Irritative mydriasis is the converse of paralytic miosis, and while the latter is due to paralytic processes in the cervical spinal cord the former is due to an irritative or stimulating lesion in the same part. Such a pupil reacts to light with convergence, is readily dilated by mydriatics, but slightly convergent by miotics. This may be caused by any early inflammatory or sclerotic process in the upper part of the spinal cord or anything causing stimulation of the cervical sympathetic.

Paralytic mydriasis is the converse of irritative miosis—if due to a lesion between the third nerve and the iris the reflexes to light, both direct and consensual, are absent, as is also the contraction accompanying convergence. If, on the other hand, the lesion is situated in the afferent path of the light reflex, between the retina and the centre for contraction, only the direct light reflex is interfered with.

With the exception of some advanced intra-cranial lesions, paralytic mydriasis is most often due to purely ocular trouble, such as glaucoma, advanced retinitis, or optic neuritis. Such a pupil is obviously unaffected, or nearly so, by drugs of either the mydriatic or miotic group.

In these pages an attempt has merely been made to consider, in the light of anatomical and physiological research, some few of the numerous extra-ocular pathological conditions which are reflected in their effect upon the pupil. To include them all would transgress by far the limits of this paper.

ART. X.—*Artificial Eruptions*.^a By ARTHUR F. BERNARD
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ARTIFICIAL eruptions include all those skin lesions produced by the action of substances which are foreign to the body. In considering them it will be found that they fall into two

^a A Thesis read for the Degree of Doctor of Medicine in the University of Dublin, July 5, 1911.

great groups :—I.—Those which produce eruptions by coming into direct contact with the skin. II.—Those which, following ingestion, produce eruptions ; the manifestation of their toxic effect on the system being the production of certain lesions on the skin.

External Agents.—The agents which fall under this heading may be of—(a) animal, (b) vegetable, or (c) inorganic nature. Among the animal irritants are—(a) parasitic forms—viz., the various forms of *Pediculi*, *Pulex irritans*, *Sarcoptes* and *Acarus*. The phenomena produced by these animals are so familiar that it is unnecessary to describe them. Of rarer forms there is the harvest-bug (*Leptus autumnalis*), which occasionally gives rise to inflammatory papules by boring into the skin ; the larva of the horse bot-fly (*Gastrophilus equi*), which makes a slightly raised pale red line that travels over the body with great rapidity. These lines are characteristic inasmuch as they never branch or bifurcate, though two lines may cross one another. There is also a remarkable epidemic urticaria, in some parts of Germany, caused by the procession of certain forms of caterpillars over the skin. The lesions are particularly irritative, and render the districts infected almost uninhabitable.

Then there are (b) non-parasitic forms—viz., certain fishes—jelly fishes and insects. The most common fishes in this country which produce skin lesions are the Great Weaver, the Little Weaver, and the Sting-Ray. These produce their effects by stinging, and they do this by means of sharp spines on their fins. Each spine at its base is connected with a poison-gland. The spine, having pierced the integument, provides the path by which the poison passes into the wound. The most common site for these lesions are on the hands and feet. The skin about the puncture becomes swollen and hyperæmic ; bullæ form containing serum or pus, and the affected area may even become gangrenous. If the poison spread in the tissues the whole limb becomes enormously swollen and erythematous ; and, at the same time, there is great pain. As a result the patient often falls into a state of collapse or delirium. Usually, however, the inflammation

subsides in a few days. Treatment of the wound should be carried out on general principles. There are no satisfactory antidotes—though iodine and turpentine are of some value. On the other hand ammonia and alkalies are quite useless. Lastly, experimental work on the poison of these fishes shows that it produces gangrene of the tissues, local paralysis and hæmolysis.

Many species of jelly-fish are also capable of producing cutaneous lesions by means of the stinging cells attached to their tentacles. These eruptions are most frequently seen in bathers during the summer. The most common features is the presence of a localised erythema—often linear—on some part of the body corresponding with the number and distribution of the tentacles which have come into contact with it. In many cases the condition is purely local, and the patient complains of no symptoms whatever; in others there may be some pain in the part with irritation and a feeling of heat. In these forms the erythema disappears, leaving no traces, in a few days. But in others the condition may be very severe, as is shown by the following case:—The patient received, while bathing, a severe sting on the right leg, which caused him much pain, and was followed very soon by an erythema of the part stung. The next day the patient felt ill and had a severe headache. His temperature rose to 100°, and his whole body, with the exception of his face, was covered with a diffuse erythematous rash very closely resembling that of scarlatina. He was compelled to remain in bed, for he felt his whole body tingling. The next day he felt much better, and the rash disappeared completely on the third day.

In this case the only treatment given was a purgative and plenty of water by the mouth.

It is evident from this account that the phenomena were identical with those which follow the absorption of a toxin into the system; and it must therefore be assumed that in this case the poison of the jelly-fish gained an entrance into the system by way of the local wound. Besides its ability to produce erythematous conditions the jelly-fish toxin can bring about urticaria. The urticaria may be localised to the

seat of injury, or it may be diffuse. Of the two the localised form is the more common, whilst the production of erythema is more frequent than urticaria. Lastly, the variety of the cutaneous lesion, and also its severity, probably depend upon the genus of the jelly-fish.

Bees and wasps by their stings produce either a local erythema or urticaria around the seat of puncture. Both varieties are accompanied by considerable pain in the part affected. Erythema is more likely to occur where the skin is coarse and tough ; whilst urticaria is more frequent where the skin is delicate. In such places as the eyelid, where the sub-cutaneous cellular tissue is lax there is frequently a considerable amount of œdema.

The specific action of these stings is due to the presence of formic acid in the poison introduced.

Treatment is directed to cleansing of the wound and the application of soothing lotions.

As typical examples of the effect produced by vegetable irritants on the skin mustard and rhus may be taken. The most familiar action of the former is the production of erythema and vesication, which may pass on to an actual dermatitis, or even ulceration.

Rhus is used in Japan for polishing furniture. It is highly irritating, but only certain persons are susceptible to its action. Its most common effect is an eczematous eruption with intense itching ; even the hands, arms and face may be enormously swollen. In more severe cases a violent dermatitis occurs with more or less marked constitutional symptoms. Lastly in this group may be mentioned nettles. Contact with this plant always produces a local urticaria.

The third class—namely, inorganic irritants—produce their effects by their physical, rather than by their chemical, properties. Thus cold produces the familiar chilblain or erythema pernio, which may advance to the condition of frost-bite.

Again, the sun produces erythema solare or “sun-burn,” and this is considered to be due to the light rather than the heat of the sun—the violet rays being the actual agent in its

production. The action of these rays is varied. In people who have fair, dry and delicate skins an erythema is produced which disappears in a few days, and may or may not be followed by desquamation. In others who have a dark moist skin the erythema is not well-marked, but it is followed by "bronzing," which may last for many weeks. The nature of this "bronzing" is probably that of a diffuse lentigo. As an example of the effects of the sun on those who have a fair, dry and delicate skin the following case may be cited:—A man, aged fifty, sat for about two hours with his fore-arms exposed to the sun. In the evening both of the exposed areas showed a violent erythema, they were visibly swollen, hot to the touch, and on pressure there was œdema. The only subjective symptom was an intense feeling of heat in the parts. The condition subsided in two days; there was no subsequent desquamation or bronzing. The only treatment given was a cooling cream.

Another condition which is very often, though not invariably, due to the action of the sun's rays is "freckles," or lentigo. Pathologically, "freckles" are patches formed by the local deposit of pigment in the basal layer of the epidermis. The colour is usually yellow or yellowish brown, occasionally sepia. They are most common in childhood, especially in those who have a fair delicate skin. Their most frequent situations are the face, particularly about the nose, cheeks and the backs of the hands. Most marked in summer, they tend to fade in the winter. They very rarely call for treatment.

More important than these, however, are the effects on the skin of other forms of light energy—foremost among them being the Röntgen rays. Exposure to these rays results in a severe dermatitis which may be acute or chronic. The acute form results from one or more over-exposures. Its degrees of severity are comparable to the first three degrees of ordinary burns. Thus there may be—firstly, erythema with swelling and desquamation; secondly, erythema with vesication; thirdly, destruction of the epidermis with ulceration. These lesions are extremely painful and leave deep scars when they

heal. The condition is usually limited to the parts exposed, stopping abruptly where the skin is covered by clothes. There is great liability to periodic recurrences.

The chronic form of dermatitis affects those who are constantly exposed to the rays over long periods. It occurs most commonly on the back of the hands, and begins with erythema, pigmentation and telangiectasis. In time the skin becomes thin, roughened and fissured; local hyperkeratosis occurs, and the growths thus formed are very liable to become the seat of epithelioma. The nails also are affected, becoming pitted, striated and brittle; they may even exfoliate. In the later stages the condition is extremely painful, and the chief danger lies in the liability to malignant changes.

Internal Agents.—Among eruptions caused by internal agents are included all those produced by substances which are introduced in some way into the body. They may be divided into three classes:—(a) Substances taken as articles of diet; (b) drugs given for medicinal purposes, and which may be taken by the mouth, by inunction, or by hypodermic injection; (c) substances of an organic nature which are inoculated—viz., serums and vaccines.

Undoubtedly the most important factor in determining the appearance of an eruption and the form which it assumes is individual susceptibility.

Again, the eruptions caused by drugs are so varied that they do not permit of any classification; but they are seldom multiform at a given time, though almost every variety may be exhibited in their course.

With regard to the method in which drugs produce eruptions various theories have been advanced. Some authorities say that when from any cause there is diminished renal activity, the skin assumes the functions of the kidneys, and the drug in passing through the cutaneous glands irritates the integument and produces lesions of various kinds. This theory postulates that before an eruption can be produced the drug must have accumulated in the body to a greater or less extent. This, however, is not the rule, for the smallest dose of a drug will produce an eruption in some people, while in other cases very

large doses of the same drug may be taken for a long time without producing any effect whatever in the skin.

Behrend claims that drug eruptions, with some exceptions, are due to the presence in the blood of some foreign substance generated by the drug. In other words there is some chemical alteration in the composition of the blood. If this were the case one would expect to find cutaneous eruptions wherever the blood circulates. But, on the contrary, we know that drug eruptions are peculiar in their distribution, and are often confined to particular parts of the cutaneous surface.

A more probable explanation, and one which accords very closely with clinical facts, is the assumption that the process is angioneurotic in character. It is a generally recognised fact in dermatology that the mechanism of vaso-motor disturbance is sufficient to account for—in most cases at any rate—the production of the series of lesions ranging from erythema to gangrene. Now it is these very series of lesions that drug eruptions simulate. Further, it has been pointed out that a large proportion of the medicinal agents which determine an eruptive disturbance act markedly on the nervous system. From this point of view individual susceptibility, which plays such an important part in drug eruptions, receives its explanation; as also the peculiar arrangement and distribution which is so common in these lesions. In brief, it may be stated that drug eruptions arise either in response to irritation of peripheral nerve endings, when the medicinal substance is applied externally to the skin, or to irritation of the central vaso-motor control, as when the drug is taken internally.

It is impossible to deal with all the substances that may produce eruptions, and mention can be made only of the commonest and most important ones.

In Class A are substances taken as articles of food. Among these the chief place must be assigned to shell-fish—especially mussels, crabs and lobsters; less important are fruit, oatmeal, salt meat and mushrooms. The most common lesion produced by these is urticaria, and in no condition is individual susceptibility more marked. It is a well-known fact that some

people can indulge freely in these articles of food without producing any affect on the skin, whilst in others the smallest quantity produces the most marked results.

In Class B the two most important and commonest drugs are bromine and iodine, and their compounds.

The most familiar eruption produced by bromine salts is a papulo-pustular one—bromic acne; and it is said to occur in 75 per cent. of cases. Bromic acne bears a considerable resemblance to acne vulgaris. Unlike the latter, however, the bromic lesion does not confine itself to parts rich in sebaceous glands, and it always develops without the antecedent existence of comedones. It shows a marked preference for hairy parts—viz., the forehead, neck, face and shoulders. The condition persists as long as the drug is given, and increases if the dose is increased. Almost any other primary lesion may be produced; and in the legs large elevated areas resembling condylomata may be formed.

The iodides also give rise to a variety of lesions, including erythema, papules, urticaria, vesicles and bullæ.

The papulo-pustular form is apparently the most common, and chiefly affects the face, neck, chest, shoulders and arms. It usually appears when the drug has been given for a week. The papulo-vesicular form, owing to its shotty feel and umbilication, may resemble small-pox.

The eruption disappears when the drug is suspended; but in one case of a man who was given 5 grs. of potassium iodide three times a day for a suspected gumma, the eruption disappeared when the dose was raised to 10 grs. three times a day. In two other cases, however, such treatment failed, the eruption being made worse.

Iodoform when used in surgical dressings is said sometimes to cause irritation of the skin—chiefly erythema and eczema. But this must be rare in proportion to the frequency with which iodoform is used for such purposes.

Arsenic plays a very important rôle in the production of skin eruptions. When applied externally it may set up a severe dermatitis—erythema followed by vesicles and pustules. When given internally it may give rise also to dermatitis, or,

more commonly, a greyish or brownish pigmentation. Prolonged administration of the drug may lead to keratosis of the palms of the hands and soles of the feet. These are very liable to become the seat of epithelioma. Copaiba, owing to its frequent administration for gonorrhœa, is a common source of skin eruptions. The commonest lesion is the presence of discrete erythematous papules generally seen on the wrists, ankles and knees; very often it spreads over the whole body.

Mercury, whether in the form of corrosive sublimate or calomel, often produces a dermatitis when applied externally. Corrosive sublimate when applied as an antiseptic dressing before operation not uncommonly sets up a mild dermatitis inside of twenty-four hours.

Opium sometimes gives rise to intense pruritus. In addition to this it may cause a diffuse scarlatiniform or morbilliform rash, which is followed by desquamation.

Aspirin is a drug which does not appear to be mentioned in the literature as a cause of skin eruptions. But the following is a case in point:—A young girl who complained of headache was given 10 grs. of aspirin in the evening. The next morning her whole body, except her face, was covered by a diffuse scarlatiniform rash; there was no elevation of temperature, and no desquamation. The condition had faded completely in three days. The explanation of this may be that aspirin is one of the salicylate group, which is known to sometimes produce a rash resembling scarlatina.

Among other drugs which act as severe irritants are chloral, aconite, arnica, cade oil, cantharides, phenol, chrysarobin, croton oil, tar, sulphur, turpentine.

Among those producing erythema and exanthematous rashes are:—Belladonna, quinine, the salicylates, antifebrin, antipyrin, boric acid, iron, lead acetate and carbonate, nux vomica, phenacetin, stramonium, sulphonal; whilst nitrate of silver produces a permanent greyish-black pigmentation termed argyria.

The ordinary enema frequently produces a diffuse erythematous rash which affects principally the neck, chest and trunk. It appears a few hours after the injection, and is far more common in women than in men.

In Class C the process of vaccination is the best known cause of skin eruptions. These eruptions may be due to pure vaccine inoculation or to mixed inoculation. In the first class they may be just secondary local inoculations—urticaria, erythema, papulo-vesicular, or generalised vaccinia; in the second class they depend, of course, on the nature of the additional virus, and so may be pyogenic, syphilitic, or tubercular. In one case of a child, three months old, there was a papulo-vesicular eruption first noticed on the eighth day, and involving chiefly the limbs, but also the face and trunk to a lesser extent.

Tuberculin sometimes gives rise to a scarlatiniform or morbilliform rash, but this appears to be rare.

Of the antitoxins, the diphtheritic is the best known for producing eruptions. The rash may be urticarial or erythematous. In eight cases observed, seven were urticaria and one almost purely erythematous on the average. The eruption was observed about the sixth day in these cases. It affected principally the body and the lower limbs. In one of the cases of urticaria the itching was especially pronounced.

ROYAL COLLEGE OF SURGEONS OF EDINBURGH.

At a meeting of the College held on Thursday, July 27th, 1911, the following gentlemen, having passed the requisite examinations, were admitted Fellows:—William Ainslie, M.B., Ch.B., Edinburgh; Richard Charles Alexander, M.B., Ch.B., Edinburgh; John Stott Beedie, M.B., Ch.B., Turriff; William Rome Cammock, M.B., Ch.B., Rutherglen; Thomas Gilray, M.B., Ch.B., Wellington, N.Z.; Thomas Arthur MacGibbon, M.B., Ch.B., Hawera, N.Z.; Eric Reginald Delme Maconeachie, M.B., Ch.B., Edinburgh; Robert Morison, M.B., Ch.B., Edinburgh; Michael Charles Frederick Morkane, M.B., Ch.B., New Zealand; Gavin Denholme Muir, M.B., Ch.B., Glasgow; Andrea Francis Honyman Rabagliati, M.B., Ch.B., M.D., Yorks; Hugh Jones Roberts, M.D., M.R.C.S.Eng., Penygroes, North Wales; Basil Lyons Thurlow, M.D., M.B., Ch.B., Tunbridge Wells, and Herbert John Walker, M.R.C.S.Eng., L.R.C.P.Lond., Brighton.