

A CLINICO-EPIDEMIOLOGICAL CLASSIFICATION OF THE FORMS OF LEPROSY*

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The definitive adoption of a classification of leprosy, initiated by the Manila conference in 1931, can be effective only through the action of another international gathering. There is so strong a movement against the criteria approved in Manila that it seems desirable to discuss the subject and to offer another, perhaps more conservative, classification. It has been our purpose to arrive at a unitarian clinico-epidemiological basis of classification that would be immediately applicable, with epidemiological significance, to morphological clinical features, which classification is necessary for any work of this kind.

HISTORY OF CLASSIFICATION

The historical development of this matter is intimately related with the chronological sequence of the different concepts of the pathogenesis of the disease. Leprosy has always maintained a singular uniformity of symptomatology; as Danielssen and Boeck stated, it manifests itself now as it did a thousand years ago. Hensler pointed out that, like syphilis, it is a morbid element which manifests itself in different ways until its complete development.

The first concrete mention of the main difference between the nodular and the anesthetic forms seems to have been made by Robinson (1819), a distinction apparently made in remote times. The same trend was followed by Fuchs (1831) who, however, divided leprosy according to development into four periods: primary or prodromal, secondary or eruptive, tertiary with deformities, and quaternary with ulcerations. In the same period Heiberg distinguished, chiefly on cutaneous symptoms, nodular, squamous and smooth forms, the last corresponding to our macular form.

* A condensation prepared from a translation, made by Dr. M. B. Lara with the assistance of F. X. Rello, S. J., of an article in *Revista Brasileira de Leprologia* 4 (1936) Special No., 375-410. The article is lengthy, discursive and replete with quotations from other authors, and cannot be printed in full. Much of the quoted matter and discussion is greatly condensed and parts are deleted, the more important deletions being indicated by notations in brackets. The introductory paragraph appeared originally as a footnote.—EDITOR.

The old dualistic idea reappeared in the fundamental work of Danielssen and Boeck (1848), with their "elephantiasis graecorum tuberosa" and "anesthetosa" (though the macular lesions were not adequately recognized until Danielssen studied the matter further) but the differentiation was made indistinct by the frequency with which the nodular form was complicated by the anesthetic, and by the fact that the anesthetic form might be complicated by nodular features. Virchow (1869) did not see any precise limit between leprosy of the skin and of the nerves, it being characterized in all periods by a granuloma with vacuolate cells; he recognized three forms: nodular, macular (with infiltrated and atrophic lesions, "morphaea negra" and "blanca"), and anesthetic (with trophic disturbances and bullous exanthemas). Hansen (1892), finding few nodular cases to have normal cutaneous sensibility, divided leprosy on the basis of the eruptive features into nodular and macular.

A new concept of the dualistic basis was introduced by Leloir (1886) with his "systematized" cutaneous and nervous forms. He thus abandoned the purely clinico-morphological basis and substituted the false idea that there is a leprosy of the skin and one of the nerves. He ignored the fact that the forms are determined by the evolution of the disease, and rejected the obviously important macular one, holding that it is not a persistent pure form. [The criticism of Leloir's views is extended.]

Hansen and Looft (1894), more scientifically, considered the "nodular" form to be an affection of both skin and nerve with an eruptive nodular syndrome, and the "maculo-anesthetic" form also mixed, with an eruptive macular syndrome. The old "mixed leprosy" they ruled out. [The reasons are stated.] These authors, for the first time, assigned to the macular lesions the importance that they have in the course of the disease, but they did not recognize the relative autonomy of that form.

Kaposi and Dehio, independently, came to recognize the lack of clear differentiation between the forms of leprosy. The former, pointing out that there only occur "certain clinical pictures which are repeated very frequently," distinguished nodular, macular, and anesthetic forms, according to the predominance of one or another eruptive element. Dehio was more radical; he distinguished two principal clinical forms, nodular and maculo-anesthetic, but recognized six varieties: nodular, nodulo-anesthetic, macular, maculo-anesthetic, anesthetic and nodulo-macular.

A new modification of the dualistic basis as used by Leloir was adopted by Rogers and Muir (1925). They distinguished two "principal types," skin and nerve, but with arbitrary definitions; the former was bacteriologically positive and not anesthetic to light touch, the latter negative and anesthetic, though it was recognized that sometimes these criteria might fail. Wade and Rodriguez (1927) also modified the dualistic concept by calling one of the types "neural" and the other "systemic" (generalized). The former was subdivided into "primary" and "secondary," the latter being those in which the disease previously had been generalized.

The Manila Conference (1931) endeavored to put the dualistic viewpoint of Muir and Wade on an international plane, but with a new change in the criteria of distinction of cutaneous and neural. The former manifests "leprotic" lesions "which present clinical or

microscopic evidence of inflammatory processes, typically of granulomatous nature, which are apparently caused by *Mycobacterium leprae* in them." It is admitted that sensory disturbances occur in that type. The old mixed form is condemned textually, but practically it is used. The secondary neural case reappears. Each type is divided into three grades: slight, moderate and advanced. Having endeavored to impose a scientifically unacceptable concept, the Conference adopted arbitrary and frequently inexact definitions of the principal anatomic-pathological features which constitute the substratum of the symptoms of leprosy. It is not surprising that its conclusions have met with many objections.

Heretofore we have lacked a critique of the entire question that would reveal the defects of that and other classifications of leprosy and of the dualistic concept. Such an analysis is attempted here.

GENERAL PATHOLOGICAL BASIS FOR A CLASSIFICATION

The problem of classification is more than a simple, didactic, clinic question; it involves the general pathology, epidemiology and prophylaxis of the disease. Of the various facts that merit special attention, the most impressive one for the dermatologist is that, despite its varied cutaneous symptomatology, leprosy has so often been studied without consideration of the principles of dermatology. As with syphilis and tuberculosis, which show dermatological polymorphism without being specifically cutaneous diseases, there would be a great advantage in applying dermatological principles in the study of leprosy.

First, there is required exact knowledge of the objective morphology and general pathology of the disease, and there should be established a concept of what should be called a "clinical form"—a stage or phase with uniform symptoms and of long duration. Second, there is required correlation between the forms of the disease and the modifications of reaction of the infected organism which regulate its further course and the degree of contagiousness and curability. The best practical application of this purely biological criterion, for clinical practice, has been obtained in syphilis. Similar attempts to classify tuberculosis appear to have been even less valid than those for leprosy, as Jadassohn has observed. Almost none of the classifications proposed for leprosy satisfy both of these conditions. Exceptions are the Japanese classification into three forms, the epidemiological classification used in São Paulo, and Lie's classification, which is scientifically precise.

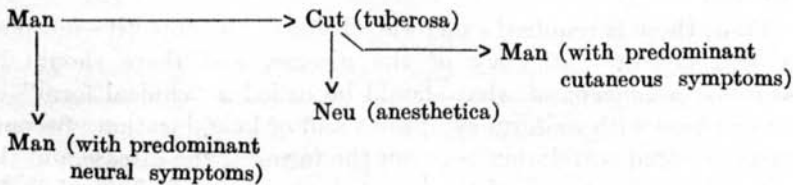
The three principal difficulties in classification are: (a) the

use of the predominant anatomical localization as the basis, to which the Manila conference returned; (b) the problem of the "maculo-anesthetic" cases; and (c) the more recent problem of the tuberculoid lesions. With regard to the last, there are cases that go on for a long time without evidence of neuritis or trophic change; these lesions are very varied in morphology, from simple macules to infiltrated lesions simulating lepromatous nodules; there are peculiarities of reaction to various antigens, specific or otherwise, and of the results of the organic reactions involving the skin, nerves, lymph nodes and even certain internal organs, as the spleen and bone marrow.

PROBLEM OF THE MACULO-ANESTHETIC CASES

The questions regarding the maculo-anesthetic cases are: (1) whether these macular processes should be related to the old maculo-anesthetic form or placed separately; (2) whether or not these macular cases ultimately become really neural in nature and therefore opposed to the nodular process; and (3) whether or not the tuberculoid lesions can or should be raised to the category of a clinically independent form.

1. *Should the macular lesions be included in the neural form or should they be given clinical autonomy?*—Elsewhere I have shown how the macular cases are related both to the nodular or cutaneous cases and to those properly called neural or anesthetic, by the following scheme, the symbols of which are: Man=maculo-anesthetic, Cut=cutaneous, Neu=neural.



In the maculo-anesthetic form we are, therefore, dealing with a transitional one, in which oscillations in the period of eruption are related to oscillations of immunity, with bacilli more or less abundant. Dermatologically these cases present leprides of the erythematous, vitiliginous, pigmentary and tuberculoid types. The ulnar nerves are less regularly involved than in the cutaneous and mixed cases (Jeanselme).

It is to be concluded: (1) that there is no clinical form that can be distinguished as "mixed"; (2) that, contrary to the opinion of Wade, we should recognize a "variety" which persists for some time

as such to be a clinical form, and not a permanently fixed "type"; and (3) that the macular form, which to Jeanselme is only a "phase" of the maculo-anesthetic form, may remain distinct as such for long periods. Therefore the cases formerly called "maculo-anesthetic" assume the category of a clinical form because of the constancy of their characters and the duration of their manifestations.

2. *Is the macular process identifiable with the anesthetic process, and if so is it the opposite of the nodular process?*—This question involves that of whether the macular process is neurogenic or cutaneous, and it therefore involves the general problem of the causes of the different aspects or forms and of the courses of the specific infectious diseases. Answers to the latter question are based variously on differences in (a) the germ concerned, (b) the mechanism of infection, and (c) the reaction of the infected organism. With regard to the first point, differences in the germ of leprosy have not been demonstrated and the question is hypothetical. With regard to the other possibilities, the information afforded by the study of the general pathology of the disease is to be considered. Less is known about the endogenous factor in the evolution of leprosy than of tuberculosis. The hematogenous and lymphatic routes, correctly considered to be the principal ones, do not suffice to explain the marked differences of the various clinical forms. It is therefore necessary to consider the question of the so-called neurotropism of the bacillus, which is held to exist but which is difficult to comprehend. [The author here discusses what is meant by neurotropism, and at considerable length the mechanisms of the neurotropic diseases.]

In a primary neurotropic disease the virus spreads in the system by the hematogenous route, but the attack on the nerve substance is almost completely independent of that origin. In contrast, the micro-organism in leprosy diffuses to the interior and produces metastatic changes almost exclusively by the hematogenous route. In experiments with herpes virus there occurs an ascending perineuritis that reaches the central nervous system; the leprosy bacillus (like the vaccine virus) does not ascend along the nerves to the central system. Altogether, there are: (1) viruses with elective affinity for the nervous system, as tetanus and rabies; (2) viruses with predominating neuro-dermatropic affinity, as herpes zoster and measles; and (3) viruses with varying affinities, particularly for the skin, mucosa, lymph nodes, testes, peripheral nerves and central nervous system, as herpes simplex, vaccinia, syphilis and leprosy. The affections included in the last group show a conditioned neurotropism and, by a very suggestive coincidence, are specifically affections proper to the skin and mucosa.

The "conditioning" circumstance varies in different diseases. In leprosy it is the primarily cutaneous involvement. The bacilli deposited by the blood in the small vessels of the papillary layer affect first the perivascular area, causing the beginning of the specific infiltration; the nerve is then affected, producing

lesions that are not very extensive as far as the subcutaneous branches. In contrast to the virus of rabies, which occurs in greatest concentration in the central system, the leprosy bacillus affects most markedly the peripheral nerves, with bacilli in great masses, but with none in the central system. Hematogenous invasion probably occurs at two points, the cutaneous nerves and the large peripheral and subcutaneous nerve trunks. The first causes isolated foci of neuritis of the small branches, disseminated at the surface of the skin (ascending invasion, Wallerian degeneration); the second causes areas of anesthesia in the territory of distribution of the nerve.

In summary, considering the average of possibilities of the extremely varied affinities of the leprosy bacillus, including its undoubted tendency to colonize in the nerve tissues, it is to be recognized that to some extent the marked clinical differences between the various forms of leprosy can be based on the relative neurotropism of the bacillus.

From the viewpoint of general pathology, the progress of the leprotic process as expressed by the clinical forms depends upon the reactivity of the organism, natural or acquired. In the nodular form the capacity to react is depressed, in the macular and anesthetic forms it is maintained for a long time. Arning, Marchoux and Jadassohn pointed out that the process does not begin at a zero level; the eruption of red macules which indicates the first reaction of the organism is the first expression of an already acquired hypersensitiveness. An analogous condition, though more acute, is seen in secondary syphilis. From this point, however, opinions are considerably divided; but the predominant view is that even in the smallest prodromal macules of neural leprosy there exists the characteristic elective attack of the nerves, soon made evident by an ascending neuritis arising in the macule. It was this view which the Manila conference upheld. I hold a very different view: in all stages of leprosy the neuritis develops secondarily to definite macroscopic or microscopic skin lesions.

It follows that the erythematous macules either (a) become infiltrated and end by transformation into nodular lepromata or by association with lepromata, or (b) they become fixed, undergo central involution with diminution in the number of the germs, show marginal erythematous infiltration, and assume a tuberculoid structure. Therefore, from the initial macular phase (incontestably cutaneous) the following developments are possible: (1) cases in which the disease starts with maculo-anesthetic exanthems or solitary macules and which may remain of that kind; (2) cases in which after a greater or lesser time there is an evolution to a macular form with predominant neural symptoms; (3) cases in which the macules undergo progressive

infiltration and advance in the manner of the cutaneous form, and from this eventually to the secondary neural form; (4) macules which evolve from the outset as in the preceding class, but later undergo tuberculoid change; and (5) cases which, after being of the cutaneous type for a greater or less period, may evolve into a mixed type with predominant cutaneous symptoms.

If there were fundamental differences between the macular and nodular lesions it would be unique in cutaneous pathology. [Here the discussion digresses to the question of whether the nodule or the macule is the more acute lesion, and to that of the time relation between the invasion of bacilli and the intervention of antibodies in those lesions, and the resultant effects.] From the point of view of general pathology there is no fundamental difference between the nodules and simple macules; that was the opinion of Hansen and Looft, Leloir, Darier and Jadassohn, and is mine, contrary to the view established in Manila. Jadassohn (1913) was of the opinion that the "tuberculoid" variety is an intermediary phase in the processes, which is a corollary conclusion to which are led all who give due consideration to the consequences of the pathogenic theory here set forth.

The question of the number and character (circumscribed or diffuse) of the evident lesions is a secondary one. There is no fundamental difference between the parts of the skin which show visible lesions and those which have microscopic leprotic changes but are of healthy appearance. Anesthetic areas occur without elementary skin lesions but with typical leprotic changes, analogous to the "silent" but virulent lesions found by Hefter and others in syphilitics. These facts are relevant, indicating how false is our clinical classification.

This leads to consideration of the very debatable question of the existence of "primary" neural cases, in which the bacilli pass directly to the nerves from the blood or lymphatic stream without passing through the skin. This view was supported long ago by some authors but denied by others. It has not been proved. To the contrary, careful studies have led to the belief that its occurrence is impossible. [Certain authors are quoted, and reasons are given for believing it improbable that the leprosy bacillus reaches the nerves without having previously produced lesions of the skin.]

The important thing is the relative grade or degree of intensity of the nerve and skin changes. If there is a brief macular phase which disappears and is followed by neuritis with amyotrophy, it is probable that macular lesions with slight cellular infiltration may appear anew. If, however, the primary macular phase is prolonged, as in nodular

leprosy, the bacillus-rich lepromatous process will predominate and there will be infiltration of the same type in the nerve trunks. The concept of primary neural leprosy should be understood to be unavoidable in clinical classification, though it cannot be demonstrated positively.

[Reverting to the manner in which the nerves are involved, in the preceding discussion of which he created the term "conditioned neurotropism," the author here discusses in detail the process of the primary affection of the skin, to which is subordinated the relative affinity of the bacillus for the peripheral nerves. Detailed references are made to the writings of Klingmüller and of Dehio and Gerlach which show that the dermal blood vessels are primarily affected embolically, and that this rather than nerve affection determines the development of the skin lesions.]

Since differences in the numbers of the bacilli cannot, alone, explain adequately the differences between the principal forms of the disease, Klingmüller accepted the view of the occurrence of qualitative differences, but in a restricted sense. Neisser had considered the two forms as really different affections of the skin, the macular lesions being characterized by absence of Virchow's cells and the rarity of bacilli. However, the undoubted differences cannot be explained on the basis of a lack of "specific" differences in structure because transition forms and association of leprides and lepromata have been repeatedly described.

[Here is taken up the old question of whether or not the macules are of trophic nature. Extensive quotations are made from Gerlach on this and other points of the histology of the leprosy lesions, and concerning the resulting disturbances, these concluding with the opinion that the two forms of leprosy present a "gradual," not essential, difference and that the division into neural and cutaneous should be abandoned. Voit, also cited, agreed that there are no essential differences between the lesions from the anatomico-pathological aspect.]

In summary, the macular process stands independent of the tropho-anesthetic process, but, far from being the opposite of the nodular process, it is intimately related to it by a series of transitional conditions. The association of macular and tropho-anesthetic lesions is to be explained by the intervention of the same factors which frequently cause the association of macules and nodules, namely, oscillations or changes of specific allergy. Jadassohn interpreted the pathogenesis of the anesthetic form as a phenomenon of that kind, "hypersusceptibility . . . a property which aims to prevent the organism from destruction." [One of the quotations from Klingmüller that follow is advanced as refuting the "dualistic" concept.]

3. *Should the changes of tuberculoid type be raised to the category of an independent clinical form?*—The principal objections have been that (a) it is infrequent, and (b) it is only a variety of the neural form.

The first objection is refuted by what is now known. The tuberculoid form is frequent everywhere that leprosy exists, though varying in its clinical aspect. [Figures from recent reports are cited.] The objection that it belongs to the neural type does not arise from a classification of leprosy based in the first place on a deliberate renunciation of a division into distinct "types," and in the second place on the admission of clinical forms that, though of uniform symptomatology of long duration, are mutable.

Jadassohn first stated (1913) that this form, which he considered an expression of an allergic state, may possibly be an intermediate phase between the macular and nodular lesions, and also between the nodular and postnodular conditions. Klingmüller agreed with this view. Different kinds of lesions, the tuberculoid with others, may occur simultaneously in the same case because of inharmonious changes of allergy ("parcellular") in different tissues. More is now known of the condition than previously, but recent observations have not led to a departure from, but only an amplification of, these conclusions, which were based largely on the study of syphilis and tuberculosis.

The first cases of tuberculoid leprosy were seen in connection with macular lesions, and today Japanese authors have the restricted idea that they are a simple variety of the macular form and subordinated to the neural form as a "type," which is not the case. This condition is as polymorphous as skin tuberculosis, certain syndromes of which [listed] it may simulate to the point of identity. Considering recent publications, it is clear how diverse are the criteria applied. For example, no dermatologist would designate as "macular" some of the tuberculoid lesions illustrated by Lowe. When Hayashi proposed the term "maculo-tuberculoid" for the tuberculoid leprosy, he characterized the whole by the part. In all the recent literature there are evidences of different ways of looking upon observed facts.

On the clinico-biological side, Hayashi holds that the nodular form can never become tuberculoid and that these two kinds of lesions cannot coexist. [This matter is again discussed. Observations of Kyrle and others concerning changes and combinations are cited, including details of cases reported by Kedrowski, Tisseuil and the author himself. Analogous changes in syphilis and tuberculosis are discussed.]

Of the outstanding features of the tuberculoid condition, one is its frequently long persistence as such. Histological study shows these lesions to be of four types: pretuberculoid, sarcoid, lupoid and colliquative (nerve abscess). The Witebsky reaction changes from positive to negative with the appearance of tuber-

culoid lesions, and tuberculin anergy is the rule; also there seems to be anergy to the vaccine virus. The nasal mucosa and macules are almost always bacteriologically negative, though they are positive in 40 percent of macular cases.

The peculiarities of this form of the disease are more striking when it is compared with the nodular one, and much less so in comparison with the anesthetic one. It would not be strange if the behavior of tuberculoid leprosy should be related to the incidence of visceral tuberculosis, as I have pointed out. Accepting tuberculoid leprosy as a transition form, we can synthesize the evolution of leprosy in an organism which is infected and sensitized by tuberculosis more or less as follows: change from the tuberculoid to the anesthetic form (accelerated development of allergy and, probably, specific allergy to the leprosy antigen); change to the nodular form with serious internal tuberculosis and subsequent diminution of symptoms to the anesthetic form, with in rare cases perhaps an increase of allergy and the appearance of postnodular tuberculoid lesions; and, finally, with diminution of allergy and disappearance of the tuberculoid changes, change of the anesthetic form into the nodular one.

A PRACTICAL CLASSIFICATION FOR CLINICAL AND EPIDEMIOLOGICAL PURPOSES

The foregoing discussion has shown the difficulties caused mostly by a defective concept of the macular process, especially the idea of its independence. The Manila conference classification is the last attempt in favor of the dualistic view, which is biologically unacceptable because leprosy is a single process which varies from case to case, both microscopically and clinically, according to the soil in which it evolves. I subscribe to the adoption of the macular form of the Japanese classification, of that of the leprosy service of São Paulo, and of Lie. The valuable São Paulo formula can be maintained if the tuberculoid form is added to it.

There is no clear-cut distinction between the leproma, the macule, and the tuberculoid lesion. The leproma is produced by a series of reactions of the organism, the others being transitional phases—though they may be of long duration—corresponding to attempts on the part of the organism to overcome the infection. On the other hand, it seems equally doubtful that the tropho-anesthetic disturbances of the leprotic "status" can be separated, and it is almost impossible to establish a practical clinical delimitation between cutaneous and neural. The only solution of the difficulty is to abandon the criterion of major clinical types and adopt a broader basis, one that is less subject to the objection of "varieties" and is more objective and simple for use in epidemiological application.

The existence of clinically pure anesthetic cases without macules, and of cases with no symptoms but macules, has been noted by Lie, who also realized that to designate nodular leprosy "cutaneous" might cause confusion and misunderstanding. [Lie is quoted at some length.] However, his classification is a little complicated and some details could be abandoned in the interest of simplicity and clarity. One such feature is the division of the principal forms by "degrees"—a concession to, or rather a confirmation of, a feature of the Manila classification. Numerical gradation introduces a personal coefficient, instability where stability is necessary. It is useless for the evaluation of the severity of the disease, because that is dependent upon a combination of factors in which the number, location and extent of the lesions is subordinate. It also has the disadvantage of separating into different clinical forms cases that are not fundamentally different; it is superfluous and unnecessary to establish different indices for cases with 1 or 2 lepromas and those with 30 or 50. It is sufficient to know that we are dealing with a case of the lepromatous kind to lead us to establish the bacteriological and other data useful to the epidemiologist. A classification capable of furnishing all these data would be preferable to the numerical criterion of the evaluation of cases. For the notation of bacteriological findings (which Muir did by dividing his cases bacteriologically into A and B, and Wade would do by adding + or - to the type symbol), Lie suggests using B+ and B-, which is somewhat complicated—added to further by "in the nose," "in the macule," "in the nerve," etc. Here is an excess of detail that, little by little, overloads an originally simple classification. There would be some advantage in knowing the bacteriological character of the different clinical forms, and for this purpose the signs + or - might be added to the symbol of the form. The indication of the evolution and prognosis of the case by symbols in Lie's system [discussed in detail] introduces further complications. A numerical notation of purely epidemiological value would be to indicate a primary condition by "1," and a secondary one by "2."

The principal characteristics of my own classification are now to be considered. To establish the clinical forms on a logical basis they are correlated with the characteristics of the reactive capacity of the organism and are based on the relatively pure ground of the fundamental pathology of the disease. The polymorphism of the pathological anatomy of the leprotic lesions, which is not the consequence of simple chance, is correlated with the three kinds of tissue reactions: a granulomatous type, with Virchow's cells and abundant bacilli; a degenerative-inflammatory type, focal, originally vascular,

and secondarily cirrhotic and atrophic, with few cells; and the tuberculoid type, rich in cells, particularly the epithelioid cell, and with few bacilli. My distribution of the clinical forms accords essentially with these criteria.

In these apparently very different types of reaction there is a certain fundamental uniformity, evidenced particularly by the multiple transition or association forms, with which is included the tuberculoid form. [Certain features pointed out elsewhere (see abstract, p. 398 of this issue) are referred to. The variations of the specific pattern in other chronic conditions is again discussed, leading to a reiteration of the principle that variations in specific allergy intervene in producing the different clinical manifestations of leprosy, depending upon the intensity of the local inflammatory reaction determined by the bacillus.] From the viewpoint of general pathology we have a predominant, fundamentally similar symptomatology in reference to the skin and nerves. From the clinico-biological aspect there are symptoms in skin and nerve due to direct action of the bacillus, and skin symptoms due to distant effects.

On this basis I propose to distribute the forms of leprosy according to all-inclusive criteria, in a manner susceptible to definition and without evident incongruity. There results a new classification with four forms, lepromatous, macular, tuberculoid and tropho-anesthetic.*

The characteristics of these forms are summarized below, and tabulated in Table 1.†

TABLE 1.—General features of the clinical forms of leprosy.

Form	Bacteriology		Immunology		Histology
	Skin	Mucosa	Witebsky reaction	Mitsuda test	
L	+ 100%	+ 70%	+++ 90%	- 90%	Virchow cell (leproma)
A		+ 30%	+++ 60%	+ 70%	Cirrhotic-atrophic process.
M	- 100%	+ 5%	+++ 20%	+ 70%	Common inflammation.
T	- 100%	-100%	- 80%	+++ 90%	Tuberculoid granuloma.

- = negative. + = positive. +++ = strongly positive.

The *lepromatous* form, corresponding to the old "nodular" one, comprises the different bacilliferous and infiltrative manifestations of the disease. Clinical bacteriology: bacilli found in smears in very large quantity. Pathological histology: massive infiltration of Virchow's leprocytes. Immunology: Mitsuda's skin test negative

*Actually, throughout the original article: "lepra lepromatosa," "lepra maculosa," "lepra tuberculoide" and "lepra tropho-anesthetica."

†The table referred to, and certain corrections of the original article, have been supplied by the author for the purpose of this reprinting.

in 90 percent, Witebsky serum reaction strongly positive in 100 percent. Epidemiology: cases with many bacilli in the skin and nasal mucosa (70 percent); coefficient of contagiousness high.

The *macular* form, in lieu of the old "maculo-anesthetic" one, comprises the (erythematous) dyschromic lesions of leprosy. Clinical bacteriology: no bacilli. Pathologic histology: chronic inflammation in perivascular foci. Immunology: Mitsuda test positive in 70 percent, Witebsky reaction weakly positive in 40 percent. Epidemiology: cases with much fewer bacilli than in the preceding form, especially as regards the skin lesions; nasal mucosa positive in about 6 percent; coefficient of contagiousness still high but lessened because of the small number of bacilli in the lesions.

The *tropho-anesthetic* form comprises those manifestations that reveal clinically the existence of alterations in the nerves, of which the trophic changes are the most evident. Included are the bullous lesions, the pathogenesis of which has not been explained but which in general appears to be intimately connected with nervous disturbances, assuming the value of a tropho-anesthetic symptom. The following are the principal symptoms of this form: (1) amyotrophies, (2) camptodactylia, (3) claw hand, (4) analgesic panaria (whitlow), (5) perforating ulcer, (6) absorption of phalanges with mutilations, (7) trophic ulceration, (8) bullae. Immunology: Mitsuda test positive in about 70 percent, Witebsky reaction strongly positive in 60 percent. Epidemiology: bacilli generally absent, even in open lesions (except in secondary cases); bacilli encountered intermittently in the nasal mucosa in about 30 percent; contagiousness considered minimal, evaluated at about 5 percent, in any case higher than in the macular form.

The *tuberculoid* form groups the tuberculoid cutaneous leprides not accompanied by neuritis of the afferent nerves, the leprides associated with neuritis of the afferent nerves, and the tuberculoid neuromas of the large peripheral nerve trunks. Clinical bacteriology: bacilli absent. Pathologic histology: sarcoid type predominant with an architecture in cords, exactly as in tuberculosis. Immunology: Mitsuda test strongly positive in 90 percent, Witebsky reaction negative in 70 to 80 percent. Epidemiology: contagiousness nil (comparable to that of tertiary syphilis); nasal mucus negative in 100 percent of cases.

The fact that the workers in India and Japan, and also Wade, are of the opinion that the tuberculoid lesions should be included in the anesthetic [*sic*] form has been mentioned. This view is due chiefly to the facts: (1) that they do not give value to the elements of dermatology, failing to distinguish macular from

infiltrated lesions, and (2) that, at least in India, the tuberculoid leprides are nearly always associated with thickening of the afferent nerves to the lesions. Muir and Chatterji described anatomo-pathological findings that are unique and as yet not confirmed, and offered a new interpretation of the lesions according to which the tuberculoid granuloma is confined to the nerves, in contrast to that of tuberculosis. I have refuted the principal points of this theory, and agree with Wade that it is "unacceptable." The nerve belonging to the cutaneous lesion may not become thickened; it does not undergo thickening proportionate to the area of the skin lesion; it may be normal and at the same time there may be thickening of a nerve apart from the lesion. It seems impossible to generalize doctrinally in the matter of leprosy from one focus place to another, for each region may be expected to have its own "dominant epidemiology." According to Prof. Ed. Rabello, the anesthetic form will preponderate in old foci, and there is nothing extraordinary in the fact that in India the cutaneous leprides are so often [figures cited] associated with involvement of the small subcutaneous nerves. [Jadassohn and later writers are cited in support of the view that affection of the nerves is not exclusive or even primary, but that they are invaded secondarily.] It is possible, in cases of both forms, that special conditions of specific allergy may condition a metastatic lesion of more intense degree, in a nerve afferent to a skin lesion or in one independent of it. All of these conditions are as has been discussed, not different from those of macular lesions.

With regard to the cases that used to be considered as constituting a "mixed" form of the disease, it is very easy to show that there is no true form of that kind, but numerous mixed or, better, "complex" cases. In recognizing four principal clinical forms, instead of the "types" formerly recognized, the complex forms will remain established by the complication of some by the others under the most varied conditions.

LIE'S CLASSIFICATION

OUR CLASSIFICATION

Principal forms	{	T (Tuberous)	Principal forms	{	L (Lepromatous)
		M (Macular)			M (Macular)
		N (Nervous)			A (Tropho-anesthetic)
					T (Tuberculoid)

Complex forms.—Combinations of the above forms (the most frequent being LA and MA).

Other symbols.— +, bacteriologically positive; —, bacteriologically negative; 1, primary; 2, secondary.