INTERNATIONAL JOURNAL OF LEPROSY
and Other Mycobacterial Diseases

OFFICIAL ORGAN OF THE INTERNATIONAL LEPROSY ASSOCIATION

EDITORIAL OFFICE
Gillis W. Long Hansen's Disease Center
Carville, Louisiana 70721, U.S.A.

VOLUME 57, NUMBER 4 DECEMBER 1989

EDITORIALS

Editorial opinions expressed are those of the writers.

Three Times, Three Places, Three Authors, and One Perspective on Leprosy in Medieval and Early Modern Europe

Leprosy in the European Middle Ages has remained the subject of much historical writing. There are several obvious reasons for this. Quite simply, leprosy is one disease whose name has not changed between medieval and modern times. In point of fact, most diseases have changed their names beyond recognition. We have no medieval equivalent for myocardial infarction, for stroke, for most infectious diseases, and cancer, although common to both vocabularies, presents real problems when one tries to draw parallels. In addition, the extreme legal, social and religious sanctions attendant upon the medieval diagnosis of leprosy produced extensive documentary remains, and historians tend to study the major concerns of the time and place of their studies. From a practical point of view, the building of leprosaria was a major aspect of governmental, private, and ecclesiastical spending. During the High Middle Ages (let us say 1050 to 1348), Western Europe built thousands of such hospitals.[1-6] From a moral perspective, leprosy aroused a vast literary and religious imagery, all of which made the disease the one most definitely a sign of inward sin.[7]

Nor have historians neglected to examine medical writings. The results have been varied. Some have simply denied that the Latin word *lepra* corresponded to what we know as leprosy today.[7-11] Within such discus-

[1] Mundy, J. H. Charity and social work in Toulouse, 1100–1250. Traditio **22** (1966) 203–287.

[2] Ell, S. R. Leprosy. In: *Dictionary of the Middle Ages.* Strayer, J. R., ed. New York: Charles Scribners' Sons, 1986, vol. 7, pp. 549–552.

[3] Richards, P. *The Medieval Leper and His Northern Heirs.* Totawa, New Jersey: Rowan and Littlefield, 1977, pp. 48–97.

[4] Cougoul, J. E. *La Lèpre dans l'Ancienne France.* Bordeaux: Delmas, 1943, pp. 33–59.

[5] Kealey, E. J. *Medieval Medicus: A Social History of Anglo-Norman Medicine.* Baltimore: Johns Hopkins University Press, 1981, pp. 82–107.

[6] Contreras Duenas, F. and Miguel, R. *Historia de la Lepra en Espana.* Madrid: Graticas Hergon, 1983, passim.

[7] Brody, S. N. *The Disease of the Soul: Leprosy in Medieval Literature.* Ithaca, New York: Cornell University Press, 1974, pp. 21–183.

[8] Bonser, W. *The Medical Background of Anglo-Saxon England.* London: Wellcome Institute Library, 1963, p. 371.

[9] Innes, J. R. An approach to the history of leprosy. Ciba Symp. **7** (1959) 117–123.

[10] MacArthur, W. Medieval "leprosy" in the British Isles. Lepr. Rev. **24** (1953) 8–19.

[11] McNeill, W. H. *Plagues and Peoples.* Garden City, New Jersey: Anchor/Doubleday, 1976, p. 175.

sions, however, certain authors have distinguished between signs and symptoms appropriate to leprosy as we know it and features of the disease they consider fanciful.[7-8] More recent studies, notably Michael Dols' examination of treatises on leprosy in medical Islam and LeMaitre's work on medieval Europe, have been more positive,[12-13] suggesting that the disease in question was indeed leprosy. Still, the paucity of physicians who were highly trained tends to vitiate the effect of the written word and leaves the everyday diagnosis of leprosy very much in doubt.

We have, however, considerable evidence to suggest both that the disease referred to as leprosy now and *lepra* in the High Middle Ages are the same and that the diagnosis was very accurate. Excavations at medieval leprosaria in Naestved, Denmark; Aachen, Federal Republic of Germany; and South Acre, England, have uniformly shown unmistakable bone changes of leprosy in 80% or more of the skeletons buried in their cemeteries. Since, by the thirteenth century, leprosy patients could not be buried in the same cemeteries as the "clean," these archaeological findings have proved the accuracy of the high and late medieval diagnosis of leprosy.[14-18]

Nonetheless, when we turn to the writings of great physicians of the period, we are left with descriptive elements that sometimes indicate leprosy and sometimes seem to be totally off the mark. How is this mixture to be explained? Why is this apparently bizarre combination seen, when we have so much reason to trust the diagnostic accuracy of those who made decisions at least partly based on such writings?

Perhaps one answer lies in the fact that physicians such as Guy de Chauliac (fl. c. 1340) did not, in fact, usually make such diagnoses. The diagnosis of leprosy was usually made by laymen, the prominent men of a community. Such men might have considerable personal experience of leprosy. If they were in doubt, they often waited to see what course the disease might take or called in an expert.[2-4] The diagnosis tended thus to be very conservative. This does not, however, explain why the experts included so much that appears fanciful.

In this paper, I would like to examine in some depth two descriptions of leprosy: that of Theodoric of Cervia, who was both bishop and surgeon (1205–1298),[19] and the later work of Fracastorius (1478–1553).[20] These descriptions differ from one another, but both show the mixture I have discussed. In probing them, however, I will employ a very particular approach. I will investigate the tracts first of all from the point of view of the fact that they were written in different times and places from our own. As a result, a certain amount of what is written can be seen to arise directly from the underlying concepts of disease. Likewise, overriding intellectual trends of these particular periods stamp the texts as well. The formal structure of medical writing also bears on what was recorded. For example, some of what was written depends on the commonplace belief in imbalance of the "Four Humours" of the body as the cause of disease. The importance of number mysticism and the nearly universal belief in astrology also influenced these authors.

Even when allowance is made for such factors, a residue of uncommon claims about leprosy remains. Although many of these have been dismissed, correlation with the latest research in leprosy more often validates than refutes these observations. In the end, I will suggest that the extensive clinical experience of Theodoric and Fracastorius,

[12] Dols, M. Leprosy in medieval Arabic medicine. J. Hist. Med. **34** (1979) 313–333.

[13] Demaitre, L. The description and diagnosis of leprosy by the fourteenth century physicians. Bull. Hist. Med. **59** (1985) 327–344.

[14] Møller-Christensen, V. Skeletefundi fra St. Jorgens Kirke i Svendborg. Fynska Minder **5** (1963) 35–49.

[15] Møller-Christensen, V. *Bone Changes in Leprosy.* Copenhagen: Munksgaard, 1961, passim.

[16] Anderson, J. G. *Studies in the Medieval Diagnosis of Leprosy in Denmark.* M.D. thesis, Copenhagen, 1969.

[17] Schmitz-Cliever, E. Zur Osteo-archaologie der mittelalterlichen lepra. Med. Hist. J. **6** (1971) 249–263 and **8** (1973) 182–200.

[18] Bayliss, J. Domus leprosae—community care in medieval England. Nurs. Times **75** (1979) 62–67.

[19] Theodoric of Cervia. *The Surgery of Theodoric.* Campbell, E and Colton, J., trans. New York: Appleton-Century Crofts, 2 vols., 1955–1960, pp. 162–187.

[20] Fracastorius, H. *De Contagione.* Wright, E. trans. New York: Putnam, 1930, pp. 158–163.

along with the authorities they drew upon, revealed facets of leprosy that have only recently been rediscovered.

An overview of the two texts

Both the works of Theodoric of Cervia and Fracastorius are available in reliable English translation.[19, 20] It is important to recall in considering any translation from Latin to English that Latin was a language with a very small number of words. Therefore, almost any attribute is open to considerable difference of opinion. It is often more reasonable when a medical writer comments, let us say, that the urine of a leprosy patient is "*pinguis*" compared to that of a normal person, to say that it is not possible to be sure exactly what was meant. The term in question is often translated as "fatty," but the word also means "containing blood and fat," "smeared," and "luxurious." It is foolish to insist on a particular meaning. What we can say is that uroscopy would produce a visible difference between the two. So, without insisting upon a particular translation of a Latin term which invariably has many, we can reasonably try to determine if there are visible (or tactile, or auditory) differences in the matter in question.

Theodoric begins his discussion by insisting on the evil nature in leprosy. He quotes Avicenna in this regard. There are two types of leprosy according to Theodoric, the Tyrian and the Alopecian. They are distinguished by the fact that the Tyrian type is milder and does not progress. Later, Theodoric, clearly citing other authors, distinguishes four types of leprosy, each with its own appropriate therapy.

Part of the evil of leprosy lies in its relation to sex. It is a venereal disease. It may arise in corrupted menstrual blood. It can be congenitally acquired.

When he turns to the general signs of leprosy, Theodoric lists a number of classic features of the disease. He notes the vocal changes, tending toward hoarsening of the voice. He describes the changes in the gums, teeth, orbits, and nose, which are the clinical counterpart of the pathologic *facies leprosa.* He notes the anesthesia characteristically first observed at the ankle. He describes skin changes, loss of vision through eyelid and globe damage, loss of digits, and a variety of other commonplaces of modern descriptions of untreated lepromatous leprosy. He also insists that phlebotomized blood of leprosy patients clots differently from that of normal persons and that their urine is also visibly different.

Fracastorius wrote his description of leprosy under the title of "elephantiasis" and in response to the contemporary (i.e., sixteenth century) claim that leprosy and syphilis ("the French Sickness") were one and the same. He also wished to fit leprosy into his overall theory of "germs" or tiny particles as the cause of disease. He begins his discussion by reviewing the use of various terms. The ancient Greeks, he informs us, wrote both of elephantiasis and of leprosy, but examination of those writings shows him that by the former they meant what was, in his time, commonly called leprosy and by the latter, a milder and no longer clearly recognizable affliction. He quotes Pliny, Galen, and Avicenna in his effort to clear up the matter of the proper use of terms. Only after this critique of classical texts does he go on to his description of leprosy.

Leprosy is characterized by a long latent period. The first visible lesion is often on a nostril and is painless, in contrast to the painful and genital site of the first lesion of syphilis. He distinguishes the cutaneous nodules of leprosy from those of disseminated syphilis. Leprosy is a contagious disease and can be transmitted by contact with the skin of leprosy patients, by their breath, and even by fomites. Again, Fracastorius emphasizes the slow progression of leprosy compared to syphilis.

Fracastorius offers a brief epidemiology. Italy (his homeland) has never been the home of large numbers of cases. Although there are many leprosaria, there are few patients in them, and many of them, in his experience, do not have leprosy. Men are more likely to contract leprosy than women. In general, he feels leprosy is commoner in places with extreme climates rather than more temperate regions. Leprosy is marked by an excessive drive toward sexual intercourse. This is another distinguishing feature from syphilis. Eating pork regularly is associated with leprosy. Germs, presumably found in pork, invade the black bile, which is the seat of the disease. Because bodily involvement is predominantly pe-

ripheral, leprosy is not usually a febrile disease.

Fracastorius does not detail the signs and symptoms of leprosy so extensively as Theodoric because he writes for a polemic purpose. He does comment on the facial involvement, but states that it leads to secondary infections.

General background of the writings

The work of each author bears the characteristic stamp of its time. There is no question that Theodoric was a product of his age as Fracastorius was of his, but that does not permit us to ignore the content of their work. Still, ignorance of their times and places would render their writings absurd, so we must begin by identifying those elements which are products of the time and place only.

Theodoric was bishop of Cervia when he wrote his *Surgery*. The whole period before the Renaissance was dominated by clerical writers. Before the year 1000, the number of known lay authors in Western Europe is trivial. It is no longer customary for medical treatises to be written by clerics, but into the twelfth century, monks and priests provided the majority of known medical care. It is certain that there were folk healers, but of them we know nearly nothing.[21–23]

The eleventh and twelfth centuries were a watershed in the intellectual life of Western Europe. In the zones of contact between Islam and Latin Christendom, notably Sicily and Spain, the treasures of antiquity were translated into Latin, often from Arabic rather than Greek. These translations of translations were to fuel one of the great intellectual explosions of all time, the thought of the High Middle Ages. The authors of the Early Middle Ages had only minute fragments of the works of the great classical authors. Of Plato, only the *Timaeus* was known; of Aristotle, only a few passages. The systematic, comprehensive intellectual constructs of the latter fueled intellects as diverse as Thomas Aquinas and William of Ockham. The "Twelfth Century Renaissance" [24, 25] represents one of the great intellectual revivals in all of history.

Unlike the later Renaissance, that of the Middle Ages was more uncritical. It accepted the works of the great Arab philosophers and physicians with an enthusiasm equal to that accorded to the Greeks, and with good reason. The Arabs had not only preserved classical writings, but also produced systematic commentaries and summaries. Thus it was that Avicenna, not Galen (too voluminous a writer), who was the standard authority in medical matters. Indeed, Avicenna's *Canon* of medicine remained a medical mainstay long after the Middle Ages.[26–28]

Theodoric's age was intoxicated by knowledge, and knowledge was most surely had from authoritative books. In the truest sense, this was a bookish time. The Bible represented ultimate knowledge, so it was not difficult to transfer some of the same awe to the immense sophistication of Aristotle, who was referred to simply as "the philosopher." *Secundum philosophum* (which is routinely translated as "according to Aristotle") was adequate to settle most disputes, so long as Aristotle was clear on a point.

By contrast, the Renaissance was a critical time, in the sense that it saw the birth of textual criticism. Original texts, those in Greek and authentic, were sought and argued over. If Avicenna still remained extremely popular, writers like Fracastorius could not simply cite one author. He had to examine all the pertinent classical texts and analyze the usage of words. He had to

[21] Riche, P. *Education and Culture in the Barbarian West*. Contreni, J., trans. Columbia, South Carolina: University of South Carolina Press, 1976.

[22] Laistner, M. L. W. *Thought and Letters in Western: A.D. 500 to 900*. 2nd ed. Ithaca, New York: Cornell University Press, 1966.

[23] Ell, S. R. Concepts of disease and the physician in the Early Middle Ages. Janus **65** (1978) 153–165.

[24] Haskins, C. H. *The Renaissance of the Twelfth Century*. Cambridge, Massachusetts: Harvard University Press, 1927.

[25] Duby, G. *The Age of the Cathedrals*. Chicago: University of Chicago Press, 1982.

[26] Lindberg, D. C. The transmission of Greek and Arabic learning to the West. In: *Science in the Middle Ages*. Lindberg, D. C., ed. Chicago: University of Chicago Press, 1978, pp. 52–90.

[27] Southern R. *The Making of the Middle Ages*. New Haven: Yale University Press, 1966.

[28] Walzer, R. Arabic transmission of Greek thought to medieval Europe. Bull. John Rylands Library **29** (1945–1946) 160–183.

be on steady ground. He had to convince, both by his own arguments and his familiarity with others. With these thoughts in mind, let us sift these texts for those elements we cannot explain as the product of time and place, and let them speak to us about leprosy as we now understand it.

Sifting the texts

Theodoric of Cervia. It is immediately apparent that much of Theodoric's discussion of leprosy is formulaic. It is dictated by conventions of medical writing and overriding concepts pertinent to medicine. Thus, the immediate reference to Avicenna, who was the most respected medical writer (on practical matters) of the time. This reference establishes Theodoric's own claim to authority. He is familiar with the master's work.

The concept of the "Four Humours" and their imbalances as the elemental factors in disease and health have received considerable historiographic attention and need not detain us long. With regard to this text, it is worth noting that the author comes very close to contradicting himself in trying to fulfill the requirement for adherence to the theory of the humors. Initially, Theodoric describes two types of leprosy, one of which is characterized by its propensity to self-limitation. This, which is a feature of a number of Arab commentators on leprosy, is very close to the basic distinction between tuberculoid and lepromatous leprosy, which remains at the heart of modern classification.[7, 29] It is almost certain that this distinction is a clinical one, the sort of thing one or many physicians who saw a significant number of leprosy cases might make. Yet, two is not a number of theoretical importance. Later in his discussion, Theodoric describes four types of leprosy, each related to a different humoral imbalance and meriting different care. The signs that distinguish these four types are confusing, overlap one another and lack the clinical detail that marks the author's general description. The point of the initial dichotomy is clear. The four types of leprosy are a concession to a theory whose absence would render a work suspect. One cannot help but feel that Theodoric is making a concession to convention, or trying to convince himself of the universal applicability of a general theory, rather than recording material he himself finds clinically useful.

The second striking feature at the beginning of this text is the insistence on the "evil" nature of leprosy. This is not unduly surprising from a cleric, a very significant number of whose colleagues had equated leprosy with sin. Major early medieval writers, such as Gregory of Tours and Hrabanus Maurus, had specifically identified leprosy with heresy. As the high medieval period unfolded, not only clerics, but secular authors of all kinds maintained the association of leprosy with sin, although the sin was usually no longer heresy. Be that as it may, leprosy indicated sin in the patient who had the disease and this was not forgotten. Theodoric, the bishop, tells us about the evil origins and meaning of leprosy yet, as is typical of medical writings of the period, there is nothing penitential in the treatment. By the time Theodoric wrote in the late thirteenth century, the Church had legislated the leprosy patient into a living death. Once the diagnosis was established, the leprosy patient was forbidden to share church, cemetery, or even everyday life with the "clean."[3, 7] Legally, he was dead and his heirs could inherit his property; only his wife was bound to him until death.[3, 7] Theodoric, as a high cleric, would have been involved in the enforcement of such laws. Still, in his medical writings such measures are not even mentioned and his treatments are, for the time, quite mild and supportive. Did Theodoric not believe in the canon law on leprosy? One cannot say with any hope of certainty. Perhaps he merely separated the clerical and medical roles carefully when writing. Nonetheless, it is sobering to realize that Theodoric's writings on leprosy do not give any hint of the attitude of the organization of which he was a very high-ranking representative.

Shifting from general concerns to clinical detail, Theodoric leaves us with other puzzles. His descriptions of the anesthetic lesions seen in early leprosy would be difficult to improve upon. Yet he insists that leprosy is a venereal disease, and that it occasions abnormal lust in its victims. He describes

[29] Talbot, C. H. Medicine. In: *Science in the Middle Ages.* Linberg, D. C., ed. Chicago: University of Chicago Press, 1978, pp. 429–460.

a visible abnormality of phlebotomized blood. The urine of the patients with leprosy is different upon visible inspection, being somehow fattier or greasier. The whole set of claims, from those relating to venereal transmission to those on blood and urine, are routinely dismissed as having no basis at all.[7–11]

Considering the formal structure of medieval medical writing, there are arguments both ways. Leprosy was a very serious disease and phlebotomy and uroscopy were as central to physical diagnosis as the relatively new stethoscope is now. Thus, the anticipation of changes in blood and urine may have led to beliefs supported by the power of suggestion. On the other hand, even though not all of these claims occur in the most accurate portion of the clinical description of leprosy, there is no reason to dismiss them automatically. In short, can we deduce any support for these claims or are they *pro forma* additions to an otherwise excellent clinical description?

Let us consider these points in turn, beginning with sexuality and leprosy. At first glance, there is little temptation to frame an argument to support Theodoric's claim. Leprosy attacks the testicles and results, in many untreated cases, in oligo- or azospermia. There is no evidence of any kind that leprosy is indeed transmitted venereally.[30–34] The leprosy bacillus is found in trivial concentration in semen, if at all. Atrophy or destruction of testicular tissue hardly seems likely to cause increased libido.

Matters are less simple than first they seem, however. In females, leprosy does not involve the ovaries to anything like the degree it affects the testes. We see the first glimmer of a foundation for some of what Theodoric asserts. One undeniable result of coitus is pregnancy. Interestingly, many women, who have either subclinical or high-immunity (tuberculoid) leprosy, suffer a downgrading reaction and develop clinically overt leprosy[35–38] during pregnancy. Thus, many women who became pregnant and developed leprosy would very reasonably attribute their disease to sexual intercourse. While not a venereal disease, leprosy can make itself manifest by venereal means.

It is well known that leprosy causes false-positive tests for syphilis in many patients.[39] What is less well known is that, for reasons unclear but probably related to immunity, a very significant number of leprosy patients also have syphilis. This number has been placed as high as 10% in the U.S.A., where the overall incidence of syphilis is lower by one or two orders of magnitude even in matched populations.[40] As Fracastorius was to note three centuries later, syphilis and leprosy can be confused early in the courses. What then of patients who contract syphilis from coitus, develop a skin lesion and later, when the long incubation period of leprosy ends, show overt leprosy? It is unlikely that this train of events would be interpreted as anything other than the venereal transmission of leprosy. There is, of course, intense controversy over the presence of syphilis in Europe before the discovery of the Americas (see McNeill[11] for an overview). Even if syphilis was not present and therefore cannot serve as an explanation of the concept

[30] Dash, R. J., Samuel, E., Kaur, S., Datta, B.N. and Rastogi, G., K. Evaluation of male gonadal function in leprosy. Horm. Metab. Res. **10** (1978) 362.

[31] Ree, G. H., Martin, F., Myles, K. and Peluso, I. Hormonal changes in human leprosy. Lepr. Rev. **52** (1981) 121–126.

[32] Shilo, S., Livshin Y., Sheskin, J. and Spitz. I. M. Gonadal function in lepromatous leprosy. Lepr. Rev. **52** (1981) 127–134.

[33] Huang, C. L.-H. The transmission of leprosy in man. Int. J. Lepr. **48** (1980) 309–318.

[34] Job, C. K. Leprosy—the source of infection and its mode of transmission. Lepr. Rev. **52** Suppl. 1 (1981) 69–76.

[35] Duncan, M. E., Melsom, R., Pearson, J. M. and Ridley, D. S. The association of leprosy and pregnancy. I. New cases, relapse of cured patients and deterioration in patients on treatment during pregnancy and lactation—results of a prospective study of 154 pregnancies in 147 Ethiopian women. Lepr. Rev. **52** (1981) 245–262.

[36] Duncan, M. E., Pearson, J. M. and Rees, R. J. The association of pregnancy and leprosy. II. Pregnancy in dapsone-resistant leprosy. Lepr. Rev. **52** (1981) 263–270.

[37] Duncan, M. E. Leprosy in young children—past, present, and future. Int. J. Lepr. **53** (1985) 468–473.

[38] Duncan, M. E., Pearson J. M. H. and Bjune, G. Pregnancy and leprosy: the consequences of alterations of cell-mediated and humoral immunity during pregnancy and lactation. Int. J. Lepr. **50** (1982) 425–435.

[39] Scott, A. T., Mackey, D. M. and Trautman, J. R. Syphilis and biological false reactors among leprosy patients. Arch. Dermatol. **101** (1970) 328–330.

[40] Murray, K. A. Syphilis and leprosy. JAMA **247** (1982) 2097–2098.

of venereal transmission, other venereal diseases might well do so, following precisely the same chain of events.

The question of hypersexuality or exaggerated sexual desire in persons with leprosy may have minimal scientific support, but this observation is much more likely a sociological phenomenon. Untreated leprosy is a disease of remissions and relapses. During the gradual destruction of testicular tissue, it has been shown that hormones stimulating the production of testosterone are very high. If the disease remitted, there could be outbursts of deprivation hypersensitivity to the stimulating hormones and resultant sudden jumps in testosterone production. Human sexuality is not so simple as hormone levels, however, and this explanation is unsatisfactory. It is much more tempting to assign to the social constructs established to protect society from leprosy the central role in the "hypersexuality" of leprosy patients.

The medieval and Renaissance leprosy patient was, as we have noted, literally a dead man. He was denied social intercourse with the healthy. If he wandered (that is, did not live in a leprosarium), he had to ring a bell to warn of his approach. For villagers to react to this signal with a hail of stones was commonplace. When one mixes this with the whole medieval disdain for sex,[3] the "forbidden fruit" quality of sex could become almost overwhelming. There was no legitimate outlet for sexuality in leprosy patients at all. Any sexual activity would then be perceived as abnormal. Recall for a moment that leprosaria were almost invariably religious foundations. The patients wore habits and lived a quasi-monastic life, including celibacy.

For the average person, the only realistic alternative was a life of wandering. In either case, the leprosy patient was the outsider to whom sex was forbidden. Persons in such situations inevitably become objects of a mixture of sexual fascination and revulsion, usually incorporating elements of the fantastic. This, in my opinion, is the heart of this claim about leprosy patients. One has only to recall the similar attribution of phenomenal sexual desire to various ethnic groups, who suffered something close to the exclusion of the medieval leprosy patient, to recognize this phenomenon in action. Consider blacks in the southern United States, Jews and Gypsies in the Third Reich, and the power of an excluded group to excite the sexual fantasies of the dominant is brought into focus. Tuberculosis patients bore the same reputation in the last century, and probably for the same reason.

The blood of a leprosy patient, Theodoric tells us, is not like that of a normal person. Modern physicians would hardly dispute this. In terms of levels of a great many substances, the blood of leprosy patients differs from that of healthy persons.[41,42] These, of course, are biochemical differences, not the crude products of looking at phlebotomized blood. In the Middle Ages, indeed until only about 200 years ago, a vein was opened and blood was allowed to drip into a dish. The dish was often pottery, nothing fancy. One thing that might be observed in this way was any visible difference in clot formation. Indeed, putting blood on a glass-bead column is a current method of measuring platelet adhesiveness.

When one considers the literature on clotting in leprosy, there is some reason to believe Theodoric's claim. It is well established that lepromatous leprosy patients (once again, those most commonly diagnosed in the period in question) suffer an extremely low incidence of thromboembolic phenomena. The exact reasons for this are unclear.[43] At the same time, the platelet adhesiveness of lepromatous leprosy patients is three-to-four times higher than that of normal controls when performed using the glass bead method, which is partly visual.[44] It is not difficult to see that placing blood against a pottery surface is not so very far from placing it in contact with a glass-bead column. There is a visible difference in the glass-bead test, and no reason to assume otherwise using the medieval tech-

---

[41] Kelkar, S. S., Mondkar, A. D. and Warawedkar, W. Serum immunoglobulins in leprosy. Lepr. India **51** (1979) 189–193.

[42] Sritharan, V., Venkatesan, K., Bharawaj, V. P. and Ramu, G. Serum lipid profile in leprosy. Lepr. India **51** (1979) 515–520.

[43] Rogers, J. H. Coronary thrombosis, cerebrovascular accidents, and pulmonary embolism in leprosy. Ann. Intern. Med. **53** (1960) 746–753.

[44] Parvez, M., Sharda, D. P., Jain, A. K., Bhargava, N. C. and Misra, N. C. A study of platelet adhesiveness in leprosy. Lepr. India **51** (1979) 363–368.

nique, particularly since many of the patients had very advanced disease when diagnosed.

Like blood, the urine of lepromatous leprosy patients contains a large number of chemical abnormalities. Urine was not just examined immediately after collection. Its odor, texture, color after standing, and behavior under heating might be considered. Neither the texts examined here nor others of similar stamp indicate, however, that the observations on urine were other than those immediately apparent. Yet, even here there is reason to accept these texts. A recent study of "bedside" urinalysis in untreated leprosy patients makes it very clear that uroscopy would demonstrate definite, visible abnormalities in lepromatous leprosy patients. This study, which involved just over 50 patients, demonstrated that in the lepromatous group more than half had significant pyuria, hematuria, or both. About one in six had very marked proteinuria.[45] Considering how advanced many medieval and early modern cases were when they came to diagnosis, there is little reason to doubt that uroscopy, however nonspecific, was very often abnormal in leprosy patients. When the diagnosis was genuinely in doubt, the usual rule was to wait and observe.[2–5] The longer the untreated period, the greater the chance of an observable urinary abnormality. It is even possible that uroscopy played a helpful role in confirming the diagnosis of leprosy, since most skin diseases with which it has traditionally be claimed to have been confused do not affect the urine.

Fracastorius. As far as signs and symptoms of leprosy are concerned, Fracastorius adds little to Theodoric. The most striking difference between the two writers lies in tone. Theodoric writes with placid authority for an audience he anticipates will accept what he says. Fracastorius writes in the Renaissance tradition of textual criticism and controversy. This is why Fracastorius discusses the writings of several other commentators on leprosy, more to determine how terminology was used than to cite authority. Authority was not adequate, argument and stylistic elegance counted. In examining Fracastorius' work, we must allow for the contentious nature of the tract and for the fact that it is intended to prove a theory, the celebrated "Germ Theory."

There are striking ideas in Fracastorius that we must examine. Perhaps most startling to the modern reader is the concept of a very long latency period in leprosy. Yet of all that Fracastorius wrote of leprosy, this is ultimately the most predictable. Without the concept of a long latency period, the "Germ Theory" was not tenable. Leprosy, despite what is often felt about it today, was considered in medieval and early modern time the prototype of a contagious disease, to which plague was often compared. Without a latent period of several years, Fracastorius could not hope to preserve his theory. Therefore, what appears as a brilliant insight is a necessary corollary of a larger theory. The theory itself, of course, was brilliant and far in advance of its time. Its corollaries, however, are necessities of the overall theory, not clinical observation.

On the other hand, nothing about "Germ Theory" demanded Fracastorius' comments on the sex distribution of leprosy in a country where the incidence was low. Here we see a practicing physician's genius. Compared to other places he knew, Italy had few cases of leprosy. Among them, most were men and here, for once, the Latin words are more revealing than the English. He specifically is referring to adults. It is well recognized that the age and sex distribution of cases of leprosy varies along the range between polar situations. When the prevalence and incidence of leprosy are highest, the sex distribution is equal, most cases are nonlepromatous, and most cases begin in childhood. At the other extreme, the lower the prevalence, there is a significant excess of males, most cases are lepromatous, and infection occurs most often well into adulthood. Fracastorius further stated that many persons he had seen in the leprosaria did not truly suffer from leprosy, a situation not difficult to believe when the incidence was low (and the opposite of the situation discovered at the archaeological excavations at Naestved and Aschen).[46–49] This series of

[45] Singh, R. G., Usha, Kumar, N. S., Singh, G., Kaur, P. and Singh K. G. Bedside urinalysis in untreated leprosy patients. Indian J. Lepr. **58** (1986) 407–414.

[46] Ell, S. R. Reconstructing the epidemiology of medieval leprosy: preliminary efforts with regard to Scandinavia. Perspect. Biol. Med. **31** (1988) 496–506.

epidemiological comments is in no way necessary to his "Germ Theory." They are the further demonstrations of his clinical acumen.

Conclusion

In the hope of assessing their clinical value (in modern terms), I have analyzed two texts on leprosy, one from the thirteenth, the other from the sixteenth century. I have attempted to show how each was a product of its time. The formal requirements and readers' expectations of each age produced predictable elements. Some homage to the theory of the "Four Humours" was necessary. The work of an authority in the thirteenth century was often adequate to settle an argument. Given the critical apparatus of the Renaissance, a variety of classical writers had to be examined and much was made of the use of words. These factors account for a substantial portion of what Theodoric and Fracastorius wrote. Obviously, however, they did not write only to fulfill formal requirements. They also had considerable personal experience with leprosy. Everything about the way they conceptualized disease, all of their diagnostic apparatus was foreign to our own. Yet, they made easily comprehensible claims about leprosy that appear to be their own, and these claims are echoed by many other medieval and early modern medical writers. Taking into account the social, legal, and personal situation of the leprosy patient in the period spanned by Theodoric and Fracastorius, along with modern scientific understanding of leprosy and the sociology of dominant/excluded groups, there is good reason to accept the claims of Theodoric and Fracastorius. The sexuality, the blood, the urine of the leprosy patient, given the situation and diagnostic apparatus of the time, can be understood exactly as these authors described them. The deep-rooted idea that leprosy was a venereal disease is readily explained when the relation of leprosy, syphilis, and pregnancy is understood.

It is easy to pass off that which we cannot explain in the medical writings of other times as fantasy. We have seen how some aspects of an author's writings might purely fulfill formal requirements, such as the four types of leprosy in Theodoric. With other claims it is not so easy. Considering the degree to which this examination has revealed that these writers were either simply correct or construed known facts in a reasonable if incorrect way, it seems worth the effort to probe such writings even further. The habit of making a diagnosis only from sophisticated laboratory tests should not blind us to the possibility that talented physicians with only their eyes, ears, hands, and noses also make very worthwhile observations. Further, such observations may transcend the concept of the disease from which they grow.

—Stephen R. Ell, M.D., Ph.D.

Chief, Radiology Service
Associate Professor of Radiology
Veterans Administration Medical Center
500 Foothill Blvd.
Salt Lake City, Utah 84148, U.S.A.

[47] de Vries, J. L. and Perry, B. H. Leprosy case detection rates by age, sex, and polar type under leprosy control conditions. Am. J. Epidemiol. **121** (1985) 403–413.

[48] Irgens, L. M. and Skjaerven, R. Secular trends in age at onset, sex ratio and type index in leprosy observed during declining incidence rates. Am. J. Epidemiol. **122** (1985) 695–705.

[49] Sansarricq, H. Leprosy in the world today. Lepr. Rev. **51** Suppl. 1. (1981) 15–31.