

The presence of this R. D. is an important diagnostic sign in excluding the myopathies or "idiopathic" atrophies. Contractions and deformities due to unequal wasting of opposing muscles are common. The "claw-hand" or "main en griffe," lordosis, and talipes equinus are examples.

The sphincters escape as a rule. Sexual power is commonly lost. Eventually the patient presents an extreme degree of generalized emaciation, the "living skeleton" type. Pulmonary complications, bulbar palsies, bedsores, and septic infection are of serious import.

Diagnosis.—The myopathies, the age (adult) at time of onset, the initial affection of the hands, the presence of



FIG. 3465.—Case of Spinal Progressive Muscular Atrophy of the Aran-Duchenne Type. (From the Neurological Department of the Cincinnati Hospital.)

fibrillary tremor and the R. D. are sufficiently distinctive. The onset in one hand and the extremely slow progress separate this from other neuron diseases, such as multiple neuritis, lead neuritis, and poliomyelitis, acute or chronic. The absence of pains and cervical deformity distinguish the affection from pachymeningitis cervicalis hypertrophica. Syringomyelia is excluded by absence of the "dissociation" sensory symptoms and of cutaneous trophic lesions.

Prognosis.—Arrest is said to be possible in rare cases. Remissions are more likely to occur. To retard the progress of the disease and improve the "compensation" in the remaining muscle tissue is as much as can be reasonably expected from treatment.

The duration is commonly prolonged, varying from two to thirty years (Dana). The fatal outcome is due to complications, pulmonary or laryngeal, resulting from involvement of the respiratory muscles.

Treatment.—Strychnine nitrate, administered hypodermically in doses gradually increased from gr. $\frac{1}{10}$ to gr. $\frac{1}{5}$, is highly commended by Gowers, who has seen the disease apparently arrested by its use.

General hygienic measures, careful diet, avoidance of fatigue are important. The phosphorus compounds should be tried.

Electricity, massage, and gymnastics should be used with caution, and any excess or fatigue should be avoided.

Mercurials and iodides are never indicated and may do harm.

B. HEREDITARY OR FAMILIAL TYPE OF PROGRESSIVE SPINAL MUSCULAR ATROPHY.—This is a rare form of neuron atrophy described by Werding⁵ and Hoffman.⁶ It is characterized by heredity, by early onset (under two years), beginning in the hips and back; by rapid progress to complete helplessness and a fatal termination at or before the sixth year. R. D. is present, and wasting of the ventral horn cells has been found. Beavor⁷ records one case which began in utero.

Diagnosis.—This is distinguished from the ordinary spinal atrophies (Aran-Duchenne type) by the hereditary element, early age, rapid progress, and absence of fibrillary twitching; from the myopathies, by the absence of hypertrophy, the presence of R. D. and the early termination.

Treatment has not influenced these cases appreciably.

C. AMYOTROPHIC LATERAL SCLEROSIS.—This is practically a progressive spinal muscular atrophy (type A) plus involvement of the upper neuron (pyramidal tracts of cord) to a marked degree (see Fig. 3460). The clinical difference consists in the marked spasticity, causing a stiff-legged gait, with toes tending to dig into the ground. There is also a rather more marked tendency to bulbar involvement, and the lower half of the face may be affected. The affection does not differ materially from type A as regards the prognosis and treatment.

D. GLOSSO-LABIO-LARYNGEAL PARALYSIS.—*Chronic Progressive Bulbar Palsy.*—This may occur primarily, or may indicate an extension upward of ordinary spinal muscular atrophy (type A). As a primary affection the degenerative process is limited to the bulbar neurons.

Patients are usually at the degenerative period of life. In many respects the disease appears to indicate a localized presenile change.

The chief symptoms are hoarseness, aphonia, dysarthria, dysphagia, sialorrhoea, atrophy, and fibrillation of the tongue, glycosuria, cardiac arrhythmia, and dyspnoea.

Pseudo-emotional symptoms, as causeless weeping or laughter, are frequent accompaniments. The palate reflex is absent in advanced cases.

The diagnosis must be made from bulbar apoplexy (small hemorrhage, thrombosis) by the sudden onset of the latter, with sensory defects of face frequently present; from cerebral lesions in the bulbar motor path (pseudo-bulbar palsy) by the sudden onset of the latter, with absence of sensory defects, of atrophy of the tongue, and also of accompanying hemiplegic symptoms; from asthenic bulbar palsy (bulbar palsy without anatomical findings) by the absence in the latter of muscular atrophy and twitching and by the frequent remissions which occur.

The progress is toward a fatal termination from inanition or respiratory complications in from one to seven years. Treatment is similar to that of other neuron muscular atrophies—viz., rest and attention to hygiene and nutrition. Electrical treatment may add to the comfort of the patient and prolong life.

E. NEURITIC OR LEG TYPE OF PROGRESSIVE MUSCULAR ATROPHY, CHARCOT-MARIE-TOOTH DISEASE.—This variety of the "neuron atrophies" differs from the typical (spinal) form (type A):

- (1) In its hereditary character.
- (2) In its onset in the legs and feet (peroneal group of muscles).
- (3) In its slower course.
- (4) In the circumstance that the prospects of prolonged life are better.

It is a rare disease in this country, Burr⁸ recording but

five known cases up to 1897, including one reported by himself.

Pathologically a degenerative neuritis has been found. The disease therefore affects the distal extremities of the lower motor neurons.

Treatment is similar to that of the other neuron forms. F. W. Langdon.

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- This work contains a digest of the French literature on the subject, with especial reference to the clinical and pathological distinctness of the Duchenne-Aran form (type A), and the amyotrophic lateral sclerosis form (type C), which Charcot (the younger) considers well established. The work is beautifully illustrated.

MUSK.—**MOSCHUS.** "The dried secretion from the preputial follicles of *Moschus moschiferus* L.; Order, *Ruminantia*," U. S. P. This little animal, the so-called musk-deer, is a slender-limbed, active, and very timid inhabitant of the mountain regions of Central and Northern Asia. In its general shape it resembles a young deer. It is 60 or 80 cm. long (from two to three feet), from 40 to 60 cm. in height, with the rump higher than the shoulders, of a grayish or blackish-brown color, with long, slender ears, large dark eyes, and two long, curved tusks projecting downward from the upper jaw. The secreting organ containing musk is a large, simple sac, situated in the median line just beneath the skin of the abdomen, in front of the preputial canal (of the male; it does not exist in the female), with which its posterior wall is connected. It is of a round or oval, plano-convex shape, 6 or 7 cm. in its longest diameter, and 1 or 2 cm. or more thick. Internally, it is incompletely divided by folds and partial partitions reflected from the wall. The orifice, often double, is situated over the middle portion of the sac, and is 1 or 2 mm. in diameter. Its position is easily determined from the outside, because the hairs converge toward it and fairly grow within it. In the living animal the secretion contained in the gland is a soft solid, not much thicker than honey, of a brownish-red color, and of a most intense, offensive smell. As it dries it darkens, becomes greasily brittle, and less odorous.

The musk-deer is laboriously hunted in the central and northern provinces of China, in the countries to the north of India, and in Siberia,—in short, over a very extensive portion of Central Asia,—for its skin and musk glands. These "pods," as they are called, are cut out as soon as the animal is killed, and dried, often with the aid of artificial heat, when they are ready for the market. In this condition they are flattish, shrivelled pouches, covered on one side with hairy skin, in the centre of which is the orifice; the other side has the black appearance of dried meat. As now usually marketed, they are prepared so as quite closely to resemble a large fowl's gizzard. The contents are dryish, crumbly, breaking as they are turned out into coarse fragments (called grains), of an almost black color and penetrating odor. The very high cost of musk has led to numerous ingenious methods of adulteration. Thus, stones and other heavy minerals, hair, dried blood, faeces, etc., are sometimes introduced through the natural opening; occasionally, also, the sac is split and emptied, and then filled and dextrously sewed up again, with a mixture containing but little musk, or that of an

inferior quality—Siberian musk, for example, instead of that from Tonquin. Or the musk itself, when sold in grains, may be tampered with in similar ways. Sometimes artificial pods are made and filled—the scrotum of some animal is used, or a bag is made entirely *de novo* from skin, with a bladder, or some other membrane, for the back. The geographical source is important in determining the quality of musk; that of China and its tributaries is the most fragrant and best. Its pods are rounder, of more uniform shape, and its grains more odorous and larger. That from the north of India comes in irregular sacs, and that from Siberia in larger and longer ones. The following are the characters of musk as given by the Pharmacopœia: "In irregular, crumbly, somewhat unctuous grains, dark reddish-brown, of a peculiar, penetrating, and persistent odor, and bitterish taste. It is contained in oval or roundish sacs, about one and a half to two inches (4 to 5 cm.) in diameter, on one side invested with a smoothish membrane, on the other side covered with stiff, appressed, grayish hairs, concentrically arranged around two orifices near the centre. About ten per cent. of musk is soluble in alcohol, the tincture being light brownish-yellow, and on the addition of water becoming slightly turbid. About fifty per cent. of musk is soluble in water, the solution being deep brown, faintly acid, and strongly odorous.

"When ignited with free access of air, musk gives off a peculiar, somewhat urinous odor, and leaves behind not more than eight per cent. of a grayish ash."

COMPOSITION.—Musk is a very complex substance, and consists chiefly of common animal tissues and secretions. The following synopsis is from Hager's "Pharmaceutische Praxis": *Fats, cholesterol, wax, biliary matters, mucus, albumin*; besides traces of *lactic, butyric, phosphoric, sulphuric, etc., acids*; traces also of *ammonia* and a *volatile oil*. The odorous principle has never been separated. It is supposed to be formed by the gradual decomposition of some of the other constituents.

ACTION AND USE.—This substance was for centuries the leading antispasmodic, and was, during most of this time, much more highly esteemed in medicine than it is at present, and it was given for numerous diseases involving disturbance of the nervous or mental faculties—*e.g.*, hysteria, epilepsy, mania, etc. In a similar manner several other odorous animal secretions—civet, castor, etc.—have been employed, but of them all musk is by far the least disgusting. Its high cost and impressive odor made it well adapted to hysterical outbreaks, for the relief of which it undoubtedly has some real value. As it is, however, it acts in these cases merely as a palliative, and as there are now a dozen or more remedies which are more certain and far cheaper (a single dose of musk, which might be repeated several times a day, costs two dollars or more), musk as a medicine may be considered as fairly out of use. It can, however, be given, if desired, in doses of about 1 gm. (gr. xv.) in pill or emulsion. A tincture (*Tinctura Moschi*, U. S. P., strength one-tenth) is official and may be used, but is mostly employed as a basis of perfumery, where the persistent or "staying" qualities of musk make it of the greatest value.

The odor of musk is considerably diminished by fennel, ergot, tannin, sour fruit juices, and some other things. Mixed with sugar it keeps very well.

W. P. Bolles.

MUSTARD.—**BLACK MUSTARD,** or **SINAPIS NIGRA**, "the seed of *Brassica nigra* (L.) Koch," and **WHITE MUSTARD,** or **SINAPIS ALBA**, "the seed of *Brassica alba* (L.) Hooker fil. (fam. *Cruciferae*)," are thus separately official in our Pharmacopœia. Since they agree in most respects, they may be discussed together, and their differences pointed out in passing. Both are natives of Europe and Western Asia, cultivated and naturalized in most countries. Both are slender, tall, and widely spreading, weedy-looking herbs, with coarsely pinnatifid or pinnate leaves, the upper entire, and yellow flowers. The two are best distinguishable by the habit of their pods. In the black mustard these are erect on spreading

pedicels; in the white, both the pedicel and the pods are spreading. White mustard is also a rougher and smaller plant. The herbage of both is reputed antiscorbutic, and is used as a salad, also for poultices. The relationship of these plants to some of the forms of turnip, rape, cabbage, and colza is close and confusing, so that in India, where mustard is most cultivated, a number of ill-defined forms exist. This condition—partly the result of natural causes and partly effected by design—results in much admixture in some lots of seeds. The following are the descriptions of the Pharmacopœia:

White Mustard.—“About 2 mm. in diameter, almost globular, with a circular hilum; testa yellowish, finely pitted, hard; embryo oily, with a curved radicle, and two cotyledons, one folded over the other; free from starch; inodorous; taste pungent and acrid.”

Black Mustard.—“About 1 mm. in diameter, almost globular, with a circular hilum; testa blackish-brown or grayish-brown, finely pitted, hard; embryo oily, with a curved radicle, and two cotyledons, one folded over the other; free from starch; inodorous when dry, but when triturated with water, of a pungent, penetrating, irritating odor; taste pungent and acrid.”

The principal adulterant of whole black mustard is rape seed, which can readily be distinguished by its slightly larger size and its peculiar bluish tinge. In the ground condition, white mustard is often mixed with it. This addition, if kept within moderate limits, only adds value to the product, for reasons stated below. Most other adulterants either contain starch—which may be determined by the iodine test—or, like curcuma, the most common of these, they contain resins, which may readily be indicated by the use of sulphuric acid.

Pure ground black mustard is almost too strong for safe use upon the table, and curcuma is usually added to dilute it. Advantage is taken of this to use excessive quantities of the substance selected for admixture. Hence the importance of the preparation of black mustard for medicinal purposes by purely pharmaceutical agencies.

COMPOSITION.—The constituents of the two varieties of mustard, although presenting close relationships, are not exactly identical. They both agree, however, in containing a considerable amount of a bland, light-colored, non-drying fixed oil—a mixture of the glycerin combinations of oleic, stearic, and erucic acids; in white mustard oil benic acid is also found. This oil amounts to about twenty-two or twenty-three per cent. of the seeds. The most remarkable constituent of black mustard is the crystalline, bitter-tasting, inodorous glucoside, *myronate of potassium*, or *sinigrin*; soluble in water, but not in alcohol or ether, and in its watery solution decomposing, in the presence of various ferments, especially of one to be mentioned below, into glucose, bisulphate of potassium, and the horribly acrid, sulphureted, essential oil of mustard (isodisulphocyanate of allyl, etc.), to which mustard is indebted in part for its medicinal value, and which is described below. This oil is not present in the dry seeds or their powder, but is produced only when they are moistened. The development of the odor upon wetting mustard flour is very evident, and distinguishes this from that of white mustard. The albuminous ferment which assists in this decomposition is called *myrosin*, and is common to both kinds of mustard.

The glucoside in white mustard, resembling the sinigrin of the black, has been correspondingly named *sinalbin*, a neutral crystalline substance, soluble in cold water, and decomposed in a similar way as sinigrin into sugar, sulphate of sinapin, and sulphocyanate of acrynyl, the latter corresponding to the essential oil of the black mustard. It is an acrid and vesicating substance, but much milder than the glucoside of the black variety, and not volatile.

To bring out the full percentage of the black mustard oil, a certain amount of myrosin, additional to that contained in this drug, is desirable, and is obtained by judiciously adding a certain quantity of the white mustard. The flour from this mixture is the strongest and best that

can be made. That obtainable in our market is often the flour of white mustard only, and is generally more or less adulterated besides.

An oil exactly resembling that of black mustard has been made synthetically and is in the market.

ACTION AND USE.—Both sorts of mustard seeds possess the same qualities; they vary only as regards the degree of pungency, the black being the stronger. Swallowed whole they do not disintegrate much, but pass through the digestive tract. In this way white mustard seed, particularly, is now and then given, in doses of a teaspoonful (3 or 4 gm.), for dyspepsia, constipation, etc.; like nearly everything else, it has also been employed in chronic cases of bronchitis, rheumatism, and some skin diseases, without any rational indication for such employment. Its rare use at present for these purposes shows its slight value.

Ground mustard, white, black, or mixed, is an active local irritant as soon as wet with water so as to produce the acrid decomposition products of the drug. Applied to the skin, it is quickly and painfully rubefacient; and if allowed to remain in contact with it for a long time, it is vesicant—producing a crop of fine, deep, eczematous blisters, easily ruptured, very painful, and rather slow to heal after rupture takes place. Internally, mustard, in small doses of 2 or 3 gm., is an aromatic stimulant, and as such is in every-day use at the table. In larger quantities, 10 or 15 gm., it is a prompt and valuable emetic, usually coming up in from two to five minutes after being swallowed. On this account, and because it is almost always at hand in the house, it is the most valuable emergency emetic at our command. For poisoning by opium or by other narcotics it is a remedy almost without an equal.

ADMINISTRATION.—The employment of whole mustard has been noticed sufficiently above. The ground mustard in use in this country is that sold by grocers for family use, and is seldom, if ever, a plain mixture of the two sorts of seeds and nothing else, which gives the most perfect product. It is oftener ground white mustard alone, and oftener still mustard diluted with a varying amount (generally considerable) of inert yellow powder. It is therefore subject to considerable variation in strength. This is used both internally and externally—internally, as a stimulant (condiment) and emetic; externally, always as a rubefacient. For an emetic, from a dessert- to a tablespoonful should be given, as a less amount may fail to produce vomiting but still cause considerable gastric distress. Externally, it is chiefly employed in foot-baths and sinapisms—for the former, from one to two tablespoonfuls may be added to a small tubful or bucketful of warm water; for the latter, the mustard meal is simply mixed with a little water and spread upon a cloth, or it may be diluted with meal or flour to reduce its strength. In this way mustard is the most widely used local remedy for the sudden and intense pain or distress of pleurisy, colic, some neuralgias, etc. It is also used as a derivative in nervous vomiting, cerebral and spinal inflammations, etc., and in many other conditions when acute attacks of pain are present. Both kinds of mustard are greatly damaged, or even spoiled, if mixed with hot water, as this destroys the ferment which brings out the active decomposition principles. The following preparations are official: *Charta Sinapis*, U. S. P., made by taking ground black mustard, exhausting it of its fatty oil by percolation with benzoin, then mixing it with enough solution of india rubber to make a paste, and spreading it upon paper. This mustard paper is almost never made by the dispensing apothecaries, since several manufacturers here and in France make excellent substitutes for it that can be easily obtained and carried everywhere. The activity of the mustard paper is not developed until it is moistened in cold or merely warm water.

Oleum Sinapis Volatile, U. S. P. The oil of black mustard is also official. It is obtained by grinding and macerating black mustard, or a mixture of both kinds, in water and distilling. It is “a colorless or pale yellow

liquid, having a very pungent and acrid odor and taste, and a neutral reaction. Sp. gr., 1.017 to 1.021. It boils at 148° C. (298.4° F.). It is freely soluble in alcohol and in ether.” Its vapor when concentrated is intensely disagreeable, causing lachrymation and severe pain in the nose. Applied to the skin, it blisters severely. Diluted with nine parts of alcohol, or three parts of olive oil, it causes, when rubbed upon the temples or forehead, a sharp temporary tingling that occasionally relieves mild headache. The compound liniment of mustard (*Linimentum Sinapis Compositum*, U. S. P.) contains:

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|--------------------------------|---------------------|
| Volatile oil of mustard..... | 3 parts. |
| Fluid extract of mezereum..... | 20 “ |
| Camphor..... | 6 “ |
| Castor oil..... | 15 “ |
| Alcohol..... | q. s. to make 100 “ |

It is a good stimulating liniment. *Henry H. Rusby.*

MYCOSIS FUNGOIDES.—Mycosis fungoides, while one of the rare diseases of the skin, its real nature being still in dispute, has been sufficiently observed since 1860 to establish for it a sharply defined clinical evolution. Alibert first described it in 1814. The symptoms, for convenience of description, have been grouped in three stages, which, however, do not always occur in regular succession. The third or fungoid stage, for example, appears at times without antecedent lesions, this giving rise to the erroneous belief that two forms of the disease exist. There is but one form. The earliest phenomena vary greatly in the first or so-called premycotic stage, the only characteristic and constant symptom being intense itching. Eczema, urticaria, pityriasis rubra, erythema exudativum, or psoriasis may be simulated in this stage, the eczematous form being, however, the most common. Kaposi says that nearly every case of mycosis fungoides starts with the characteristics of an eczema. The lesions manifest themselves upon the trunk, folds of the articulations, the face, more particularly the forehead, or, indeed, any part of the body, by more or less sharply defined erythematous patches, varying from the size of a silver dollar to that of the palm of the hand and even larger. Upon these patches the epidermis presents a fine desquamation, and it is but rarely and only in places here and there that a slight exudation occurs with the formation of thin crusts. The alteration in the skin corresponds perfectly to the well-known picture of squamous eczema which occurs in patches of a pale red color with but slight tendency to become moist. The itching is intense at this stage, and insomnia is often a troublesome feature of the disease. This “eczema” may persist for several months or for one or two years (French authors denominate this the eczematous stage of mycosis fungoides), and while certain areas fade out and disappear, others make their appearance. Some of the lesions persist, extending peripherally over quite large areas of the body to unite with neighboring lesions. Hence, in some cases, although rarely, almost a completely generalized eczema, with interspersed areas of normal skin, will be established. Some of the lesions fade in the centre while they extend peripherally, giving rise to circinate lesions. Besides the desquamation and the slight occasional moisture, no lesions except those secondary to scratching supervene.

After a more or less extended period the second stage, or stage of infiltration, sets in. This is marked by a thickening of the skin consequent upon an inflammatory oedematous infiltration of the chorion, more particularly appreciable at the periphery of the eczematous areas, the borders of which appear tense, smooth, and shining. From this time on appear various circinate, sharply defined, more or less elevated plaques and nodules of a brownish-red or bright pink color, situated at the centre or upon the irregular borders of the eczematous parts of the skin. These nodules, plaques, and elevations vary in size and may appear upon regions of the skin which are free from eczema, which are located at the most diverse points, and which manifest no particular regularity in

their disposition. A certain number of these lesions disappear completely after an existence of several days or weeks, leaving no trace other than a slight pigmentation, while others start up at new points. This spontaneous disappearance is quite as characteristic as is that of the lesions of the first stage. The two periods together may last many years (fourteen in one case) before the appearance of tumors.

In the so-called third or fungoid stage, which in some instances is the first and only stage, the characteristic tumors of the disease appear upon different portions of the body. They vary in size from a bean to an orange or even a larger object, and their coloring likewise varies from a pink to a dull red hue. As regards their shape they are either sessile or pedunculated, well rounded or lobulated, and distinctly circumscribed. When developing from the plaques they may be quite flat. They may develop from previously existing lesions or from the sound skin. They are usually painful. Like the other lesions of this disorder, the tumors may disappear spontaneously, while at the same time others make their appearance; or they may all disappear to return after uncertain intervals without known cause. As a rule, they leave no trace behind them of their previous existence, though they may be followed by pigmentation or slight atrophy of the skin. Sooner or later some of the tumors degenerate and lead to superficial ulceration, usually followed by papillary excrescences and mushroom-like growths of varying sizes, from which the disease obtains its name. At times they may be the seat of much more destructive ulceration, though with but few exceptions this destruction is limited to the new growths; and even large fungoid and apparently deeply ulcerated tumors may completely disappear and leave no trace of their previous existence, further than pigmentation and possibly a small atrophic scar.

The general condition of the patient at first seems unaltered; later, when the tumors ulcerate, exhaustion occurs and the victim usually dies as the result of febrile processes, of intercurrent disorders, of cachexia, or of pyæmia. Extirpation of the tumors is usually followed by recurrence, frequently with added malignancy. The duration of the tumor stage is brief compared with the others, death frequently occurring within a few months, though it may be postponed for two or three years.

Although the cause of the disease is not definitely known, there can be little question to-day as to its infectious character. It is probably produced by specific micro-organisms, but direct evidence of contagion and successful culture and inoculation experiments are wanting. The disease is more frequent in men than in women, and usually occurs after the fortieth year, though in a few recorded instances it began earlier.

DIAGNOSIS.—At the beginning, when apparently simple eruptions precede the formation of the tumors, the diagnosis may be very difficult, even Hebra having once diagnosed a case as eczema; and it may also be mistaken for an exudative erythema, a psoriasis, or a pityriasis rubra. The irregularity of distribution, the sharply defined border, and the greater thickening than in any of those diseases might excite suspicion. There is generally not so much discharge as in eczema with the same amount of hyperæmia; the heaping of silvery scales is decidedly less than it is in psoriasis; and, finally, there is too much scalliness and it persists for too long a time for exudative erythema. The itching, also, is generally more severe than it would be in any skin affection except eczema. Besnier says: “In all cases of ambiguous pruritic dermatoses which are prolonged and rebellious to ordinary methods of treatment, the possibility of the affection being the premycotic period of mycosis fungoides should be borne in mind.” When the bright red gives way to a deeper or more coppery red, and the infiltration increases, a suspicion of tubercular leprosy may be aroused, but there would be no anesthesia and the scalliness would be much greater than that which leprosy infiltrations present; moreover, the characteristic bacilli of that disease would be absent. When the fungating tumor

stage is reached there can be no difficulty in making diagnosis. In the more localized forms in which there is no preceding eruption, the disease may be mistaken for sarcoma or carcinoma cutis. Against this diagnosis, however, there would be the absence of early implication of the lymphatic glands (although tumors in the groin may simulate them) and the comparative painlessness; and besides, as a rule, the course would be slower than in cancer and the internal organs would never be implicated.

With possibly two recorded exceptions, the disease has invariably terminated fatally, the extremes of duration being nine weeks (a case of Gaillard's) and fifteen years. The widespread cases, which commence as apparently simple inflammations, are much less malignant in their course than those which begin at once as tumors.

PATHOLOGY.—While the main facts as to the morbid anatomy of mycosis fungoides are generally agreed upon, much difference of opinion exists as to the interpretation to be placed upon these facts. Anatomically, the tumors consist of round cells supported by a scanty, delicate reticulum, which replace the normal tissue of the cutis. The new growth is somewhat scantily provided with vessels, and as it spreads it destroys the cutaneous capillaries. The boundary between the healthy and diseased tissues is ill defined. Ranvier and most French observers have classed it with lymphadenoma, but Sireday thought it was lymphosarcoma, and until recently all German authors have considered it to be a sarcoma. There is a growing tendency among observers at the present time to class the disease with the infectious granulomata. Various micro-organisms have been seen in the tissues by different observers and some have been cultivated, but none have as yet been demonstrated to have any pathogenic relation to the disease.

TREATMENT, so far as a cure is concerned, seems to be of little avail. Arsenic has been used hypodermically with apparent temporary benefit. Large doses of quinine are recommended. Resorcin subcutaneously has failed. The x-ray has of late been tried, but not with sufficient thoroughness to determine its value. Pyrogallie acid, aristol, iodoform, ichthyol have been used for the relief of local symptoms. It should, of course, be the physician's endeavor to make the patient as comfortable as possible by treating the various distressing symptoms as they arise.

Charles Townsend Dade.

MYCOSIS INTESTINALIS. See *Anthrax*.

MYDRIATICS AND MYOTICS.—The opposing forces which maintain the iris in a state of equilibrium are controlled by two sets of nerves; the contracting muscle, the *sphincter pupille*, and the ciliary muscle being supplied by the third, while the dilating muscles are under the influence of the sympathetic nerve. The action of the third nerve has been very clearly demonstrated, but that of the sympathetic is not so evident, as the presence of radiating muscle fibres in the iris is a matter of dispute. Paralysis, or section of the third nerve, is followed by a relaxation of the sphincter muscle and dilatation of the pupil, and stimulation of the nerve produces contraction of the muscle and myosis. If the sympathetic nerve is stimulated there follows a dilatation of the pupil, and that the nerve exercises a positive dilating influence is shown by the greater degree of dilatation that takes place when a mydriatic is placed in an eye in which the third nerve has been paralyzed. This action of the sympathetic has generally been explained by the direct effect of the nerve upon the dilating muscles; but, since the presence of these latter has been called in question, a further explanation is necessary, and it has been suggested that the dilating nerve acts through the muscular tissue in the walls of the blood-vessels of the iris (see article on *Cocaine*).

Alterations in the size of the pupil may be due to ordinary physiological action, to some pathological change, or to the effect of certain drugs. Exposure to a strong light or to darkness, efforts at accommodation, the influence of fear or of shock, will produce an enlargement or

a narrowing of the pupil, according as one or other set of muscles is reflexly irritated. So also diseases of the central nervous system, which interfere with the integrity of the third nerve, cause dilatation, as is seen in meningitis, hydrocephalus, brain tumors, etc., while any profuse effect upon the basal ganglia or depression of the sympathetic will be followed by contraction of the pupil.

MYDRIATICS.—Mydriatic drugs produce their effect either by paralyzing the motor oculi or by stimulating the sympathetic nerve. Belladonna and its allies are examples of the first group, and cocaine belongs to the second.

In the first group are belladonna, hyoscyamus, stramonium, and duboisia, the alkaloids of which—atropine, hyoscyamine, daturine, and duboisine—are active mydriatics and are almost identical chemically. Many other plants, not employed therapeutically, are members of the order Solanaceæ and possess the same physiological action. Hyoscyne and scopolamine are closely allied to atropine, yet differ from it to some extent and form another group.

Belladonna is the best-known mydriatic and has been longest employed. Whether administered internally or applied directly to the eye, one of its earliest and most marked symptoms is the dilatation of the pupil. This persists for several days, the length of time depending upon the dosage. In some cases of poisoning the pupil has remained under the influence of the drug for three or four weeks. When it is employed as a mydriatic, a solution of the alkaloid is applied directly to the eye in order to obtain a purely local action. Formerly the extract was painted around the eye or upon the temple, or an infusion of the leaves was applied as a poultice over the eye. The pupil is extremely sensitive to the effects of atropine. It will be influenced by gr. $\frac{1}{30000}$, and a solution of the strength of 1 to 80,000 will enlarge the pupil within an hour. Accommodation is not affected by solutions below a strength of from one-thirtieth to one-tenth per cent. Generally a one-per-cent. solution is selected, which, instilled into the eye, begins to act in fifteen minutes and fully dilates the pupil in half an hour, accommodation being lost in one hour. The paralysis lasts for three or four days and is accompanied by annoying disturbance of vision caused by the enlarged pupil and loss of accommodation. Minor disturbances may persist for several days. For convenience of use gelatin discs are prepared which contain gr. $\frac{1}{3000}$, and which are easily inserted beneath the lid. If paralysis of accommodation is required, discs containing gr. $\frac{1}{100}$ must be used. A solution of salicylate of atropine is to be preferred to the sulphate, as it forms an antiseptic solution which remains free from any fungoid growth such as forms in solutions of the sulphate.

Homatropine is replacing atropine when dilatation is required for the purpose of examination. The advantage is a more rapid and less prolonged action. The pupil begins to dilate in the course of a few minutes and accommodation fails in thirty or forty minutes. Its effect begins to subside in three or four hours, and the eyesight is quite recovered within twenty-four hours. The drug is also less irritating to the conjunctiva and is devoid of constitutional effects when used with ordinary care. For the purpose of simply dilating the pupil, a one-per-cent. solution is employed; when accommodation is to be paralyzed, a two-per-cent. solution is to be preferred. If mydriasis is required for a prolonged period, atropine is selected in preference to homatropine.

Hyoscyamine and *daturine* are rarely or never employed for their mydriatic action. Their action is the same as that of atropine, but they are less to be depended upon and offer no advantages.

Hyoscyne exercises a much less marked influence upon the pupil, and is never used.

Duboisine.—This alkaloid has recently been extolled as possessing a more powerful action than atropine and as producing effects which are of shorter duration. As it is chemically identical with atropine, it will probably be found to have the same mydriatic action. The solu-

tion employed has a strength of one per cent., and produces dilatation within an hour.

Cocaine.—As a mydriatic cocaine differs from atropine and possesses many advantages. It is much less intense in its action, the pupil is not dilated to so great an extent, and a certain degree of reaction to light or other stimulus may be retained. Its effect is accomplished in half an hour and passes off in a few hours. There is little or no influence exerted on the power of accommodation. As before stated, it acts through the sympathetic nerves, either by stimulating the dilating muscle of the iris (if these exist) or by contracting the arteries of the iris.

When it is combined with atropine a very powerful mydriatic is obtained, as both a paralysis of the sphincter and a stimulation of the dilators are obtained. Koller uses a mixture of equal parts of a one-per-cent. solution of atropine sulphate and a five-per-cent. solution of cocaine hydrochlorate. This is applied every ten minutes until dilatation is secured, and if a prolonged action is required it is maintained by applying the solution three times a day. In inflammatory conditions much benefit is also obtained from the anæmia and blanching of the parts which the cocaine produces.

Mydriatics are employed to dilate the pupil for the purpose of an efficient intraocular examination and to facilitate cataract operations; also to remove the iris from the danger of adhesions in many inflammatory conditions. The dilatation of the pupil will also lessen the probability of prolapse of the iris in wounds of the eye.

For ophthalmic examinations and for simple dilatation of the pupil, homatropine and cocaine are now employed almost to the exclusion of atropine on account of their transient action. In examinations in which it is necessary to paralyze accommodation homatropine must be employed, as the action of cocaine upon the ciliary muscle is insufficient. In inflammatory states where a prolonged effect is required, atropine, with or without cocaine, is to be preferred. It is also indicated in all forms of iritis and in wounds or injuries accompanied by inflammatory action. When there is much ciliary spasm, it lessens the pain and photophobia by paralyzing the muscle.

The employment of mydriatics is not unaccompanied by dangers. For example, the alkaloid may be absorbed to such an extent as to cause severe constitutional disturbances, or some of the solution may pass into the nasopharynx and its local action be extended into the throat. Mydriatics may also, by continued use, prove so irritating as to produce a conjunctivitis. The most serious danger is the possibility of aggravating an incipient glaucoma—a result which has frequently followed their careless employment. This is due to the increased intraocular tension which accompanies the paralysis of the ciliary muscle, and, although cocaine is thought to have but little effect in increasing this tension, many cases are reported in which it has aggravated a glaucomatous condition of the eye. Certain signs of glaucoma, which readily distinguish it from iritis, are very marked and should never be overlooked. In iritis the iris is contracted and fixed, while in glaucoma it is dilated and also fixed; in iritis the eye is hypersensitive, in glaucoma it is almost insensitive. In glaucoma there are also the early symptoms of vomiting, with inflammation of the eye, and the prodromal disturbances of vision, with haziness of the cornea, color rings, etc.

MYOTICS.—The action of myotics is quite the opposite to that of mydriatics, the contracting muscles being stimulated and the dilating muscles depressed. With the contraction of the sphincter pupillæ there is also a contraction of the ciliary muscle which lessens intraocular tension. The action of myotic drugs is not well understood. It is probable that they act upon both sets of muscles, but even in the case of physostigmine, the best known of these drugs, many authorities consider that its action as a stimulant of the motor oculi is the most important, while others claim that its influence is directed chiefly as a depressor of the sympathetic. My-

otics are of less therapeutic value than are mydriatics, and were it not for the lessened intraocular tension that accompanies the narrowing of the pupil, they would very rarely be employed. They are recommended in cases of paralysis of the third nerve, but are rarely of any service, except in the paralysis following diphtheria. In glaucoma they are of undoubted value. The great tension is overcome and the eye is relieved, and in many instances their employment has apparently rendered an operation unnecessary. In wounds of the surface of the eye and in corneal ulcers the tendency to rupture of the coat is lessened by their use.

Physostigmine or *Eserine* is the drug always selected. Pilocarpine exercises the same effect, but it is mild and uncertain. A solution of the sulphate or salicylate of eserine is employed, of the strength of one-quarter grain to the ounce. This will begin to act in fifteen minutes, its full effect will be reached in an hour and will continue for two or three hours, and in twenty-four hours the myosis will have disappeared. In glaucoma myosis is more difficult to obtain, and a solution of two per cent. may be required. The condition of myosis is not so intense as is that of mydriasis, and if atropine has been applied to the eye eserine will have no effect until the action of the atropine has begun to pass off. On the other hand, atropine rapidly dilates a pupil under the influence of eserine.

Beaumont Small.

MYDRIN is a colorless powder composed of ephedrine hydrochloride, 100 parts, and homatropine hydrochloride, 1 part. It is used in ten-per-cent. solution as an evanescent mydriatic.

W. A. Bastedo.

MYELOMA.—Under the greatest variety of names there have been described in recent years cases of an affection of the bones which have in common certain features so distinctive as to justify their union under one name. Briefly stated, these cases show as a rule evidence of the presence of multiple new growths developing simultaneously in the most widely separated bones. Pain is often felt in these tumor-like masses, and from the destructive influence which they exert upon the bony structure fractures with dislocation and deformity soon appear as the result of the most trifling traumatism. A cachectic condition supervenes in the later stages and is associated with the occurrence of a peculiar urinary condition,—one in which the urine contains albumoses. Various paresthesias and pareses may occur, and with the great increase in the deformities produced by the tumor masses the patient finally dies of exhaustion or succumbs to some intercurrent affection.

As early as 1847 a case of this sort was observed by Bence Jones¹ and Macintyre. Their attention was particularly attracted to the condition of the urine, in which a peculiar proteid could be demonstrated. The patient after a long and very painful illness died, and at the autopsy there were found red gelatinous masses replacing in large part the vertebrae, sternum, ribs, etc. They designated the condition "osteomalacia fragilis rubra."

Rustizky² first gave the name multiple myeloma to the condition in a paper published in 1873. He considered it a simple hypertrophy of the bone marrow, because, although the tumors were multiple, they were present only in the bones and did not give rise to metastases.

Since then a number of cases have been described under this name, while many others obviously of the same nature have been designated "osteomalacia," medullary pseudoleukæmia, sarcomatous osteitis, malignant osteomyelitis, lymphosarcoma, etc. Good summaries of the literature with descriptions of cases have recently been given by Hammer,³ Winkler,⁴ Wieland,⁵ and Paltauf,⁶ from which it appears that there is really a well-defined condition, easily distinguishable from the endotheliomata and sarcomata of bone, and for which the name myeloma is most fitting,—a condition which Virchow prophesied, although at that time no case had been published.

The disease may perhaps be made clear most easily by the description of a case which occurred recently at the