

3. DEMOGRAPHY

There was much death at Pisa so that few or no one remained in the parish of San Cosma and San Cassiano and San Paolo a Ripa d'Arno.

Chronicon breve pisanum (1257)

I personally am a witness, since tertian fever did not infect me.

FEDERIGO VISCONTI (1257)

ESTIMATING the population of a medieval town, always a hazardous venture, involves two steps.¹ First, a suitable base figure must be found, such as the size of a communal army or fleet, the number of conjurors at a treaty, the number of hearths in a tax list, and so forth. Second and most difficult, a coefficient must be deduced which will represent the relation of the base to the citizen core, that is, the adult male members of the community who alone figure in its public life and who constituted about one-

1. On the demographic history of Tuscany, see most especially K. J. Beloch, *Die Bevölkerung des Kirchenstaates, Toskanas und der Herzogtümer am Po* (Berlin, 1940), Vol. 2 of his *Bevölkerungsgeschichte Italiens*. It must be stated, however, that the figures for the areas enclosed by city walls given by Beloch occasionally are at considerable variance with estimates of other authors, and an effort should be made, where possible, to check their accuracy. For the figures given in this chapter on the area enclosed by Florence's walls I am following O. Marinelli, "La Carta topografica e lo sviluppo di Firenze," *RGI*, 28 (1921), 18-38, (first circle, 23 ha.; second circle, 80 ha.; third circle, 630 ha.) rather than Beloch (first circle, 32 ha.; second, 105 ha.; third 512 ha.), as Marinelli's are more in accordance with my own calculations based on the map of Florence given by Davidsohn, *Geschichte*, I, Pt. II. Beloch's figure of 114 ha. for Pisa's size is clearly wrong, and I am rather following the estimate of 185 ha., excluding the Arno, given by Pedreschi, "Geografia," p. 124. Beloch's figure is approxi-

third of the total population. The lack of an objectively based coefficient has rendered divergent the several attempts to calculate Pisa's medieval population. A hitherto unused base figure, however, offers a fresh approach. From the latter half of the 13th century, from 1293 but fortunately unaffected by Meloria's human loss, has come a matricula of the guild of notaries.² At that time exactly 232 notaries practiced at Pisa. Another source gives the coefficient. In 1228 over 4,200 Pisans, 4,271 by my count, swore to uphold a treaty.³ Clearly a generous cross-section of urban society, the oath in giving the number of notaries (79) among the 4,271 gives, too, a ratio made secure by the numbers involved: 1 to 54. Estimating on both ratio and base, we arrive at a citizen core of 12,500 and a total population in 1293 of about 38,000. By 1293, Pisa had not yet ceased growing; but she was nearing her medieval peak.

More important than absolute figures are the dynamic and relative aspects of demography: dynamic in relation to trends of growth or decline, relative in relation to Pisa's principal rivals.

mately accurate for the area of Pisa north of the Arno, and may possibly have been intended by the author to represent the area actually enclosed by 1200, although he does not say so expressly. For further discussion of Pisan demography, see C. Barbagallo, *Medio Evo* (Turin, 1935), p. 948, Vol. 3 of his *Storia universale*, and especially A. Rossi, "Lo Sviluppo demografico di Pisa dal XII al XV secolo," *BSP*, 14-16 (1945-47), 5-62. Both estimates (40,000-50,000) are based on an oath of 4200 Pisans taken in 1228 (below, n. 3) and presumably are meant to express Pisa's population in that year. In 1228, Pisa's population was probably not half that number. Beloch's figure (p. 161) of upward of 15,000 is more prudent.

2. In *Stat.*, 3, 841. The list is not strictly the guild's matricula, but an extract from the matricula made for tax-collecting purposes. It represents the number not of notaries physically present at Pisa but of those enrolled in the guild, as shown by the entry, *exbannitus*, after several of the names. Even a notary imprisoned at Genoa could be expected to be on it.

3. *Caleffo*, 1, 365 ff.

In 1164 against Lucca, Pisa fielded an army of 3,000 soldiers and 400 horsemen.⁴ Since all citizens who could bear arms had to serve, since neither levies from the contado nor foreign mercenaries had importance in this early period, a coefficient of three and one-half to one is a fair one. In 1164 Pisa's population was no more than 11,000.

And though it can only be sketchily reconstructed, the demographic curve that joins these two figures demands a study. The closing decades of the 12th century saw rapid growth. The area of early medieval Pisa was about thirty hectares; her new walls, begun not long after 1150, enclosed about 114 hectares north of the Arno (the walls of Kinsica, the quarter south of the Arno, were not completed until shortly after 1300). In 1182, the men of the urban parish of San Cristofano could no longer fit into their old church.⁵ Approximately between 1160 and 1190, the money of Pisa and of Lucca depreciated by 50 per cent, here as often in the history of medieval Italy evidence of profound economic changes.⁶ Specifically at Pisa, for the first time commercially raised and processed fur—lamb pelts—cut the market from under foxes, rabbits, and squirrels—the products of the chase.⁷ When the furriers in 1193 for the first time acquired themselves a church, their newborn brotherhood counted twenty-three.⁸ In the oath of 1228 they were sixty-four and we cannot estimate absentees. The institutional changes were profound: the adoption of the commune's first proportionate direct tax on property, the *libra*; the appearance of the *curia maris*; the birth and recognition of Pisa's earliest artisan guilds (tan-

4. Maragone, *Annales*, p. 29, year 1164. Rossi, "Sviluppo," p. 26.

5. *Reg. pis.*, no. 560.

6. Herlihy, "Coinage," p. 149.

7. See below, p. 148.

8. Document in *Stat.*, 3, 1092.

ners, iron workers, furriers and butchers); the agony of the communal consulate and the rise of the podesta. Then, too, Burgundio Pisano and Leonardo Fibonacci gave Pisa an intellectual stature she was never again to equal.

From roughly 1200 to 1250 the signs of growth and change subside in economy, guilds, and government. If a government notary could live on three to four pounds a year in 1227, in 1247 he still received that salary.⁹ Then in the late 1240's and especially during the episcopacy of Federigo Visconti (1257-77), the demographic curve surges upward at what seems an almost incredible pace. In the six years of 1227-32 the communal treasurers averaged an income of less than 2400 pounds a year; in 1288 they counted near 40,000—an increase over sixteenfold (over eight in terms of the value in silver of the coins) in a city supposedly languishing.¹⁰ If one could have lived on four pounds a year in 1247, by 1266 the cost was more like twelve to fifteen pounds.¹¹ Again we hear of a church so crowded that men within it could not breathe for room—this time San Piero a Grado at the Arno's ancient mouth, whose old church had sufficed since the time St. Peter him-

9. ASP, Roncioni, 4 June 1233, two notaries receive eighteen pounds each for six years of service, and ASP, Alliata, 24 Nov. 1248, a notary receives three pounds for a year's service.

10. The commune's income from 1227-32 was 14,091 pounds, eight solidi, one denarius (ASP, Roncioni, 4 June 1233). In 1288 for the months of January, February, and March, the income was 9968 pounds, eight solidi, and nine denarii (ASP, Alliata, 28 Dec. 1288).

11. In 1267 (ASP, Alliata, 27 Dec.) the year's salary for a tax official was twelve pounds; in 1282 the salary for a lighthouse keeper was fifteen (ASP, Coletti, 13 March 1282). Twelve to fifteen pounds is the average amount awarded by Pisan courts for the yearly support of dependents. See 2516 3v (1273), 2545 28r (1283), 2545 113r (1283), 2523 31v (1308), and ASP, Trovatielli, 24 Aug. 1284. Of the fifteen pounds, in one instance (2515 90r 8 Nov. 1272), two pounds went for rent, one for incidentals, and the remaining twelve pounds were spent for grain (five staia) and wine (five barrels) and clothing.

self, we are told, built it on coming from the Holy Land.¹² In 1262 when Federigo Visconti made his visitations, he remarked with pride and weariness that he must have confirmed 10,000 persons.¹³ As the parish of San Cristofano heralded the first demographic upsurge by building a new church, so it marked the second by sinking a new well.¹⁴ Of Pisan building—the Camposanto, the Baptistry, Santa Caterina, San Francesco, and the list goes on—this is the golden age. In size the two churches of Santa Caterina (Dominican) and San Francesco (Franciscan) rival the cathedral, and of course the art which this building brought is that of the dawning Renaissance. This is the age of brick, now widely applied in construction, of earthenware, of the peach and orange, of the use of vernacular in literature and spaghetti in the diet, in short, of a changing and advancing standard of living that argues an increase in population.¹⁵ It is the period too of profound economic and social changes which this study must analyze.

Of all the evidence of demographic upsurge, most telling are the chartularies. They provide statistics from the unit where demographic history was written: an urban parish.

San Cristoforo, or, in its more vernacular spelling, San Cristofano, was a parish of Kinsica, Pisa's business quarter on the Arno's left bank. We have seen it building a new church in 1182 and a new well in 1273. And in 1273 when

12. Visconti, 49v. The old church was destroyed "propter pressuram hominum qui ibidem fere sufficabantur."

13. Ibid., 134r.

14. 2515 25v 3 April 1273. Cf. Lupi, "Casa pisana," *ASI*, ser. 5, 29 (1902), 217-18.

15. *Vermicelli*, apparently spaghetti, is mentioned at Pisa in 1284. 2545 118v 13 Feb. 1284, where a baker hires a helper "in faciendis et vendendis vermicellis." Oranges are common by the early 14th century, 2630 8v (1308). Peaches are found at Lucca by 1310, Sardi, *Contrattazioni*, p. 149.

the parish captains sounded the bells for the men to gather to discuss the well, twenty-five persons responded. This was a rump *parliamentum*, of course. The attendance in 1228—104 persons—was much better because the notary came three times to the parish over several months to solicit conjurors. However, the meeting of 1273, recorded by the notary Ugolinus, himself working in—if not a member of—the parish, may be used in reconstructing San Cristofano's population, by means of which Pisa's demography can best be examined. For if San Cristofano came collectively to Ugolinus to record its business, it came distributively as well, and in the years 1272 to 1274, the great, the poor, the noble and the commoner, the exploiter, the exploited, and the bystander are there to be counted.

From 1272 to 1274, 117 parishioners or residents appear in Ugolinus' contracts as principals or witnesses.¹⁶ That the number is more than that of the conjurors of 1228 at this one notary's is suggestive; however, our reconstructed parish population permits a study of demography that prescind from the unknown and uncontrollable factor of absentees. It allows a study of the origins of the individual parishioner, whether native or immigrant. Of course, chartularies do not tell all. Only if a man figures in many contracts will the chances approach certainty that Ugolinus will let fall some hint of his background. A study of immigrants versus natives in San Cristofano will yield results conservative in the extreme.

But if conservative, the results are the more remarkable. Over 50 per cent of the parishioners (62 out of 117) are new arrivals in San Cristofano.¹⁷

16. See Appendix I, Population.

17. The significance of the toponymic surname, "de N." has recently come under considerable discussion. R. Emery, "The Use of the Surname in the Study of Medieval Economic History," *Medievalia et Humanistica*,

The evidence of the chartularies is not isolated. With characteristic insight, G. Volpe noted that of the notaries from Kinsica in the matricula of 1293, 65 out of 98 appear to be recent immigrants from the contado.¹⁸ Further, in the *Breve antianorum*, the list of citizens elected to Pisa's governing board after 1289, over two-thirds are rural in origin. Volpe, and P. Silva who followed him, interpreted this peculiarity as evidence of a marked influx from the contado specifically for the period after Meloria. The interpretation has validity, with the warning, however, that both notaries and anziani represent a relatively exalted economic status and their behavior cannot be too lightly generalized. The chartularies, besides illuminating all levels of Pisan society, place this immigration better in time than does the *Breve antianorum*. They show how much the 60's and 70's were years of growth and change.

This phenomenal urban growth in the late 13th century may well be considered the salient fact in the economic history not only of Pisa, but of Tuscany generally and indeed of Italy. Florence's new circle of walls, projected in 1284, completed in 1333, enclosed an area (630 hectares)

7 (1952), 43-50; R. S. Lopez, "Concerning Surnames and Places of Origin," *ibid.*, 8 (1954), 6-16; R. Emery, "A Further Note on Medieval Surnames," *ibid.*, 9 (1955), 104-6. Emery cautions that a toponymic surname is no sure proof that its bearer came from the place in question. While his point is well taken, there can be no doubt that the use of "de N." in Pisa in the 13th century indicates recent immigration and that the toponym is not yet standardized as a family name (with the exception of noble houses, which possessed surnames considerably earlier than the *popolani*). Cf. 2515 82r, "Nuccius de Singna filius quondam Puliensis de sancto Miniato." Evidence of this is the fact that the name "de N." is consistently used in conjunction with the formula "qui moratur Pisis, in cappella N.," which, in contradistinction to the formula "de cappella N.," describes new arrivals in, rather than the natives of, a parish. Cf. 2543 32r 30 May 1263, "Lazarius quondam Talliapanis qui fuit de scripto burgo sancti Genesii et nunc moratur Pisis in cappella sancti Cristofori . . ."

18. Volpe, "Pisa," p. 295, and Silva, *Gambacorta*, p. 13.

over seven times greater than the area (80 ha.) enclosed by the older walls, begun in 1172, which had girded her in the early 13th century. Moreover, this growth of cities seems to have represented much more than the result of natural increase, and the draining of unneeded younger sons from the rural farms and estates. From the one area in Tuscany where full statistics of population trends in the countryside have survived—from the contado of Pistoia—we can conclude that the density of rural population was falling considerably in the latter half of the 13th century, undoubtedly as a result primarily of this influx to the city.¹⁹ From Pisa too we have evidence, albeit much scantier, of a similar, sharp decline in the density of rural settlement in the later 13th century.²⁰ Some of the factors behind this mass exodus from the countryside we shall be dealing with extensively in the chapters to follow; here, however, let us draw a tighter comparison between the demographic history of Pisa and that of her inland rivals.

In comparison with Lucca, Pisa's bitterest Tuscan enemy, Pisa was both clearly more precocious in her growth and probably remained, even in the fourteenth century, a slightly larger city. Lucca began her second circle of walls about 1200, and completed them in 1265, about a half century after Pisa had begun her comparable circle. The 75 ha. of land they embraced were less than, though not significantly less than, the 114 ha. enclosed by Pisa's walls north of the Arno. Though Pisa in the late 13th and early 14th centuries was to bring her area to about 185 ha. by enclosing her quarter of Kinsica, south of the Arno, Lucca

19. Cf. *Liber focorum districtus Pistorii* (a. 1226). *Liber finium districtus Pistorii* (a. 1255), ed. Q. Santoli, *Fonti per la storia d'Italia*, 93, Rome, 1956. The comparison (p. 22) of these two surveys shows a "progressive depopulation of the countryside." L. Zdekauer believed that by 1294 the population of the contado of Pistoia had fallen by as much as 50 per cent, (*ibid.*, p. 24).

20. See below, pp. 124 ff.

was not to add further to her walls until the 16th century. Moreover, in 1334 Lucca drank 168,300 barrels of wine every year.²¹ On the objective coefficient of the medieval Tuscan's considerable thirst—five to six barrels per year—she had a wine-drinking residency of from 28,000 to 30,000 and a population of about 40,000. The figures would seem to show that for all their ruinous wars, neither of the enemies had secured a decisive advantage. The critical comparison is rather with Tuscany's miracle: Florence.

Florence's second circle of walls, begun in 1172 and carried rapidly to completion, enclosed about 80 ha., less than the area of 114 ha. of contemporary Pisa. Almost certainly, throughout the 12th century Pisa remained Tuscany's largest town. Giovanni Villani states that in 1252 Pisa had not half the population of Florence.²² This is the boast of a Florentine and a noncontemporary. It does, however, set the trend, as with the trend if not the pace the evidence of city walls is in agreement. When shortly after 1300 Pisa had extended her walls to enclose the quarter of Kinsica on the Arno's left bank, her area was about 185 ha. Florence, on the other hand, in 1284 projected a completely new third circle of walls, which when completed, by 1333, enclosed 630 ha.—extremely high for a medieval city. The comparison would show that Florence secured her own demographic advantage the same generation that Pisa, too, was growing most rapidly.

But by 1300, that advantage was decisive. According to the figures given by Giovanni Villani, Florence's population was then about 95,000.²³ We can reach a comparable figure (96,000) by applying our coefficient of notaries to the

21. Cited in Sardi, *Contrattazioni*, p. 138.

22. *Cronica*, 2, 78. Villani does not of course here have the authority of a contemporary witness.

23. For the latest and best reconstruction of Florence's population on the basis of the statistics given by Villani, see E. Fiumi, "La Demografia fiorentina nelle pagine di Giovanni Villani," *ASI*, 108 (1950), 78–158.

600 Villani later says served the city. By the end of the 13th century Pisa was indeed not half Florence's size. To explain this differential growth is to search for diversity in likeness.

Of course, for Pisa's people, the sea had its lure. To give instances of Pisans found or even settled from Catalonia to Kiev, from Tunis to Provence, of numerous half-colonists, half-conquerors in Sardinia, is easy. Did not even the father of St. Bona leave wife and babe and settle permanently in the Levant, to marry again (and from the adulterous union were born, we are told, the Patriarch of Jerusalem, the Master of the Templars, and the Master of the Hospitalers)?²⁴ Yet of mass colonization in these overseas areas there was nothing. From this flux of population—ever the mark of the maritime—Pisa might have gained as much as she lost: we don't know.

More serious a check was war, for war in the late 13th century was serious business. When Lucca's gentle maiden St. Zita thought of visiting a favorite shrine in Pisan territory, she was told that if the Pisans found her, she was apt not to escape alive.²⁵ A Lucchese agricultural contract speculates on losses "from the hail or the Pisans."²⁶ In the generation before 1305, the frontier town of Quosa dropped from thirty to ten men, as her people sought a safer home.²⁷ Pisa's heavy losses at Meloria were of course basic in slowing her population growth, especially since the Genoese decided not to kill their Pisan prisoners, thereby to prevent their wives back home from remarrying, and thereby to cut the Pisan birth rate. Still, even Pisa's

24. *ASS*, 20, 146 A.

25. *ASS*, 12, 509 C.

26. "Pisanorum vel glandine" in contract of 1224 in Sardi, *Contrattazioni*, p. 54.

27. ASP, Comune A 83 7or 31 Oct. 1305.

ill fortune at Meloria and Genoese ingenuity cannot sufficiently explain Pisa's slower population growth, since they come too late—in 1284, when Florence, as shown by her newly projected walls, had already secured her predominance.²⁸ In Pisan demography the critical element is neither the lure of the sea nor the losses of war but the lay of the land.

Pisa's plain is low.²⁹ Pisa herself, some seven miles from the sea, stands above sea level only twelve feet; Cascina, ten miles above Pisa, only twenty-four. Falling at the rate of less than 0.3 per 1,000, the Arno cannot drain the high waters of the Tuscan autumn and winter. Of a great flood in 1332 a Pisan chronicler has left an awesome description, telling how the whole Pisan plain was submerged and that only by boat or horse could one travel in Kinsica, Pisa's largest quarter.³⁰ The picture is not unique. In the late 13th century the river seems yearly to have passed its banks; in 1167, it flooded nine times in one autumn.³¹ Even in the *Constitutum Usus*, Pisa was desperately fighting this problem. In times of flood the Valdarno's numerous communes north of the city were ordered to cut their dikes, to let the Arno drown their lands, so that the city at least might preserve its "pulcherrimus aspectus."³²

Pisa's plain while low is not flat. Water collects in lagoon-like *tomboli* along the shore and in extensive swamps inland. The area northeast of the city stretching to the Monti Pisani was a swamp throughout the 13th century. Pisa herself was surrounded by water: the Arno and a half-canal, half-river called the Auser, which, coming down

28. *Stradario storico e amministrativo della città e del comune di Firenze* (Florence, 1913), p. xv.

29. Statistics on the Arno in Pedreschi, "Geografia," p. 108.

30. *RIS*, 24, 668 D.

31. Maragone, *Annales*, p. 44, year 1168 (Pisan style).

32. *Constitutum Usus*, *Stat.*, 2, 955.

from the Monti Pisani, formed a moat for the city walls and created, even within those walls, a swamp.

Drinking water was a problem.³³ Although wealthy houses might possess an elaborately engraved plumbing system, drawing well water, or perhaps rain water, pure and precious, from private cisterns, the bulk of the people depended on wells. From Pisa's inability to build an aqueduct, a key in the Medici revival, undoubtedly the health of her people suffered much. Some houses had wells in the narrow courtyards into which they opened, and such private wells could serve whole neighborhoods. Or else, with booming populations, parishes like San Cristofano sank the wells from which the people drew water with buckets (*caldarias a puteo*), or even helmets turned, like swords into ploughshares, to peaceful purposes.³⁴

In spite of these dubious health conditions, Pisa's republican years have been viewed as something of a golden age in the spotty history of Pisan hygiene.³⁵ The interpretation is based on a double argument: Pisa's undeniable status, maintained at least up to 1200, as the largest and commercially most advanced city in Tuscany—a status enhanced further by her marvelous overseas expansion; and the provisions of her statutes which legislated valiantly against her rampaging waterways. Indeed, to the latter argument the chartularies can make a contribution, since if mention of a project does not prove its execution, the

33. For a well, placed between a house and stable and serving "illi qui habitant in aliis suis domibus scripti Mathei de terris circumstantibus," 2543 49r 24 Aug. 1263. For a well in a "claustrum" or courtyard, 2523 213v 7 Feb. 1309. For engraved metal drain pipes, see Lupi, "Casa pisana," *ASI*, ser. 5, 29 (1902), 222.

34. 2521 58v (1306), "caldariam unam a puteo que fuit una cervelleria."

35. Cf. A. Feroci, *Le Condizioni igieniche di Pisa e del suo circondario*, Pisa, 1875; R. Fiaschi, *Le Magistrature pisane delle acque* (Pisa, 1938), pp. 18–19.

chartularies point up the actual expenditures of energy and wealth to meet the problem.³⁶ The argument performs a service in emphasizing that the health conditions of Pisa suffered a marked deterioration paralleling her political collapse; indeed, other sources can spell out the cost of Pisa's exhaustion in terms of floods, ruined crops, disease, and flight.³⁷

However, this view has had the unfortunate result of tying hygiene too closely to public works and hence to political factors, so that the deterioration is looked upon entirely as the result and not as a cause of Pisa's decline. In Volpe's rich studies on 13th-century Pisa, hygienic conditions are never considered. But of course, the expenditure of much wealth and energy on public works does not prove that conditions are salubrious but only that the problem is great. To evaluate those conditions we must look elsewhere.

Of course, there are plagues. In the year of Meloria, Salimbene describes a pestilence which decimated the city.³⁸ "And the city that went out a thousand there shall remain a hundred; and the city that went out a hundred there shall remain ten." In 1257, another plague reduced to "few or no one" three urban parishes.³⁹ Significantly, all three parishes are in Kinsica, near neighbors of San

36. The chartulary of Cherlus, 2629, mentions eight separate public-works projects on which Pisans were working in 1285. See below, p. 96, n. 27.

37. For example, ASP, Comune A 88 60r (1322), a broken dike on the Arno caused a flood so that "quamplures familie vallis Arni . . . vix modo etiam possunt exire de domibus." ASP, Comune A 88 93r (1322), since the Crespina river had not been dredged for over ten years, the valley was flooded with every rain and the water ruined "quasi totam bladum vallis communis."

38. *Cronica*, p. 770.

39. *Chronicon breve pisanum*, ed. in appendix to Maragone, *Annales*, p. 108. The year should be 1257. See Davidsohn, *Forsch.*, 4, 123.

Cristofano, and in the oath of 1228 were among Pisa's most populous.

Plagues, however, are common to all medieval towns; they may even be signs of growth. And without statistics to evaluate mortality, history must rather consider the types of diseases to see if Pisa had a cross greater than her neighbors.

And for such a diagnosis of Pisa's endemic diseases, we have suitable sources. In the lives of Pisa's saints, in the miracles they wrought, is a thorough catalogue of medieval ills, and the ghastliness of the description is only slightly mitigated by the unfailing happy ending. Most rich are the almost one hundred miracles of St. Rainerius, most of which were performed after his death (1160) and are described by a contemporary. Thus a left-handed compliment to Pisan cattle-raising is the prevalence of lockjaw, ranging from swollen jaws to cases where the patient had to be fed with a knife.⁴⁰ Dysentery and stomach pains confirm what could have been imagined from our knowledge of Pisa's water.⁴¹ Most significant, however, is the number of fever cases, of all diseases the most numerous.⁴² Fever, common to so many diseases, is likewise the most difficult to identify. The one clue is periodic occurrence: *febris quotidiana*, *semi-tertiana*, *tertiana*, *quaterna*, and so forth. Periodic occurrence is characteristic of malaria, and when reference to such a periodic fever comes from an area (such as the coastal regions of Tuscany) with a long history of malaria infestation, the identification seems certain.⁴³

And the ominous rhythm appears in the miracles of St.

40. *ASS*, 24, 367 F, 369 A, 377 F.

41. "Fluxium disenterie," *ibid.*, 364 D, 368 F.

42. *Ibid.*, 362 E, 368 A, 369 A, 369 B, 370 A, 372 D, 373 D, 375 C, 377 A, 377 B, 377 F, 380 C. And from the life of St. Bona, *ASS*, 20, 146 E, 151 A, 157 A, 157 F.

43. For the identification, see E. Kind, "Malaria," *Realencyclopedia der classischen Altertumswissenschaft*, 14 (1928), 830-46.

Rainerius: *hemitritaeum*, Greek for semi-tertiana, and again febris quotidiana.⁴⁴ In the life of St. Bona (d. 1207), we find among her miracles the curing of a *febris quaterna*, and the saint herself suffered from fever all her life.⁴⁵ Indeed, with all reverence to Pisa's saints, we may wonder how many of these miracles were permanent cures and how many the tricks of a malaria infection. Even before 1200 Pisa faced a lingering endemic malaria she could not stamp out.

But only with the population increase after 1250 does malaria work its full havoc. In 1257 when Federigo Visconti remarked that tertian fever had not infected him, he tells us what was behind the plague that leveled the three parishes. Another time he told his flock: "The weather is having a tremendous effect contrary to nature and if it doesn't change for a while we must fear some pestilence."⁴⁶ And we know what pestilence he means. In 1285 when exuberant Lucca sent an army down the Serchio to Pisa's plain, her soldiers met an enemy more lethal than the prostrate Pisans.⁴⁷ That year at Lucca a plague "de terzi-
anis," of malaria, broke out, and Lucca's chronicler Tolomeo tells us that its chief victims were the valorous veterans of the Serchio campaign. From this too we can identify the plague which Salimbene describes at Pisa after Meloria.

By the end of the century, Pisa of a summer was always half infested. For the year 1299, a year undistinguished in the crowded annals of plagues, the *Provvisioni* of Pisa's anziani tells us what Federigo Visconti's bad-weather pestilence could do. On July 19, Franciscus Bellomus had to be

44. ASS, 24, 371 D, 380 C.

45. ASS, 20, 146 F, 157 A.

46. 123v. "Quia contra naturam temporis maximus est effectus propter quod [read: quem ?] multum timendum quem [read: quod ?] si tempora temporaliter se non recludent de aliqua pestilentia dubitatur."

47. *Die Annalen des Ptolomeus von Lucca in doppelter Verfassung*, ed. B. Schmeidler, MGH, Ss, new ser., 8, (Berlin, 1930), p. 207, 7-20.

relieved from service in the *planus portus* because of "fever."⁴⁸ His successor lasted less than two months before declaring he could serve no more "since he is sick." On August 10, Bacciameus Tadi had to be relieved of service in Elba; at that post his successor could take no more than one month. Ganus Del Ponte sent to Castiglione della Pescaia in the Maremma was good only "for a few days" before fleeing back to Pisa. At the same time, so many government notaries became sick "some in the city and some in the contado" that rural administration in "certain captaincies" was paralyzed so that the captains could not perform their services. Little willing, however, were the captains to remain at such posts, and of them we are told "many . . . are away from Pisa." All business had to be prorogued until autumn from San Piero a Grado to the lower Livorno hills and into the Maremma.

The wonder may seem not that Pisa declined but that she was ever great. However, Pisa had controlled her endemic malaria, partially through public works. Federigo Visconti was well aware that stagnant water was "rotten," and the standard theme of Pisa's river policy was to keep the water flowing.⁴⁹ However, the most effective means of holding the disease in check seem to have been a rarified population coupled with a flight from the city one step ahead of the hot weather. For the cycle of malaria is built as much on men as on mosquitoes, and the more numerous the infected, in geometric ratio the greater the chances of new infections. This flight is most evident where the problem was severest: Elba and the Maremma. Up to the late 13th century, Pisa worked her iron mines intensively only in winter, and the year-round, intensive operation of

48. For what follows, ASP, Comune A 82 60r-64r.

49. 122r "Quod prout in aquis que si in aliqua fovea vel alio loco fuerint sine motu et non labantur super terram corrupte sunt et infime . . . si vero moveantur et labantur sane efficiuntur et meliorantur."

the mines after that time, which seems to have reduced the miners to physical ruin, may be considered as much as mosquitoes the cause of the upsurge of malaria.⁵⁰

From the city, too, an exodus in the summer is evident. Recent immigrants were reluctant to break ties with the *contado*. To become a citizen and attain the privileges thereof, the immigrant had to live in the city nine months.⁵¹ Even to serve as a notary, the required residency was nine months per year.⁵² In the earlier period, we hear of cityfolk returning to the countryside to help with the harvests; by 1286, however, to prevent peasants from enlisting in a city parish, securing the tax concessions thereof, but continuing to work their farms, the commune had come to forbid such agricultural labors on the part of its citizens.⁵³ Cityfolk were still allowed, however, to live in the countryside for a three-months' period. Those who could might still flee the city during the mosquito-infested months of July, August and September—those whom economic advantage had forced to the city but whom reasons of health drove back to the countryside during the summer whose dangers they knew.

It remains to place these hygienic conditions in the overall picture of Pisa's 13th-century history.

That in Pisa's fall from expanding Europe's forefront to a sleepy provincial town hygiene played a role needs no argument. "You who were once as the stars in the heaven in multitude," said Salimbene to the Pisans, "shall be few in number."⁵⁴ Indeed, few in numbers, malaria-smitten Pisa was weak in moral energies as well. Federigo Visconti

50. Pintor, "Elba," has much on Elba's hygienic conditions in the 14th century.

51. *Stat.*, 1, 204-5.

52. *Stat.*, 3, 776.

53. *Stat.*, 2, 1000 and *Stat.*, 1, 205.

54. *Cronica*, p. 770.

compliments Pisa's merchants on profiting the world through intelligence (*per sapientiam*) rather than through violence (*per potentiam*).⁵⁵ In Tuscan lyric poetry the theme appears again, but with a significant twist.⁵⁶ The Pisans are the wolves who get nothing through energy (*forza*) but only through cheating. By the 14th century the city's cultural contribution is almost nil. She has not even a chronicler, and three men from the contado—Corvaria, Vico, and Sardinia—write of her ruin. From the contado, too, comes her single important heretic. For the 14th century G. Volpe has again well noted the remarkable cultural status of the contado *vis-à-vis* the city, but he interprets it as evidence of the contado's growing importance rather than the city's progressive decadence.⁵⁷

By the middle 14th century Pisa was no place to reside. Boccaccio describes the women of Kinsica as "wormy lizards."⁵⁸ In 1345 when a Milanese army camped ten miles south of Pisa at Colle Salvetti, the soldiers complained that "because of flies and mosquitoes which were there and because the land was rotten, many got sick and died and almost everyone became yellow with swollen bodies because of the bad state there."⁵⁹ By 1550 Pisa had a population of 8,600.⁶⁰

55. 80v. "Cristus filius dei dicitur negotiator sive mercator per excellentiam qui vollens negociando humanum genus lucrari per sapientiam . . . fecerat . . . non per potentiam." 81v "Patet quanto filius dei fuit negotiator sive mercator et lucratus est . . . genus humanum per sapientiam et non per violentiam."

56. Cf. Volpe, "Pisa," p. 193.

57. Ibid., p. 298.

58. *Il Decameron*, ed. G. Petronio (Turin, 1950), 1, 287, second day, story ten.

59. Cited by Fiaschi, *Acqua*, p. 19. Other examples of Pisa's hygienic conditions in the later Middle Ages may be found in Palmieri, "De Captivitate Pisarum," *RIS*, 19, 12.

60. Repetti, *Dizionario*, 4, 374.

Pisa's utter collapse in the later Middle Ages is the appearance of the familiar pattern of a malaria-infected community: high mortality particularly among the young, exhaustion of physical and moral energies, and the loss of the population's stronger elements to better homes. In part it is the history of her military crisis which crippled efforts to control her environment. As such it forms part of a cycle of military defeat, financial exhaustion, ruinous taxation, breakdown of public works, worse hygiene, worse military defeats, and so forth. In part it is the history of a mounting level of social control and social obligations which prevented the physical freedom of former years. In 1286 Pisa had to screen her sewers to prevent debtors from slipping out at night, away from the city and their obligations.⁶¹ But the prosperous artisan found in his economic interests as effective a screen. More nearly, Pisa's catastrophe was the cost of growth: the booming population, urbanization, industrialization, and integrated living that growth brought. In this sense Pisa was foredoomed to ruin in the same way all urban Europe was foredoomed to the later ravages of the Black Death. The difference is that for Pisa, her swamps imposed on her a sort of Malthusian limitation which she had neither the medicine nor the technology to break. But before she had pushed toward that limitation, she had made a history which paralleled and at times anticipated the profound economic and social changes witnessed by towns more fortunate than she.

61. *Stat.*, I, 475.