; it is, however, sufficiently powerful at all seasons. At least one half of the cases I have seen have occurred in the autumn, after the change in the foliage, and in persons who, collecting autumn leaves, had been attracted by the gorgeous coloring both species then

exhibit. No leaves approach in variety and brilliancy of tints those of *Rhus venenata*. But later still in the season the venomous properties of these plants manifest themselves. In winter, even, cases of poisoning occur, and are no doubt sometimes unrecognized. In the case of the young lady cited in illustration of the severer form of poisoning, one of the attacks, it will be remembered, was caused by handling twigs and dried foliage of *Rhus toxicodendron* at Christmas time. Other cases might be reported at length, but it will be enough for the purpose simply to mention them.

Some years ago, in December, I was called to a gentleman who had a severe attack upon his hands, caused by handling some of the branches while chopping wood.

Last February I treated a gentleman for quite a severe attack upon the hands, who handled wood entwined by poison-ivy out of doors, and whose farmer at the same time was very badly poisoned while chopping the same wood.

Dr. Bigelow states, in his "Medical Botany," that he has known persons to be poisoned in the winter, when the wood of *Rhus venenata* was burned upon the fire. Whether in these cases the poisoning was produced by the exhalations of the burning wood, or by contact while handling it by the fireside, he could not positively say.

Every winter boys in this vicinity are poisoned by cutting the straight branches of *Rhus venenata* for hockie-sticks, which grows abundantly around the edges of the frozen swamps and ponds on which they are skating.

Thus not only the leaves, but the wood and bark, contain the virulent principle at all seasons, and the fruit also possesses poisonous properties when swallowed.

I was curious to know how long dried specimens in the herbarium might retain their poisonous properties, and for this purpose wrote to Professor Gray, who very kindly replied as follows: —

BOTANIC GARDEN, CAMBRIDGE, MASS.,
October 21, 1872.

DEAR DOCTOR, — My personal knowledge that *Rhus* dried specimens are harmless amounts merely to this: I handle over and over dried specimens with impunity, but am very sensitive to the fresh plant. Then the poison is volatile, as shown by its affecting persons who do not touch it actually; that of the leaves, I should say, must escape and dry out in the drying process, or in the course of time. In a stem it would not volatilize so soon; but I should not expect to be poisoned from any *old* herbarium specimen, either from twigs or leaves. . . .

The time required for the development of the visible manifestations of the poison upon the skin, after contact with the plant or its emanations, or its period of apparent latency, seems to vary greatly. In his "Genera," Gray says, "The symptoms begin several hours after exposure." Dr. Bigelow, in his remarks on *R. venenata*, says, "The effects show themselves upon the skin generally within eight hours." My own observations do not agree with these as to the rapidity of its action. In my own case, above recorded, at least forty-eight hours passed before anything was felt or seen upon the parts to which *R. venenata* was applied. It may be properly suggested,

in explanation of such delay, that my skin is not easily acted upon by the poison. This is true, but my other observations concern patients, that is, persons especially susceptible to its action; and I find on reference to my record-book that three days, four days, and five days are repeatedly given by them as the interval between contact and the appearance of an eruption sufficiently marked to attract their attention. Such length of interval seems to be by no means an exception in my experience, although this, of course, does not invalidate the correctness of the statements, that, under some circumstances, a few hours may be sufficient for the development of the eruption. Generally, the skin begins to show some signs of inflammation by the end of forty-eight hours. That new efflorescences may continue to appear, after the first manifestations, for a much longer period, we have already seen.

But how shall we explain some of the peculiar phenomena connected with the action of this poison, as recorded in my own case, for instance? The first vesicle appeared on the second day following that of contact with the juice. From that time for twenty-two days these characteristic efflorescences continued to be occasionally developed, singly toward the last, and on parts of the hands more or less remote from one another. Where had the active principle, which on November 3 gave rise to the solitary vesicle on my left thumb at a distance of two inches from the single and only other eruption on that member, been since the contact on October 10? Had it been originally absorbed at that particular point, and been lying dormant for three weeks before sufficiently im-

pressing the tissues to recognize its presence by such excessive vitality of action? or was the poison borne thither at that late period from some other focus of activity? or had the spot been freshly poisoned by contact with parts similarly affected? Strange as it may seem, the first of the three suppositions is the least improbable, and must therefore, for want of better explanation, be accepted as the solution of this mysterious action.

With regard to the latter point, that of *contagion*, a definite opinion may be expressed. The question is often asked, "Is ivy poisoning contagious? Will contact with the eruption, or the fluid discharges, produce the disease upon other parts of the same person, or upon the skin of another individual?" It is not at all improbable that a person who has been handling specimens of *Rhus* might, by immediately taking the hand of a person excessively sensitive to its action, and before the volatile principle had been dissipated, or washed away, or absorbed, convey the poison thus to the other, which would subsequently prove effective. That would be transferring the poison, not the disease. Professor Maisch shows the possibility of such an event in the account of his experiments. It is in this way that the genitals are so often affected, no doubt, in being handled during micturition while out of doors or at night, and while the poison is still fresh upon the hands. There are no grounds for believing that, the poison once absorbed, or removed by washing or volatilization, the disease is in any way contagious. The freest handling of parts affected in all stages of the efflorescence fails to transfer the disease to the hands of another, and I believe surface contact with

other parts of the same individual entirely ineffectual in spreading the eruption after the lapse of twenty-four hours. To determine the possibility of such communication, I undertook the following experiment in connection with my own case. On October 14th both the vesicles upon my wrist, the one of twenty-four, the other of eight hours' duration, were opened, and their clear and colorless contents applied and scratched into the epidermis on the wrist of a gentleman who is especially sensitive to the poison of *Rhus toxicodendron*, having suffered twice during the present summer, and many times and severely in past seasons, from contact with it. The result was wholly negative. Dr. Bigelow reports that Dr. Pierson inoculated with the serum from vesicles on the second day in the case above referred to, and with the discharge from the later stage, but without effect.

On Animals. — I have been unable to find a single instance on record of the poisonous action of *Rhus* on the lower animals. I have inquired of a great number of sportsmen with regard to their dogs, and published in the "Spirit of the Times," through the courtesy of its editor, a similar inquiry. There seems to be no reason why short-haired pointers, considering the necessarily frequent contact with poison ivy while hunting, should not sometimes exhibit the effects of its action, if their skins were at all susceptible. One gentleman, a physician, told me that his dog's eyes had been closed by swelling once or twice while hunting where ivy abounded, which he attributed to its action, but he had never seen any eruption upon the skin at the time.

The leaves of both species are found eaten by

worms, and spiders attach their webs to them. Dr. Bigelow, on the other hand, refers to an account, in the New York Medical Repository, of a swarm of bees alighting on the branches of *Rhus venenata*. The next day they were found dead, their bodies being black and swollen. He adds, that in spring their flowers are sought by numerous insects. On the other hand, I find it stated that insects never attack the Japanese tree.

Treatment. — A great many remedies have been recommended, in both medical and botanical books, for the treatment of persons poisoned by Rhus, while others of a "domestic" character are used in various parts of the country. Among the former, a solution of acetate of lead holds the most conspicuous place. Torrey, in his "Botany of New York," says one of the best applications is a solution of sugar of lead, after the use of saline cathartics. Dr. Bigelow (Medical Botany) thinks the application of acetate of lead as useful as any external palliative, and that it should be used as cold as possible. Solutions of sulphate of copper and of other metallic salts have also been recommended by physicians. Among the domestic remedies, vinegar, and solutions of saleratus and carbonate of soda, are widely and highly esteemed. A decoction of Virginia snakeroot (*Serpentaria*) is also supposed to possess special power over the poison. In an old copy of Bigelow's "Florula Bostoniensis," picked up in a second-hand bookstore, I find, in connection with *Rhus toxicodendron*, a marginal note by its former owners, stating that, if soft-soap be rubbed thoroughly into the hands after handling specimens, its poisonous action will be prevented. The following

list comprises most of the other articles recommended by writers in medical journals as "cures" for Rhus poisoning, many of which are stated to be "specific," and to act "like magic." It is needless to give the detailed directions for their application.

Grindelia robusta.	Sassafras officinale.
Comptonia asplenifolia.	Atropa belladonna.
Dulcamara berries (in cream).	Solutions of
Cephalanthus occidentalis.	Bromine.
Gelsemium sempervirens.	Sulphate of zinc.
Rhamnus.	Chlorate of potash.
Lactuca elongata.	Chlorinated soda.
Collinsonia Canadensis.	Sulphite of sodium.
Quercus alba (bark).	Alum curd.
Lindera benzoin.	Turkish bath.

It is always a suspicious element in therapeutics when remedies are recommended as specifics, and when the list of cures for any one disease is exceptionally long. It is not strange, therefore, that we find even non-professional writers remarking that "the reputed remedies are more numerous than efficacious" (Torrey and Gray); and that an editorial in the Pacific Medical and Surgical Journal says with regard to several proposed specifics for the cure of poisoning by *Rhus diversiloba*: "The washing with these decoctions does more good than the various materials contained in them. In the early stages they may thus all be of benefit, but afterwards they exert little influence over the course of the inflammation. This is the reason why there are so many sure cures for Rhus poisoning."¹

¹ See the excellent editorial notes on the treatment of Rhus poisoning in the Journal of Cutaneous Medicine, June, 1886, by Dr. Morrow.

It is evident from our knowledge of the nature of the poison and its effects, as above described, that two distinct questions are to be considered in connection with the treatment of Rhus poisoning, as in toxicological therapeutics generally: first, that of the necessity and selection of an antidote; second, that of the proper management of the changes in the tissues of the skin. So far as I know, these are not sufficiently recognized by writers and practitioners, perhaps because we were so long ignorant of the true chemical nature of the poison; and the reputation which some of the above-mentioned remedies have, perhaps justly, acquired, rests upon their successful action in one or the other of these directions, according to the period in which they may have been used. Moreover, it should not be forgotten that the inflammatory process excited by the poison is generally self-limited in its duration.

If contact with poison Rhus be known or suspected, the parts should be immediately washed or bathed for a considerable time with water, and care exercised that the hands, if they have touched the plant, are not applied to any part of the body until after such thorough soaking.

Whether or not we should resort to an antidote must, of course, be determined by the length of time since the parts affected were in contact with the plant or its exhalations. As the poisonous principle is of a volatile character, it is questionable how much good can be done in this direction after the first day, or even during it, after the hands have been washed with simple water. How long the poison may retain its characteristic peculiarities after absorption by the

skin, and how readily our antidote may follow and penetrate to it, are also matters of uncertainty. As to the nature of the remedies to be used at this stage and for this purpose, there can be, of course, no longer any question. We have to deal with an acid, and the antidote for an acid is an alkali, — that is, provided the salts thus formed are not equally poisonous. In poisoning by oxalic acid, for instance, potash is not an antidote, because the combination formed is nearly as poisonous as the acid itself. Whether the salts formed with toxicodendric acid by ammonia, potash, and soda are likewise poisonous, Professor Maisch leaves us somewhat in doubt as the result of experiment, but speaking clinically he leads us to believe that they are not; for he says that the application of solutions of ammonia seemed to be most effective in counteracting the action of the acid. This is consistent with the popular reputation of solutions of saleratus and soda as remedies, and will explain the action of the soft-soap above mentioned. These are true antidotes, but they can be of benefit only from their chemical action, and in this way. In the later stages, or, in other words, against the subsequent inflammatory changes in the cutaneous tissues, they can do no good. The action of that most popular of all remedies in this affection, the solution of sugar of lead, is a mixed one, and seems to have been happily, though unwittingly, selected as an appropriate remedy in all stages. Toxicodendric acid precipitates from it an insoluble and therefore harmless salt, while its astringent action is well adapted in many cases to the relief of the inflammatory processes in the skin.

The treatment of the later stages of Rhus poisoning, that is, of the eruption it produces, need not be especially considered; for it is mainly that of the corresponding varieties of ordinary acute eczema. It is seldom that the physician is called upon before the inflammatory process is well developed, so that there generally remains for him only the selection of the applications appropriate to a simple eczema of the same stage. In the specific efficacy of any particular drug, internally or externally employed, I do not believe. In the great majority of cases I have found black-wash — calomel ʒj, lime-water Oj — by far the best application to the affected parts, used as an evaporating lotion upon thin and old linen or cotton cloth, for half an hour at a time, two or three times a day. I have used in connection with it, to moist or excoriated parts, a powder of oxide of zinc ʒj, starch ʒj, or plasters of oxide of zinc or diachylon ointment, as in the management of ordinary eczema. In the black wash we have, possibly, three elements at work in our favor: first, the alkali as antidote, if it is of any avail at such periods; second, the action of cold from evaporation upon the local hyperæmia; and, third, the so-called astringent effect of the mercurial powder upon the diseased tissues. Caution is necessary in its use, however, when extensive surfaces are affected, owing to the danger of absorption of the mercury. In such cases, therefore, and with dispensary patients, I generally employ the following wash: —

R. zinc. oxid. ʒiv, acid. carbol. ʒj, aq. calcis Oj, m̄.

This, after being shaken, is sopped over the affected parts freely and repeatedly throughout the day, and

by night as well, as often as the patient is wakened by the intense itching and burning which characterize the inflammation in its early stages. It may be applied over the whole surface of the body, and for any length of time, with safety, and is generally well borne in all phases of the dermatosis. I know no more reliable remedy for the relief of the patient's sufferings, and for checking and abbreviating the course of the inflammatory process. Yet, under the use of this or any applications, the lesions of an acute dermatitis of high grade, when once developed, require a certain time for their necessary steps of involution, and must continue to occasion more or less disturbed sensation in the parts. Such tissue changes are physical, and cannot be made to disappear with the magical suddenness attributed to the action of many of the "cures" above enumerated.

I am acquainted with no internal remedies which exert any direct influence over the course of the affection. Saline cathartics may be used if they are required, and sometimes cooling drinks, as acetate of potash, if there be — which is rarely the case — any febrile disturbance of the economy. The diet in severe cases should be simple, and no hot or stimulating drinks allowed. No scratching or rubbing should be permitted, and old cotton or linen garments should be worn in contact with the inflamed skin.

Doubtful Species.

There are other species of *Rhus* in the United States, concerning the poisonous nature of which

much doubt still exists, even among botanical and medical authorities.

Rhus pumila grows abundantly in the pine barrens of the Carolinas and Georgia. Chapman, in his Flora of the Southern States, describes it as "Low, procumbent; branches and petioles tomentose; leaflets 11-13, oval or oblong, acute, coarsely serrate, pale and tomentose beneath. Branches one foot high." Pursh says it is the most poisonous of all the species. Elliot, in his sketch of the botany of South Carolina and Georgia, says, on the authority of Mr. Lyon, that it is very poisonous. Loudon, in his Cyclopædia, states that this Mr. Lyon, a collector, suffered severely after gathering the seeds. Dr. Porcher of Charleston kindly answers my inquiry, that he quotes the opinion of Pursh above given in his "Resources of Southern Fields and Forests," but adds, "I can say nothing positive concerning it from personal experience." In Wood's Botany it is placed with the poisonous species, and the National Dispensatory gives it the same character.

On the other hand, Curtis, in his "Shrubs of North Carolina," says, "Pursh has represented it as being very poisonous, but it is perfectly harmless." My friend, Dr. W. H. Geddings, of Aiken, was kind enough to address H. W. Ravenel, Esq., a distinguished botanist of South Carolina, with regard to it, who writes: "I can say that *Rhus pumila* is not poisonous; it belongs to the non-poisonous section of the genus." Lastly, Dr. Chapman in his valuable manual states that it is not poisonous.

Rhus metobium. This is a tree growing in the West Indies and in Southern Florida, called coral

sumach or mountain manchineel. The National Dispensatory pronounces it poisonous, as does Nuttall in his work. Dr. Chapman, on the contrary, does not include it in the poisonous group of species.

Semecarpus anacardium.

Cashew Nut.

Indian Marking-Nut.

This tree is a native of Tropical America, but has been naturalized in Africa and the East Indies. It bears an edible nut, but its rind or mesocarp contains an oily liquid, which turns black on exposure to the air, and acts as a severe irritant upon the skin. Its active principle is a yellowish oil called cardol.

According to the Dispensatory, the juice of the rind of the nut is almost caustic, and has been used for destroying corns, warts, and vegetations, and as an epispastic; but the last application it considers to be very objectionable, because it is apt to be carried by the patient's fingers to the genitals and other parts, and to give rise to a very painful and persistent eczematous eruption. It states also that the liquid in the blisters has a similar property.

Rev. Charles Kingsley, in "At Last," states that the fumes of the oil will blister the cook's face while roasting the nuts, if she hold it too near the fire.

Dr. Taylor, of Guy's Hospital, reports (Medical Times and Gazette, Nov. 6, 1875) the following case illustrative of its action. A boy aged thirteen rubbed some of the juice upon the arm, May 9th. The part turned black upon drying, but produced no ill results except a little smarting for a week, when on the 16th the arm became red, and pimples appeared upon it.

At the same time his face became red and swollen, and the next day he came to the hospital. The left hand, forearm, and lower half of the upper arm were swollen, and of a bright red color, resembling erysipelas. On the forearm where the juice was applied was an abrasion, and over the rest of the part were many vesicles of various sizes and shapes, mixed with minute pustules. There were a few efflorescences of a similar character on the right hand. The face presented a similar inflammatory condition. There were redness and swelling of both eyes (the left being quite closed), upper lip, chin, and right cheek. On the chin was a yellow crust resembling that in eczema. There were patches of vesicles and redness also on the inner side of each thigh and lower part of the abdomen. The eruption caused considerable itching. The inflammation reached its height on the 21st, and had nearly disappeared on the 31st, when he was discharged. A playmate who also applied the juice to himself at the same time was affected in a similar manner.

It will be seen that the action of cardol very closely resembles that of Rhus.

APOCYNACEÆ.

Nerium oleander.

Oleander.

This ornamental tree, a native of Palestine and the East, was formerly much cultivated in tubs, so as to be kept in-doors during the severe winters of our Northern States.

Bigelow remarks that it is said to affect some persons in a similar manner to Rhus.

Loudon states that its leaves are acrid and poisonous.

Figuier describes it as a destroyer of cutaneous vermin, and a formidable poison.

Van Hasselt states that the oil obtained from the leaves produces intense burning and itching when rubbed into the skin.

The National Dispensatory also states that the essential oil irritates the skin.

Piffard quotes Barton as ascribing to it a vesicating property.

ARACEÆ.

Arisæma triphyllum. *Indian Turnip. Dragon-root.*
Jack-in-Pulpit.

Bigelow states that every part of this widely diffused plant, especially the root, is violently acrid, and almost caustic.

Piffard quotes authorities for the statement that the fresh leaves and root are rubefacient and vesicant.

The National Dispensatory says that the juice of the fresh plant applied to the skin may produce vesication.

A North Carolina dealer, who offers one thousand pounds of the root for sale, informs me that it produces intolerable itching and inflammation of the skin.

It was a trick among the boys of my day to "stump" their playfellows to taste certain plants well known to the experienced. The favorite ordeal was a slice of a tuber of this showy plant. I remember that no amount of water would quench the fire it set going in the tongue for a long time after the briefest contact with it.

Its active principle is unknown.

The Dispensatory states that the *Arisæma draconium*, the Green Dragon, applied to a freshly blistered surface, augments its secretion.

Symplocarpus foetidus.

Skunk Cabbage.

A common plant in the New England, Middle, and Western States.

Bigelow states that an acrid principle exists in the root, even when perfectly dry.

Mr. Cheney, a dealer in native drugs, informs me that the root produces intolerable itching and inflammation of the skin.

ARALIACEÆ.

Aralia spinosa.

Angelica Tree. Prickly Elder.

Southern Prickly-Ash.

This large shrub, belonging to the Sarsaparilla genus, grows from Pennsylvania southwards, and is much used in "botanic" medicine. Mr. Cheney informs me that the green bark, when taken from the roots or small shrubs, acts as an irritant upon the hands of the collectors.

ARTOCARPACEÆ.

Antiaris toxicaria.

Upas Tree.

A native of Java.

According to old accounts, this was the most deadly object of creation. It was told in traveller's tales that but a single tree of the kind existed in Java, and

that this was so poisonous that no other plant could live within a circuit of fifteen miles. No animal could live within this region of death, and birds flying over it perished and fell. Men approaching it from the leeward fell dead, and of one hundred persons condemned to death who were employed to collect its juice only three survived the attempt. So much for fables. The facts are that the juice of the tree is the source of one of the most deadly arrow poisons, *Upas antjar*.

Loudon states that when the trees are largely wounded or felled the effluvia produce cutaneous eruptions.

Van Hasselt reports that among the Javanese a dermatitis toxica, an erysipelatous swelling resembling that of *Rhus*, is produced on contact with the tree.

According to the Dispensatory, this poisonous principle is antiarin.

The tree has been cultivated in botanic gardens, and would appear to be no more poisonous on contact than *Rhus venenata*.

AURANTIA CEÆ.

Citrus vulgaris.

Bitter Orange.

The bitter orange is completely naturalized in some portions of Florida, and its fruit is largely used in the manufacture of marmalade there and in some parts of Europe. Bazin describes the occurrence among the workmen engaged in peeling them in France, not only of some general symptoms in consequence of the saturation of the atmosphere with the oil, but of painful

erythema with swelling, and vesicular and pustular eruptions with itching. They affect the face and upper extremities, especially the left hand, which holds the fruit when being cut. The efflorescence is remarkable for its indefinite persistence in some cases, and for the intolerable suffering it sometimes causes. M. Imbert-Gourbeyre, who describes the affection (*Moniteur des Hôp.*, 1850, p. 78), likens the action of the volatile principle of the orange to that of camphor.

Our Dispensatory states that persons employed in manufacturing the oil of orange peel suffer greatly from erythematous, papular, and vesicular eruptions of the skin, especially of the hands and face. The oil contains a hydrocarbol called hesperidene, and some other undetermined elements.

Inquiry among the large orange growers of Southern California fails to discover the occurrence of irritation of the skins of those who handle the fruit; but little marmalade is made there.

BERBERIDACEÆ.

Podophyllum peltatum.

May Apple. Mandrake.

This is a common plant in the Middle and Western States, and grows sparsely north and south of this belt. Gray describes the leaves and root as drastic and poisonous, and Wood speaks of it as a rather poisonous herb. It is largely used in medicine. The trade circular of one collector of our native drugs in North Carolina reports six thousand pounds in stock.

Bigelow quotes Dr. Burgon as to its action. "I was employed one afternoon," he says, "in a close room

in powdering the *Rad. podophylli*, which by the next morning occasioned a most violent inflammation of my right eye and eyelid; it yielded, however, to the antiphlogistic regimen in eight or ten days."

The Dispensatory states that workmen employed in pulverizing the root find it extremely irritating to eyes, nose, mouth, and skin; and a large wholesale dealer in vegetable drugs informs me that the powder of the root often poisons the workmen, especially their eyelids.

Mr. Lloyd writes: "Our employees experience great trouble in working this, owing to the irritating action on the skin. We have in numerous instances had our men cease work for several days owing to its action, which causes very painful inflammation of the skin, especially of the eyes."

BIGNONIACEÆ.

Catalpa bignonioides.

The Catalpa. Indian Bean.

This highly ornamental tree is a native of our Southern States, but has long been cultivated over the whole country, for the beauty of its bloom, and lately for its valuable timber. Its reputation is generally good, but in exceptional cases it may act as a poison upon man.

The National Dispensatory states that the emanations of the tree are reported to be poisonous.

I am informed by a large dealer in our native medicinal plants that the flowers are irritant to many persons, producing reddening of the skin and mucous membrane.

*BORRAGINACEÆ.**Borago officinalis.**Borage.*

This plant, a native of Europe, is cultivated in our gardens. It is covered in all parts with short bristly hairs. It is used as a salad, and finds a place in our Dispensatory.

Mr. Cheney, a large dealer in vegetable drugs, informs me that it is irritant to the hands, like cowhage, but in less degree.

*CACTACEÆ.**Cactus grandiflorus.**Night-blooming Cereus.*

According to the Dispensatory, this plant, a native of Tropical America, and cultivated amongst us for its showy and evanescent bloom, contains an extremely acrid juice, which is capable of producing vesicles and pustules on the skin.

Piffard also states that it may cause pruritus, excoriations, and pustules.

I have heard of no instances of disturbance of the skin produced by those handling it; but as its popular reputation is good, the source of such possible accidents may have been overlooked.

*COMPOSITÆ.**Anacyclus pyrethrum.**Pellitory.*

This is a plant resembling chamomile, growing in Africa, and its root, which is used in medicine, is described by the Dispensatory as a powerful irritant and rubefacient upon the skin.

Pyrethrum roseum, *P. carneum*, and *P. cinerariæfolium* are allied plants, and their pulverized flowers, the so-called insect-powders, so destructive of insect life, have been known to produce some irritation of the skin when scattered over sheets to destroy bed vermin. This statement I make on hearsay evidence, as I have met with no such results of their action.

Arnica montana.

Arnica.

The following account of the action of arnica upon the skin was published eleven years ago, at a time when scarcely anything had been written upon the subject, and when it was regarded as one of the most valuable and harmless of domestic remedies for external use.

I have seen several cases of dermatitis caused by its action since; but they presented no features which are not sufficiently noted in the description then given, which I reproduce with but few changes. Within the last few years several articles have appeared in medical literature upon this property of the plant,* and its character should now be well understood, at least by the medical profession.

CASE I. — A gentleman, sixty-five years of age, in descending the stairs to mount his horse for a ride, slipped and scraped the lower part of his back. A handkerchief dipped in tincture of arnica was immediately applied to the bruised skin of the buttocks and worn in contact with the part during the ride, which was not given up on account of the injury. Before his return a good deal of itching was felt in the back,

* The latest is by Dr. Paul de Molènes, *Annales de Derm. et de Syph.*, Février, 1886.

which caused the parts to be rubbed vigorously. On examination after reaching home, the skin was found to be already greatly congested, and the irritation of the parts increased a great deal during the day and night. On the next day I was called to see him. The skin of the back, nearly to the shoulders, was in a state of active hyperæmia, and already covered with innumerable papules. The inflammatory process extended rapidly downwards nearly to the knees, and forwards upon the abdomen and genitals. In a few days these parts presented all the characteristic appearances of acute eczema in its various stages of progression: general hyperæmia, papules, vesicles, excoriated and exuding surfaces, and crusts. The subjective symptoms were intense itching, stinging, and burning in the parts. Scarcely any clothing could be borne in contact with the skin by day, and sleep was for a few nights almost impossible, but the system generally was only slightly disturbed. The course of the affection need not, however, be given in detail, as it did not vary in any important particulars from that of an ordinary acute eczema of high grade and short duration; the process reaching (under treatment) its height within a week, and rapidly disappearing with the usual retrogressive manifestations.

CASE II. — A gentleman, sixty years old, applied to his right arm above the elbow a fomentation of tincture of arnica on two successive days, on account of a so-called rheumatic pain in the limb. The part became generally reddened and swollen in a few days, and ten days after the applications were made he consulted me. The arm from the elbow to the shoulder at that time was considerably swollen, of a vivid red-

ness, and covered over the lower half of this district with a very thick eruption of papules, many of which were already partially converted into vesicles. Great itching and burning were felt in the part, which gradually ceased as the inflammation subsided. The efflorescence under treatment did not progress beyond the vesicular stage, and the skin returned to its normal state in ten or fourteen days subsequently.

CASE III. — A gentleman, aged fifty-two years, was thrown from his carriage and sprained his knee. With the consent of his family physician, he dressed the part with fomentations of tincture of arnica and water. After two days' use of these, the skin over the knee became so red that the physician advised him not to apply them again. The redness extended down the leg nearly to the ankle, and upon this surface there was developed in a few days a general eruption of papules. A similar process, but of less severity, ensued a day or two later upon the inner surface of the corresponding parts of the other leg, which were more or less in contact with the fomentations. The efflorescence upon the legs did not pass into the vesicular stage generally, but remained at its height for a week, and then very gradually subsided under treatment. Three days after the use of the fomentations, an inflammation of the skin of the face also began, which increased in severity until I saw him, one week after the injury. His whole face was then very much swollen, of a deep red color, and covered with papules and vesicles towards its periphery, whilst upon the central portions there was a very free exudation of serum from many excoriated points, which in parts had already stiffened into crusts. The vesicles and

papules on the forehead were arranged in prominent and isolated clusters of two or three individuals in each. The whole had an artificial look, and strongly resembled in appearance a severe case of ivy poisoning. The subjective symptoms were mainly intense itching with slight burning; and considerable suffering was thereby occasioned for several days. After two days' treatment, the amount of free exudation was largely reduced, and no new efflorescence appeared. The swelling and redness were still considerable on the fourteenth day after the beginning of the inflammation, but were rapidly diminishing, and at the end of the month the skin was again in its natural state.

The nature and cause of the affection of the skin in these cases cannot, I think, be misinterpreted. In all of them we have an acute inflammatory process, confined to the upper dermal layers, and manifesting itself, according to the stage reached, by the following appearances: hyperæmia, papules, vesicles, excoriations, crusts, and scales, in regular sequence. The local sensations were intense itching and some degree of burning in the parts affected. There was no constitutional disturbance. In course, character, and sequence of the lesions in their development and retrogression, in the intensity of the subjective and absence of constitutional symptoms, the type of the affection is unmistakably that of acute eczema. It may be that cases occur in which the inflammation extends so deeply, and reaches so high a degree, as to indicate the existence of a deeper dermatitis, but I have never seen them.

The cause was also plainly manifest. The inflam-

mation followed in all the cases the application of tincture of arnica to the skin as a fomentation. In one of the instances, the first, the epidermis may have been slightly broken; but in the others the skin of the parts was whole and healthy at the time of the applications. The inflammation began to show itself after intervals varying from a few hours to several days, and was confined to the part to which the application was made, or extended from this as a centre. In the last case the disease was developed also upon the other knee and upon the face, but by direct contact, nevertheless, with the exciting cause, for the right knee was in contact with the left during the nights that the fomentations were applied to the latter, and the face was frequently rubbed (a constant habit of the patient) with the hands while applying the fomentation. That the hands were not likewise affected may be accounted for by the greater resistance to absorption offered by the thickened epidermis of the palms.

These three cases will serve, as well as more which might be presented, as typical illustrations of the action of arnica at times upon the skin. The affection, as will be seen, follows a very regular course in the character, distribution, and duration of its lesions, differing widely in some of these respects from the wayward manifestations so peculiar to the action of *Rhus*. Like the latter, arnica must therefore be regarded as an irritant poison when applied to the skin of some persons, but of less intensity, and probably of less certainty in its action than *Rhus*. With regard to this latter point, the proportionate frequency of poisoning after its external use, I do not know that we can form any judgment. There can be no doubt that

tincture of arnica is very often used in the same way as in the cases above given. It has long enjoyed an exceptionally permanent reputation, and almost miraculous healing powers have been attributed to it. Oesterlen says that "its reputation dates from the times when magicians carried on their hocus-pocus with it; from these it passed into the hands of quacks, and finally to physicians." There is scarcely a symptom of disease which, it was at one time thought in Europe, its internal administration could not successfully meet.

The physiological action of both the root and the flowers of arnica is said to be irritant, large doses producing vomiting and diarrhoea, inflammation of the stomach and bowels, headache, and dizziness. Its properties reside in an acrid resin and volatile oil. Our officinal preparations are a tincture, an alcoholic extract, and a plaster. That tincture of arnica has retained for centuries its great reputation as an application in bruises and sprains, and remains to this day perhaps the most popular remedy for such purposes, it may thank the alcohol associated with it, for this beyond doubt is the only active agent in such applications.

I am informed by one of the largest dealers in drugs in this city that their house sells between two and three thousand pounds of arnica flowers yearly, one half of which he thinks is used in veterinary surgery.

If, then, it is used so extensively, why are not cases of poisoning by it of more common occurrence? I believe that they do occur not infrequently, but that they are not recognized. The appearances which follow its use are no doubt often mistaken for the im-

mediate effect, or the sequelæ, of the injury or other trouble for which it was applied. Even the physician, there can be little doubt, often fails to recognize the artificial nature of the eczema he is called to treat, and to connect it with the prior application of arnica to the skin. The almost universal belief in its harmlessness, too, would prevent in most cases the patient from communicating to the physician the fact of its use before the appearance of the disease. It is not to be wondered at, however, that physicians are so little acquainted with these poisonous properties, when we see how little mention is made of them in medical literature. The works on materia medica that I have at hand give it a more or less feeble commendation, but make no allusion to its injurious action upon the skin. Very few of the works on toxicology place arnica among the poisons, and Van Hasselt,¹ who gives the fullest account of its injurious properties when administered internally, says nothing of its action upon the skin. Neither do I recall any reports in medical journals of cases of such affection. In works on dermatology, even, scarcely any mention is made of the subject. In a long list of substances enumerated as capable of producing eczema, in his chapter on this disease, Hebra includes arnica without special mention; but in his chapter on erythema nodosum he says: "Some medical men, however, suppose that the tincture of arnica is a perfectly harmless remedy in erythema nodosum, and in similar affections. But I would give a friendly warning to those who advocate its use; unless, indeed, they propose to employ it homœopathically and in infinitesimal doses. In the

¹ Handbuch der Giftelehre.

proportion of a drop of the tincture to a pail of water, this substance may certainly be applied without any risk of doing harm. But I have in practice had abundant occasion to observe that the tincture of arnica, even when much diluted, acts most injuriously upon the skin of some persons. I have frequently seen eczema or dermatitis excited by the assiduous application of lotions containing this drug, in the treatment of slight bruises or sprains.”¹ Fox, in his brief remarks on medicinal rashes, says: “Arnica may produce erythema and swelling of the part to which it is applied, or it may excite a real eczema.”²

It is to warn physicians who may be ignorant of these properties belonging to it, and that through them the public may be more generally informed concerning the dangerous character of one of the most popular and useless among domestic external remedies, that I have thus brought the subject before the profession.

Piffard in his remarks upon this action of the plant suggests that, as all the cases which had fallen under his notice were produced by the use of the tincture of the flowers, it may be due to the larvæ of an insect, *Atherix maculatus*, which infests the flowers.

The National Dispensatory, on the other hand, states that the root is irritant as well as the blossom, and a large dealer in vegetable drugs states that the root is largely used as well as the latter, and that he disbelieves in the animal theory of its irritating property.

Oesterlen also states that the root is irritant.

¹ Sydenham Translation, vol. i. p. 291.

² Skin Diseases, London, 1873.

The Dispensatory states that the active principle is uncertain, but that the plant contains formic and angelic acids and a volatile oil.

Prof. Goodale of Cambridge writes: "*Arnica montana* does not grow in the United States. All of our species, which are many, have more or less of its resinous character, but we have not known that any of them are poisonous to touch."

So far as I have been able to learn, none of them have been used for medicinal purposes.

Bidens frondosa.

Beggar-ticks.

We have several species of burr-marigold growing in the United States, provided with a pappus of rough awns, which adhere to the passer-by in a troublesome manner.

I am informed by Mr. Cheney that this plant causes itching on handling.

Erigeron Canadense.

Fleabane. Horseweed.

This species of a very common weed in all parts of North America contains a volatile oil, and is the only one of the genus to which irritating properties have been attributed.

Mr. Cheney informs me that the fresh plant will cause irritation upon the skin of many persons after handling it.

Lappa officinalis.

Burdock.

A native of Europe, but a common weed in most parts of the United States.

In the country burdock leaves are sometimes ap-

plied to the skin for the rubefacient action which their rough surface produces.

I am informed by a wholesale dealer in vegetable drugs, that parts of the burrs mixed with the seeds are as bad to handle as cowhage, so that workmen always get to windward of them when packing them.

Leucanthemum vulgare. *Ox-eye Daisy. White-weed.*

I have known one instance of poisoning by this most common weed, naturalized from Europe in all parts of the country. A papular and vesicular inflammation was produced upon the lateral surfaces of the fingers by plucking carelessly some of the flowers. This person, a physician, has recently assured me that on one or more occasions since the occurrence above noted he has experienced a similar result on handling the flowers.¹

I have also in other instances of acute dermatitis of mild degree, occurring during the flowering season of this plant, suspected that it might be the cause of the irritation, but have been unable to obtain positive evidence of such action on its part.

Maruta Cotula. *Mayweed. Wild Chamomile.*

The leaves of this common roadside weed, a native of Europe, are used, according to the Dispensatory, as an external application, and its juice is described as capable of blistering the skin.

In the days of my boyhood it was commonly used as the steadying tassel at the end of the kite tail when additional balancing was necessary, and the sharp, acrid nature of the juice was well known.

¹ See Boston Medical and Surgical Journal, vol. cxvi. p. 227.

Solidago.*Golden-rod.*

There are some seventy or more species, not to mention varieties, of *Solidago* in the United States, only one of which, *S. odora*, is used in medicine. I have long had golden-rod on my list of suspected plants, for in several instances I have seen a mild dermatitis develop upon the hands of those who have gathered it, and who have assured me that this was the only flower they handled; but as one must go into the fields to gather wild-flowers, and opportunity is so favorable for touching ignorantly or inadvertently the ubiquitous *Rhus* or other possibly poisonous plants under such circumstances, I have hesitated to attribute such irritative action positively to any of our golden-rods. I was surprised, on consulting the Dispensatory, to find the statement that *S. odora* contains a volatile oil, and is irritant and rubefacient.

Xanthium strumarium.*Cocklebur. Clotbur.
Sea Burdock.*

This rough plant, growing in New England and the Middle States, according to Mr. Cheney, causes itching on account of the hairs or dust with which it is covered.

CONIFERÆ.**Abies Canadensis.***Hemlock Spruce.***Abies excelsa.***Norway Spruce.*

The resins which exude from these trees under the names, respectively, of Canada pitch and Burgundy pitch, act alike upon the skin when applied to it in the form of a plaster. When worn for varying

periods, it causes redness, itching, papules, and on delicate skins even pustules and superficial ulcers.

According to Piffard, it produces an eczematous eruption.

Juniperus Virginiana.	<i>Red Cedar.</i>	<i>Savin.</i>
Juniperus Sabina.	<i>Savin.</i>	

Both these species of American juniper, the former found throughout the United States, the latter in its northern parts, possess irritating properties when applied to the excoriated skin at least. The leaves of both are used, after being made into an ointment, to promote or sustain the discharge from blistered surfaces. The latter was formerly used in the treatment of alopecia.

According to Piffard, *Juniperus communis*, which inhabits the northern parts of North America, also produces a slight redness, and sometimes even vesication.

<i>Thuja occidentalis.</i>	<i>Arbor Vitæ.</i>
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The National Dispensatory states that the fresh leaves sometimes irritate the skin, like savin. It grows from Pennsylvania northward.

CRASSULACEÆ.

<i>Sedum Acre.</i>	<i>Mossy Stonecrop.</i>
	<i>English Moss. Houseleek.</i>

This little plant, a native of Europe, is much used as an edging for beds in the flower garden, and may often have been the cause of mischief upon the hands of fair gardeners, the nature of which has not been suspected.

Wood states that the whole plant abounds in an acrid, biting juice. Oesterlen says that it is sharply irritative upon the skin.

The National Dispensatory states that the juice is capable of blistering the skin, and that it is used upon corns and warts to soften them, and upon swollen glands as a resolvent.

Mr. Cheney, a wholesale dealer in vegetable drugs, informs me that the juice of the green plant is poisonous to the skin of many persons.

CRUCIFERÆ.

Lepidium sativum.	<i>Peppergrass.</i>
Nasturtium Armoracia.	<i>Horseradish.</i>
Sinapis alba, Sinapis nigra.	<i>Mustard.</i>
Sisymbrium officinale.	<i>Hedge Mustard.</i>

These, and several other members of this family, are typical rubefacients. The acrid principle producing this effect has been called sinalbin in mustard, and many of the Cruciferæ contain it.

The action of the sinapism is well known. In a few minutes after its application the skin begins to feel warm, and by the end of a half-hour, if the patient bear it so long, this sensation has increased to an intolerable burning. The changes in the cutaneous tissues are, within a few minutes, a considerable degree of hyperæmia, which after a time increases to an intense redness, which persists for a day or two, and often leaves behind it a persistent pigmentation, at times of a dark brown color, to mark the seat of the sinapism. On this account one should never be applied upon the upper chest, or other part of a woman which the dress

will not always conceal. If the action be continued beyond its legitimate rubefacient effect, a period which varies greatly in persons, it may produce vesication, or even deep suppuration, effects at times very intractable under treatment. It is stated that the addition of vinegar to a mustard poultice greatly lessens its activity.

The volatile oil of mustard is a powerful irritant and caustic.

Nasturtium and Sisymbrium, above mentioned, are both capable of blistering the skin, if applied to it.

CUCURBITACEÆ.

Bryonia alba.

Tetterberry. Wild Hops.

This plant, of which we have but one indigenous representative, is regarded with much favor by the "botanic" practitioner. The Tayuya-root, recently tried as a remedy for syphilis, belongs to the genus.

The Dispensatory states that the fresh plant applied to the skin produces vesication.

Piffard states that the fresh plant applied to the skin produces redness, and, if left on for some time, a pustular eruption.

DROSERACEÆ.

Drosera rotundifolia.

Sundew.

According to Loudon, the juice of this interesting carnivorous plant, common in the Northern parts of the United States, is acrid, and removes warts, corns, freckles, and sunburn.

Piffard attributes vesicating properties to it.

ERICACEÆ.

Chimaphila umbellata. *Pipsissewa. Prince's Pine.*
Wintergreen.

Inhabits the Northern United States and Canada.

The National Dispensatory is my authority for the statement that the fresh bruised leaves applied to the skin cause redness, and even vesication.

Bigelow states that it acts as a topical stimulant, and when long continued not unfrequently vesicates.

Oxydendrum arboreum *The Andromeda Tree.*
(Andromeda arborea, L.). *Elkwood. Sorrel Tree.*

The bark and leaves of this tree, which grows in the Middle and Southern States, are used in "botanic" medicine. The latter have an acid taste. It is put down in the Dispensatory as allied to our poisonous *Kalmias*.

Mr. Cheney informs me that it is an acrid poison when handled.

EUPHORBIACEÆ.

Buxus sempervirens, L. *Box.*

This old-fashioned garden border plant, a native of Europe, was an object of suspicion in the classic age, for Loudon states that Corsican honey was supposed to owe its infamy to the bees feeding on the box. It is collected for its supposed medicinal virtues "in the treatment of syphilis, epilepsy, and hysteria," and Mr. Cheney informs me that the juice of the plant will cause irritation and intense itching to many.

Croton tiglium.

This tree, from the seeds of which croton oil (*oleum tiglii*) is obtained, is a native of the East Indies.

The oil has long been employed in the East as an external irritant and purgative. It was formerly largely used to produce a "counter irritation" upon the skin in diseases of the chest, and was pricked into the skin in the process called "Baunscheitismus." Lately its external employment in medicine has greatly fallen into disuse, but it still plays an important part in some popular unofficinal liniments. According to the Dispensatory five thousand one hundred pounds of the oil were imported into the United States in 1878, and in 1883 only three hundred and eight pounds. Its active irritative principle has been attributed to various substances obtained from it, but it is not definitely known.

When gently rubbed into the skin, it produces after a short time a considerable degree of itching, redness, and burning, and within a few hours small red papules may develop. All these phenomena, representing the lowest grade of inflammation, may wholly disappear in the course of twenty-four or thirty-six hours. If the oil be applied more freely, or rubbed repeatedly into the same area, the subjective symptoms are intensified, and the papules are more abundant, thickly crowded, acuminate or sharply rounded, and are often surrounded with a bright red halo. After a time the tips of the efflorescence become opaque by the effusion of serum within the epidermal layers, and the vesicular stage of inflammation is established. By the second day, if the quantity of oil used has been sufficient, the eruption has become distinctly pustular, and for three

or four days new lesions may appear and undergo similar metamorphoses. They may become confluent, discharge their coverings, and form large crusts, or their contents may be absorbed during involution without rupturing. Generally the pustules become flattened or umbilicated, but are never as large as those produced by the application of tartar emetic. The skin remains red for a considerable time after the disappearance of the efflorescence, according to the intensity of the preceding inflammation. Scars are a frequent sequel of the process, but their formation seems to be to some extent an individuality of the skin. They are often merely punctate, are generally crowded, and rarely prominent. The seat of the inflammatory process is sometimes the epidermal layers alone, in which case no cicatrices result; but when the oil has been freely or thoroughly applied, it affects the papillary layer and subjacent portions of the corium. Sometimes it follows the glandular structures downwards to the deepest parts of the cutis, forming furuncular-like lesions.

Euphorbia.

More than one hundred species of Euphorbia, or spurge, grow in the United States, either indigenous or immigrants from Europe. Of every species Loudon says the juice is so acrid as to corrode and ulcerate the body wherever applied; and of *E. resinifera*, from which the officinal euphorbium is obtained, Pliny and Dioscorides, according to the Dispensatory, describe the method of collecting juice, so as to prevent irritation of the hands and face. This substance is used as a plaster to prolong suppuration.

Van Hasselt states that the juice of several species is used by quacks to remove warts, freckles, as depilatory, etc. ; and that the application of the juice, powder, and extract produces not only erysipelatous, pustular, and phlegmonous inflammation, but even gangrene. In one case mentioned the whole abdominal wall became the seat of gangrene.

Of our native species, Bigelow says that the juice of several was used in his day to destroy warts ; and Gray describes them all as containing an acrid, poisonous juice. The most active of them are *E. corollata*, *E. ipecacuanhæ*, and *E. lathyris*. The first of these, commonly called snake-milk, according to Bigelow has been used for blistering purposes, and the Dispensatory states that the bruised root will vesicate the skin.

Mr. Cheney informs me that the juice of *E. ipecacuanhæ* is quite troublesome to many who collect and handle it ; and Bazin states that the dust of *E. lathyris*, growing both in Europe and in this country, causes redness, painful swelling, and vesicles upon the workmen employed in handling it.

Hippomane mancinella.

Manchineel.

This large family of Euphorbiaceæ contains some of the most poisonous plants. One of the most virulent is the manchineel, a small tree, bearing fruit resembling an apple, which grows in Southern Florida.

Loudon states that it abounds in a white milk highly poisonous, and so very caustic that a single drop placed upon the skin instantly causes the sensation of a hot iron, and in a short space of time raises a blister. It is a common belief that to sleep under it causes death. Whole woods on the sea-coast of Mar-

tinique have been burned in order to clear the country of such a dangerous pest. The fruit is highly poisonous.

The following is an extract from "West India Sketches": "The branches contain a milky juice which will certainly blister the skin, and it has been a common trick among the negroes to apply it to their backs in order to excite the compassion of those who might mistake it for the effects of beating."

Kingsley, in his charming "At Last," writes of it: "We learnt to distinguish the poisonous manchineel, and were thankful in serious earnest that we had happily plucked none the night before, when we were snatching at every new leaf; for its milky juice by mere dropping on the skin burns like the poisoned tunic of Nessus, and will even, when the head is injured by it, cause blindness and death."

Hura crepitans.

Sand-box.

A large tree, native of Central America and the West Indies. *Hura Brasiliensis* has similar properties.

Its abundant milky juice contains a very acrid volatile principle. It has been used in Brazil in the treatment of leprosy. A decoction applied to the skin causes irritation and vesication.

According to Piffard, it produces severe swelling of the face.

Jatropha urens.

Jatropha urens, L., var. *stimulosa*, (*Cnidocolus stimulosus*, Pohl,) is a plant growing from Virginia southward in sandy soil along the coast. It is abundantly

supplied with stinging bristles, and is well named "Tread-softly."

Stillingia sylvatica, L.

Queen's-root.

The Dispensatory states that the root is acrid. Piffard quotes Frost as stating that it causes smarting and irritation, and Mr. Cheney informs me that the juice from the green root will inflame, and produce swelling of the hands and joints. It grows in the Southern States.

FUNGI.

Ustilago hypodites.

In the *Annales de Derm. et de Syph.*, November, 1885, there is an abstract of an article published by Gerbaud on an affection among the workers in reeds in Provence, due to the action of this fungus, which is parasitic upon *Arundo donax*.

The inflammation affects almost exclusively the face and genitals. It begins upon the former with a violent itching in about twenty-four hours after contact with the reeds, which is followed by a uniform redness, especially marked about the orifices, and swelling of the eyelids. The appearance of the patient strongly resembles that of erysipelas. Later small vesicles develop, terminating in persistent excoriations.

Upon the male genitals it begins also with itching, followed by general swelling, with intense redness of the scrotum, and later by vesicles filled with a yellow serum, terminating in persistent and very painful erosions. The penis is sometimes affected, producing an inflammatory phimosis.

Delicate skins are most easily affected, and a moist condition favors the action of the parasite. Similar effects were produced upon the skin of the rabbit, by applying to it after being shaved some of the fungus removed from the reeds.¹

After reading the above, I wrote to Prof. W. G. Farlow of Cambridge, our authority in cryptogamic botany, with regard to the occurrence of this species in America, and received the following reply: "Your information about the poisonous character of *Ustilago hypodites* is something quite new to me. I do not know of any reference to the subject in botanical books. The spores of *Ustilagineæ* are known to be at times irritants when they reach the air-passages, but they are not poisonous to handle. *U. hypodites*, a species whose characters are not very well marked, I may say, has been found in two places in this country. I found it at Wood's Holl, Mass., on *Phragmites* (a reed). It was found by Curtis in North Carolina on *Arundinaria*, the cane, and what is probably the same species occurs in Iowa on a species of *Stipa*. The fungus may be much more common in this country than is now supposed, as few persons have collected fungi of this order."

Ustilago maydis, the corn-smut, grows upon our maize, and *U. segetum* attacks several of our grains, wheat, oats, barley, and our grasses; but I have never heard of their producing any irritative action upon the skin.

¹ See also a description of other cases in Bazin, p. 67.

*IRIDACEÆ.**Iris florentina.**Orris-root.*

The root of this European flag seems to possess slightly acrid properties similar to our own *Iris versicolor*. It has been used to make "issue peas," and according to Piffard it may produce eczematoid and urticarial eruptions.

*LEGUMINOSÆ.**Andira Araroba.**Goa Powder.*

This tree grows abundantly in the forests near Bahia, Brazil, and contains in the large cavities which traverse the wood parallel with the trunk a powder of a light yellow color. This is obtained by cutting the tree down, splitting open the trunk, and scraping it out from the clefts. The workmen engaged in this occupation are obliged to protect their faces and air-passages against the irritating action of the dust. From this powder is extracted a crystalline substance, called at first and erroneously chrysophanic acid, now known in our materia medica as chrysarobinum. The action upon the skin of the Goa powder, which was first used in medicine, and of this extracted principle, is the same, differing only in intensity.

The irritative properties of both are considerable upon many persons. Used first as an application for the cure of ringworm, tinea trichophytina, later in psoriasis, and since then tried in the local treatment of many cutaneous affections, it has been found that, in addition to their power of staining the skin of a red, purple, or brownish color, they often produce such a degree of dermatitis that their use must be discon-

tinued. There is developed a marked degree of erythema (not to be confounded with the pigmentation), much oedema, especially about the face, and subsequently desquamation; also much burning. These results are so likely to follow its use upon the scalp or face, that its application to the head is scarcely justifiable.

It may be most safely employed by so applying it that its action shall be confined to the diseased portions of the integument, as when made into a paint with traumaticin, or a solution of gutta-percha in chloroform. Used in the form of ointment, paste, or powder, on the other hand, it is easily transferred to the surrounding normal skin, and thus its chances of provoking irritation greatly multiplied. Its mischievous action is much increased in hot weather.

Mucuna pruriens.

Cowhage.

This vine grows both wild and in a cultivated state in the East and West Indies. The pods are covered with straight, prismatic, sharply pointed, retrorsely serrate hairs, one eighth of an inch long.

According to the Dispensatory they easily penetrate the skin, and occasion intolerable itching, which is greatly increased by washing and rubbing.

Oesterlen states that an ointment of cowhage hairs, gr. viii. in an ounce of lard (*Ung. urticans*), produces an immediate burning and urticaria.

Bigelow,¹ in his essay on *Mucuna*, writes: "It is well known that when these bristles are rubbed on the skin they excite an intense and violent itching, which lasts for a considerable time. They have been sometimes indiscreetly used as a counter irritant, applied

¹ Nature in Disease.

to the skin by spreading from four to six grains on lint and confining it with adhesive plaster. The result, within my observation, has been an exceedingly uncomfortable itching and burning of the part, which on the second day becomes universally red and inflamed. A copious eruption of papulæ follows, which increases in size for a week, and at length terminates in pustules, which require a second week to pass into scabs. In one patient two or three large prominences, like boils, continued for ten days after the rest of the part was well. The application produced by cowhage appears to me greatly to exceed that which attends the application of flies or of tartar emetic."

I am informed by a wholesale dealer in drugs, that so much trouble is occasioned by handling cowhage in the preparation of anthelmintics, that many in the trade refuse to deal in it.

Our native species of *Dolichos*, according to Professor Goodale, are not known to possess irritating hairs.

LILIACEÆ.

Allium sativum.

Garlic.

A native of Sicily.

An application of garlic bulbs is advised as a counter irritant to the chest in pulmonary diseases. They are capable of reddening the skin, and may even vesicate it. The same property, if in a less degree, is attributed to allied species, the leek, the onion, etc.

Asparagus officinalis.

Asparagus.

Güntz, of Dresden, relates¹ the case of a woman employed in a restaurant, whose sole occupation during

¹ Vierteljahresschrift für Derm. und Syph., vii. 65.

its season was the preparation of asparagus cuttings for cooking. After a time her hands and arms presented a diffused redness, moderate swelling, and innumerable miliary vesicles. Her face and neck were somewhat swollen, and reddened also, and exhibited a few vesicles. There was marked conjunctivitis. The dermatitis subsided without treatment rapidly after leaving this occupation, but, on resuming it later, the arms again became red. The following year in asparagus time her face and arms again became erythematous when this occupation was resumed; but it was persisted in, and without further injury. A niece of this patient had previously been affected in a similar manner, so as to be obliged to abstain from preparing asparagus in the restaurant.

I can find nowhere a reference to such irritative action of asparagus upon the skin. It is one of the oldest culinary plants known, and was as much a favorite upon the tables of old Rome as at the present day. I have made inquiry at some of the largest restaurants of Boston, but their vegetable cooks have no knowledge of such properties. None of the chemical principles of the plant are known to be irritating. It should be placed upon the doubtful list, I think.

Urginia scilla.

Squill.

This bulb grows chiefly along the shores of the Mediterranean.

The juice of the fresh plant, according to the Dispensatory, acts upon the skin as a rubefacient.

*LINACEÆ.**Linum usitatissimum.**Flax.*

In 1875 Purdon¹ reported the occurrence of a peculiar form of acne upon the forearms of the operatives in the linen mills of Belfast, Ireland. It affected principally the young girls who remove the bobbins from the machinery and oil the same, and the spinners. The skin of the arms was described as harsh and dry, and covered with a papulo-pustular efflorescence, having a shotty feel in its early stages, and accompanied by numerous comedones. The eruption was frequently observed upon the face, and was accounted for by wiping it with oily hands while perspiring. The disease was attributed to the oil used upon the machinery, and to that contained in the flax. A certain kind of Russian flax was supposed to produce a pustular efflorescence resembling that of variola. Treatment was of little service as long as the patients remained in the mill.

This description closely resembles one of an eruption which occurs in factories where tarry preparations are used to lubricate the machinery, and where the air is saturated with tarry emanations. The formation of numerous comedones, and the shotty feeling papular efflorescence, are very suggestive of "tar acne."

Prof. Leloir² describes an affection of the skin among flax spinners observed in his wards and at the works at Lille. It is seated upon the hands, more commonly upon the left one, but is generally symmetrical.

¹ Treatise on Cut. Med.

² Annales de Derm. et de Syph., 1885, p. 129.

It affects principally the internal surface of the thumb, the external and palmar surfaces of the index finger, and the cubital and palmar border of the hand and little finger. In the most intense cases it may extend over the whole hand, and in exceptional instances up the forearms as far as the elbows. The inflammation is of an eczematous type, sometimes erythematous-vesicular, sometimes vesico-pustular or squamous. Most frequently, however, it has a dry lichenoid character. The skin is thickened, and its folds are more pronounced than natural. The epidermis is glossy, but sometimes slightly scaly, and nearly always more or less deeply fissured. There is often a marked thickening of the horny layer of the thumb and fingers. The nails are very rarely affected. There is a variable, but constant, degree of pruritus. All the workmen are not affected, — only three or four out of ten. Some are only affected when they work, the dermatitis disappearing in from one to two weeks after ceasing to labor. With others it is much more persistent, lasting for months after giving up work. Very rarely it affects the soles of workmen who go about habitually with naked feet.

The affection is peculiar to the spinners who work the flax in a moist state. The threads are made to pass through a trough filled with very hot water, for the purpose of cleansing the flax of certain impurities, and in the manipulation of the threads the hands are kept constantly moist with the impure water from the trough, so that they become covered with a mucilaginous or gummy coating. This water is found to contain, as a result of fermentation, butyric and lactic acid combined with carbonate of lime in solution, and

it is to its character that Prof. Leloir ascribes the production of the dermatitis. The treatment recommended by him was a more frequent change of the water in the troughs, frequent washing of the hands, and the use of glycerine pomades and rubber gloves.

It will be observed that in the cases described both by Purdon and Leloir, it is not the flax itself to which the inflammation can fairly be ascribed with certainty, as other elements, possibly irritative in character, may have been operative partially or wholly. In support of this view of the probably innocent character of the plant under all circumstances I offer the following replies to an inquiry kindly made, at my request, by the proprietor of one of the largest flax mills in the country, Charles T. Hubbard, Esq., since deceased.

MR. C. T. HUBBARD.

My dear Sir, — I received your letter, saying you would like my opinion on workers handling flax, and how long I have had persons working for me. I have had charge of workers thirty-four years, and I have worked in the mill fifty-two years altogether, and I must say I never saw any workers have the skin disease from handling flax. I have seen one or two instances where workers had to leave their work on account of a rash breaking out all over them, but it was from working amongst jute. It was reported that it was from using a certain kind of oil.

I never saw nor heard of any one having skin disease from working amongst flax or any kinds of hems.

From yours truly,

JAMES LANE.

CHAS. T. HUBBARD, *Treas. Ludlow Manuf. Co., Boston.*

Dear Sir, — In reply to your favor of some days since I have to say that I have had charge of the mills of the Ludlow

Manuf. Co. some eighteen years, where flax and flax tows have been worked by a considerable number of hands most of the time, and have carefully watched the effects of such employment on the health of the employees as compared with those of other kinds of fibre manufactures I have been acquainted with, and fully believe that the employment in flax and similar manufactures is not in the least injurious.

Old hacklers, who have spent their lives in preparing flax for spinning, have recently said to me that they have not seen a case of eruptive disease believed to be caused by handling flax.

I have seen some cases of irritation of throat, and perhaps of the lungs, but they were persons easily annoyed by any kind of dust.

Yours truly,

L. H. BRIGHAM, *Agent.*

CHARLES T. HUBBARD, Esq., *Petersham, Mass.*

Dear Sir, — In reply to your inquiry of the 9th inst., I have been connected with the manufacture of flax, hemp, and jute for nearly twenty-two years, and have yet to learn of a single case of cutaneous disease caused directly or indirectly by the handling of either of these fibres. In an experience of ten years in the mills among hundreds of operatives, I found them usually healthy, their health averaging fully that of those in other employments. If there were any cutaneous diseases, they were caused in some other way than by their employment. In my experience I have found the invariable rule in all parts of the mill, where a man was injured by being cut or otherwise, to apply some soft flax or tow, that being there regarded as a sure cure for all such troubles.

Very respectfully yours,

C. N. WALLACE.

EAST BRAINTREE, September 11, 1886.

MR. C. N. WALLACE.

In reply to your question, if in my knowledge flax was likely to cause skin diseases, I say no. In my experience of over forty

years' flax-dressing, during twenty-five years of which I had charge of that department in the Boston Flax Mills, and had under me twenty-five to thirty men, I found the following. In dressing or hackling flax, the flax is wrapped around the right and drawn through the left hand through a hackle tool, causing a constant friction, so that the skin of the left hand and under the right arm becomes quite transparent, and the blood oozes through. In very hot weather the skin becomes quite raw. I have known nearly all the hacklers in this country and many in Great Britain, and their invariable rule is to apply fine flax tow, from which they merely shake the dirt, putting a wad of that under the arm when the arm becomes sore, and doing up all scratches and bruises in the same manner. If you wish for any indorsement of my statement, you can get it of any flax mill in the world.

I regard the fibre as a very healthy one.

Very respectfully yours,

JAMES WILSON.

LUDLOW, MASS., September 10, 1886.

CHAS. T. HUBBARD, Esq., *Treas., Boston, Mass.*

My dear Sir, — In reply to your favor of the 9th inst., I have had particularly good opportunities for observing the condition of people accustomed most of their lives to work flax, and my opinion is, that they are not in the least degree subject to cutaneous diseases of any kind.

I had charge for some years of one of the largest flax mills in Russia. We employed about seven hundred operatives, working entirely on flax and flax tow. Most of these operatives lived in our own houses, and we had one house especially fitted up for the care of the sick; we had some twenty cots, but rarely more than five or six occupied, and generally less than that. We had no cutaneous diseases except such as had a distinct cause quite apart from the mill.

Our mill was situated in the heart of a flax-growing district, and we bought most of our flax from the peasant farmers direct. They were a very healthy people.

I have travelled very extensively in those districts of Europe where flax-spinning is a leading industry. I never heard any diseases associated with the manufacture of flax except some of a pulmonary character.

Yours truly,

JNO. ED. STEVENS, *Supt.*

It is well known that a flax-seed poultice often excites a follicular inflammation, pustular or furuncular, in the area of skin to which it has been applied; but it is not certain how much of this action is to be attributed to the oil which the seeds contain, and how much to the macerating effect of the heat, moisture, etc. of the application.

Corchorus olitorius.

Jute.

In one of the letters published from the workmen in the flax mills (see page 106) it was stated that an instance of a rash occurring among workers in jute had been known. In the *Berlin. Klin. Wochenschrift*, 1881, p. 503, an account is given of the diseases which prevail in jute mills, among which is eczema of the hands and arms. It is attributed by the writer, as in the letter above referred to, to the oil with which the fibres have to be saturated in order to work them.

LOASACEÆ.

Mentzelia oligosperma.

Mentzelia.

My attention was first called to the irritative properties of these plants by Prof. Goodale of the Botanic Garden at Cambridge, who writes: "Mentzelia has grown in our garden, and has always been amazingly irritating to us all."

The family is represented as possessing stinging hairs, and Figuier describes the hairs as charged with an acrid juice.

The above-named species is a native of our Western and Southwestern States, and is provided with very rough barbed hairs. *M. Floridana* grows in South Florida, and *M. Lindleyi* is a showy Californian species cultivated in our gardens under the name of Golden Bartonia.

LOBELIACEÆ.

Lobelia inflata.

Indian Tobacco.

According to Piffard, this plant, abundant in all parts of the United States, when applied to the skin, is capable of producing an irritation.

LOGANIACEÆ.

Gelsemium sempervirens.

Yellow Jessamine.

This handsome vine, growing abundantly in the Southern States, belongs to a family containing some of the most deadly poisons of the vegetable world. Its root contains gelsemine, a dangerous alkaloid.

According to Mr. Cheney, many collectors of the root complain of its poisonous effects upon the skin.

MELANTHACEÆ.

Colchicum autumnale.

Meadow Saffron.

The Dispensatory states that the fresh corms, when applied to the skin, produce pricking and redness. It is a native of Southern and Central Europe.

Veratrum viride.

Indian Poke.

Veratrum album.

White Hellebore.

The action of these two plants, probably identical, is closely allied to *V. sabadilla*, although their chemical principles are not identical. They are all powerful animal parasiticides.

V. viride, our common native species, applied to the skin in a moist state, causes redness and burning, and *V. album*, the European representative, according to Piffard, may cause inflammation and vesicles.

Veratria, applied in solution, or as an ointment, to the sound skin, produces a slight prickling sensation, and if used freely, according to the Dispensatory, may cause burning pain and vesicles.

MYRTACEÆ.

Eugenia pimenta.

Pimento. Allspice.

A native of Tropical America and the West Indies.

When applied to the skin, according to the Dispensatory, it rapidly produces a sense of warmth, which is followed by smarting and redness. Like Capsicum, it is mixed with Burgundy pitch or lead plasters to increase their stimulating action.

Myrcia acris.

Bayberry.

This tree, known as wild clove, wild cinnamon, and bayberry, is a native of the West Indies and Tropical America. Its leaves yield on distillation a fragrant oil, which is used in the preparation of bay rum. In the West Indies bay rum is made by distilling the fresh leaves of the plant with a certain proportion of its fruit with St. Croix rum; but most of this spirit

sold in the United States is manufactured here. The officinal formula is: oil of myrcia 16 parts, oil of orange-peel 1 part, oil of pimento 1 part, alcohol 1,000 parts, water 782 parts.

Bay rum is used as a perfume and popular wash for the skin. It is very commonly found upon the table of the barber and hair-dresser, and is often in my experience the source of mischief in their establishments. I have treated a considerable number of cases of inflammation of the scalp and face which have followed hair-cutting and shaving, and which I have ascribed to the irritating action of this preparation, which had been applied in each case. The inflammation was sometimes in the form of an erythema, most pronounced about the openings of the hair follicles, and lasting from twelve to forty-eight hours, with much smarting and burning; sometimes a papular, advancing to a pustular eruption, with a generally reddened skin, a serious dermatitis lasting a week or ten days. Several instances of what seemed to be ordinary acute eczema of the scalp have been developed in this way. It is difficult to determine what is the real excitant in these cases, for in many of them, no doubt, the skin has been cut or scraped by the razor, or unduly stimulated, possibly excoriated, by the improper use of sharp-toothed comb and over-stiff brush before the rubbing in of the bay rum, which might have been applied to the sound skin without harm. Then the preparation is no doubt often made up in part of substances entirely foreign to its proper composition, which, and not its legitimate constituents, are the cause of the inflammation. Some of the worst cases which I have seen followed the single visit to some country barber-

shop, where cheap materials were no doubt employed. On the other hand, the officinal preparation, as above given, contains, in addition to the oil of myrcia, oil of orange-peel and of pimento, both of which are possible excitants of the skin.

Although I am unable to state, therefore, that genuine West India bay rum is deleterious, I am none the less sure that the preparation so called, which is so universally used as a cosmetic, is sometimes the cause of serious dermatitis.

ORCHIDACEÆ.

Cypripedium pubescens. *Yellow Lady's-Slipper.*

Two of our lady's-slippers, have long been used in medicine, *C. pubescens* and *C. parviflorum*. I had never heard of any poisonous property attributed to them, and was greatly surprised to be informed by Prof. J. Nevins Hyde, of Chicago, that his friend, the late Prof. H. H. Babcock, a distinguished botanist of that city, found the *C. pubescens*, which grows from Canada to Georgia, nearly as irritating to him as *Rhus toxicodendron*, from which he suffered severely and repeatedly.

Other, but more indefinite reports, sustain this character of the plant.

Vanilla planifolia.

Vanilla.

This species is a native of Eastern Mexico, where it is also largely cultivated. Other species of inferior merit are found in other parts of Tropical America.

According to the Dispensatory, workmen engaged in handling vanilla beans suffer from itching of the

hands and face, and the skin is covered with a "pruriginous" eruption, and swells, reddens, and desquamates. These effects have been attributed to the action of an acarus, and to the presence of cardol, which is said to be applied to the pods for the purpose of producing the desirable brownish-black color.

These statements may be true regarding the lower grades of vanilla, or those grown in some localities. On the other hand, I am informed by Mr. Burnett, of Boston, who has spent much time in the vanilla plantations and curing establishments of Mexico, and who uses great quantities of the beans in his well-known laboratory, that he has never known any irritation to be produced upon the skins of those employed in handling it at any stage. Every pod has to be turned several times a day, for several weeks after being gathered, to develop its best qualities. It should be stated, however, that he deals only in the very best quality, and employs as workmen only those who have especially dry skins, as a drop of perspiration or moisture coming in contact with the beans causes their destruction by the development of a fungus upon them. He does not believe that the first quality of the fruit is ever artificially colored. It may be interesting to learn that, in his opinion, the internal use of vanilla is *always* perfectly harmless when pure, and that the extract prepared by his house is often drunk in considerable quantities as a liquor or cordial. He states that Tonka bean is very largely used as an adulterant in some manufactures of vanilla.

PAPAVERACEÆ.

Chelidonium majus. *Tetterwort. Celandine.*

This plant, a native of Europe, is cultivated widely, but it has become a roadside weed in many places.

Loudon represents its orange-yellow juice as very acrimonious, and capable of destroying warts, ring-worm, and the itch.

Van Hasselt states that the juice and bruised leaves act as a rubefacient and caustic.

According to Oesterlen the fresh juice applied to the skin produces inflammation and blisters.

The National Dispensatory says that the fresh plant, as well as the juice, irritates the skin.

Piffard quotes authorities for the statement that it is acrid, irritant, and even escharotic.

Mr. Cheney informs me that he has known the plant to poison the skin, if handled so as to crush the leaves or stem.

To indicate the extent to which it is used in some form in medicine, it may be stated that a collector in North Carolina offers fifteen hundred pounds of the leaves for sale.

Sanguinaria Canadensis. *Bloodroot.*

This interesting flower of early spring, growing throughout Canada and the United States, long ago attracted to itself the attention of physicians, presumably through its blood-red juice.

Bigelow states that Prof. Smith cured polypi "of the soft kind" by applying the root.

Oesterlen represents its root as sharply irritating.

Mr. Cheney informs me that the root has poisoned those handling it.

Mr. Lloyd writes: "There are two native drugs that are very irritant to mucous surfaces, so much so that the dust is very disagreeable, and we presume that they would have a similar irritating action on the skin: Bloodroot, and *Caulophyllum thalictroides*, blue cohosh or pappoose-root."

The active principle has been called Sanguinarius.

PHYTOLACCAEÆ.

Phytolacca decandra.

Poke. Garget.

This striking looking plant grows in all parts of the United States.

Bigelow states that it is stimulating when applied to the skin, frequently producing an eschar; and that an ointment made of it excites a sense of heat and smarting, and that he has cured cases of psora (?) with it.

A North Carolina collector of medicinal plants informs me that handling the green plant and root often produces inflammation of the skin. He has fifteen hundred pounds for sale.

The Dispensatory states that the juice, or a strong decoction of the root, applied to the skin when tender or abraded, causes smarting or burning pain.

Mr. Lloyd writes: "Fresh *phytolacca* applied to the skin produces an irritating action, and we think it should be certainly classified among the plants you are considering." Its action upon workmen in his laboratory is described as similar to that of *Podophyllum*, causing serious inflammation of the eyelids.

*PIPERACEÆ.**Piper nigrum.**Black and White Pepper.*

This is an Indian shrub, now cultivated in many tropical islands. Many other species are also cultivated for their pungent properties as condiments. The active principle is pepperine chiefly.

Applied to the skin, ground pepper causes severe pain and redness, and is sometimes used as a local stimulant. It may even produce vesication.

POLYGONACEÆ.

Polygonum hydropiper. Smartweed. Water Pepper.
Polygonum acre.

Common in most of the United States.

Gray states that the juice of these plants is very acrid, and I am informed by a large dealer in our native medicinal plants that the former irritates the hands and face of the collectors, causing itching and burning.

*RANUNCULACEÆ.**Aconitum napellus.**Monkshood.*

Common in cultivation.

The Dispensatory states that the ointment produces on the sound skin an itching and prickling without redness.

Piffard quotes authorities for its power to excite redness and vesicles.

Working the plant for aconitia often produces severe inflammation of the skin, according to Lloyd.

Actæa spicata.

Baneberry.

Piffard attributes vesicating properties to this plant, common in the Northern States.

Anemone nemorosa. *Wood Anemone. Wind-flower.*

Anemone patens. *Pasque-flower. Pulsatilla.*

The first-named species, of wide occurrence, is one of our earliest and most plucked wild-flowers of spring, and I have not known that it has caused trouble to any one thus handling it, but I am informed by a large wholesale dealer in our medicinal plants that it is regarded as an external corrosive poison, as is the *pulsatilla* also.

The National Dispensatory states that the bruised fresh plant of *Anemone pratensis*, a Western species, when rubbed upon the skin, irritates and may even vesicate it, and that similar acrid properties, due to anemonin, exist in other species.

Piffard quotes authorities who represent both the species named as capable of producing redness, vesicles, and even ulcers.

Oesterlen states that *pulsatilla* is locally an irritant.

Lloyd states that all the plants containing anemonin are troublesome in the laboratory in the process of extracting the latter.

It will be well to bear in mind this character of the Anemones in cases of dermatitis following the gathering of wild-flowers in early spring.

Clematis.

Virgin's-Bower.

Numerous species of this plant are natives of the United States, and several are cultivated for their

showy blossoms. The most common of the former, growing in all parts of the United States, is *C. Virginiana*. The herbage of all is acrid and caustic, according to the text-books of botany.

The Dispensatory represents all the species, especially the European (*C. erecta*, etc.), as possessing essentially the same properties, those of an acrid irritant. The juice of the plant, or the bruised plant applied to the skin, is apt to cause blisters, or even ulcers, and the emanations, when it is crushed, readily make the eyes water and become inflamed. The fresh leaves are used as a vesicant in Europe, and beggars produce sores on their limbs with them purposely, so that the plant is there called beggar's-weed. An infusion of the plant in oil has been used to cure the itch, and violent inflammation of the skin has been produced by friction with it.

Lloyd writes to me that, "in working Clematis for anemonin, our hands were blistered several times."

Delphinium consolida.

Larkspur.

Delphinium staphisagria.

My attention was first called to the poisonous action of the Delphinia upon the skin by Dr. F. C. Shattuck, of Boston, two years ago, who reported to me the following case which occurred in an orphan asylum under his professional charge. Sister M. applied a preparation of the seeds of "larkspur" soaked in alcohol upon the heads of several children for the purpose of destroying lice. The use of *Delphinium staphisagria*, or staves-acre, for such an object is well known. Three days afterwards, an acute dermatitis resembling eczema appeared upon the face and hands,

which lasted a week. The patient had never had eczema nor used "larkspur" previously.

We have in the United States several species of Delphinium, but none of them appear to have been used in medicine. *D. consolida*, however, is much cultivated, and has become naturalized in some parts of the country. Mr. Cheney informs me that this is the species mainly sold in this country, and is largely raised here. A tincture of the seeds mixed with those of *Lobelia inflata* is sold in great quantity as a parasiticide.

The active principle of the genus is delphinin, and this, according to Van Hasselt, is a mild vesicatory. Oesterlen says that it produces great burning and inflammation when applied to the skin, and the National Dispensatory states that an ointment containing it, when rubbed upon the skin, causes burning, prickling, and a transitory redness, such as veratrin occasions.

Helleborus niger. *Black Hellebore. Christmas Rose.*

It is a native of Southern Europe. The rhizome is the part used in medicine.

Piffard ascribes to it vesicating properties.

Ranunculus.

Buttercups.

Some twenty species of native and naturalized Ranunculi grow in the United States, most of which contain a very acrid juice.

Bigelow states that, before the introduction of cantharides as a vesicatory, different species of them were used upon the skin as external stimulants. Their power of occasioning erosion and ulceration appears to have been known to the ancients. A slice of the

fresh root of *R. bulbosus*, one of the most common buttercups, placed in contact with the inside of the finger, brought on burning in two minutes. When taken off, the skin was found without redness, and the sensation of heat and itching ceased. In two hours, however, it returned, and in ten hours a full serous blister was raised. This was followed by an ulcer of a bad character, and difficult to heal. The leaves, flowers, and buds also of *R. bulbosus*, *acris*, *sceleratus*, etc., excite redness and vesication if applied to the skin, and were used as rubefacients in rheumatism, hip disease, and hemicrania. Applied to the scalp, they produce tumefaction, but no discharge. He quotes Tissot's report of a case, in which an application to the thumb caused a deep and painful ulcer, which penetrated to the bone and required some months to heal. In another case, a blister thus produced spread over the whole arm, occasioning fever and delirium. Other cases of similar spreading inflammation are reported by him. He finds that upon some persons the plants do not act. Cattle will not eat them while fresh, but when dry they produce no harm when mixed with the hay.

Loudon states that *R. sceleratus*, common in the United States, may be considered one of the most virulent of English plants. Bruised and applied to the skin, it soon raises a blister, and makes a sore by no means easy to heal. Strolling beggars are said to use it for this purpose to excite compassion. *R. bulbosus* also possesses the property of inflaming and blistering the skin, especially the root; and *R. acris* and *repens* often cause inflammation of the palms when the plants are pulled up.

Van Hasselt describes several of the species as powerfully caustic, and capable of producing deep destruction, and even gangrene.

Our Dispensatory states that fresh *R. bulbosus* bruised may be used as a counter irritant; and that the acrid principle exists in a golden yellow volatile oil, which is readily changed into anemonin and anemonic acid.

Mr. Lloyd writes: "A large family of plants containing anemonin, such as *Ranunculus*, etc., are properly irritants. In working them for anemonin in our laboratory, our hands were blistered several times by contact with these principles."

In virtue of this stimulating action upon the skin, I tried the effect of an application of their juice upon the scalp, on one occasion, in a case of alopecia. A single application produced such peculiar sensations, numbness of the scalp, headache, confusion of thought, etc., that the patient did not dare to repeat the experiment, nor I to advise it.

RUBIACEÆ.

Cephaelis ipecacuanha.

Ipecac.

This plant is a native of Brazil, and its active principle is an alkaloid called emetine, a powerful local irritant.

According to the Dispensatory, the dust or effluvia of the root is apt to occasion inflammation of the air-passages and conjunctivitis, and applied to the skin in the form of an ointment it excites a pustular eruption similar to that caused by tartar emetic.

Piffard quotes several authorities with regard to its action upon the skin, which is described as capable of producing erythema, papules, vesicles, and, according to Duckworth, small, discrete pustules, with a rather large areola, and afterward, if the application be persisted in, large pustules, followed by severe ulceration.

Bazin describes the action of an ointment composed of one part ipecacuanha and two parts lard: "After from two to four gentle frictions, the skin presents diffused erythematous patches, followed after a time by a few quite large, discrete, and red papules. They disappear very slowly, changing to a bluish or violet color, and only fading entirely away after two weeks. The eruption is accompanied by an intense degree of pruritus, so that the tips of the papules are often excoriated and covered with bloody crusts. The inflammation is followed by no exfoliation."

Cinchona.

The many species of trees yielding cinchona barks are natives of Tropical South America. I can find no reference to the occurrence of any inflammation of the skin produced by contact with the crude bark or other parts of the trees, but quinia and its compounds seem to possess this property.

According to the Dispensatory, such eruptions are not uncommon among the workmen in the manufactories of quinine, and a "lichenoid" efflorescence has been produced by a bath containing sulphate of quinine. When applied to the denuded cutis, this salt occasions severe burning and smarting pain, and sometimes forms a superficial eschar.

Bazin gives the results of an inquiry addressed by Chevallier to the principal factories in France, Germany, and England, in the following conclusions. The workmen employed in the fabrication of sulphate of quinine are liable to cutaneous disturbances, which sometimes force them to abandon the occupation. These accidents are very common in Germany and France, less frequent in England. They affect almost exclusively those who boil the bark, those who convert the quinine into the sulphate, and those who place the latter in bottles. The same effects have sometimes followed a simple residence in the factories without employment in them. They consist of erythema, vesicles, pustules, and crusts, seated upon the hands and forearms, the face, and genitals, and in exceptional cases over the whole surface. They are accompanied by great itching. The eruption lasts from a fortnight to a month. These effects are produced, not by the mechanical action of particles, but to quinine emanations. He cites also cases in detail under his own observation. All the workmen do not appear to be similarly disposed to the affection, and some of them are employed for years in the factories without harm; whereas others are so easily affected that a few hours in the laboratory will develop itching, and subsequently the cutaneous inflammation. In some persons the attacks become less and less severe, and gradually cease; but others are obliged to relinquish the work forever.

I am informed by Messrs. Rosengarten and Sons of Philadelphia, one of the largest manufacturers in this country, that occasional cases of the rash occur among their workmen. They state that "those attacked by

it seem to have an idiosyncrasy that renders them unfit for this work. The rash is generally of a very mild character, and soon disappears when they are put to other work."

RUTACEÆ.

Ailanthus glandulosa.

Tree of Heaven.

Introduced from China.

Some years ago I read in some medical journal an account of suspected poisoning by this tree during its flowering season. I made no memorandum of the case at the time, and am unable to find any reference to it, but I remember that it was characterized by a marked dermatitis of the face especially, which was attributed by the recorder to the emanations of this tree, which grew very near the sleeping-chamber of the patient.

I am informed by a person thoroughly acquainted with the properties of our native plants, that he knew the case of a lady who was poisoned by contact with it.

Certainly its intensely disagreeable odors during the flowering season are a warning against approach to it.

We have evidence enough against it to regard it as an object of suspicion.

Pilocarpus pennatifolius.

Jaborandi.

This is a shrub growing in Brazil. Several other plants are known by this title, jaborandi. From it the alkaloid pilocarpine is obtained.

In addition to its stimulation of the sweat glands, the statement is made by the Dispensatory, that the powder irritates the skin by prolonged contact with it.

Ruta graveolens.

Garden Rue.

A native of Southern Europe.

My attention was first called to the poisonous character of garden rue by a statement in Bigelow's chapter on *Rhus*, in which he says: "Even the garden rue is said to affect some persons in a similar manner." Our Cambridge authorities in botany had no knowledge of such property, so that I was surprised to learn how widely and long it has been regarded with suspicion.

Loudon remarks, that in its recent state the leaves will inflame and blister the skin, but much of this power is dissipated by drying.

Van Hasselt says, "Handling the flowers and fruit produces an erythematous inflammation, with burning, itching, and vesication, lasting several weeks."

Oesterlen says, that externally used it produces an inflammation of the skin.

Piffard quotes Soubeiran, ascribing to it the power of producing redness, vesicles, and desquamation.

The Dispensatory gives the case of a man who, after gathering rue, suffered from inflammation of the forearms with abundant vesicles, which healed very slowly. It states that among the ancients it was known to cause a pustular eruption upon the hands of those who gathered it, and was used to destroy fleas.

Bazin relates the case of a druggist who experienced violent itching of the hands after collecting specimens, and on the following day had an eruption upon them

of vesicles in groups. After two days these had extended and formed by confluence large bullæ. This condition persisted for ten days, and terminated in exfoliation. For a space of three weeks small groups of vesicles continued to appear. On the following year this person again gathered specimens of the plant, but took the precaution to take the branch only between the finger and thumb, and to cut it below with scissors; but the experiment was immediately followed by an inflammation, still more intense, of three weeks' duration, which covered the whole surface of the right hand.

The plant is upon the list of the materia medica, and I am informed by a large dealer that it is disagreeable for many to handle when green.

SALICACEÆ.

Populus candicans.

Balm of Gilead.

One of the most popular household remedies for external use in some parts of New England, for several generations back, has been the bottle of balm of Gilead buds preserved in rum or alcohol. The leaf-buds, which are picked in the spring, are large, of a varnished brownish appearance, and are saturated with a strongly odorous resin, which fills the neighborhood of the tree with its penetrating fragrance. The tree was formerly much cultivated around New England homes, and is found growing sparsely in a wild state in the Northern United States and Canada. Possibly its popular name, as well as the strong odor emanating from it, gave to it a reputation for healing virtues. The tincture, prepared in the household by

turning rum or alcohol upon the buds in a bottle, has a brownish color, and retains the strong odor of the tree in spring. It is used chiefly as an application to the skin after bruises, cuts, and sprains, — for such purposes, in fact, as its more fashionable successors in household therapeutics, tincture of arnica and extract of hamamelis, are now so commonly employed ; but it has not yet been wholly supplanted by these. Mr. Cheney, of a firm of dealers in our native drugs, informs me that he sells three hundred pounds of the buds a year, which mostly go to the Western States. The tincture is sometimes rubbed into the skin, sometimes laid upon it as an evaporating lotion, or applied as a fomentation. The sensations generally produced in the skin when thus used are slight glowing, or smarting, if the skin be broken or excoriated. Upon the majority of persons it produces no other appreciable effect ; but in some cases — how frequently it is impossible to determine — it causes a very severe inflammation of the skin, resembling, but exceeding in intensity, that which results from the similar use of tincture of arnica. I have seen instances enough to enable me to recognize the nature of this dermatitis with a considerable degree of certainty at sight, and to distinguish between the cutaneous appearances produced by it and other irritants, although it would be impossible for me to present a table of positive points of difference. An intense grade of erythema, a deep œdematous infiltration, and a formation of large bullæ, are the most characteristic features of the dermatitis. I have not seen the uniform papular efflorescence which occurs so often in mild cases or early stages of dermatitis from arnica, nor have I

ever seen an inflammation excited upon other parts than those to which the preparation was directly applied; whereas after the use of tincture of arnica portions of the skin remote from those to which the treatment has been addressed are very frequently affected through contact with the hands or bandages while wet with it. The duration of the inflammatory process is in proportion to its intensity, and the skin has, in the cases under my observation, always returned to a normal condition in periods varying from two to six weeks.

The following brief account of a case in my service in the skin department of the Massachusetts General Hospital will illustrate its action. A man thirty years old sprained his elbow, without in any way injuring the skin. The limb was rubbed with the balm of Gilead liniment, and bound up over night in a cloth soaked in the same. On the following day the arm was somewhat swollen and very red, and the inflammation increased to such an extent that on the next day the patient applied for treatment at the hospital. The whole limb, from the shoulder down, including the hand, was enormously swollen, and of a deep crimson color. Over large areas serum was freely oozing from the general surface, as if the epithelium were uniformly washed away from such portions by the intensity of the inflammatory process beneath, and as if there had not been time for the formation of the primary lesions which usually precede such a dermatitis madidans. There was scarcely any appearance of papules or vesicles, even at the periphery of the affected integument. On the other hand, there were many bullæ upon the back of the hand, and

upon some parts of the arm, varying in size from a pea to a pigeon's egg. The contents were not distinguished by any peculiar coloration. The sensations in the limb were very distressing, — a great burning and feeling of distention. There was no marked constitutional disturbance. Under treatment the arm continued tensely swollen and vividly red for three or four days, with continual serous discharge; after which the inflammation very slowly subsided, with the formation of the ordinary secondary lesions of involution, namely, crusts and scales, which, with the redness and gradually diminishing œdema, persisted for some two weeks longer. Only a mild degree of superficial suppuration was observed.

In other cases, where the liniment has been longer used, in consequence of mistaking the dermatitis for the effects of the injury for which it was applied, — a very common error, — the inflammation has been of longer duration; but its characteristic phenomena have been those above given. Occasionally, under continued scratching, the process has passed into a true eczema, with a more or less chronic course.

The frequency of occurrence of these cases cannot be readily ascertained, as its use is chiefly in rural communities, and the possibly "poisonous" action of the plant is not generally known. I find, in fact, no reference to such property in any of the works on dermatology or materia medica I have consulted, yet every year I see a case or two in my clinic at the hospital. To those who meet with exceptionally severe cases of dermatitis after injuries, I would suggest the inquiry whether this liniment may not have been used before its development.

Treatment, such as similar grades of dermatitis demand. Rest for the limb in a horizontal position; the application of evaporating lotions of spirit and water; the use of the washes advised in the treatment of Rhus poisoning; or, if more soothing, enveloping the part in cloths spread with bland ointments.

SCROPHULARIACEÆ.

Verbascum thapsus.

Mullein.

The leaves of our common mullein, introduced from Europe as a roadside weed, are thickly covered with woolly hairs which are irritating to the skin. They are often applied to the throat externally, in some parts of the country, to produce a rubefacient effect.

SOLANACEÆ.

Capsicum fastigiatum.

Red Pepper.

This and several other species, *C. longum*, *annuum*, and *frutescens*, furnish the well-known red peppers of the table and pharmacy. Their active principle is a crystallizable body called capsaicin. They are supposed to be natives of Central America, but are now cultivated in most countries.

The rubefacient property of *Capsicum* is well known, as it is often applied to the skin as a domestic remedy for this purpose, and it is much used in the manufacture of stimulating plasters. If its action be long continued, the inflammatory process may advance to vesicle formation.

Datura stramonium.

Jamestown-weed.

A common weed in waste grounds, introduced from Asia.

Mr. Cheney informs me that it poisons the eyes of those who collect it for medicinal purposes, causing their eyelids to swell.

Stramonium ointment produces no irritation upon the skin, so far as I am aware.

THYMELEACEÆ.

Daphne mezereum.

This is a shrub indigenous to the high latitudes of the eastern continent. Two other species with similar properties, *D. gnidium* and *D. laureola*, are found in Southern Europe. The bark, as is well known, is used both internally and in the form of an ointment.

Loudon states that the whole plant is extremely acrid, and that in France the bark is applied to the skin for the purposes of a "perpetual blister."

Oesterlen remarks, that all parts of the plant produce on contact irritation and inflammation, and that the tincture, extract, and ointment are used as a rubefacient.

According to the Dispensatory, the bark when fresh, or after soaking in water, reddens the skin, and at length occasions vesicles followed by painful ulcers, which are difficult to heal. It mentions the case of a girl on whose cheek the fresh juice of the plant was rubbed. This was followed by extreme swelling, pain, and a vesicular eruption. It states that the comminution of the bark requires some precaution to avoid

the injurious effects of the dust, although its poisonous action is generally limited to the mucous membrane of the workmen. It represents the nature of the active principle as uncertain.

Dirca palustris. *Leatherwood.* *Moosewood.*

This shrub grows abundantly in the Northern United States and Canada, and more sparingly in the Southern States. It is noted for the toughness of its fibres.

The Dispensatory states that all parts have a nauseous acrid taste, and contain an unknown acrid principle. The fresh bark applied to the skin causes redness and vesication, and sores which are very difficult to heal.

TROPÆOLACEÆ.

Tropæolum majus. *Garden Nasturtium.*

The common garden nasturtium, a native of Peru, so abundantly cultivated of recent years, and in such gorgeous variety of coloring, possesses, as is well known, a pungent taste in all its parts, resembling that of the Cruciferæ, which makes its seed capsules, when pickled, a pleasant condiment. Beyond this slightly warming or stimulating effect upon the mucous membrane, it is not supposed to exert any exciting action upon the human tissues. In exceptional cases, however, it may give rise to a decided inflammation of the external skin. In two persons I have known it to produce a dermatitis repeatedly, and in other instances I have suspected, but could not positively determine, that it has been the exciting cause

of similar troubles. Its action may perhaps be best illustrated by a brief description of the cases.

Case I. — A few years ago a lady of thirty or more years presented herself to me for treatment of an apparent acute eczema of papular and vesicular type upon the hands, the inflammation being most advanced upon the fingers, including the palmar surfaces. There was little in the appearances to suggest an artificial or extraneous origin to the inflammation, with the exception of a rather unusual preponderance and exaggerated development of vesicles. On inquiry it was ascertained that the patient had been engaged for a long time in handling the plants in an extensive nasturtium bed two days in succession before the eruption appeared, and that she had noticed on both occasions an immediate itching sensation in the hands. The course of the affection was that of an acute eczema of similar grade under local treatment. The following year, at the same season, this whole history repeated itself. A morning's work in training the young nasturtium creepers was followed by the development of an identical dermatitis, scarcely varying to an appreciable degree from an ordinary eczema. Since then she has avoided contact with this flower.

Case II. — A young lady consulted me for an acute inflammatory affection of the right hand. The lateral surfaces of the fingers were thickly occupied by vesicles, which were more sparsely scattered also over their dorsal surfaces, the back of the hand, and the wrist. Upon the inside of the whole hand similar lesions were seen imbedded in the thickened epidermis, unable to assume their ordinary dome-shaped roofs. The subjective symptoms were great heat and itching.

Two or three days previously the patient had picked with the bare right hand a large bunch of nasturtiums, and subsequently carried them for a considerable time in the same hand. The left hand had remained gloved all this time, and did not come in contact with the plant or flowers. As nearly as she could remember, she had washed her hand within an hour after picking the flowers. On the following day she felt an itching in the hand, and within twenty-four hours after contact the eruption had become noticeable. The appearances when seen by me could not be distinguished from an ordinary acute eczema in its fullest development. Subsequently many of the vesicles upon the lateral and dorsal surfaces became confluent, ruptured, oozed, and crusted, according to the ordinary course, and then the whole process, under treatment, rapidly underwent involution, so that the complete duration did not exceed fourteen days. Two years later a similar attack of eczema-like dermatitis followed the inadvertent handling of nasturtium plants before the flowering season. Since then she has had no cutaneous disturbances, with the exception, ten years later, of an artificial dermatitis of the back of the neck, following the application to the scalp of stimulating applications in the course of treatment for alopecia areata, showing that her skin is very susceptible to the action of irritants.

The type of the dermatitis in both these cases was purely eczematous; indeed, it would be impossible for one well skilled in dermatology to distinguish it from exceptionally uniform but possible vesicular eczema. It may be wrong to call it anything else; if so, we may then say with certainty that these patients would

not have had the eczema without contact with nasturtiums, or that this plant is capable of exciting an eczema. To this view I see no objection.

No mention of such irritative action of the nasturtium is to be found in books of botany or in medical writings, so far as I have been able to consult them; but its near resemblance to the Cruciferæ in its pungent properties makes it probable that such cases may not be of infrequent, although unrecognized occurrence.

UMBELLIFERÆ.

Ferula galbaniflua.

This plant is a native of Northern Persia. It exudes spontaneously a gum resin, known in pharmacy as galbanum.

Applied to the skin, according to the Dispensatory, it occasions a papular efflorescence, and if the true skin be exposed it causes it to ulcerate.

Piffard represents it as rubefacient and irritant to the tender skin.

Heracleum lanatum.

Masterwort. Cow-Parsonip.

Growing in all parts of the country north of Pennsylvania.

This plant occupies a prominent position upon the list of the "botanic" practitioner, and finds a place in our Dispensatory also, which describes it as possessing a rank odor and a pungently acrid taste. Its leaves applied to the skin may produce vesication, and have been used as a counter irritant. The active principle is not known.

Thapsia garganica.

Thapsia.

This herb is a native of Northern Africa and Southern Europe.

The Dispensatory states that its acrid principle is a resin. This applied to the skin produces an intolerable itching and a copious vesicular eruption. If the action is prolonged, the eruption becomes confluent and leaves a suppurating, ulcerating surface, with subsequent scars resembling those of small-pox. The juice also irritates the skin, and workmen employed in making the extract are much troubled by swelling of the hands and face. It also states that in the Therapeutical Society of Paris, in 1882, all its leading members condemned thapsia plasters as unnecessary and as sometimes dangerous.

Bazin remarks that its application produces an eruption remarkable for the numerous and uniform vesicles, and for the rapidity with which pus forms in them.

URTICACEÆ.

Urtica.

Nettle.

Laportea.

Wood Nettle.

There are two genera of the Urticaceæ in the United States which possess stinging properties, *Urtica* and *Laportea*. The former, in addition to the native species, is represented by the well-known *Urtica dioica* and *U. urens*, introduced from Europe and of common occurrence in waste places. The native stinging species are *U. gracilis*, common in New England and Canada; *U. purpurascens*, growing from Kentucky to Louisiana; and *U. chamædryoides*, from Kentucky

southward ; also *Laportea Canadensis*, in the moist rich woods of Canada and the United States.

Some years ago, while collecting plants for my herbarium on a hot summer day, I found growing on the edge of a stream in a wood a plant, with large leaves on slender petioles and inconspicuous flowers, with which I was unacquainted. I picked several specimens, which I placed in my box without stopping to examine them. Within two or three minutes I perceived a sensation of burning on the back of my thumb, and, seeing that the part was somewhat reddened, concluded that I had been bitten by a mosquito. In a few minutes later, however, the whole radial half of the dorsum of the left hand, in which the plants had been so briefly held, became violently red, and presented numerous well-marked wheals of circular shape and boldly prominent. The skin of the part within five minutes was considerably swollen. The sensations were an intense burning with a moderate degree of itching. I then suspected the nature of the plant, and placed my hand in the brook, retaining it there for ten minutes. Even under water the wheals continued to develop for this period, gradually becoming confluent and forming a uniform densely hard thickening of the skin. Subsequently I bound the hand up in a wetted handkerchief, and on my return home after an hour's walk the skin had nearly returned to its natural appearance, but it continued to itch and burn for two or three hours longer, and later a slightly benumbed sensation in the part was experienced. The plant, on examination, proved to be *Laportea Canadensis*, or the wood nettle, handsomer but rarer than our stinging species of *Urtica*, and pre-

senting in its appearance nothing to excite suspicion as to its venomous nature.

This was a typical but mild illustration of the stinging properties of the *Urticæ*, from which our term *urticaria* has been derived. The action of their stinging-glands is at times, however, much more violent and of longer duration, according to extent of cutaneous surface affected and individual susceptibility of the victim. Urtication was formerly practised for the cure of paralysis, impotence, lethargy, etc., and consisted in beating the skin with a bunch of nettles. The result was the development of an immediate hyperæmia or erythema, and an abundant efflorescence of wheals. After the third or fourth successive application the skin ceases to react under fresh contact.

An excellent account of the anatomy of the stinging organs of the nettle is given by J. Duval-Jouve.¹ His observations were made upon *Urtica urens*, *dioica*, and *pilulifera*. According to his investigations, they possess three kinds of hairs, only one of which has stinging properties. These are unequally scattered over all parts of the plants. They consist of a needle-like cell, with a bulbous dilatation at the base, and terminating in a somewhat blunted or swollen point, which is bent upon itself at a right angle at the extreme tip. They are erect and about two millimeters in length. They are hollow to the extremity of the point, and are filled with a colorless transparent liquid, holding in suspension a fine granular matter. The walls of this needle-like cell contain numerous vacuoles arranged in a spiral manner. If one of the stings be applied

¹ Étude sur les Stimules d'Ortie. Bull. de la Soc. Botan. de France, XIV. 36.

with the forceps gently to the skin, it will be seen by the aid of a lens that the tip has entered and been broken off within the epidermis, appearing as a minute white point, and that a little liquid is spread upon the surface round about. If the tip be merely touched with the point of a needle, it will be seen to rupture and discharge its fluid contents, while the sting itself elongates and contracts. If a needle be dipped in this liquid and inserted in the skin, the ordinary stinging sensations are produced, but only feebly and briefly. Dipped in the fluid of the bulb, the sensations thus produced are still more feeble. The liquid taken from the tip gives a distinctly acid reaction with litmus, whereas that contained in the bulb does not. If the plant be seized boldly with the hand, many of the stinging glands fail to pierce the thickened epidermis of the palm; but in the folds of the articulations, on the lateral surfaces of the fingers and the back of the hand, and upon the wrist, numerous stings will always succeed in implanting themselves. The sensations are generally almost immediately noticeable, and in some parts last for a short time only; in others they last for a whole day even.

These effects of contact with American and European species of *Urticæ* are trifling compared with the action of those growing in the East Indies. The most venomous of these are *U. urentissima*, *U. crenulata*, *U. stimulan*s, and *U. ferox*. The third of these, according to Van Hasselt, produces at first only a mild burning, which increases in an hour to most raging pain, without swelling or redness. The pain extends over the whole body, and lasts twenty-four hours, accompanied by trismus. It begins to abate on the following day,

but does not wholly disappear for a week. Figuiet quotes the following account of the action of *U. crenulata* by De la Tours. "One of the leaves slightly touched the first three fingers of my left hand. At the time, I only perceived a slight pricking, to which I paid no attention. This was at seven in the morning. The pain continued to increase. In an hour it had become intolerable; it seemed as if some one was rubbing my hand with a red-hot iron. Still there was no remarkable appearance, neither swelling, nor pustules, nor inflammation. The pain spread rapidly along the arm as far as the armpit. I was then seized with frequent sneezings, and with a copious running at the nose. About noon I experienced a painful contraction of the back of the jaws, which made me fear an attack of tetanus. I went to bed, hoping that repose would alleviate my suffering, but it did not abate; on the contrary, it continued nearly the whole of the following night, but I lost the contraction of the jaws about seven in the evening. The next day the pain left me. I continued to suffer for two days, and the pain returned when I put my hand into the water, and I did not finally lose it for nine days." Again, a species in Timor produces, as Van Hasselt states, an erysipelatous dermatitis, with most intolerable pain, trismus, tetanus, and death, in the same way as after extensive burns. According to other accounts, the sufferings may be protracted for a year.

The nature of the poisonous principle contained in the glands of the *Urticæ* has not yet been definitely determined. They have been reported to contain formic acid and carbonate of ammonia, but formic acid does not produce wheals when pricked into the skin,

nor the formidable class of symptoms attributed to the tropical species.

Cases of poisoning by nettles rarely come to the physician for treatment in this country, probably because the duration of the urticarial condition is so brief. I have never seen a case, with the exception of that upon my own hand. Possibly the family physician in the country might have a wider experience in the treatment of the affection. Works on dermatology offer only the briefest description, if any, of their effect upon the skin. Large quantities of some of the introduced species are gathered in some parts of the country for medicinal purposes, one dealer in North Carolina offering in a recent circular one thousand pounds for sale. The dried plants are harmless when handled.

Treatment. — This may be very briefly considered. The duration of the effect of all the species growing in the United States upon the skin is short, never, so far as I know, exceeding twenty-four hours, and rarely more than two or three. In our ignorance of the nature of the active principle, it would be useless to discuss the action of antidotes. Probably the course of the erythema and urticarial efflorescence would be abbreviated, and the burning pain alleviated, by the application of evaporating lotions of alcohol and water. Possibly the addition of carbolic acid or laudanum would relieve more quickly the subjective symptoms.

OTHER IRRITANTS,

ORGANIC AND INORGANIC.

OTHER DEPARTMENTS

THE UNIVERSITY OF CHICAGO

The University of Chicago is a leading center of research and learning. It is a place where the best minds in the world meet to explore the frontiers of knowledge. The university is committed to the highest standards of academic excellence and to the advancement of the human spirit. It is a place where the past and the future meet, and where the light of truth is always burning.

OTHER IRRITANTS,
ORGANIC AND INORGANIC.

IN this list is included a great variety of substances, many of which are among the most powerful cutaneous irritants known. They are all capable of exciting a dermatitis by contact, although some of them may also produce a caustic action upon the skin.

Saccharum.

Sugar.

The old-fashioned term "grocer's itch" is rarely applicable in these days of refined and double-refined sugars. Formerly, when brown sugars were almost universally used in the household, it was employed to signify an eczema of frequent occurrence upon the hands of the grocer, who handled not only these, but many other substances belonging to his trade, which were more or less irritating to the skin. What share the sugar had in thus exciting the skin, it is impossible to say, but to it was attributed the greatest. These sugars often contained an abundance of mites, but it is improbable that they excited any irritation by contact. In sugar and candy manufactories a mild papular dermatitis of the hands and arms is not uncommon among the workmen; but we have here a very active cause of irritation of the skin in operation also, viz. direct

heat and a general high temperature of the work-rooms. A mixture of brown sugar and salt, or sugar and salt pork, is often used to stimulate an inflammation of the skin. The inflammatory condition of the skin in diabetes may be directly due to the sugar circulating in its tissues.

Oleum Terebinthinæ.

Oil of Turpentine.

Oil or "spirits" of turpentine has long been used as an external application to produce counter irritation, or a rubefacient effect upon the skin. This is best accomplished by wringing out a flannel cloth in hot water, then saturating it with the turpentine and applying it to the skin. In a few minutes great heat is felt in the part, soon transformed into smarting, which in fifteen or twenty minutes becomes almost unbearable. On removing the cloth, the skin is then found to be of an intense uniform redness, which persists for several hours, and does not wholly fade out for two or three days. If such stupes be kept too long upon the skin, vesication may result.

Applied simply to the skin turpentine may generally be used freely, even over extensive surfaces, without producing the slightest irritation. Thus in the treatment of tinea versicolor it may be rubbed over the whole trunk daily for an indefinite period without exciting the skin.

The vapor of turpentine seems at times to be more stimulating to the skin than its direct contact. In several instances, mostly in women, I have seen an eczematous inflammation of the face, which I have referred to the frequent use of the oil in cleaning pallets and brushes, and in many cases I have seen repeated aggra-

vation of acne among young lady artists, which I ascribed to the same cause.

Tar.

Oil of Cade.

Pix liquida.

Oleum cadinum.

These empyreumatic oleoresins, the former obtained by destructive distillation from the wood of our Southern pines, the latter from the *Juniperus oxycedrus* of Southern Europe, and similar products from the birch and beech, may all be considered under the common name of tars. They all act alike upon the skin in health and disease. Useful as they all are when applied externally in the treatment of several diseases of the skin, they frequently cause disturbance of its tissues from injudicious use, and in some persons cannot be employed at all in this way. As a rule, the skin in a state of acute inflammation is intolerant of their application except in a very dilute state, so that their chief usefulness in cutaneous therapeutics is in the chronic, especially the scaling stages of its inflammatory affections.

They are capable of exciting two forms of inflammation, even when applied to the skin largely diluted in the form of ointment, or solution. One is a diffused dermatitis, characterized by uniform thickening and redness of the area to which it has been applied, with much burning and itching, which subside slowly, and sometimes pass into an eczema of indefinite duration. The other form is a well-marked acne-like inflammation of the follicles, occurring as papules, and papulo-pustules, discrete or grouped, and variable in size. The mouths of the follicles are often strongly defined by a black stain or plug of dried tar, so that

both the tips of the inflamed glands, as well as those which remain unaffected, present the appearance of comedones. Sometimes the papules or pustules are surrounded by a well-marked halo of redness. This condition is called tar acne. It has been sometimes observed in workmen employed over machinery lubricated with tarry compounds, and under other conditions by which the atmosphere of working-rooms is impregnated with the vapor of tar. In some persons the comedo-like formations are extensively present when no folliculitis occurs. The affection generally disappears soon after the exciting cause ceases to act upon the skin.

Creasotum.

Creasote.

Since the introduction of carbolic acid into such frequent use in therapeutics, the employment of creasote as an application to the skin has become almost obsolete. Applied in an undiluted state it causes a considerable degree of reddening and irritation, and on parts denuded of epidermis it produces an immediate white appearance due to the coagulation of the albumen of the cutaneous fluids, with the formation of an eschar. Even upon the normal surface of the skin it may act as a caustic, when painted over it thoroughly or repeatedly.

Acidum Carbolicum.

Carbolic Acid.

The application of undiluted carbolic acid to the skin produces an immediate burning sensation, followed by tingling and partial loss of sensibility. The part becomes at first white, and later remains of a

reddish brown tint for a considerable time. The surrounding integument is reddened, and a more or less intense dermatitis ensues beneath the superficial eschar thus formed, which may last for two or three weeks, marked by fluid and cell exudation, and the formation of sero-purulent or even hemorrhagic crusts. The action is at times purely caustic, but only superficial. It is on account of its superficial escharotic action that its application in a concentrated form to the skin in the vegetable parasitic affections is not advisable, as the eschar thus formed serves as an impenetrable shield to its continued action upon the plant life below it. At times it is described as producing a sort of mummification and death of the whole cutaneous tissues, when applied to a portion of integument for a considerable time.

In such diluted states as are generally employed in cutaneous therapeutics, carbolic acid is capable of producing a decided irritation, an erythematous and papular inflammation of the integument over wide areas, characterized often by a peculiar brownish hue, which may be sustained or excited to higher grades of dermatitis even, by continued use. By its injudicious use in this way, inflammatory affections of the skin are often prolonged or aggravated.

In such extreme dilutions as are employed in surgical antiseptic sprays, dressings, and baths, too, carbolic acid often irritates the skins of nurses and dressers, causing generally an erythema or a fine papular efflorescence upon the hands and arms, so much exposed to contact with them, identical in appearance with ordinary eczema of the same grade.

Paraffin.

Ogsten describes, according to Piffard, a condition of the skin of workmen engaged in working crude paraffin at Aberdeen, who are brought in contact with the shale and oily matters mixed with it. In the acute form, the hands, wrists, feet, and legs soon become covered with an eruption of bright red nodules, usually largest and most numerous on the wrist. The backs of the hands are most severely affected, while the palms and soles remain unaffected. The redness and induration, which are confined to the hair follicles, gradually diminish after a little time, and leave the follicle enlarged and its mouth dilated. In this way by successive invasion of this inflammatory process, the hair follicles of all workers in paraffin become enlarged and patent, so that the black dots in the skin strike the observer at once. This is more noticeable in persons with dark skins and coarse hair.

In chronic and exaggerated cases, the backs of the hands and feet, fingers and toes included, exhibit a peculiar honeycombed appearance of the skin, which is elevated, thickened, and inelastic, so as to render flexion painful and difficult. This appearance is due to densely grouped clusters of hair follicles distended with accumulations of dry epithelial cells, so as to easily admit the entrance of a probe within their mouths. The hairs become atrophied and disappear, and cracks and bleeding fissures form in the affected parts. In some workmen these changes in the skin are so serious that they are obliged to give up the occupation.

Petroleum.

Oleum Petræ. Rock Oil.

According to the Dispensatory, the application of crude petroleum to the skin may produce eczematous eruptions, and Piffard quotes from Koehler the statement that workmen in petroleum suffer from a scarlatinoid eruption, or from furuncles upon exposed parts of the skin.

On the other hand, I have seen teamsters, engaged in transporting the crude material from the railroad tank to the refining factories, wash their faces and hands in a bucket of the oil. For years I have used it for the destruction of scalp and pubic lice, directing it to be applied to the head and genital regions, and to be left in contact with the parts for hours at a time; and although the skin is frequently greatly inflamed in consequence of the presence of these parasites, I have never seen the slightest evidence of any irritative action produced by its use.

It may be that workmen in refineries suffer, as above stated, from contact with some of the very numerous products obtained by the various processes there employed, and not from the crude oil itself; but I am informed by the superintendent of one of the largest refineries in the country, that it is only very rarely that any irritation of the skin occurs among his workmen. This is noticed especially in hot weather, and among those only who have to do with the paraffin products. It consists of a mild degree of eczematous inflammation of the backs of the hands and forearms, which passes away rapidly after giving up the occupation. It affects but a small proportion of the workmen. It should be stated,

however, that the crude oils used in this establishment do not contain as large a percentage of paraffin as some others.

Acidum Pyrogallicum.

Pyrogallic Acid.

This product of the sublimation of gallic acid, lately introduced into cutaneous therapeutics, and largely discarded in turn on account of the fatal results which have followed its use in several instances when extensively applied to the skin, is capable also of producing an active local inflammation when used upon the integument in ways not otherwise dangerous.

It is frequently employed in the form of an ointment, powder, or mixed with gelatine or traumaticin, etc., for the destruction of morbid tissues in lupus and epithelioma. If an ointment, ʒss or ʒj to ʒj of lard or vaseline (smeared upon linen), be applied to an area of the disease and renewed morning and evening, it may be worn without much pain for twenty-four or thirty-six hours. Later it causes great smarting and burning, and if removed at this period it will be found that the healthy integument surrounding the disease in contact with the acid is often in a state of intense inflammation. The natural redness of the dermatitis is concealed by the blackening of the parts, due to the oxidation of the acid, but the epidermal layers are softened and elevated by the fluid exudations beneath them, and on being cast off show a freely suppurating surface. A thick, dark crust is established, beneath which the process of repair takes place with a complete restoration of the normal skin. If the application be continued beyond the above periods for any considerable time, a deeper-seated inflammation may

ensue, resulting in a destruction or sloughing of the sound skin in direct contact with the preparation, and in a dermatitis of a milder grade affecting the surrounding integument to a considerable extent. The ulceration thus produced results, of course, in a permanent cicatrix.

It is stated in the Dispensatory, and by some writers on dermatology, that pyrogallic acid does not affect the healthy tissues when applied in this way for the destruction of the morbid growths in the affections above mentioned, but this is an error. Examples of its irritating action upon the normal integument are published in the "Journal of Cutaneous Diseases," for January, 1886, by Dr. C. W. Allen of New York.

Acidum Salicylicum.

Salicylic Acid.

Salicylic acid as applied to the skin in diseased conditions, mostly in the form of ointment, cannot generally be borne beyond certain strengths without increasing any inflammation which may be present, or exciting it where it did not previously exist. Upon an inflamed surface, as in acute eczema, an ointment of ʒss to the ounce will often greatly aggravate the inflammation, and sometimes the skin will not tolerate one of more than gr. v. Upon non-inflamed surfaces ʒj to the ounce will generally be borne without injury, but occasionally this proportion will produce hyperæmia, or even a papular dermatitis.

Acidum Formicicum.

Formic Acid.

Concentrated formic acid applied to the skin produces violent inflammation, severe burning pain, and

vesication, closely resembling the action of the Spanish fly. Its prolonged contact has caused sloughing.

Acidum Picricum. Picric Acid. Carbazotic Acid.

This acid, in addition to its powerful dyeing properties upon the skin, is stated by Piffard, quoting Grangé, to be capable of producing also erythema, vesicles, and pustules.

Chloral.

Hydrate of Chloral.

Chloral hydrate applied to the healthy skin produces a sensation of heat and redness, and is stated by the Dispensatory to act as a powerful irritant upon wounded surfaces. Saturated aqueous solutions are said to have produced a vesicating and even caustic effect upon the skin. Used as an anti-pruritic in dilute alcoholic solutions, ʒj to Oj, it is capable of creating a considerable degree of warmth and erythematous inflammation, and even a fine papular efflorescence, when sopped upon the skin two or three times a day. In the more concentrated form of camphorated chloral, consisting of equal parts of chloral and camphor rubbed together into a syrupy liquid, it produces intense burning pain for a short time, and often a brief dermatitis when applied to restricted areas, as in pruritus ani, but its irritative effects are disproportionately less than those of the weaker solutions above mentioned.

The "Medical Press" (October 13, 1886) attributes vesicating properties to chloral hydrate. It recommends that it be spread in powder form upon adhesive plaster warmed over a gas jet until the chloral becomes

discolored and melted, and applied to the skin, which should be anointed beforehand with olive oil. It should be allowed to remain in contact with the skin for fifteen minutes, and it blisters without producing any unpleasant sensation.

Chloroformum.

Chloroform.

Chloroform applied lightly to the skin produces a slight degree of redness. If used freely and incautiously, especially about the genital regions as a parasiticide in pediculosis pubis, it may produce an intense dermatitis, great redness and swelling, papules, vesication, etc. If evaporation be prevented after its application, it readily produces a blister. In the diluted state in which it exists in the various liniments used for the relief of neuralgia, etc., it is capable of exciting redness, and even the formation of vesicles, if employed too freely.

Acidum Sulphurosum.

Sulphurous Acid.

The officinal solution of sulphurous acid often produces when applied to the skin, in the treatment of pruritus, the vegetable parasitic affections, etc., a considerable erythema and fine papular efflorescence, so that its use has to be discontinued.

Acidum Sulphuricum.

Sulphuric Acid.

In concentrated form, this acid destroys the cutaneous tissues deeply, abstracting their watery elements, and carbonizing them. In the process of repair irregular cicatrices are often formed, much hypertrophied, and causing great deformity and disfigurement. Its

action as a caustic in surgery, therefore, is not to be recommended. The diluted acid, sometimes employed in the treatment of skin diseases, and in the arts, is also capable of exciting the skin to a state of erythematous and papular inflammation.

Acidum Nitricum.

Nitric Acid.

Applied gently to the skin in concentrated form, nitric acid changes it to a bright yellow color; applied freely or rubbed into it forcibly with a sharply pointed stick, it causes the epidermis to swell and turn white, and forms an eschar, beneath which the process of repair is completed in ten days or a fortnight. As a caustic, thus employed, in the treatment of superficial epithelioma and other new growths of the skin, it holds a high rank, as its action is confined to the tissues to which it is applied.

Acidum Hydrochloricum.

Muriatic Acid.

Hydrochloric acid and nitro-muriatic acid in concentrated forms act as superficial caustics upon the skin, but less powerfully than nitric and sulphuric acids. Used in weak solutions, as baths and fomentations, they sometimes produce a general erythematous irritation, or a mild follicular inflammation.

Ammonia.

Aqua ammoniæ, if lightly applied to the skin, readily dissolves the epithelial layer, but if allowed to remain long in contact produces an erythematous or even vesicular inflammation. If the strongest or caustic preparation be applied to the skin upon lint it will

soon cause a blister, and later a deeper destruction or cauterization of its tissues.

Concentrated solutions of carbonate of ammonia may excite a mild degree of inflammation.

Potassa.

Potassa applied to the skin rapidly destroys its tissues, so that it is often used as a quick cautery. The inflammation thus produced extends to a considerable extent beyond the borders of immediate contact, and downwards throughout all the cutaneous structures. Mixed with caustic lime, it forms the highly destructive Vienna paste.

Concentrated solutions, applied by compresses upon or rubbed into the skin, quickly dissolve the epithelial layers, and stimulate to resolution chronic inflammatory cell-infiltrations beneath. The dermatitis thus excited must be controlled by the immediate use of cold compresses and soothing ointments.

Weaker solutions, and of the carbonate as well, as used in alkaline baths, may produce a general redness or fine papular eruption.

But it is in certain employments that the irritating action of potash upon the skin is chiefly met with. Printers very frequently have an eczema of the hands excited by handling rollers and types which have been cleansed by potash. Soapmakers present all varieties of acute and chronic eczematous inflammation of the hands. Washwomen and others who use soft or potash soaps frequently have hands which are dry and chapped, or may exhibit all grades of dermatitis. Sapo viridis is often a violent irritant of the skin, as injudiciously used in the treatment of its diseases.

Soda.

The effects of caustic and concentrated solutions of soda are similar to those produced by potash, but soda soaps rarely produce more than a drying effect upon the skin when the alkali is in excess.

Calx.

The affinity of quicklime for the water of the tissues, and the great heat evolved by such union, make it an active caustic when applied to the skin. Its milder irritating properties are seen upon the hands of masons.

Sodii Chloridum.

Common Salt.

Salt may be handled in its dry form without harm, but a concentrated solution of it applied to the skin is capable of exciting a papular efflorescence. The use of brine baths at certain health resorts also produces upon the surface of many persons a fine papular eruption of an eczematous character. The concentrated waters of our Great Salt Lake have produced similar results. I have seen not only these mild forms of inflammation upon the hands of pork packers, who handle moist salt and concentrated saline pickles, but also much more severe forms of dermatitis, impetiginous, furuncular, and ecthymatous lesions, and sometimes diffused, deeper-seated inflammation. As such persons are often intemperate in their habits, and as other elements are present besides the salt, animal fluids of course, it is impossible to judge how exclusively the salt is the cause of the irritation; but I have not met with just such appearances in workmen engaged in other occupations. The popular use of mix-

tures of moistened salt and sugar to stimulate the skin already in a state of inflammation, as over boils and abscesses, is well known.

Sulphur.

Sulphur, in nearly all the forms in which it has been for so long time applied to the skin, is capable of producing great irritation of its tissues. As an ointment, powder, wash, fumigation, or bath, it may cause an erythematous, papular, or vesicular inflammation, according to individuality of integument and duration of contact. Used, as it is so commonly, as a salve in the treatment of scabies and chronic affections of the skin, it often, if employed injudiciously, greatly aggravates the existing dermatosis. I have repeatedly seen the eczematous accompaniments of scabies aggravated and sustained for months by the continued use of this substance. It would have performed its serviceable duty as a parasiticide in three days; its longer application becomes a perpetual irritant. I have often seen sulphur preparations convert a psoriasis into an active eczema, and their excessive use in acne often over-stimulates the skin of the face. A sulphur vapor bath may produce a universal erythematous or papular dermatitis of great intensity.

Similar forms of cutaneous inflammation are excited by the combinations of sulphur and the alkalies, if employed without proper care; the compounds chiefly used in the treatment of skin diseases being sulphide of potassium and Vlemingx solution, a pentasulphide of calcium. Solutions or baths of the former may produce a papular or vesicular efflorescence, partly due, perhaps, to the action of the alkaline element, but

chiefly, without doubt, to the sulphur. The over free use of the Vlemingx solution in the treatment of scabies, psoriasis, acne, etc., very readily excites an active inflammation, characterized by hyperæmia, dryness, and chapping, or by swelling, and a fine papular eruption. Upon the most sensitive parts of the skin it may produce extensive excoriations, or the formation of vesicles.

Iodine.

Iodine is applied to the skin generally in the form of simple tincture, compound tincture, ethereal tincture, or the more concentrated "iod-glycerine," made by rubbing up equal parts of iodine and iodide of potash in glycerine. All these preparations, even slightly used, produce a reddish brown stain upon the skin, and some degree of redness and heat, followed by desquamation. Applied more thoroughly, especially the last two, they cause severe pain, and an inflammation of the cutaneous tissues, amounting almost to a caustic action. The common custom of painting considerable areas of the skin with the simple tincture sometimes produces great swelling or "caking" of the integument, which is very painful, and may last for several days as an acute dermatitis. The epidermal structures are so altered and stiffened by the action of the iodine as to be unable to indicate this condition by the ordinary lesions, and the surface retains its flattened and even level. Occasionally, however, the inflammation seems to be more concentrated within or surrounding the follicles, and an acneform efflorescence, papulo-pustular, appears, of considerable size, which persists after the more superficial and general dermatitis has subsided.

*Iodoformum.**Iodoform.*

The Dispensatory states that the application of iodoform to the sound skin and ulcers is not at all irritating, and, farther on, that it has excited a severe eczematous eruption. This substance is used with the greatest freedom as a dressing to wounds, ulcers, and denuded surfaces of all sorts, in dispensary and hospital practice, and generally, no doubt, without harm. On the other hand, it is very frequently the cause of inflammation of the healthy integument surrounding the seat of its application for such purposes. I have observed many cases of this nature, in which the inflammation, starting up in the immediate vicinity of the ulcer or wound, has spread from it as a centre over extensive areas of skin. The character of the dermatitis is generally eczematous, resembling eczema erythematosum and papulosum. The skin is uniformly red, swollen, and thickly occupied by minute papules, which become excoriated at points, and discharge serum without passing into the vesicular stage. Occasionally more intense grades of inflammation are produced, indicated by great œdema, by abundant vesiculation, and by the formation of large bullæ. Such effects are more likely to occur when iodoform is applied to the scalp or its vicinity, and are very threatening in appearance for a time. The inflammation may persist as an ordinary eczema long after the exciting cause has ceased to act. Sometimes the dermatitis may be produced upon parts remote from the original sore by the accidental or careless scattering of the powder upon such distant parts during treatment, or by its too profuse application over a large extent of surface surrounding a wound, either by the attendant,

or by loosely adjusted dressings. Such results more commonly follow its use in the form of powder.

Cutler in his paper on iodoform poisoning (Boston Medical and Surgical Journal, July 29, 1886) refers to several cases of dermatitis produced by its application to the skin.

Bromum.

Bromine.

Bromine is a powerful corrosive irritant of the skin, producing rapid cauterization of its tissues in its concentrated form, and at times gangrenous sores. Its action upon wounds for the destruction of unhealthy tissue is well known, and is extremely painful.

Chlorum.

Chlorine.

Chlorine gas acts as an irritant upon the skin, producing prickling and redness when held in contact with it, and sometimes an eruption of papules and vesicles. Its solution in water, aqua chlori, has sometimes produced an irritation of the skin also. Chlorinated soda and chlorinated lime solutions occasionally cause a mild degree of inflammation, erythematous and papular in character, in workmen employed in bleacheries, paper-mills, etc.

Arsenicum.

Arsenic.

Various preparations of arsenic are the frequent cause of dermatitis, owing to their large use in the arts. As pigments, in the preparation of wall and other colored papers, in printed and dyed cloths for garments and artificial flowers, in combination with aniline and other dyes, as preservatives of sizings and pastes, for curing hides and bird skins, etc., they are

used in vast quantities, and the workmen employed in manufacturing and those manipulating these products are subject to a great variety of inflammatory processes of the skin.

The action of arsenical compounds upon the skin was studied by Bazin experimentally, by rubbing them repeatedly into it. The mildest grade of inflammation produced is an erythema, which is diffused, and upon which, later, small papules may develop, which increase in size, or fine transparent vesicles and pustules may arise. The last are conical, with a red base, and rapidly become purulent at their tips and covered with yellow crusts. By further contact with the arsenic the pustule is converted into a characteristic ulcer, which is round, with a grayish or reddish moist base, and is sometimes surrounded by a dense induration. It may penetrate the cutaneous tissues deeply, and is generally painful. Such, too, are the lesions which affect the workmen employed in the arts in which arsenical compounds are freely used. Their most common seat is the hands, especially about the nails, and the forearms, parts which come directly in contact with the arsenic. They frequently affect also the face, especially the regions of the lips and nose, behind the ears about the neck, the scrotum and surfaces of the thighs adjoining, and the toes.¹

The following cases will illustrate various grades of dermatitis.

CASE I.—I was called to see a baby two months old which was receiving nourishment from a wet nurse,

¹ See article on Arsenical Eruptions, by Prince A. Morrow, M.D., in *Journal of Cutaneous and Venereal Diseases*, July, 1886.

and was plump and of healthy appearance. During the preceding week there had developed a papular eruption upon the cheeks, and a slight intertrigo behind the ears and in the folds of the neck. In spite of the treatment advised, the disease increased rapidly in extent and severity, the whole face presenting within ten days a papular efflorescence of vivid redness, confluent and excoriated, while a considerable portion of the scalp was affected in the same way. Upon the neck the opposing surfaces of the integument within the deep folds were intensely reddened and excoriated at their juncture, at the bottom of the furrows. In the folds of the axillæ, in the groins, and in several of the deep folds on the inner surface of the thighs, the skin presented the same intense grade of intertrigo. Upon the lower legs there was an eczematous papular efflorescence. I continued to treat the child from December 1st to February 6th without being able to control the inflammation at all. After the first two or three weeks the child's digestion became disturbed, and the stools assumed a bright green color and were over frequent. It ceased to gain in weight also. The wet nurse was changed twice, the second one because she had several attacks of acute indigestion; but with the third one, a florid, healthy woman in all respects, no improvement in the child's condition took place. On this latter date, February 6th, the wall-paper upon the child's room attracted my attention, (the baby had until then been brought down-stairs at my visits,) and on analysis it was found to be highly arsenical. It was an old French paper, and the pigments were loosely laid on. The patient was removed to another room, and an immediate change in the child took place.

The intestinal discharges became less frequent, and after a few days lost their green color; the intertrigo became at once less red and moist; and there was a gain during the first week of three quarters of a pound in weight. At the end of the second week another pound had been gained, the diarrhoea had wholly ceased, the intertrigo had disappeared from all parts, and there was only a little dry and scaly eczema left upon the cheeks. All these rapid changes ensued without any alteration in the treatment employed. The development of the dermatosis in this case ten days after beginning to occupy the arsenical chamber, the very unusual area of intertriginous inflammation in the winter season, its extraordinary resistance to treatment, and its immediate recovery on removal to another room, with the other symptoms, leave no doubt in my mind that it was an example of arsenical dermatitis.

CASE II. — A few years ago a student consulted me with regard to his hands. The palmar surfaces were universally occupied by vesicles buried deeply beneath the thick horny layer, as closely approximated as possible without becoming confluent, and varying in size from a large pin's head to a medium-sized pea. They presented with their semi-translucent coverings that peculiar boiled-sago-like appearance considered to be characteristic of so-called dysidrosis. The pressure of the imprisoned fluid produced but a slight bulging of the cuticle overlying the individual efflorescences, but towards the lateral surfaces of the fingers the lesions became more prominent, and in the more yielding epidermis between them well-developed elevated vesicles. There was considerable general thickening of

the integument, with much burning and itching. All these manifestations of an acute dermatitis reached their height of development in three or four days, and subsided in the course of the following week, leaving a somewhat prolonged desquamation of the palms, corresponding to the depressed roofs of the vesicles in their stage of involution, none of which had been able to discharge their fluid contents. The patient had been using a few evenings before the beginning of the inflammation a pack of playing cards, the backs of which were printed with arsenical green.

Some years after this attack the same patient, then Dr. X., of the staff of the Massachusetts General Hospital, showed me his hands again in a state of acute dermatitis, of which he kindly furnishes the following account. A few days after papering a screen with some wall-paper, after the manner of paper-hangers, i. e. moistening the paper with paste and laying it upon the frame and brushing the colored side until it became smooth, a number of fine papules appeared in groups upon the dorsum of the fingers of each hand. In twenty-four hours they had increased rapidly, and were accompanied by burning and tingling. Many of the papules coalesced and formed vesicles. The hands were swollen and painful, and the inflammation extended to the lower forearms. New efflorescences appeared for several days, and the attack lasted some ten days. A piece of the paper was examined by Dr. Charles Harrington, who reported that it was "loaded with arsenic," and was one of the worst samples he had ever seen.

CASE III. — On the 19th of the month my opinion was asked concerning a patient applying for readmis-

sion to the Massachusetts General Hospital, from which he had been discharged "well" twelve days previously, after five weeks' residence on account of "anæmia and general debility." He had been at work for a week, but for two days his mouth had felt sore, and he had noticed red spots upon his hands and forearms. When I saw him, these parts were swollen, and presented numerous erythematous patches, which in some parts had already passed into papular forms of inflammation. His face was very red and greatly swollen, so that his eyes were nearly closed. The ears were of nearly double their natural thickness, and were discharging serum. The œdema and redness extended downwards upon the neck as far as it was exposed to view only. There was also serous oozing and crust formation upon the chin. It was evidently a case of severe artificial dermatitis. On the following day, the 20th, the face presented a more general incrustation, and there was free oozing of serum from its surface. The eyes could be partially opened. On the 21st, the skin of the face and neck remained as before, but the backs of the hands and forearms were covered with serous and sero-purulent vesicles. On the 22d, the face was still more crusted, and the hair was falling in great quantity from the whole scalp. On the 23d, the vesicles upon the hands and forearms had increased greatly in number and size, and by confluence some groups had been converted into large, prominent bullæ. There was some oozing from these parts, and crusts were beginning to form upon them. In the evening the patient's condition had become greatly exaggerated. The face was so swollen that it seemed ready to burst, and, indeed, was discharging serum profusely from numerous

points. The eyes were entirely concealed. The hands and arms were of enormous size, and were also dripping freely. The temperature had risen to 102.5° F. The pulse was 100. The patient appeared to be in a very dull mental condition, and made but little complaint. On the following morning, the 24th, there was a free general sero-purulent exudation from the face, and the temperature rose again in the evening, but only to 101° F. From this time the inflammation of the skin slowly subsided. On the 28th, the eyes could be opened, and the face was nearly free from crusts. On the 7th of the following month the patient was discharged, although the skin of the parts affected was still reddened and desquamating. It was learned during his illness that he had been engaged for three days previous to the appearance of the cutaneous symptoms in fastening pieces of white webbing into sample books, the paper linings of which, as determined by chemical analysis, were covered with green arsenical pigment.

Arsenical preparations are used purposely for the destruction of cutaneous tissues. Their action varies from that of a simple depilatory to that of a caustic of deep penetration. They may give rise to gangrene, and have produced fatal results by absorption.

The following list of articles in which arsenical pigments, dyes, or mordants are used is found in the article by Professor Wood in the report of the Massachusetts Board of Health for 1884 on "Arsenic as a Domestic Poison": —

Paper, fancy and surface-colored; in sheets; for covering card-board boxes; for labels of all kinds; for advertising cards; for playing cards; for wrappers

and cases for sweetmeats, cosaques, etc.; for the ornamentation of children's toys; for covering children's and other books; for lamp-shades; paper hangings for walls and other purposes; printed or woven fabrics intended for use as curtains or covering for furniture; printed or woven fabrics, intended for use as garments; children's toys, particularly inflated india-rubber balls with dry color inside; painted india-rubber dolls, stands and rockers of rocking-horses, and the like; glass balls (hollow); distemper color for decorative purposes; oil paint for the same; lithographic color printing; decorated tin plates, including painted labels used by butchers and others to advertise the price of provisions; japanned goods generally; Venetian and other blinds; American or leather cloth; printed table baizes; carpets; floor-cloth; linoleum; book-cloth and fancy bindings.

Hydrargyrum.

Mercurial Preparations.

Mercury and its compounds are used upon the skin in the form of ointments, lotions, baths, and fumigations; and in all such forms it is capable of producing dermatitis in varying degrees of intensity. The preparations most commonly employed with such results are unguentum hydrargyri, ung. hydrarg. ammon., liquor hydrarg. nitratis, and solutions of hydrarg. chlorid. corrosiv.

Mercurial ointment, as employed in the inunction cure of syphilis, where it is rubbed into considerable areas of the skin for several minutes — ten to twenty — at a time, and for months consecutively, is ordinarily borne without producing noticeable irritation. In exceptional cases, however, especially in the hot

season, it causes an inflammation of the seat of friction, characterized by diffused erythema, by an abundant eruption of papules, which rarely pass into vesicles, or by simple hyperæmia of the follicles.

White precipitate ointment is a more active irritant than the above, as generally used upon the skin in a state of disease. If applied, in the strength of a drachm to the ounce of lard, to an eczematous surface, for instance, it often aggravates the existing dermatitis, or changes a chronic state of inflammation into an acute one.

Nitrate of mercury or citrine ointment is still more irritating, and often causes a decided dermatitis, redness, swelling, papules, and vesicles, when injudiciously applied to the skin in the treatment of its inflammatory and non-inflammatory affections. The liquor hydrargyri nitratis is a powerful caustic when applied to the skin, causing a yellow coagulation and crust, and producing severe inflammation of the cutaneous tissues surrounding the point of application. Its local action closely resembles that of nitric acid, and in fact is largely due to the presence of the latter in an uncombined state.

Corrosive sublimate may be applied to the skin in aqueous solutions of one grain to the ounce, generally without irritation, upon surfaces even somewhat inflamed. Stronger solutions must be used cautiously, and frequently produce erythematous, papular, and vesicular inflammation when applied as lotions even to the sound skin. The use of the antiseptic solutions, dilute as they are, in the form of spray and bath, not unfrequently excite a mild degree of dermatitis, erythematous and papular, of the hands and arms of surgical dressers and attendants.

Antimonii et Potassii Tartras. *Tartar Emetic.*

Solutions of this double salt applied to the skin produce a variable degree of redness and superficial irritation according to their concentration, but mixed with fat it gives rise to deep and intense dermatitis of long duration ; the lesions are at first papular, rapidly changing to vesico-pustules, which increase in size and closely resemble the eruption in variola with the exception of not being umbilicated. They are seen and felt to be deeply seated, and are surrounded by a considerable hyperæmia. The pustules are fully formed in four or five days, and terminate in thick crusts, or in open ulcers, which heal very slowly and often leave permanent scars. Sometimes deep sloughs are formed, resulting in disfiguring cicatrices.

Salts of antimony (chloride) are often used as a mordant in process of dyeing, and frequently produce upon the hands and forearms of workmen, who handle the fabrics moistened by them, a violent dermatitis, resembling papular, oozing, and pustular eczema. Such cases may arise, therefore, where the pigments themselves employed in the dye-house are perfectly harmless.

Argenti Nitras. *Nitrate of Silver. Lunar Caustic.*

It is on account of the failure of nitrate of silver to produce dermatitis that its use in cutaneous surgery is so general and valuable. This negative property is no doubt due to the rapid affinity of the silver salt for albumen, which is instantly coagulated, forming a firm shield, which prevents the extension of the caustic action beyond the immediate point of contact

with the tissues. On this account the fused stick of caustic may be bored deeply into softening diseased tissues, like lupus, without producing more than a slight redness and swelling of the surrounding and healthy integument, which subside within a few hours or days. Applied to the healthy skin in a moist state, it produces a white stain, which soon becomes gray and later black, but, if gently used, no inflammatory action. If it be rubbed violently into the sound skin for a considerable time, it may possibly produce vesication and a superficial eschar; but this is not followed by the formation of a scar.

Zinci Chloridum.

Chloride of Zinc.

Chloride of zinc, through its strong affinity for water, acts as a powerful corrosive caustic upon the cutaneous tissues, producing a mummifying action upon those with which it comes in contact, and a considerable inflammation in those surrounding, with great pain. These properties have brought it into frequent use for the destruction of morbid growths of the skin. Fatal results through absorption have followed its application to the lip.

Acidum Chromicum.

Chromic Acid.

Chromic acid, in an undiluted form, acts as a powerful and rapid caustic upon the skin, forming a black eschar, and leaving a superficial granulating surface. Upon workmen engaged in its manufacture or use, it frequently causes intense dermatitis of the hands and arms, and bad ulcers. Its use in surgery for the destruction of excrescences and new growths of the cutaneous tissues is well known.

Potassii Bichromas.

Bichromate of Potash.

In combination with potash, chromic acid is still a powerful irritant of the skin. Applied in concentrated form to cutaneous growths, it destroys them; but its action is less violent than that of the free acid. Its dust, inhaled, produces destructive ulceration of the nasal mucous membrane. Strong solutions applied frequently or habitually to the skin produce an eruption of papules and pustules, and later deep sloughs and ulcers. Thus workmen who employ it in their arts — dyers, electricians, photographers, etc. — are liable to deep and painful ulcers on the hands and arms. Recently attention has been called to its irritative action upon the skin in wearing apparel. Dr. Harrington (Boston Medical and Surgical Journal, August 12, 1886) has published an important paper upon this subject. He finds that chrome mordants are used in the production of brown, brownish red, claret-red, olive, yellow, old gold, purple, buff, gray, and black dyes. He cites the case of a capmaker, who, after cutting up a piece of dark blue cloth for boys' caps, experienced in a few days an intense itching of her scalp, face, neck, and hands. Later the itching became general, and sores appeared upon the neck, breast, thighs, and hands. The ears were swollen and oozing. After sewing the caps, the fingers became swollen and very painful, and ulcerations about the nails developed, resulting in the loss of three nails. Poisoning was suspected, and an analysis of the cloth demonstrated the presence of a large amount of chromium. The work was discontinued, and in a short time the cutaneous symptoms disap-

peared. Two years afterwards she spent some time in dusting and packing away the same unmade caps, and on the following day her hands again became sore, especially the nails, and one of the latter "came away." Another case was that of a clergyman, who, after wearing for three or four days a pair of newly purchased brown woollen mixed gloves, noticed a redness and irritation of hands and wrists. He continued to wear them, however, for a few days longer, until he noticed that the increasing inflammation ceased abruptly at the line where the gloves ceased to come in contact with the wrists. Then they were laid aside, and a subsequent examination showed the presence of a large amount of chromium, and the absence of arsenic and antimony. The eruption was "at first in the form of pimples, but afterwards many of them ran together and became blotches." Later, considerable ulceration occurred, and at the end of some two months the large and deep ulcers had healed.

I have seen several cases of deep-seated dermatitis produced by gloves and stockings of quiet colors which may have been due to the presence of chrome mordants. The presence of chromium compounds was not ascertained because not looked for; but the absence of arsenic in the fabrics was determined in several of the cases.

Cases of irritation by this substance are so common among photographers that the affection has recently been described by Dr. B. W. Richardson, of London, as "the bichromate disease." It begins with a violent irritation between the fingers, and spreads over the hands and wrists. The solution of bichromate employed in the carbon process is one part in twenty

of water. Persons whose skin is thus affected are obliged to work with rubber gloves.

Platini Chloridum.

Chloride of Platinum.

Strong solutions of the perchloride of platinum act as an irritant upon the skin, producing an eruption of papules. In concentrated form it causes the formation of a yellowish white eschar, with great redness of the surrounding tissues.

Poisonous Clothing.

Formerly cases of dermatitis from articles of wearing apparel were mostly produced by dresses or veils of brilliant colors readily recognized to be arsenical dyes, as green tarlatans, etc., and instances of this nature still occasionally occur; but in the past twenty-five years, since the discovery of the aniline pigments and new processes of developing and fixing colors by mineral mordants, the poisonous nature of clothing has immensely increased, and can be no longer recognized or suspected by its tints. The great variety of brilliant dyes made from aniline or coal tar are largely produced by the agencies of such powerful irritants as compounds of arsenic, mercury, and chromium, and often contain traces or considerable quantities of these substances when employed in the arts. In the processes of mordanting and printing too, chromium, antimony, and arsenic are used in great quantities, and remain in the fabrics as possible sources of irritation. In some instances where arseniate of alumina has been employed as a substitute for albumen, twenty grains of arsenious acid have been extracted from a single yard of calico. It is not surprising, therefore,

that workmen engaged in dyeing and handling such cloths, milliners and dress-makers who make them up, and those finally who wear garments made from them, should suffer from contact with them. The most common sources of such forms of dermatitis are colored undershirts and drawers, socks, and gloves, garments which are worn in long and close contact with the skin, but hat linings and shoe linings also occasionally produce similar results. Paper collars and cuffs have also caused inflammations of the skin from the presence of arsenic in the sizing employed in their finish or glaze. Less frequently, outer garments, both thin and heavy fabrics, have given rise to similar cutaneous disturbances. It is not the brilliant red dyes alone which are dangerous; the most quiet colors may be equally so. I once treated a case of intense bullous dermatitis of the feet in parallel lines with interspaces of healthy skin. On comparing these markings with the stockings, which were colored in alternate stripes of scarlet and brown, it was found that the bands of inflammation corresponded to the brown dye.

The nature of the dermatitis produced by such poisonous articles of clothing varies from simple hyperæmia, papulation, vesiculation, or pustulation to excoriations and ulcerations, and according to the part affected, the duration of contact, and individual susceptibility. The particular form of inflammation is of course determined also by the nature of the poison in the dye; but as these are generally preparations of arsenic, antimony, or chromium, their effects have already been described sufficiently in detail in the accounts of these substances respectively. Some cases

of unmistakable poisoning of the skin by clothing do occur, however, in which none of these substances are present, and in which the irritating element cannot be recognized by chemical tests. The diagnosis of these cases of dermatitis is simplified by the abrupt lines of demarcation, in most cases, between the inflamed and healthy areas of skin, the limitation of the process to regions which fit certain articles of clothing worn in direct contact with them, and the intensity and sudden development of the inflammation. The skin is, moreover, generally more uniformly affected than in other dermatoses with which it might be confounded.

Electricity.

The application of electrical currents to the skin is capable of creating all degrees of excitement, inflammation, and destruction of its tissues, according to their strength, nature of electrode, etc. When applied in a diffused form over considerable areas, a slight degree of prickling, heat, and redness only are produced. If more condensed or longer sustained, contact with electrodes, even when covered with wetted cloth, may produce wheals, erythema, and papules of rapid formation, which may subsequently develop into vesicles, pustules, or even slowly healing ulcers. The application of the electrolytic needle to the skin produces an immediate decomposition of its fluids at the negative pole, with the destruction of the tissues with which it is in contact. When employed in the operation for hypertrichosis, in which the needle is introduced to the bottom of the hair follicle, a red papule arises immediately, often capped by a crust, which

sinks down in a day or two, and leaves a slight red point, which may remain for one or more weeks, and occasionally a minute white depressed scar, to mark the seat of the former follicle. If the needle be inserted into several adjoining follicles in succession, the dermatitis excited is much more violent, expressed by the formation of large papules or tubercles covered with serous or hemorrhagic crusts, and permanently by large disfiguring scars. The insertion of the positive pole produces a charring, carbonizing action upon the tissues. When employed in the form of the thermo-cautery, the destructive effect upon the skin and the after action depend upon the degree of heat to which the electrode is raised. At the temperature of redness the subsequent inflammation of the tissues is generally more diffused and extensive than that which follows the more rapidly destructive action of the cautery at white heat.

ANIMAL IRRITANTS.

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

ANIMAL IRRITANTS.

A WORK on Dermatitis Venenata should contain at least a brief account of the action of certain of the lower animals upon the skin.

The number of these which are capable of producing some degree of inflammation in the cutaneous tissues by biting, stinging, or by mere surface contact, is considerable. It is excited in almost all cases by the insertion into the skin of some irritating substance, the nature of which is mostly unknown, connected with the mouth, mandibles, proboscis, etc., by means of special stinging organs situated elsewhere, or by the mechanical action of hairs, bristles, and the like. As with the vegetable irritants, the skins of all persons are not affected in the same degree by such agencies, and there is reason to believe that the cutaneous tissues acquire a protection against some of these animal poisons by repeated inoculation. I reproduce here, in substance, a communication published some years ago upon this subject.

The law of more or less permanent and perfect protection against the subsequent action of many morbid agencies after primary inoculation is well recognized, although in no degree satisfactorily understood. The infrequent recurrence of the exanthemata in the same individual, the great immunity of

variolized persons from a repetition of the process, the still rarer repetition of syphilis, so rare that its possibility was long denied, the accepted theory of the influence of acclimatization, so called, over the action of miasmata, are sufficiently obvious illustrations of it. Perhaps, too, the protection against the toxical action of many of the mineral and vegetable poisons, gained by long-continued and gradually increasing doses, may be mentioned as a pertinent example of the same law, though less permanent in effect than in the instances first mentioned.

The tissues and fluids of venomous snakes, as far as can be estimated by our capabilities of discernment, are identical with those of harmless species ; yet a small glandular arrangement of their tissues can make from these innocuous fluids a poison in swiftness and intensity of action equalling the most deadly of those produced by the chemistry of the laboratory or vegetable kingdom. Now, strange to say, experiments conducted by most careful observers have demonstrated that this poison, so universally fatal to warm-blooded animals and all harmless serpents, when injected naturally and directly by the fangs, or artificially by the syringe, into the blood and tissues of the serpents producing it, or other individuals of the same or even allied species, produces but slight or no poisonous effect whatever. "It is fairly to be concluded," Dr. Fayrer writes, "that the cobra is not affected by the poison either of the daboia or of its own species ;" and with regard to our own native poisonous serpent, the rattlesnake, Dr. S. Weir Mitchell records experiments proving that it "is not susceptible of being injured by the venom of its own species." How can we explain this immunity except by reference to this mysterious law of protection through self-inoculation, accomplished by the gradual absorption through life of minute quantities of virus? To the toxical action of all other poisons the same tissues are most delicately susceptible, as much so as those of the non-venomous serpents.

Whether man or other animals can be protected against injury from them by inoculation with their virus in quantities too small to produce serious results, or whether a person once

bitten and escaping death is no longer susceptible of injury from them, are questions of great interest in this connection; but I can find no reliable data, founded on experiment, upon which they can be answered. I am permitted, however, to give an extract from a note by Professor Jeffries Wyman pertaining to the subject: "I have received your note with reference to poisonous snakes. I know of no *good* evidence that man is rendered less susceptible to their poisons by inoculation. When in Surinam I was assured by Dr. Craigin, a very intelligent and careful observer, that the negroes there practised inoculation, and were rendered safe thereby. He stated that such persons were employed to hunt venomous snakes that had found their way into houses, and that they handled the snakes with impunity. I always felt, however, that there was a defect in the evidence, and did not consider the assertion *bien constaté*." This assertion of Dr. Craigin at least indicates the existence of a popular belief in the effective protection of inoculation.

But the animal poisons which now concern us are not of this grave kind, and their action upon the human tissues is limited to the immediate vicinity of the point of insertion in most cases. It is only by the multiplication of these individual points, and over considerable areas of surface, that effects in any way serious are produced. We have all had ample opportunity for personal study of the ordinary appearances produced upon the skin by the bite of a mosquito, flea, or that other and vile insect which shares with them their love of human blood. The prick of a lancet or needle, which draws the same quantity of fluid that they extract, produces but a momentary sensation of pain, and the minute wound closes by the elasticity of the tissues, or by the plastic elements which exude, and there the process ends. Not so with the lesion produced by these insects. There is first perceived a sensation of heat or itching in the part, and the hand is half involuntarily directed to the relief of the telltale nerve, although not always referred to the centre of sensation at once, so that a large portion of the contiguous skin is often rubbed or scratched before the right spot

is reached and temporary ease thus obtained. On looking, we see somewhere about the middle of the region we have been at work upon, and standing up in bold contrast to the reddened surface around it, a white and flattened prominence of irregularly circular outline and hard, brawny feel, which increases in size according to the amount of original irritation, external friction, and individual temperament, and finally flattens down and disappears, leaving behind only in some cases a minute spot or depression, indicating the point of insertion of the poison. This is the ordinary effect of its introduction, although there are persons fortunate enough to be possessed of envelopes either so much like leather, or so blunted in sensibility, or so little to the taste of these insects, as to be uninjured by their attacks. There are those, on the other hand, on whom these appearances are greatly exaggerated, or who exhibit in the course of twenty-four hours a repetition of the same process, as if the poison had renewed its activity, or in whom the effects are not confined to the immediate locality of the bite, but extend to large portions of the neighboring tissues, and cause great œdema and inflammation.

But under peculiar conditions quite different and much more serious lesions of the skin are produced by the bites of all these insects.

A family consisting of parents and four children, the latter between six and eighteen years of age, came to the Skin Department of the Massachusetts General Hospital for advice. The father and mother presented upon their faces, necks, forearms, and hands a very abundant outbreak of large and small papules, more or less prominent and mostly excoriated, among which were a few wheals and large vesicles. In the children, in addition to these forms of efflorescence, the whole skin of these parts was in an erythematous condition, and in the older two there were numerous pustular and furuncular, almost ecthymatous lesions. It was in the youngest two children, however, that the climax of the disturbance was developed; for upon them the process of free exudation was carried to its extreme limit in the form of very large bullæ, which were so generally

distributed upon the regions above named as to give a predominant character to the whole efflorescence and constitute an apparent pemphigus of extreme grade. Some of these blebs upon the arm of the boy were more than three inches long, and contained more than half an ounce of fluid. No better illustrations of the progressive passage of one form of well-defined efflorescence into another, from erythematous spot, through papule, vesicle, pustule, to furuncle, or from wheal to bleb, and of the insufficient basis their halting stages alone afford for the establishment of distinct titles in nosology could be desired. Yet this great diversity of appearances, embracing nearly every form of acute cutaneous lesion recognized, was produced by one and the same exciting cause in all the cases, viz. the bites of mosquitos. The differences presented by the various individuals of the family were such as are consistent with the well-known greater tendency to exudation in inflammatory processes of the skin in childhood than in the same affections in adult life. The subjective symptoms in all were only slight itching, and the soreness necessarily consequent upon the gravity of the lesions. There was no constitutional disturbance.

How now shall we explain the serious and unusual effects of so simple and common a disturbing cause as mosquito bites in this instance? Similar manifestations and of as varied a type, although of much milder degree, I have often seen in individual cases before; but the fact of six persons of one family simultaneously exhibiting such extraordinary results, shows the existence of some unusual element in the case. That element I believe to have been a want of protection against the poison of these insects through prior inoculation. The family, leaving their home in England, had arrived in Boston well and clean two weeks previous to my seeing them, and had spent that interval in lodgings in a street at the North End, where there were many mosquitos, insects they had never seen before. Although the appearances were confined to parts exposed to their bites, they were quite unsuspecting of the cause of trouble.

Here was then a new virus inserted through hundreds of points into tissues and fluids never before impressed by its presence; unprotected, as I assume, by this mysterious influence of past contact or mixture. I am justified in my conclusion moreover, I think, from observation in many other instances. The worst cases of mosquito bites that I have been called upon to treat, serious enough to require medical advice I mean, have been in foreigners newly arrived in Boston from Europe, or in persons from other parts of the country, where our city mosquito of late summer and fall is not found.

I find an interesting confirmation of this view in Froude's "Oceana." He writes thus of his first night spent in Sydney, Australia: "I awoke in the morning bitten over hands and face. Where the mosquito has fastened his fangs and poured in his poison, there rise lumps and blotches which irritate to madness. The blotch opens into a sore, and I was left with a wound on the back of my right hand, which did not heal for a month. Happily he chiefly torments the new-comers. I was inoculated that night, and suffered no more afterwards. Perhaps the blood is in some way so affected that the venom finds an antidote."

From my own experience, I can testify as to the protection which acquaintance affords against the bites of the other two insects named. I was never bitten by a bedbug until I left my home for life at Cambridge. For some time their attacks upon me there were productive of large swellings, in appearance like those of erythema nodosum, and in parts of loose texture, as the eyelids, of considerable œdema, not unlike erysipelas of those parts. Gradually, as I got used to them, as we say, an expression highly suggestive in this connection, the effects were less and less severe, and since that time the extended acquaintance with them which travel and our system of frequent change of servants in domestic life makes unavoidable, has reduced the severity of their action upon me to a mild urticarial lesion of a few hours' duration. This personal experience I know to be that of several of my friends, with whom I have spoken on the subject. Classes of persons, on

the other hand, who are brought up with them as bed companions, and whose homes swarm with them, will almost always say that they do not mind them much, or are unconscious of their presence, although their young children present at first all the characteristic appearances of being severely bitten. Yet they prey upon old and young alike.

With fleas, too, my experience warrants a similar conclusion. This insect is by no means so abundant in New England as in warmer regions of our own country, or in the districts of the Old World most frequented by travellers. The majority of the residents of our New England villages and towns very probably have never seen or been bitten by a flea, except possibly by those of the dog or cat. To such the plague of fleas met with when they travel abroad is perhaps the most acute and longest remembered impression of their foreign trip. It by far outbalances the exemption from the annoyance of the bugs and mosquitos incident to their home travel.

My first nights in the Vienna Gebärhaus under those long-wooled blankets, so well adapted to flea-breeding, were hours of torment, and after each of them my body for the next thirty-six hours was the thickly covered seat of an urticarial efflorescence of a phoenix-like type. But after a month or two I got used to the fleas, so that their bites were borne with some degree of equanimity, and the irritation caused was confined more strictly to the immediate proximity of the point of insertion, and with no tendency to recur after the shortened primary sensation had passed. Those, on the other hand, brought up in daily contact with them, generally pay little heed to their attacks; and the terms *custom* and *use* applied in explanation of this latter fact, when we think to interpret them, are but the unconscious recognition of the operation of the law in question.

These data may seem insufficient to establish a theory, not, so far as I know, generally adopted hitherto; but I mainly cite my own case alone, because it has afforded me the best opportunity for close and long-continued observation, while it is fully sustained by my general experience in special practice.

The application of this law to the insects above named assumes, of course, the power on their part to irritate the skin in some way other than mechanically; and although a study of their anatomy fails to reveal anything to explain the nature of this function, and they are not recognized as secreting a poison, the peculiar effects of their bites can be accounted for in no other way. It is a property no doubt conferred upon them for the purpose of stimulating the circulation of the part injured, and of thus bringing to them a freer flow of their desired food, which the skin resents. The prurigo-like papule, the purpuric macule, the livid and lichenoid efflorescence, the wheal and the œdematous nodule, which give an unmistakable individuality to the bite of the louse, flea, mosquito, and bed-bug respectively, cannot possibly be reproduced, or in any way imitated, by the puncture or laceration of the cutaneous tissues with a clean metallic instrument. They are the result of contact with some peculiar and distinct virus or irritating substance in each case, and are to be considered in this connection quite apart from the secondary and general lesions which follow upon and are caused by the subsequent scratching they excite.

If there be sufficient evidence in what I have adduced to show the possibility of adding this as another instance to the list of illustrations first mentioned of the mysterious law of protection by inoculation, it will strengthen still more the conviction that an ever-increasing number of foreign elements is engrafted upon man's normal essence as he progresses in life, which are more or less lasting and transmissible in their effects, and which essentially modify his primitive nature.

Hydrozoa. Medusæ. Polyyps.

Among these low forms of marine life there are many which have the power of irritating the skin, and hence are called *urticæ marinæ*, *orties de mer*, *Seenesseln*, etc. Most of them possess special cells or bladders, which contain stinging filaments coiled

within them, ready to be uncoiled or darted against anything which presses upon them, and to discharge an irritating fluid. Many of the jelly-fishes, which abound in our waters, possess this property, and frequently cause an intense prickling and redness of the skin among swimmers. The water in which they live may derive from them similar irritative properties. Much more powerful effects are produced by some of the tropical forms.

Mr. Bennett thus describes the action of *Physalia utriculus*, the Portuguese man-of-war: "On one occasion I tried the experiment of its stinging powers upon myself intentionally. When I seized it by the bladder portion, it raised the long cables, and, entwining the slender appendages about my hand and finger, inflicted severe and peculiarly pungent pain. The stinging continued during the whole time that the minutest portion of the tentacula remained adherent to the skin. . . . The secondary effects were very severe, continuing for nearly three quarters of an hour; the duration being probably longer in consequence of the delay occasioned by removing the tentacula from the skin, to which they adhered by the aid of the stinging capsules. On the whole being removed, the pain began to abate; but during the day a peculiar numbness was felt, accompanied by an increased temperature in the limb on which the sting had been inflicted. For some hours afterwards the skin displayed white elevations, or wheals, on the parts stung, similar to those resulting from the poison of the stinging-nettle. After the creature has been removed from the water for some time, the stinging property, although still continuing to act, is found

to have perceptibly diminished. I have observed, also, that this irritative power is retained for some weeks after the death of the animal in the vesicles of the cable, and even linen cloth which has been used for wiping off the adhering tentacles, when touched, still retained the pungency, although it had not the power of producing such violent constitutional irritation."¹

Mr. A. Agassiz, of the Museum of Comparative Zoölogy, whose practical experience with marine life is so extensive, kindly sends me the following information.

MUSEUM OF COMPARATIVE ZOÖLOGY,
Cambridge, Mass., Nov. 26, 1886.

There are among the Fishes a number of species which are dangerous from wounds inflicted by sharp spines of dorsals and pectorals, or anals.

Among Annelids there are many species the sharp bristles of which produce great pain, accompanied by numbness. They belong mainly to the family of Amphinomidæ and Eunicidæ.

Among the Polyps and Sea-anemones, many of the larger tropical and deep-water species produce a stinging effect, like nettles, from action of their large lasso cells. Many species of Corals do the same, — in a less degree, however.

But it is among the Jelly-fishes that the most dangerous animals are found. The large red *Cyanea* of our coast will, if it surrounds an arm or leg or body, irritate to such an extent, combined with producing numbness, as to become quite dangerous. Many of the Jelly-fishes with large tentacles have to be handled with the greatest care on this account. Action produced by lasso cells similar to those of the Polyps. In the Portuguese man-of-war (*Physalia*) the lasso cells are very powerful, and the sting produced is most painful. There are others among the Siphonophores which are also dangerous. The Hydroids of some of the Jelly-fishes also produce a gentle irritation from a similar cause.

¹ Wright's "Animal Life."

Among the Sea-urchins, those with short, sharp, delicate needle-like spines — Diadema, Echinothuriæ, Spatangoids — produce when handled a similar sensation to that produced by Jelly-fishes. In some cases the spines have a poisonous gland (?), a bag attached to the shaft, which may serve to irritate the wound. If you want this in greater detail, I could give you some more names; but it would take me quite a while to hunt them up. The above are the general groups in which such action has been noticed.

Yours truly,

ALEXANDER AGASSIZ.

Hirudo medicinalis.

Leech.

In addition to the peculiar wound or bite made by the mouth of the worm, instances are on record in which more or less severe erysipelatous inflammation of the surrounding skin, and long and persistent sup-puration, even circumscribed gangrene, have followed the application of leeches.

Acanthia lectularia.

Bedbug.

Pulex irritans.

Common Flea.

Culex pipiens.

Mosquito.

These three insects, which draw their sustenance in part from human blood by puncturing the skin, produce an inflammation characterized by one common form of lesion, the wheal. Variations from this typical efflorescence occur, as the mildest and most fugitive exhibitions of erythema immediately surrounding the point of puncture, or a minute red papule; or, on the other hand, large areas of œdema, as in giant urticaria, causing great disfigurement lasting for a day or two at times. In some persons no impression whatever seems to be produced upon the cutaneous tissues by

the "bite," not even the usual subjective symptoms of itching. Occasionally, as in true urticaria, the wheal will subside after a few minutes or hours, to revive with its primary intensity after half a day or longer, and this intermittent activity may continue for two or three days. Occasionally the wheal may give place to a small papule of several days' duration, and in exceptional cases to troublesome excoriations. In persons whose tissues are of feeble vitality, especially children, or saturated with alcohol, still worse lesions may result, — pustules, ecthymatous forms of eruption, or ulcerations, which are slow to heal. Hemorrhagic extravasations about the puncture, especially those of the flea, occasionally occur, and pigment stains not unfrequently mark the seat of all these forms for an indefinite time. Still more exceptional and exaggerated inflammatory lesions may be produced upon the skins of those who are bitten for the first time, as was described above. But are there any distinguishing marks by which the bite of any one of these insects may be recognized? The mosquito generally stings those portions of the skin which are uncovered by clothing, as the hands and face, but the lower legs of children are often protected only by stockings which are easily penetrated by the "bill," and in the night the bed-clothes are often thrown wholly off, so that the whole surface may exhibit the "bites." The lesions are often much more numerous than those produced by the flea or bedbug, owing to the great numbers which often attack the person at one time. The poison, moreover, seems to be less virulent in character than that inserted by the last two insects, as the lesions are generally smaller and shorter-lived.

The bite of the flea generally exhibits in the centre of the wheal a slight pit or dark point, which marks the puncture. The efflorescence is often grouped closely, so as to form at times elevated areas of considerable extent, and the itching is generally more intense than with either of the others, and more persistent. It is more disposed also to present hemorrhagic effusions. The bedbug is as insatiate in its ravages as the flea, and often makes an incredible number of bites within a small area. It may attack during the night parts ordinarily unprotected by clothing, as the hands and face. The injuries they all inflict upon the skin are generally confined to the direct lesions, and are rarely accompanied or followed by the secondary forms of eruption which form so important a part of pediculous disease and scabies.

There are numerous other flying insects, other species of mosquito, midges, gnats, etc., capable of producing inflammation of the skin, erythematous macules, papules, or wheals, not differing materially from the lesions above described, which require no more special mention here.

Pulex penetrans.

Chigoe, or Jigger.

The female sand-flea burrows into the skin, generally of the toes, and produces after a few days a painful oedema with redness, and, later, pustulation. Frequently ulceration and abscess formation result from its presence, or improper attempts at removal. The opening into the skin made by the insect should be dilated by a needle, and the distended animal extracted with the same.

Simulium.*Blackfly.*

This pest of the woods, which so sadly interferes with the pleasures of the hunter and angler, produces with most of its victims a puncture in the skin from which the blood flows freely for a time. I have seen the eyes almost stopped with the coagulation of blood flowing into them from innumerable bites upon the forehead. Occasionally the bites cause great swelling, especially upon the scalp, and furuncular forms of inflammation with much suffering.

Leptus.*Harvest Mite.*

Two species of this mite, *Americanus* and *irritans*, are found in this country, resembling the *autumnalis* of Europe. They all cause great irritation of the skin by their bites, characterized by papules, vesicles, and pustules. They bury their anterior portion only within the skin.

Sarcoptes hominis.*Itch Insect.*

The inflammatory lesions produced by the presence of this animal in the cutaneous tissues are of two kinds, those directly due to the action of the insect, and those which result secondarily from the itching it causes. The first consist of small papules, vesicles, and pustules immediately provoked by the young and males, and the long burrow containing the female and eggs, which is often surrounded by a red halo, or is pushed up above the general level by an inflammatory exudation beneath it, or converted into a pustule. The secondary lesions are of an eczematous character, and result both from the severe scratching the skin receives and from the irritating presence of the ani-

mal. They are not confined to the near vicinity of the primary lesions, but may be developed over the whole surface of the body excepting the head. They consist of papules, vesicles, pustules, excoriations, and crusts, and sometimes of large ecthymatous forms of efflorescence.

Pediculus capitis.

Head Louse.

This louse may exist in great numbers upon the hairs without producing any inflammation upon some persons, but generally it excites by its puncture upon the scalp much irritation, which leads to scratching, and this in turn to various forms of efflorescence, not only upon the scalp, but upon those portions of the skin bordering upon it. They are eczematous in character, and consist of papules, vesicles, pustules, and excoriations. The hair is often matted by the coagulation of the serum oozing from large areas of excoriation. The eczema often extends to a considerable distance below the occiput, affects the ears or forehead, but sometimes manifests itself exclusively about the nostrils and mouth, when the scalp and its immediate surroundings show no signs of inflammation.

Pediculus vestimenti.

Clothes or Body Louse.

This louse, although breeding upon the clothing, draws its nourishment from the fluids of the skin by puncture. It gives rise to papules primarily, but excites so much irritation of the integument that it is scratched more violently in most cases than in any other itching affection, in consequence of which deep and extensive excoriations are formed by the nails,

and later all grades of inflammatory lesions are secondarily developed, papules, pustules, crusts, and shallow ulcerations. In cases of life-long standing, so frequently seen in foreign hospitals, the so-called vagabond's disease, the general surface may gradually assume a very dark color, in consequence of the deposition of blood pigmentation resulting from prolonged and continuous hyperæmia.

Phthirius pubis.

Pubic Louse.

The injuries inflicted by this louse are confined to those regions of the skin which are covered by the short hairs, the genitals and their surroundings more especially, but also in hairy persons the legs, trunk, and arms; also the axillæ, and occasionally the eyebrows and eyelashes. They consist of minute red macules and papules at the base of the hairs. They rarely give rise to more serious lesions directly, but sometimes excite secondarily an eczema about the genitals, of any possible intensity and duration.

Apis, Bombus, Vespa.

Bees, Hornets, Wasps.

Many species of these hymenopterous insects possess stings and poison glands at their posterior extremity, capable of producing inflammation when inserted into the cutaneous tissues. A lancinating and burning pain in the part stung is first felt, which is generally followed by an erythematous swelling, resembling a boil, and presenting a darker point in its centre. The swelling may extend and assume an erysipelalous character with radiating red streaks. Gangrene of the affected area has rarely been observed.

Cantharis.

Spanish Fly.

Powdered cantharides, or their irritating principle, cantharidin, applied to the skin, very soon produce a burning sensation and redness, which rapidly increase to intense smarting and a most violent superficial dermatitis. The process is so rapid in its evolution, that the ordinary transition steps of acute cutaneous inflammation are not observed, and in a very brief period, three to five hours, hyperæmia of the upper corium, escape of serum into the epidermal layers in great quantity, with elevation of the same in the shape of vesicles and bullæ, large and small, take place. Unless the irritant be kept too long in contact with the skin, the excitement of the tissues slowly subsides from this point, under soothing dressings, with the ordinary changes of involution of an acute dermatitis. Sometimes, however, instead of the clear and abundant discharge of serum from the inflamed corium, there is formed a pseudo-membranous layer of fibrinous nature beneath the bullæ; or in feeble persons, infants, and old people, gangrene of the inflamed tissues may result. Sometimes an erysipelas spreads from the blistered surface, or an eczema may affect the surrounding integument and in children extend over the whole body. Furuncular and ecthymatous eruptions may also be excited in the vicinity of the vesicated area. Symptoms of internal poisoning may manifest themselves, as is well known, by absorption. In place of these extreme grades of dermatitis, all degrees of reduced irritation of the skin may be produced at will by dilution of the active agent down to the mildest rubefacient result, or the stimulation of the cutaneous glands

without the slightest visible hyperæmia or sensation of heat.

Other insects possess this irritating action upon the skin in the same or less degree, as *Blatta*, *Formica*, etc.

Formica.

Ants.

This and several other genera of ants, especially those of tropical countries, produce by their "bites" a vivid sensation of stinging (formic acid?), resembling that caused by the nettle, with a slight erythematous œdema in the skin. Tropical forms may cause great pain, with the formation of vesicles, and even serious constitutional disturbances.

Bombyx, Gastropacha.

Caterpillars.

The hairs of the caterpillars of these and many other genera of the Lepidoptera, with the dust of their bodies and the fluids which they discharge from their anterior or posterior openings and other parts, produce by mechanical or chemical action great irritation upon the skin of those who handle them. The first symptoms are intense itching, with pain, redness, and swelling. Later an erysipelas-like erythema and urticarial efflorescences may develop, or papules, vesicles, and pustules may be formed. Occasionally phlegmon, abscesses, and inflammation of the lymphatics have been observed.

Van Hasselt gives the following list of injurious larvæ belonging to European families: *Gastropacha pityocampa*, *Gastropacha pini*, *Gastropacha processionea*, *Bombyx mori*, *Harpya vinula*, *Sphinx Euphorbiæ*; and the following as suspicious: *Liparis auriflua*, *Liparis chrysorrhœa*, *Liparis dispar*, *Gas-*

tropacha pinivora, *Phalæna potatoria*, and *Plusia gamma*.

Riley, in his Fifth Annual Report on Noxious and other Insects of Missouri, gives the following list of larvæ in the West, the spines of which have urticating properties: *Lagoa crispata*, *Lagoa opercularia*, *Euclea pænulata*, *Euclea querciti*, *Parasa chloris*, *Phobetron pithecium*, *Phobetron hyalinum*, *Adoneta spinuloides*, *Monoleuca semifascia*, *Empretia stimulea*, *Acronycta xylinoides*, *Anisota stigma*, *Pseudohazis Eglanterina*. He attributes their irritating action upon the skin to the prick of the spines, and states that the dried larvæ in collections retain this power for a long time.

Mr. George Dimmock of Cambridge describes very fully in "Psyche," Nos. 102 and 103, the tegumentary glands of many larvæ communicating with hollow hairs, and containing a fluid to which he attributes such irritating properties.

Mr. Scudder adds to the above lists Hypercheria, Io, and a species of Lagoa. He writes: "I recall an instance where a friend let one of these last silken, snow-white caterpillars crawl over his hand and up his arm above the elbow, and it was not for some time, five or ten minutes, that he began to suffer in consequence. Then the track of the larva was marked by a red flush over the whole arm, and my recollection is that he suffered a good deal."

Silk Cocoons.

Dr. Potton of Lyon has described (Bull. de l'Acad. de Med., xvii. 803), under the title *Mal de vers*, an inflammatory affection of the hands among silk weavers who unwind the silk from the cocoons. It begins

after a week of constant work. The right hand is especially affected. A redness and swelling develop at the base of and between the fingers, accompanied by itching, which is followed by rounded vesicles, which, if the disease progresses, are converted into pustules, which may spread rapidly over the whole surface of the hand. The eruption is accompanied at first by itching, and later by acute pain, so as to render motion of the part impossible. The process is at its height on the fifteenth or sixteenth day, and the vesico-pustules may leave, on breaking, swollen and ulcerated surfaces. After this stage recovery rapidly follows, so that by the eighteenth day the patient is able to go to work again. Occasionally the disease assumes a more serious form. The inflammation affects the skin, even to the subcutaneous tissues; the swelling is enormous, and the course of the lymphatics is marked by red lines extending to the axillary glands. Small circumscribed seats of phlegmonous inflammation are developed beneath the pustules. Nevertheless, in spite of all these menacing symptoms, the inflammation rapidly subsides, and by the twentieth day the cure is complete. Recurrences of the affection are generally much less severe than the primary attack. M. Potton attributes the disease to the presence of the worm in the cocoon, to its decomposition, and to changes which gradually take place in its interior.¹

Mr. F. W. Cheney, of the celebrated silk works of South Manchester, Conn., very kindly informs me that in their extensive factory no cases of inflammation of the skin have occurred among their workmen.

¹ See Bazin, *Affections Cutanées Artificielles*.

Buthus.*Scorpion.*

The local effects of the sting of the scorpion, of which there are many species, are an erythematous œdema with a dark point in the centre, and excessive pain. Some species produce effects closely resembling those of a wasp-sting, but others, which are powerful enough to cause fatal results, give rise to black discoloration, with great swelling of the part, inflammation of the lymphatics, and even gangrene.

Spiders.

The bite of many species of spider, which are provided with a poison apparatus, produces a redness and swelling, with more or less pain and itching. Sometimes phlegmonous inflammation results.

Ixodes.*Woodtick.*

Several species of these ticks infest our woods and attach themselves to the skin by their compound beaks, which they bury in its tissues. They produce much irritation, and if the head be allowed to remain in the skin, when the animal, swollen with the blood drawn, is perceived and removed, great inflammation of the tissues follows, accompanied by persistent suppuration until the foreign body is extracted.

Treatment.

The treatment of the direct injuries inflicted upon the skin of man by the bites and stings of these various animals, and the resulting forms of dermatitis, is very simple. Ordinarily, they are of brief duration, unless they are constantly reproduced by the continuous presence of the animal. The first object is, therefore,

to remove the latter from the surface, or from within the tissues of the skin; the second, to allay the irritation produced at the point of injury; and the third, to subdue the inflammation which results, either directly or secondarily, from this.

Pediculi may be removed from the hairs of the head and body by soaking the same in petroleum, and allowing them to remain saturated for an hour or so for several days in succession. From the clothing (*P. vestimenti*) they are removed by boiling all under-garments in water, and ironing the seams of the outer ones with a very hot flat-iron.

The itch insect is destroyed by rubbing into the skin preparations of sulphur, naphthol, Peruvian balsam, etc., for several days in succession.

The chigoe is extracted by carefully dilating the aperture of entrance with a needle, and removing with the same.

The ixodes is made to relax its hold and drop off by applying sweet oil repeatedly to it.

The leptus mite may be treated as the itch insect by similar parasiticides.

With the removal of these animals the inflammation which they have excited in the skin generally subsides, more or less gradually, without special treatment.

Bites and stings, and the irritation produced in other ways by contact with the other animals above mentioned, may be immediately treated by ammonia water, dilute acetic acid or vinegar, dilute carbolic acid, alcohol, a drop of laudanum, etc., and generally with some relief.

The more diffused and the secondary forms of inflammation which often follow may be controlled by

the means best adapted to the management of similar grades of dermatitis in other cases. Cooling and astringent washes and soothing ointments are mostly called for in the secondary lesions ; whilst evaporating lotions of spirit and water, to which carbolic acid has been added, will be found most effective upon the early inflammation immediately surrounding the point of injury.

The first part of the report is devoted to the description of the experimental conditions. It is followed by a discussion of the results obtained in the various experiments. The final part of the report is a summary of the conclusions reached.

The results of the experiments show that the rate of reaction is affected by the concentration of the reactants. It is found that the rate increases with increasing concentration of the reactants.

The effect of temperature on the rate of reaction is also investigated. It is found that the rate increases with increasing temperature. This is in agreement with the Arrhenius equation.

The order of reaction with respect to the reactants is determined to be first order. This is in agreement with the proposed mechanism for the reaction.

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