

heart must here be reckoned with. Even in diseases of the heart itself, great benefit is sometimes to be derived through the rest afforded.

Its use in insomnia is subject to the very great risk of establishing the opium habit. Even when the insomnia is but temporary, the exceedingly pleasant results are liable to lead to its use upon similar future occasions, and the temptation is most insidious.

Other uses of morphine, for which opium itself is more appropriate, will be considered under the latter title.

Compounds, Preparations, and Doses.—Morphine is rarely used in the pure state, since one may obtain numerous salts which are far more soluble and absorbable than itself. Its ordinary dose is 0.008 to 0.015 gm. (gr. $\frac{1}{4}$ to $\frac{1}{2}$). This dose, however, as well as those of its salts, is subject to a degree of variation scarcely equalled in any other drug. Children are far more susceptible than adults, women are distinctly more susceptible than men, and there is a great difference among the latter, depending upon temperament. The effect of the drug is directly counteracted by pain or excitement, and large quantities must frequently be given to overcome the former. Tolerance is quickly established, and under it, or under the influence of habit, the production of medicinal effects demands a great increase in the dose.

The acetate (*Morphine Acetas*— $C_{17}H_{19}NO_3 \cdot C_2H_3O_2 + 3H_2O = 398.12$) is white or faintly yellowish, crystalline or powdery, has a faint odor of acetic acid and a bitter taste, is soluble in 2.5 parts of water, 47.6 of alcohol, 1,700 of ether, and 2,100 of chloroform. Upon exposure, it gradually loses its acetic acid and becomes less soluble.

The hydrochlorate (*Morphine Hydrochloras*— $C_{17}H_{19}NO_3 \cdot HCl + 3H_2O = 374.63$) occurs in a white feathery silky mass of fine acicular crystals or in minute cubical crystals, which are bitter and permanent, soluble in 24 parts of water, 62 of alcohol, and very little in ether or water chloroform. It is neutral.

The sulphate (*Morphine Sulphas*— $[C_{17}H_{19}NO_3]_2 \cdot H_2SO_4 + 5H_2O = 756.38$) presents an appearance similar to that of the hydrochlorate, but dissolves in 21 parts of and 702 of alcohol.

The doses of these salts are about the same as those of morphine, and they are, especially the acetate, because of its high solubility, readily available for hypodermatic use. The official preparations are wholly of the sulphate. The compound morphine powder or Tully's powder (*Pulvis Morphine Compositus*) has a strength of one part of the sulphate of morphine in sixty, the remainder being nineteen of camphor, twenty of powdered liquorice, and twenty of precipitated calcium carbonate. The dose is 0.3 to 1 gm. (gr. v. to xv.). The troches of morphine and ipecac (*Trochisci Morphine et Ipecacuanhe*) each contain 0.0016 gm. (gr. $\frac{1}{6}$) of morphine sulphate, with about three times as much powdered ipecac, mixed with sugar, mucilage of tragacanth, and a little oil of wintergreen to flavor. The dose is one to five troches. The *Liquor Morphine Sulphatis* is made by dissolving thirty-five grains of morphine sulphate in two fluidounces of alcohol and about six fluidounces of distilled water, so that it has a strength of about half a grain of morphine sulphate to the fluidrachm. The dose is fl. ζ ss. to i. The Magendie's solution is somewhat similar, but contains sixteen grains of morphine sulphate to the fluidounce, or two grains to the fluidrachm, thus four times as strong as the last; the dose is \mathfrak{m} v. to xv. There is still another *Liquor Morphine Sulphatis*, of an earlier pharmacopœia, containing one grain to the fluidounce. Because of these wide differences in strength, it is not advisable to prescribe this solution by name without specifying the strength.

Henry H. Rusby.

MORPHŒA—(Gr. *μορφή*, form, shape); keloid of Addison; circumscribed scleroderma—is a disease of the skin characterized by the presence of variously sized, round, oval, or band-like patches, violaceous, white, yellowish-white, or brown in color, situated on various parts of the cutaneous surface, without definite arrangement or, less frequently, distributed along the course of some nerve.

These patches vary in size from a small pea to the palm of the hand and even larger, are sharply circumscribed, and are usually surrounded by a pink or lilac-colored border, of variable width, which is composed of minute blood-vessels. They may project slightly above the surrounding normal skin or be on a level with it; they are firm and inelastic to the touch, smooth, and shining, presenting an appearance, when the patches are white, which has been aptly compared to old ivory. In patches which have existed for some time there may be moderate scaling, or the centre may be occupied by a number of small pit-like depressions looking like the dilated mouths of the ducts of sebaceous glands, with which, however, they have no connection. The number of lesions present varies from a single one to a half-dozen or more, but is rarely considerable. While no part of the skin is exempt, the disease shows a predilection for certain regions, the parts most commonly affected being the face, the breasts in women, the arms, and the thighs. When the lesions assume a zosteriform arrangement they occur most frequently over the branches of the fifth pair, in the course of some of the branches of the brachial plexus, over the intercostals, or down the thigh. As a rule, subjective symptoms are rarely marked and are often entirely wanting. There may be slight itching, tingling or burning, and in a small number of cases more or less severe neuralgic pains.

The malady is a chronic one and its course is apt to be extremely irregular. After gradually increasing in size for a time the patches may remain unchanged for months or years, and then slowly and almost imperceptibly the skin may resume its normal condition. On the other hand, the skin may become thin, shrivelled, and scaling, adherent to the parts beneath, assuming, particularly in the case of the band-like patches, the appearance of deep scars. When such an atrophic process occurs in patches situated in the neighborhood of joints motion may be more or less seriously interfered with.

Morphœa is seen much more frequently in women than in men. Age is apparently without influence. Long-continued irritation of the skin, such as may result from the pressure of a garter or the rubbing of the stays, a blow, or an injury to a nerve, have seemed to be the exciting cause in some cases. In the great majority of cases, however, no satisfactory explanation of the occurrence of the disease can be given.

PATHOLOGY.—Although the exact nature of the malady is not yet definitely determined, there is much in favor of the view that it is a trophoneurosis. Its frequent occurrence in neurotic subjects, the arrangement of the patches over the course of some nerve, and the neuralgic pains which accompany it in a certain proportion of cases are some of the features which lend probability to the neurotic theory of its origin.

The tissue changes characteristic of the affection are found almost exclusively in the corium, the epidermis being little if at all affected. The papillary layer is markedly flattened, and its blood-vessels are greatly narrowed and even in places obliterated. About the vessels of the deeper parts of the corium there is a round-cell exudate which produces narrowing of their lumen and occasional thrombosis. According to Unna the elastic fibres are unchanged, but there is an hypertrophy of the collagenous tissues. About the margins of the sclerosed areas there are numerous dilated vessels—the result of a collateral hyperemia—which give rise to the peculiar lilac-colored border about the patches. The sebaceous and sweat glands are more or less atrophied, the result of the pressure from the hypertrophied fibrous tissues.

DIAGNOSIS.—Well-developed morphœa presents such marked and peculiar features that there is seldom any difficulty in its diagnosis. The smooth, ivory-like patches surrounded by a violet border are quite unlike any other disease of the skin.

In the white patches of vitiligo, which only remotely resemble those of morphœa, there is simple loss of pigment without any structural alteration of the skin.

PROGNOSIS.—In cases of moderate extent and severity the prognosis is usually fairly favorable. In the majority of cases, after a duration of some months, or it may be two or three years, the skin gradually resumes its normal aspect. When, however, marked atrophy has taken place with adhesion to the deeper structures, forming scar-like patches, the prognosis is extremely unfavorable.

TREATMENT.—Treatment is rather unsatisfactory. Internally such remedies as cod-liver oil, arsenic, quinine, and iron may be administered with the view of improving the patient's general health. Thyroid extract has been given with asserted good results in a small number of cases. Locally, frictions with bland oils and fats are useful, and so also are mild galvanic currents applied, as Crocker suggests, in the neighborhood of, rather than directly to, the patches, to avoid any possible irritant effect. Brocq recommends electrolysis, employed as in the removal of hairs. The needle should be inserted in every portion of the patch, the current used varying from 8 to 15 milliampères, and the needle should be allowed to remain fifteen seconds at each puncture. Between the sittings mercurial plaster is to be applied. Hebra has obtained good results from intramuscular injections of a fifteen-per-cent. alcoholic solution of thiostramin, half a Pravaz syringe of the solution being injected every second day. Milton B. Hartzell.

MORRISON SPRINGS.—Jefferson County, Colorado.

POST-OFFICE.—Morrison. Hotel recently built.

ACCESS.—From Denver via Denver, Gunnison, and Leadville Railroad. Morrison Springs are located fourteen miles southwest from Denver, in the basin of Bear Creek and just within the Rocky Mountain foothills at an altitude of six thousand feet above the sea level. No complete quantitative analysis of the waters seems to have been made, but Dr. W. C. McNeal, of Morrison, furnishes us the following report of a partial qualitative examination:

Sulphureted hydrogen.	Iron.
Calcium bicarbonate.	Magnesium sulphate (forty grains per gallon).
Manganese.	Potassium (trace).
Sulphuric acid (doubtless in combination).	
Arsenious acid (combination).	
Temperature of water, 80° F.	

This incomplete analysis would indicate that the waters possess tonic, laxative, and alterative properties. They are recommended in renal, digestive, skin, and rheumatic affections, and in chronic syphilis. James K. Crook.

MORTALITY. See *Vital Statistics*.

MORVAN'S DISEASE; ANALGIC PANARITIUM.—This curious and extraordinarily rare disease was first described by Morvan, of Brittany, in 1883. In applying the name analgic panaritiom, or "painless whitlows," Morvan was obviously more influenced by the salient clinical feature of the disease than by any consideration for its underlying pathology. Viewed in the light of the more critical tendencies of recent years, the desirability of retaining it as a clinical entity, to the burden of an already overcrowded neurological nosology, seems more than doubtful.

The opportunities for investigating the disease, even in the services of large hospitals, are so meagre that little or no satisfactory advance has been made in our exact understanding of its genesis and morbid sub-structure. It appears to consist of a syringomyelic condition—or of the associated gliomatosis—plus a peripheral neuritis.

In the few cases in which a microscopic examination of the cord has been made, the connective-tissue overgrowth appeared in the posterior part of the gray matter and in the posterior columns.

It is practically certain that syringomyelia takes its origin in a developmental defect. As the primary morbid condition of the disease under consideration is analogous to that of syringomyelia in all essential details, it seems to the writer much more reasonable to regard the extra feature of Morvan's disease, the peripheral neuritis, of identical origin. This point of view makes the two

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morbid processes practically alike in all respects except topography, and the doubt arises as to whether this single feature of dissimilarity is sufficient to establish Morvan's disease on the plane of a clinical entity. Repeated observations of the apparent fortuitousness of the morbid distribution in cases of other developmental defects should tend, by analogy, to reduce the present distinguishing features of syringomyelia and what we now term Morvan's disease to the vanishing point, and such a result is desirable for obvious reasons.

As the clinical features of the two diseases now stand, there is nothing upon which we may rely absolutely for differentiation between them. Both are apt to give the first clinical manifestations of their presence in the first half of adult life, and both are alleged to follow some traumatism or to arise in consequence of abuse of function. How important local traumatism may be in the production of Morvan's disease it is difficult to say, owing to the natural rarity of the affection. It probably has about as much etiologic value, however, as that other frequently alleged causative agent in nervous diseases—exposure to cold and wet.

In Morvan's disease the symptoms begin as a rule in the upper extremities. Of these the most striking are the whitlows, which are usually, though not invariably, painless, owing to the loss of all forms of sensation preceding them. With the whitlows there may be recurring ulcerations on various parts of the fingers. These ulcers are deep and not unlike the perforating variety observed in tabes. They are accompanied by cracks in the skin, and the nails shrivel and split. Although the occurrence of the whitlows is the striking feature of the disease, it is not the most important or serious. As has been said, they occur as a rule subsequently to the abolition of all forms of sensation, but they have important precursors in the form of muscular weakness and wasting in the hands and forearms. Although the trophic mischief is practically limited to the hands, and the muscular wasting does not go above the forearms, the sensory loss may involve the entire arms, parts of the trunk, and even the face. Sufficient vaso-motor derangement to cause lividity and pallor of the skin often precedes and accompanies the nutritional disturbance. An affection of the shoulder-joint has been noted. When the ulcerations of the fingers involve the terminal phalanges, the latter may be entirely destroyed. The electrical irritability of the nerves involved in the affected parts pursues variations, as the disease progresses, similar to those observed in the progressive atrophies of spinal origin, a gradually increasing quantitative loss, followed by inversion of the formula. The feet are rarely the seat of the painless ulceration; although the legs may be weak and the knee-jerks exaggerated, owing probably to the partial implication of the nutritional arteries of the lateral columns in the overgrowth of tissue. The course of the disease is extremely slow, extending over many years. In certain cases it has appeared to be arrested.

In the matter of differential diagnosis there are no particular difficulties except in regard to syringomyelia. Here, in the opinion of the writer, there is no absolute distinction. For certain authorities the retention of tactile sensibility and the absence of the whitlows are sufficient to rule out Morvan's disease in a doubtful case. In Raynaud's disease the vaso-motor disturbance is paramount and the loss of sensibility, when it exists, is not alike in kind or degree. In sclerodactyla there are no sensory loss and no tendency to destructive ulceration of the finger ends. In anesthetic leprosy there are no ulcerations whatever, while there is a tendency to pigmentary deposit in the skin areas involved.

Owing to the nature of the malady, the question of treatment is easily settled. No drugs are specifically indicated. Even symptomatic treatment is of little importance because of the practically painless course which the disease pursues. Iron, arsenic, and strychnine are among the drugs used, but it is more than doubtful if they have exerted other than a general effect.

Joseph William Courtney.

MOSQUITOES IN RELATION TO HUMAN PATHOLOGY.—The special importance of the mosquito as an agent in the transmission of disease has been thoroughly demonstrated by recent discoveries, a brief synopsis of which may be given as an introduction to the subject.

HISTORY.—In 1880 Manson, by establishing the connection of mosquitoes with elephantiasis, gave the first demonstration of their culpability in spreading disease. It was the same year (1880) that Laveran discovered the intraglobular parasites now universally acknowledged as the cause of malaria. The transference of these hematozoa from one host to another by means of mosquitoes was conjectured as early as 1883 by King and in the following year by Koch and Laveran; but was first actually demonstrated by Ross, in a series of experiments between 1895 and 1899; these facts have been abundantly confirmed by many subsequent investigators. In 1897 MacCallum first observed the sexual phase in the allied avian hematozoa, and the further elucidation of the life history of the parasite was brought about by contributions of Ross, Bastianelli, Bignami, Grassi, and others, while unimpeachable evidence of the agency of the mosquito in carrying the disease was furnished by the positive infection experiments of Manson, who imported

(*Megarhina*); or long in male, shorter in female (*Toxorhynchites*).

II. Dull-tinted insects with straight proboscis.
(b) Palpi about as long as the proboscis in both sexes; those of the male clubbed at the end, those of the female linear.
(c) Palpi about the length of the proboscis in the male but much shorter in the female, being here usually very short.

(d) Palpi very short in both sexes.

Section B. Mouth parts not formed for piercing, there being no true proboscis. Palpi small.
For the determination of the genera the form and arrangement of the scales, which are all important, are shown diagrammatically in the figure (Fig. 3363). So far as the species are concerned, it is impracticable to make more than a preliminary determination without referring to a monograph, and there will be mentioned only a few of the more important forms, in those genera which are now known to be responsible for the transmission of disease. A few hints as to methods of collecting and examining will doubtless be useful to the practitioner. The adult mosquitoes are very delicate, so that the parts are easily broken and the arrangement of the scales easily obscured

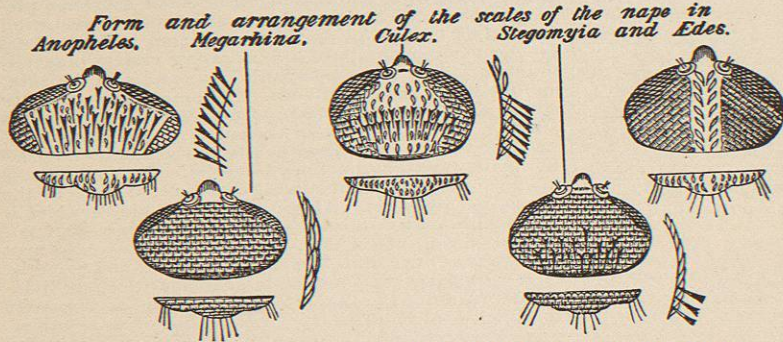


FIG. 3363.—Graphic Key to Scale Arrangement of Leading Genera. (After Theobald.)

from Rome tertian infected *Anopheles*, which evoked the disease in those whom they were permitted to bite in London.

The connection of the mosquito with yellow fever, conjectured by Finlay of Havana as early as 1881, waited until 1900 for its experimental demonstration in the investigations of the Yellow Fever Commission, consisting of Drs. Reed, Carroll, Lazear, and Agramonte, in the course of which two members of the Commission acquired the disease and one, Dr. Lazear, succumbed to it.

Kinds of Mosquitoes.—It is necessary now to consider the various types of mosquitoes before taking up more specifically their relations to disease. In all about three hundred species of mosquitoes have been described, of which only thirty-six species have been recorded in North America. Of these five belong to the genus *Anopheles*, three to *Stegomyia*, and no less than eighteen to *Culex*. It would be impossible within the limits of an article even to outline the complete classification of the group, but some of the most important facts may be stated briefly. The order and family have been sufficiently characterized by Professor Osborn (see *Insects*). It is extremely uniform in character, and only recently has Theobald found a basis for subdivision in the form and arrangement of the scales on the body and wings. His classification with some additions suggested by Giles is followed here. The sub-families are distinguished as follows:

Section A. Proboscis formed for piercing.

I. Brilliantly colored insects with a very long, curved proboscis.

(a) Palpi, about as long as the proboscis in both sexes

by rough handling. The female may be readily caught on the hand or arm when biting, or even on the wall of a room, by inverting an ordinary vial over it; once trapped a whiff of tobacco smoke or a drop of chloroform will kill it immediately and leave the specimen in good condition for examination or transportation on cotton in a pill box. A good killing vial may be made by confining a small piece of cyanide of potassium at the bottom of a shell vial by a disc of blotting paper cut to fit the vial. After it has been inverted over the mosquito, the cork may be slipped into the mouth of the vial and the insect succumbs almost instantly and without damage. Mosquitoes may be mounted dry on pieces of thin card or cork, but should not be enclosed in balsam as this destroys colors and renders identification difficult. Most of the characters can be determined with a triplet; all with the low power of a compound microscope.

For collecting larvæ, which are often difficult to distinguish against the dark background in a pool, a white cup is useful; or a coffee strainer may be drawn through the vegetation at the margin of a pond or stream and the material obtained may be examined more carefully in a cup of water or on a white plate. Larvæ may be bred in jars, which should be covered with mosquito netting to prevent the escape of the adults when they emerge, while the latter may be kept in frames of netting, but should be provided with a little water and pieces of banana or dates on which they feed. If desired larvæ may also be preserved in dilute formalin or in alcohol. Further data may be found in any of the manuals cited.

Anopheles Meigen (1818).

Head with both flat and narrow curved scales, but mainly covered with large upright forked scales; palpi long in both sexes, usually about the length of the proboscis, four-jointed in the female, three-jointed in the male, in which the last two joints are short and thick; constrictions at the base make the palpi possess apparently one or two extra joints in each sex. Antennæ, fourteen-jointed, filiform, pilose in the female, fifteen-jointed and plumose in the male.

Thorax sometimes nude on the dorsum, usually with narrow curved or small spindle-shaped flat scales. Abdomen generally pilose, but sometimes with a few scales

and rarely with many. Wings covered with small scales of normal form or inflated, with the first submarginal cell longer and narrower than the second posterior cell; both

Anopheles maculipennis Meigen (1818) (Fig. 3364). Wings with four tufted spots on the wing field, the costa being uniformly dark except at the apex, where its color

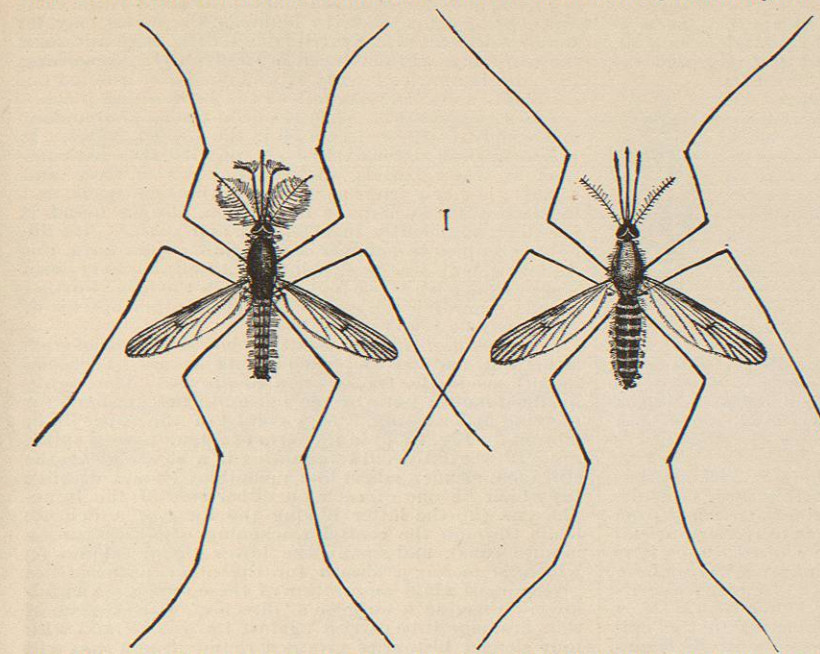


FIG. 3364.—*Anopheles maculipennis* Meig. Male at left, female at right. (After Howard, Bull. United States Dep. Ag.)

mentioned in the synopsis above it may be noted that the anterior fork cell is at least as long as the hind one. Of the dozen genera only two are noted.

Stegomyia Theobald 1901. Palpi short, four-jointed in the female; long, five-jointed in the male. Head clothed completely with an armour of broad, flat scales; mesothorax covered with either narrow curved or spindle-shaped scales. Scutellum always with broad flat scales on the middle lobe and usually also on the lateral lobes; abdomen completely covered with flat scales, banded or unbanded, but always with white lateral spots. The female palpi are small, never more than one-third the length of the proboscis; those of the male are as long as, or longer than, the proboscis. Wings of similar venation to those of *Culex*, but the fork cells are short. With hardly an exception they are colored jet black contrasted with pure white in bands and stripes on the legs and thorax, which is often elaborately adorned; in all black predominates, and they have a characteristic smooth satin-like appearance.

As these mosquitoes are rarely found north of 40° North latitude, they are characteristically tropical and

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FIG. 3365.—Wing of *Anopheles maculipennis*. Outer outline to show size variation. (After Giles.)

subtropical forms. They are said to be good sailors and as a result *S. fasciata* belts the world with its colonies, being the most widely distributed of all mosquitoes.

Anopheles punctipennis Say. Wings with the costa black, interrupted by a single large ferruginous spot a little outside the transverse veins, with also a smaller apical spot and some yellow spots near the tips of the long veins. Legs and tarsi nearly uniformly black. Thorax and abdomen deep brown, nude except for some yellowish-brown hairs; wings much longer than abdomen; head black with a scanty whitish frontal tuft, palpi and proboscis dark yellowish-brown unbanded, but rather lighter at the tips, length 5 to 7 mm.

This species is very widely distributed over our continent and is said to be called the "winter mosquito," having been taken when the temperature was only 6° F.