

ALEX SCOBIE

Slums, Sanitation, and Mortality in the Roman World

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In recent years a great deal has been written about life expectancy and mortality in the Roman empire, but very little has been said about the possible or probable causes of what by contemporary western standards must be regarded as a very low average life expectancy at birth of c. 25 years, an estimate which now appears to be generally accepted by many classicists.¹ It is true that some writers hint that low levels of sanitation and poor standards of public health at Rome and in other large cities in the Roman empire are in some way to blame for a high mortality rate.² Frier, for example, refers in passing to "fetid metropolises",³ but leaves his readers to imagine the details for themselves.

The aim of this paper, then, is to try to estimate, as accurately as available evidence permits, how sanitary or insanitary Roman towns were. Particular attention will be paid to fundamental inadequacies in various types of Roman housing, deficiencies in the disposal of human and animal wastes, and legal shortcomings which virtually ensured that large numbers of destitute and near-destitute inhabitants of Rome lived in squalid conditions which were well known to high-status Romans, but which were ignored by successive imperial administrations.

¹ To cite only the most recent estimates: P. A. Brunt, *Italian Manpower 225 B. C. — A. D. 14*, Oxford 1971, 133; K. Hopkins, *Brother-Sister Marriage in Roman Egypt*, in: *Comparative Studies in Society and History* 22 [1980], 319; W. V. Harris, *Towards a Study of the Roman Slave Trade*, in: J. H. D'Arms — E. C. Kopff (edd.), *The Seaborne Commerce of Ancient Rome*, Rome 1980, 118 (134 n. 12); T. Molleson, *What the Bones Tell Us*, in: S. C. Humphreys — H. King (edd.), *Mortality and Immortality*, London 1981, 21; K. Hopkins, *Death and Renewal*, Cambridge 1983, 71; B. W. Frier, *Roman Life Expectancy: Ulpian's Evidence*, in: *HSCP* 86 [1982], 249 assigns a shorter "average life expectancy at birth of 21.11 years, and an infant mortality rate of 466.9 per thousand."

² Brunt (n. 1) 134, 385f.; for a more general account of the living conditions of the urban plebs in Late Republican Rome, see P. A. Brunt, *The Roman Mob*, in: *Past and Present* 35 [1966], 3-27 revised versions of which appear, in: M. I. Finley (ed.), *Studies in Ancient Societies*, London 1974, 74-101; H. Schneider (ed.), *Zur Sozial- und Wirtschaftsgeschichte der späten römischen Republik*, Darmstadt 1976, 271-310; Z. Yavetz, *The Living Conditions of the Urban Plebs in Republican Rome*, in: *Latomus* 17 [1958], 500-517 (repr. in Schneider 549-553); for the imperial period, see M. Mazza, *Sul proletariato urbano in epoca imperiale*, in: *Siculorum Gymnasium* 27 [1974], 237-278; a short discussion of disease and public health in Roman Africa is given by J. M. Lassère, *Ubique Populus*, Paris 1977, 549-553; cf. also L. A. Thompson, *Development and Underdevelopment in the Early Roman Empire*, in: *Klio* 64 [1982], 398 and n. 85.

³ Above n. 1, 250.

Despite the shortcomings of Roman urban hygiene which emerge when comparisons are made with standards of public health in modern western industrialized societies, it must be said that the Romans achieved a remarkable level of standardization in the provision of certain basic facilities such as public latrines and baths. These, as will be seen, had some serious deficiencies, but credit should be given to the Romans for some degree of progress in the sphere of public hygiene. References to hygiene-criteria established by modern authorities have been included in this paper mainly because of a lack of critical Roman evidence in this field. The modern criteria referred to in this paper serve primarily to provide the discussion with a structural framework. They are not intended to give a negative aspect to Roman achievement, though negative inferences will sometimes inevitably arise.

The difficulties involved in such an undertaking are not to be underestimated. Archaeologists rarely concern themselves with either latrines or sewers. Hence the extent of the underground sewer-networks of Pompeii⁴, Ostia⁵, and Rome⁶ are still very imperfectly known. Nor is the current lack of archaeological reporting in this area counterbalanced by a sufficiency of evidence in ancient literary sources. Vitruvius has much to say about such subjects as salubrious sites for villas and the purity of domestic water supplies,⁷ but he has virtually nothing to say about the disposal of human and other wastes in houses or cities.⁸ Perhaps decorum precluded discussion

of such topics, and it is in such a discussion unnecessary to mention aristocratic patrons, and

Modern scholarly literature on the accuracy of the standard *Homo*¹³, Carcopino¹⁴, and town-plan, and administration of the life-styles of the *de* area of public hygiene.

I "Slums"

The enormous gulf which existed between the empire with respect to a city apartment (Epig. 12 lived in houses which could have recently shown, many long term leases. The apartment functions, would be situated on the floors of these buildings. *cellae* rented probably on a design ranged from single

⁹ R. Pöhlmann, *Die Über*

¹⁰ R. Lanciani, *The Ruins of* (1979); see also n. 6 above

¹¹ Above n. 6, 441–480 for

¹² L. Friedländer, *Sittenge* (Latrinenwesen).

¹³ L. Homo, *Rome impéri* sourced and documented

¹⁴ J. Carcopino, *Daily Life* (houses and streets).

¹⁵ P. Lavedan – J. Hugues, *kind, Urban Developme* its condemnation of elite

M. Hammond, *The City* archeologica di Roma, (Mass.) 1980; G. Herma

also Lugli's contributor

¹⁶ For status symbols and Rom, in: *Chiron* 7 [1977]

¹⁷ W. L. MacDonald, *The*

¹⁸ B. W. Frier, *Landlords*

¹⁹ *Ibid.* 39f.

²⁰ *KLIO* 68 (1986) 2

⁴ By far the most comprehensive study of all aspects of hygiene at Pompeii (ventilation, water supply, drains, latrines, etc.) is by H. Mygind, *Hygienische Verhältnisse im alten Pompeji*, in: *Janus* 25 [1921], 251–281, 385–324, 353–383, a study which has not received the attention it deserves (hereafter cited as Mygind). On p. 270 Mygind says the underground sewer network is insufficiently known, a remark repeated by H. Eschebach, *Pompeji – Straßenbau in der Antike*, in: *Antike Welt* 9 [1978], 10; cf. also Mygind's *Die Wasserversorgung Pompejis*, in: *Janus* 21 [1917], 294–351 and Eschebach's *Die Gebrauchswasserversorgung des antiken Pompeji*, in: *Antike Welt* 10 [1979], 3–24.

⁵ R. Meiggs, *Roman Ostia*, Oxford 1973, 586 (hereafter Meiggs). Both Pompeii and Rome are situated on sloping sites; a circumstance which enabled engineers to construct street drains with a steep fall, discharging in the case of Pompeii into the Sarno, in the case of Rome into the Tiber (though, as will be seen, the Cloaca Maxima did back up in its lower stretches near the river, see p. 413 below). By contrast Ostia was built on a comparatively level site with a high water-table which made it relatively easy for engineers to construct water wheels to supplement with ground water aqueduct supplies which were inadequate for the full needs of the *thermae* (Meiggs 144). This combination of a level site with a high water table possibly resulted in drains becoming water-logged. For example the main sewer of the Baths of Mithras "is filled with water and is perhaps still connected with the Tiber"; I. Nielson, *The Water System in the Baths of Mithras in Ostia*, in: *Analecta Romana* 9 [1980], 155; cf. also R. Étienne, *Maisons et hydraulique à Volubilis*, in: *Service des Antiquités du Maroc, Publications* 10 [1954], 200 for observations on the steep fall of the main street drains at Volubilis.

⁶ Brief discussion by R. Lanciani, *Ancient Rome in the Light of Recent Discoveries*, Boston 1889, 49–73; H. Jordan, *Topographie der Stadt Rom im Alterthum* I. 1, Berlin 1871 (repr. Rome 1970), 441–451; although parts of the Cloaca Maxima have been sporadically explored (see S. B. Platner – T. Ashby, *A Topographical Dictionary of Ancient Rome*, Oxford 1929, 126f.) the fabric of the entire collector with all its tributaries has never been systematically studied. The start of such a project was announced by S. Picozzi, *L'Esplorazione della Cloaca Massima*, in: *Capitolium* 50 [1975], 2–10.

⁷ For a somewhat perfunctory discussion, see A. Söllner, *Die hygienischen Anschauungen des römischen Architekten Vitruvius*, Jena 1913.

⁸ At 1. 1. 10 Vitruvius says architects must be acquainted with *iura . . . cloacarum*, but neither here nor elsewhere in his handbook does he enunciate these *iura*.

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of such topics, and it is possible that presumed knowledge of normal practice made such a discussion unnecessary. It is to be remembered that Vitruvius was writing for aristocratic patrons, and not for public health engineers.

Modern scholarly literature on Roman urban sanitation is also limited in scope and accuracy. The standard works of Pöhlmann⁹, Lanciani¹⁰, Jordan¹¹, Friedländer¹², Homo¹³, Carcopino¹⁴, and others,¹⁵ provide valuable overviews of the topography, town-plan, and administration of the city of Rome, and also give a general picture of the life-styles of the different sectors of Roman society, but are deficient in the area of public hygiene.

I "Slums"

The enormous gulf which separated advantaged from disadvantaged in the Roman empire with respect to access to the legal system, medical care, and education, is also very evident in the case of housing which was taken to be an index of a person's social status.¹⁶ At the top of the Roman housing scale were the conspicuously lavish imperial palaces such as the short-lived *Domus Aurea* and the longlived "Palatium" of Domitian which provided this and all subsequent emperors in the Western empire with 40,000 m²¹⁷ of secure, comfortable, living space, and which virtually monopolized Rome's most prestigious hill. Next came senatorial residences such as that of Sparsus, the charms of which Martial contrasts with the disadvantages of his noisy city apartment (Epig. 12. 57). But not all senators, equites, and wealthy freedmen lived in houses which could offer their occupants the delights of *rus in urbe*. As Frier¹⁸ has recently shown, many members of these classes rented *cenacula* in *insulae* on long term leases. The apartments, subdivided into rooms with individual specific functions, would be situated on the lower floors of *insulae*. By contrast the upper floors of these buildings housed lower-status Romans in subdivided, undifferentiated *cellae* rented probably on a daily basis.¹⁹ The poor also lived in *tabernae* which in design ranged from single roomed shop/dwellings to larger complexes consisting of

⁹ R. Pöhlmann, *Die Übervölkerung der antiken Großstädte*, Leipzig 1884 (repr. 1967).

¹⁰ R. Lanciani, *The Ruins and Excavations of Ancient Rome*, London 1897 (repr. New York 1979); see also n. 6 above.

¹¹ Above n. 6, 441–480 for drains and water supply.

¹² L. Friedländer, *Sittengeschichte Roms* vol. 4, Leipzig 1922 (repr. Aalen 1964), 310f. (*Latrinenwesen*).

¹³ L. Homo, *Rome impériale et l'urbanisme dans l'antiquité*, Paris 1971 (indifferently sourced and documented).

¹⁴ J. Carcopino, *Daily Life in Ancient Rome*, ed. H. T. Rowell, London 1962, 33–64 (houses and streets).

¹⁵ P. Lavedan — J. Huguency, *Histoire de l'urbanisme: antiquité*, Paris 1966; E. A. Gutkind, *Urban Development in S. Europe: Italy and Greece*, New York 1969 (scathing in its condemnation of elite Roman neglect of the basic material needs of the *plebs urbana*); M. Hammond, *The City in the Ancient World*, Harvard 1972; F. Coarelli, *Guida archeologica di Roma*, Milan 1974; L. Benevolo, *The History of the City*, Cambridge (Mass.) 1980; G. Hermansen, *Ostia: Aspects of Roman City Life*, Edmonton 1981. See also Lugli's contributions; below notes 47, 141.

¹⁶ For status symbols among the Romans, see F. Kolb, *Zur Statussymbolik im antiken Rom*, in: *Chiron* 7 [1977], 239–260.

¹⁷ W. L. MacDonald, *The Architecture of the Roman Empire*, New Haven 1982, 47, 202.

¹⁸ B. W. Frier, *Landlords and Tenants in Imperial Rome*, Princeton 1980, 39–47.

¹⁹ *Ibid.* 39f.

a shop with one or two living rooms at the rear with or without mezzanines.²⁰ The very poor might also hire rooms in cheap boarding houses²¹ where rent was probably paid daily. The destitute (*egeni*) suffered the rigours of a wide range of improvised shelter: shanties pieced together from the detritus of the more fortunate (*tuguria*²², *ergasteria*²³) which must have been similar to the improvised shacks in slums which skirt the capitals of many developing countries.²⁴ Several ancient sources refer to huts erected against or on top of public buildings, or between the columns of porticoes in front of shops. Such structures were likely to be demolished from time to time by city officials.²⁵ The destitute also found refuge in tombs²⁶ which also served on occasion

²⁰ Four main types are distinguished by G. Girri, *La taberna nel quadro urbanistico e sociale di Ostia*, Rome 1956, 6f., whereas only two are recognized at Rome by R. A. Staccioli, *Le tabernae a Roma attraverso la Forma Urbis*, in: *Rend. Linc.* 14 [1959], 58; B. W. Frier, *The Rental Market in Early Imperial Rome*, in: *JRS* 67 [1977], 30 n. 20 accepts that c. 91–95 % of the population of Ostia lived in shops or small flats, or slept in the streets; cf. also J. E. Packer, *Middle and Lower Class Housing in Pompeii and Herculaneum*, in: B. Andreae – H. Kyrielis (edd.), *Neue Forschungen in Pompeji*, Essen 1974, 141.

²¹ *cauponae*, *deversoria*, *hospitia*, *stabularia* were all “rooming houses” where inmates could sleep and eat. J. E. Packer, *Inns at Pompeii: A Short Survey*, in: *Cronache Pompeiane* 4 [1978], 5–35; Hermansen (above n. 15) 125–203. Both these studies improve on the standard work by T. Kleberg, *Hôtels, restaurants et cabarets dans l’antiquité romaine*, Uppsala 1957. Ulpian (Dig. 47. 5. 1. 6) proves the existence of permanent residents in *cauponae* and *stabula*.

²² According to Pomponius, Dig. 50. 16. 180, *tugurium* originally denoted a shack erected in the country for the guarding of crops, and was not associated with town dwellings. In Costa Rica *tugurio* = slum; R. Biesanz, *The Costa Ricans*, Englewood Cliffs 1982, 74. Cf. Vitruvius 2. 1. 4–5 for descriptions of various types of *tuguria* and *casae* found in different parts of the Roman world; Alciphron 1. 1. 2; 2. 27. 1; Apuleius, *Met.* 4. 12; 9. 32; Strabo 4. 4. 3; Pausanias 10. 4. 1; for the thatched huts of agricultural workers in N. Africa (*mapalia*), see R. Laporte, *L’Habitat rural d’époque romaine en Maurétanie tingitane*, in: *Rivista Storica dell’Antichità* 4 [1974], 173f.; R. G. Goodchild, in: *PBSR* 19 [1951], 53, 55; also depicted on a mosaic in the Bardo Museum; T. Cornell – J. Matthews, *Atlas of the Roman World*, London 1982, 118. According to Seneca, *Ep.* 18. 7; 100. 6 the rich included in their residences *pauperum cellae* where they fleetingly practised austerity. On the so-called *tugurium Faustulicase Romuli*, see A. Alföldi, *Die Struktur des voretruskischen Römerstaates*, Heidelberg 1974, 117.

²³ E. Patlagean, *Pauvreté économique et pauvreté sociale à Byzance*, Paris 1977, 60f.; J. H. W. G. Liebeschuetz, *Antioch, City and Administration in the Later Roman Empire*, Oxford 1972, 56.

²⁴ See for example D. J. Dwyer, *Asian Urbanization, A Hong Kong Casebook*, Hong Kong 1971, 89–110 (The Aplichau Squatter Area).

²⁵ R. MacMullen, *Roman Imperial Building in the Provinces*, in: *HSCP* 64 [1959], 208f. (slum clearance); Dio Chrysostom, *Or.* 40, 8–9; John Chrys. in *I Cor.* 11. 5 (PG 61, 94f.) on which see A. González Blanco, *Economía y sociedad en el bajo imperio según S. J. Crisóstomo*, Madrid 1980, 328; Ulpian, Dig. 43. 8. 2. 17 indicating that if an unofficial building did not obstruct a public place, it might be allowed to stand and yield land-tax (*solarium*); Cod. Theod. 15. 1. 39 states that “lean-tos” (*parapetasia*) attached to public or private buildings are to be torn down, if the neighbourhood feared they might become a fire risk or be a source of *insidiae*; but cf. 15. 1. 4 which permits the erection of shelters above public workshops. For squatting against aqueducts, see O. Robinson, *The Water Supply of Rome*, in: *Studia et Documenta Historiae et Iuris* 46 [1980], 72.

²⁶ Ulpian, Dig. 47. 12. 3; 47. 12. 3. 11 refers specifically to slaves living in tombs. Those of the rich often took the form of small houses; K. Hopkins, *Death and Renewal*, Cambridge 1983, 205f., 247–255; W. F. Jashemski, *The Gardens of Pompeii*, New York 1979, 141–153; Meiggs 455–470.

as improvised brothels *insulae (subscalaria)*,²⁷ open air.²⁸ To what extent it is difficult to estimate. The very poorest, but since so little is known it is difficult to estimate especially during winter. It may be concluded by mentioning legionaries²⁹, *vigiles*³⁰,

²⁷ Hence the term *bustu*

²⁸ Trimalchio fears that

²⁹ “The *subscalaria* in Ostia: The Regional *cenacula* were often small; J. E. Packer, in: *B* [1935], 23 & fig. 7; cf. Pelagalli, *Cane e cani* 199.

³⁰ Pöhlmann (above n. 1).

³¹ Pöhlmann (above n. 1) but the references he gives to *fornice*, do not necessarily refer to underground

³² Frier (above n. 20) 30

³³ SHA, Sev. Alex. 24. refers to the closing of the *cellae* regarded as a source of evidence for the use of antike Badewesen, I without documentation der Nacht“ (119). The use of public bathing the cost of providing night, but not allowing the required temperature unexpected, or short-vicis rather than he windows such as the Thatcher, The Term Alciphron 3. 40. 3; F grecque, Paris 1962, R. Birley, *Vindolanda* “the same floor space before World War II Ostia: Meiggs 305; av The Vigiles of Imper Pompeii: J. Overbeck found in the *cellae* w La gladiature en Oc a room c. 10–15 m². of c. 20 m² (300); see Zürich 1981, 131.

³⁸ P. Guzman, *Pompeii*

at mezzanines.²⁰ The rent was probably in the range of improvised fortunate (*tuguria*²², racks in slums which ancient sources refer to as columns of porticoes from time to time by also served on occasion

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as improvised brothels²⁷ and lavatories.²⁸ Others slept in spaces under the stairs of *insulae* (*subscalaria*),²⁹ in underground cellars (*crypta*)³⁰, vaults (*fornices*)³¹, or in the open air.³² To what extent public baths were used by the poor for shelter is impossible to estimate. The very low admission fee at Rome of $\frac{1}{4}$ as would admit all but the poorest, but since so little is known about the administration of the baths at night,³³ it is difficult to estimate how many people might have tried to sleep in them at night, especially during wintertime.³⁴ This brief list of types of urban accommodation may be concluded by mentioning unicellular barrack-room units which were standard for legionaries³⁵, *vigiles*³⁶, gladiators³⁷, and low-status prostitutes³⁸.

²⁷ Hence the term *bustuariae moechae*; Martial 3. 93. 15.

²⁸ Trimalchio fears that people will soil his tomb with excrement; Petronius Satyr. 71. 8.

²⁹ "The *subscalaria* in Ostia show heavy use": G. Hermansen, The Population of Imperial Rome: The Regionaries, in: *Historia* 27 [1978], 166f.; the latrines of ground floor *cenacula* were often situated close to or under the *subscalariae*: Hermansen (above n. 15) 25; J. E. Packer, in: *Bullettino Commissione* 81 [1968/1969], 147 n. 51; Harsh, in: *MAAR* 12 [1935], 23 & fig. 7; dogs were sometimes housed in this area; C. Giordano — G. V. Pelagalli, *Cane e canili nella antica Pompeii*, in: *Accademia Pontaniana, Atti* 7 [1957], 199.

³⁰ Pöhlmann (above n. 9) 96–98.

³¹ Pöhlmann (above n. 9) classifies *crypta* together with *fornices* as „Kellerwohnungen“, but the references he cites (97 n. 2), e.g., Juvenal 10. 239 *carcer fornicis*; 11. 174 *olido fornice*, do not necessarily imply that the vaults are underground. It is likely that in these cases *fornix* = *cella meretricia*, a cubicle in a *lupanar*. Ulpian, *Dig.* 43. 17. 3. 7 refers to underground rooms.

³² Frier (above n. 20) 30 n. 20.

³³ SHA, Sev. Alex. 24. 6 explicitly says *thermae* were open at night; SHA, Tac. 10. 2 refers to the closing of the baths at night in the reign of Tacitus, because they were regarded as a source of *sedition*. Cod. Just. 8. 12. 19 and Cod. Theod. 15. 1. 32 provide evidence for the use of the baths at night. E. Brödner, *Die römischen Thermen und das antike Badewesen*, Darmstadt 1983 offers no useful comment and merely remarks without documentation that bath facilities were suspended „nur einige Stunden während der Nacht“ (119). Two economic considerations would seem to have militated against the use of public baths at night: Firstly the cost of providing oil for lighting, secondly the cost of providing additional fuel for the furnaces which would be damped down at night, but not allowed to go out, since it took a considerable length of time to achieve the required temperatures when the heating system was initially cold. Pliny sent unexpected, or short-term guests at his Laurentine villa to the public baths of a nearby *vicus* rather than heat up the baths at his villa (Ep. 2. 17. 26). Baths with unglazed windows such as the Forum Baths at Ostia would be unsuitable for night use; E. D. Thatcher, *The Terme del Foro at Ostia*, in: *MAAR* 24 [1956], 200.

³⁴ Alciphron 3. 40. 3; R. Ginouvès, *Balaneutike, Recherches sur le bain dans l'antiquité grecque*, Paris 1962, 219.

³⁵ R. Birley, *Vindolanda*, London 1977, 47; average dimensions of each room: 12 × 16 ft.; "the same floor space British architects gave to the families of native soldiers in India before World War II".

³⁶ Ostia: Meiggs 305; average dimensions of *cellae* 20 × 20 ft. Rome: P. K. Baillie Reynolds, *The Vigiles of Imperial Rome*, London 1926, 46.

³⁷ Pompeii: J. Overbeck — A. Mau, *Pompeii*, Leipzig 41884, 195; no traces of beds were found in the *cellae* when excavated; it is assumed the gladiators slept on straw; G. Ville, *La gladiature en Occident*, Paris 1981, 298–301 assumes the inmates slept 1 or 2 to a room c. 10–15 m². At the Ludus Magnus at Rome the *cellae* have average dimensions of c. 20 m² (300); see further A. Hönle — A. Henze, *Römische Amphitheater und Stadien*, Zürich 1981, 131.

³⁸ P. Guzman, *Pompeii*, London 1900, 226–228; *cellae* in the brothel at the junction of

It is not unusual for classicists to claim that Rome's urban poor lived in "slums",³⁹ but those who use this term do not define the word or specify its implications. It might be useful, therefore, to consider modern criteria and definitions of sub-standard accommodation and then apply these to the ancient evidence. P. Townsend in his massive study of poverty in the U. K.⁴⁰ isolates the following traditionally accepted indices of "poor", "unfit", or "slum" housing:

1. Structural defects (leaking roofs, damp walls, brickwork, ill-fitting doors and windows, etc.)
2. Inadequate housing facilities (lack of piped water, toilets, washing facilities, etc.)
3. Inadequate space, overcrowding (no more than two people to one room).

II Ruina

The structural shortcomings of Rome's *insulae* which according to the *Regionaries* outnumbered *domus* by a ratio of c. 26:1,⁴¹ are widely attested in late Republican and imperial literature. Poor building materials, inadequate preparation of foundations, and inept or careless workmanship seem often to have resulted in structural collapse,⁴² a fate which was also feared though probably not so frequently experienced by the occupants of *domus*.⁴³ As in other large cities in the Roman world, such as Carthage⁴⁴ and Antioch⁴⁵, the rich at Rome tended to site their houses on the ridges or slopes of hills which were well ventilated, drained, and sunny, whereas the poor

the via del Balcone and via del Lupanare measure c. 6 × 6 ft.; in some streets, according to Guzman, single *cellae meretriciae* "open directly into the street, having no communication with the houses in which they are embedded". It is to be assumed that such rooms were rented from the owners of the houses concerned; I. Bloch, *Die Prostitution* vol. 1, Berlin 1912, 325f.; M. della Corte, *Casa ed abitanti di Pompei*, Rome 1954, 48, 134f., 141, 198.

³⁹ "We may fairly suppose that most of the inhabitants of Rome lived in appalling slums": P. A. Brunt, in: *Past and Present* 35 [1966], 13; cf. Meiggs 142; A. G. McKay, *Houses, Villas, and Palaces in the Roman World*, London 1975, 85; Frier, in: *JRS* 67 [1977], 30; Hermansen, in: *Historia* 27 [1978], 167; R. Meiggs, *Trees and Timber in the Ancient Mediterranean*, Oxford 1982, 239.

⁴⁰ *Poverty in the United Kingdom: A Survey of Household Resources and Standards of Living*, Harmondsworth 1979, 479–486.

⁴¹ The *Regionaries* give a total of c. 46,000 *insulae* for Rome, a figure Hermansen amends to c. 25,000 (above n. 29, 167). H. rightly criticises those who have uncritically accepted the statistics of the *Regionaries*.

⁴² *Homo* (above n. 13) 506–531; Yavetz, in: *Latomus* 17 [1958], 507–513; Packer, in: *MAAR* 31 [1971], 74–79.

⁴³ Sen. Ep. 90.43, contrasting the luxury of contemporary Roman houses with the dwellings of primitive man: *at vos ad omnem tectorum pavetis sonum et inter picturas vestras, si quid increpuit, fugitis attoniti. non habebant domos instar urbium . . . haec erat secundum naturam domus, in qua libebat habitare nec ipsam nec pro ipsa timentem: nunc magna pars nostri metus tecta sunt.*

⁴⁴ A. Lézine, *Sur la population des villes africaines*, in: *Antiquités africaines* 3 [1969], 74 who states (70) that there is no proof of the existence of *insulae* in Roman Carthage, or at any other site in proconsular Africa; Strabo 16. 2. 23 claims houses at Tyre had more storeys than *insulae* at Rome. For tower-blocks at Motya, see J. I. S. Whitaker, *Motya*, London 1921, 22, 86.

⁴⁵ Liebeschuetz (above n. 23) 51.

lived in the valleys between the river overflowed, as it frequently undermined foundations, or

Vitruvius "an expert [*insulae*]"⁴⁹ explicitly refers to party walls more than 1½' thick kept to the same breadth throughout since it not only explains the use of load-bearing walls on the somewhat lackadaisical attitude responsible and effective but also of party walls, but which in the case of external walls, is clearly linked to the materials and increase in the size of the largest possible number of rooms to become a contributing cause.

Other Roman building laws⁵¹ established by Augustus affecting the maintenance of the rudimentary building regulations by property owners. The state prosecuted delinquent landlords with complete indifference

⁴⁶ After the building of the I Aventine, and Quirinal hills. The poor were crowded into the Velabrum. Transtiberim (above n. 15) 323; *Homo* Subura, in: *TAPA* 108 [1977], 108.

⁴⁷ For a list of the main inurnments, see Bardi 1934, 231f.

⁴⁸ Dio 39. 61. 1–2 gives such a list.

⁴⁹ P. Harsh, *The Origins of the La preminenza dell'insula*.

⁵⁰ For the meagre corpus of Frier (above n. 20) 36.

^{50a} "Overcrowding is one reason for the decline of the Economist, Dec. 25, 1982,

⁵¹ This limit was evidently the buildings in relation to many cases unsatisfactory H: L [hauteur: largeur]. (above n. 15) 461.

⁵² Cf. the frequent repetition of Tarentum, Urso, and M Town Planning, Oxford 1977.

⁵³ P. Garnsey, *Social Status*.

⁵⁴ Cicero, *Ad Att.* 14. 9. 1; in

lived in "slums",³⁹ its implications. It consists of sub-standard P. Townsend in his additionally accepted

ill-fitting doors and

washing facilities, etc.) (one room).

to the *Regionaries* in late Republican comparison of foundations resulted in structural problems frequently experienced in the Roman world, such as houses on the ridges, whereas the poor

the streets, according to having no communication that such rooms are Prostitution vol. 1, Rome 1954, 48, 134f.,

in appalling slums": G. McKay, Houses, in: JRS 67 [1977], 30; number in the Ancient

Practices and Standards of

the Hermansen amends uncritically accepted

507-513; Packer, in:

houses with the dwellings *ter picturas vestras, si... haec erat secundum mentem: nunc magna*

africaines 3 [1969], 74 in Roman Carthage, as houses at Tyre had see J. I. S. Whitaker,

lived in the valleys between the hills, or in the areas close to the Tiber.⁴⁶ When the river overflowed, as it frequently did,⁴⁷ swirling flood-water might scour out and undermine foundations, or mud brick walls might become saturated and collapse.⁴⁸

Vitruvius "an expert [who] bears testimony to the excellent construction of *insulae*"⁴⁹ explicitly refers to *leges publicae* (2. 8. 17) which prohibited the building of party walls more than 1½' thick, and observes that other walls (*ceteri parietes*) were kept to the same breadth to maximize internal living space. This passage is instructive, since it not only explains one possible cause of structural collapse due to the inadequacy of load-bearing walls on the lower floors of apartment blocks, but also reveals the somewhat lackadaisical attitude of Roman officialdom towards the establishment of responsible and effective building codes.⁵⁰ A law which lays down the maximum width of party walls, but which ignores the minimum thickness of freestanding, load-bearing external walls, is clearly likely to be open to abuse by speculators keen to save money on materials and increase rental revenues by letting the greatest available floor space to the largest possible number of tenants. Under such conditions overcrowding might become a contributing cause of structural failure.^{50a}

Other Roman building laws give the impression of evincing some concern for the structural safety of *insulae*. The most important is the height restriction of 70 Roman feet⁵¹ established by Augustus. Yet subsequent reiteration of this and the few other laws⁵² affecting the maintenance of dwellings suggests that they were largely ignored by property owners. The state lacked the machinery to enforce the observance of its rudimentary building regulations, and poverty-stricken *inquilini* would be reluctant to prosecute delinquent landlords⁵³ who regarded the collapse of rental properties with complete indifference for the fates of their tenants.⁵⁴ Lacking both the financial

⁴⁶ After the building of the Domus Flavia on the Palatine, the rich moved to the Caelian, Aventine, and Quirinal hills. The Pincian was also noted for its sumptuous villas and *horti*. The poor were crowded into low-lying, inner-city areas: the Subura, Argiletum and Velabrum. Transtiberim, the Janiculum excepted, was a poor district; Lavedan (above n. 15) 323; Homo (above n. 13) 477-485; J. P. Poe, The Septizonium and the Subura, in: TAPA 108 [1978], 147-154; J. C. Anderson, Domitian, the Argiletum and the Temple of Peace, in: AJA 86 [1982], 101-103.

⁴⁷ For a list of the main inundations, see G. Lugli, Monumenti antichi di Roma e suburbio vol. 2, Bardi 1934, 231f.

⁴⁸ Dio 39. 61. 1-2 gives such an account during a flood in B. C. 54.

⁴⁹ P. Harsh, The Origins of the *Insulae* at Ostia, in: MAAR 12 [1935], 11 n. 2; cf. G. Calza, La preminenza dell'insula nella edilizia romana, in: Monumenti Antichi 23 [1914], 558.

⁵⁰ For the meagre corpus of Roman building laws, see Yavetz, in: Latomus 17 [1958], 512f.; Frier (above n. 20) 36.

^{50a} "Overcrowding is one reason why houses frequently fall down" (sc. in Cairo): The Economist, Dec. 25, 1982, p. 54.

⁵¹ This limit was evidently determined without proper considerations for the height of the buildings in relation to the width of the streets. In this case the result would be in many cases unsatisfactory ventilation and insufficient light at street level: « Le rapport H: L [hauteur: largeur] ... choquera évidemment tout urbaniste moderne »; Lavedan (above n. 15) 461.

⁵² Cf. the frequent repetition of the prohibition against unroofing, dismantling, or demolishing urban dwellings *negotiandi causa*. The provision is found in the town charters of Tarentum, Urso, and Malaca; Homo (above n. 13) 537-544; F. Haverfield, Ancient Town Planning, Oxford 1913, 137-139.

⁵³ P. Garnsey, Social Status and Legal Privilege in the Roman Empire, Oxford 1970, 99.

⁵⁴ Cicero, Ad Att. 14. 9. 1; *inquilini* could abandon a building without risk of prosecution

and political resources requisite for redress,⁵⁵ the *plebs urbana* must have considered the risk of *ruina* as much a part of life in the capital as the dangers of fire and flood. All available evidence about accommodation at Rome reveals a massive degree of indifference on the part of the state towards the housing needs of its indigent masses.⁵⁶ A reflection of this indifference comes from the statement of Gaius in the *Digest* (50. 16. 234. 2) that subsistence was thought to refer only to food, though others considered it also comprised clothing and straw, *sine his enim vivere neminem posse*. From this it is clear that shelter was not considered an essential part of the legal concept of subsistence in the Roman world.⁵⁷

However, it must not be assumed that all *insulae* at Rome were structurally unsound. Such an assumption would be as false as a belief based on Vitruvius' claim that *insularii* were comfortably housed and had agreeable views of the city,⁵⁸ a reflection surely of the architect's will to flatter Augustus rather than a statement of his personal views of residential tower blocks at Rome.

Packer's thorough study of the only "almost intact" *insula* at Rome, the Casa di via Giulio Romano⁵⁹, suggests that all the inhabitants of this Trajanic building, from its ground floor shops to its fourth floor cubicles, must have experienced a wide range of discomforts and anxieties frequently alluded to by Martial and Juvenal;⁶⁰ but a fear of *ruina* is not likely to have been one of them, since this *insula* was built of brick-faced concrete, and concrete vaults are in evidence on all of its surviving floors.⁶¹ In this respect, then, the building does *not* conform to the satirical stereotype depicted by Juvenal in Sat. 3. 190ff. As the building backs directly on to and abuts the living rock of the Capitoline, it gained extra stability, though in this case the benefit of additional support was offset by the seepage of moisture through the rear walls which were not fitted with double walls or *tegulae mammatae*.⁶² On the fourth floor the rear access corridor would have acted as a protective damp course, but such an arrangement is not found on the other floors. It is also noteworthy that the building measures c. 22 m. from its base to the top of its highest surviving floor⁶³ thus exceeding both the Augustan and the Trajanic height limits (20.65 m and 17.70 m respectively). At

by a landlord for loss of rent, if their fears of *ruina* were justifiable; see Frier (above n. 18) 99f.

⁵⁵ See Thompson, On Development and Underdevelopment (above n. 2) 390f.

⁵⁶ Cf. R. C. Fried, Planning the Eternal City, London 1973, 166; Gutkind (above n. 15) 56f.

⁵⁷ The *hortulanus* in Apuleius, Met. 9. 31 lives below even this level of subsistence: *prae nimia paupertate ne sibi quidem, nedum mihi posset stramen aliquod vel exiguum tegimen parare*; according to Sallust, Cat. 48. 2. the *plebs* had nothing beyond their food and clothing; G. E. M. de Ste Croix, The Class Struggle in the Ancient Greek World, London 1981, 372.

⁵⁸ 2. 8. 17.

⁵⁹ Bullettino Commissione 81 [1968/1969], 127-148.

⁶⁰ Ibid. 147 n. 54.

⁶¹ The outer walls on the ground floor are c. 3 Roman feet thick, reducing to c. 2' (or less) on the fourth. The masonry dividing walls, c. 0.36 m thick, rest on vaulted ceilings; Harsh, in: MAAR 12 [1935], 26 n. 4, 28 n. 2. Frier (above n. 18) 14 dates the building to c. A. D. 100.

⁶² Vitruvius' solution of a double wall (7. 4. 1-2) is nowhere found at Pompeii (Mygind 298); on *tegulae mammatae*, see G. Brodrick, *Tegulae Mammatae*, in: Antiquaries Journal 59 [1979], 400.

⁶³ Packer (above n. 59) 131 fig. 2.

least 2 more metres m that there was another

The Ostian evidence of structural soundness, but Ostia should not be undervalued and even after the fire experienced at Ostia the structural soundness of the Ostian literary tradition strongly suggests that though they appear to be however, that because of strains and stresses in velocity) structural soundness and prestigious buildings buttressing not long Casa dei Triclini (I. x

III Sanitation

Townsend's second book on housing facilities") will in Roman houses and sanitation (i.e., the difference to some basic modern

"The improper disposal threatening the health systems are not available producing organisms (persons ... Knowing dysentery, infectious found in excreta, it is likely to be contaminated, but Therefore, the mere existence of the stage for possible when 1) It will not be the ground, or be exposed not contaminate any hazard by being accessible carriers that may cause

⁶⁴ Harsh (above n. 61)

⁶⁵ J. E. Packer, The Insulae (above n. 39) 239.

⁶⁶ MacDonald (above n. 61)

⁶⁷ Harsh (above n. 61)

⁶⁸ J. A. Salvato, Environs

must have considered dangers of fire and flood. There is a massive degree of fire in its indigent masses.⁵⁶ Gaius in the *Digest* on food, though others *vivere neminem posse*. The material part of the legal

were structurally undermined on Vitruvius' claims of the city,⁵⁸ a reflection of a statement of his

at Rome, the Casa di Trajanic building, from experienced a wide range of Juvenal;⁶⁰ but a fear *ula* was built of brick-*s* surviving floors.⁶¹ In the stereotyped depicted to and abuts the living his case the benefit of the rear walls which the fourth floor the rear, but such an arrangement the building measures thus exceeding both 70 m respectively). At

ifiable; see Frier (above

ve n. 2) 390f.

; Gutkind (above n. 15)

level of subsistence: *prae quod vel exiguum tegimen* beyond their food and in the Greek World, London

ck, reducing to c. 2' (or rest on vaulted ceilings; 14 dates the building to

and at Pompeii (Mygind *matae*, in: *Antiquaries*

least 2 more metres may be added to the already given total height, since it is likely that there was another floor above the highest surviving level.⁶⁴

The Ostian evidence shows that *insulae* there were generally of an adequate structural soundness, but it is also acknowledged that conclusions made about housing at Ostia should not be uncritically applied to Rome⁶⁵ which was larger, more congested, and even after the fire of A.D. 64, did not undergo the type of radical redevelopment experienced at Ostia in the reigns of Claudius, Trajan, and Hadrian. Despite the structural soundness of the via Giulio Romano *insula*, the persistence of an unfavourable literary tradition about Roman *insulae* from Cicero to the end of the empire, strongly suggests that jerry-built multiple dwellings were the norm at Rome, even though they appear to have been the exception at Ostia. It must be remembered, however, that because Roman architects were incapable of exactly calculating the strains and stresses in any given structure (just as Roman engineers could not measure velocity) structural soundness could not be guaranteed even for the most expensive and prestigious buildings. Thus the *basilica* of Domitian's palace required considerable buttressing not long after its construction,⁶⁶ as did the main vaulted room in the *Casa dei Triclini* (I. xii. 1) at Ostia.⁶⁷

III Sanitation

Townsend's second broad indicator of substandard accommodation ("inadequate housing facilities") will be examined in relation to evidence for sanitation and hygiene in Roman houses and cities. To help in distinguishing adequate from inadequate sanitation (i.e., the disposal of human and other wastes), it would be helpful to refer to some basic modern criteria. These are succinctly given by Salvato:⁶⁸

"The improper disposal of human excreta and sewage is one of the major factors threatening the health and comfort of individuals in areas where satisfactory sewage systems are not available. This is so because very large numbers of different disease producing organisms can be found in the fecal discharges of ill and apparently healthy persons . . . Knowing that organisms causing various types of diarrhea, bacillary dysentery, infectious hepatitis, salmonella infection, and many other illnesses are found in excreta, it becomes obvious that all sewage should be considered presumptively contaminated, beyond any reasonable doubt, with disease producing organisms. . . Therefore, the mere exposure of sewage, or its improper disposal, immediately sets the stage for possible disease transmission . . . Sewage is satisfactorily disposed of when 1) It will not be accessible to children or household pets, pollute the surface of the ground, or be exposed to the atmosphere when inadequately treated. 2) It will not contaminate any drinking water supply. 3) It will not give rise to a public health hazard by being accessible to insects, rodents, pets, or other possible mechanical carriers that may come in contact with food or drinking water. 4) It will not give

⁶⁴ Harsh (above n. 61) 26 n. 4.

⁶⁵ J. E. Packer, *The Insulae of Imperial Ostia*, Rome 1971, 78; Meiggs, *Trees and Timber* (above n. 39) 239.

⁶⁶ MacDonald (above n. 17) 60.

⁶⁷ Harsh (above n. 61) 23.

⁶⁸ J. A. Salvato, *Environmental Sanitation*, New York 1958, 186f.

rise to a nuisance due to odor or unsightly appearance. 5) It will not pollute or contaminate the waters of any bathing beach, shell-fish breeding ground, or stream used for public, domestic water supply, or recreational purposes. 6) It will not violate laws or regulations governing water pollution or sewage disposal."

Literary evidence concerning sewers and latrines in the Roman world is extremely meagre. Vitruvius, as already noted (p. 400f.) maintains a discreet silence. Frontinus merely observes that the overflow (*aqua caduca/otiosa*) of Rome's fountains (*salientes*) and public basins (*lacus*) flushed the city's sewers.⁶⁹ Agricultural writers make brief references to the use of human excrement as a supplement to animal fertilizers.⁷⁰ There are a few other references to the cleansing of sewers by convict labour,⁷¹ and to those who profited from running public latrines (*foricae*),⁷² to the fullers' terracotta jars placed in the streets for the public to use as urinals,⁷³ and to Vespasian's tax on urine.⁷⁴ However, though some of these brief allusions⁷⁵ are useful, there is nowhere extant a description of either a public or private Roman latrine, and no account of their administration.

Legal texts are also exiguous. The *lex Julia municipalis* (66f.) (CIL 12. 593) states that *plostra stercoris*⁷⁶ *exportandei causa* were permitted to enter Rome during the daytime when most wheeled traffic was prohibited. Ulpian (Dig. 43. 23. 1-2) reports a praetor's edict which states that sewers were to be kept clean and in a good state of repair *quorum utrumque et ad salubritatem civitatum et ad tutelam pertinet: nam et caelum pestilens*⁷⁷ *et ruinas minantur immunditiae cloacarum* (43. 23. 1. 2). While it is easy to understand that clogged sewers will create a fetid atmosphere, it is not immediately evident why they would be likely to cause the collapse of buildings.⁷⁸ However, a major blockage in a large collector such as the Cloaca Maxima which in winter must have conducted large volumes of marsh and storm water into the Tiber, could have caused floods with consequent scouring out of foundations and the dissolving of mud-brick structures.

The edict also distinguishes between public sewers maintained by the state, and private sewers the upkeep of which was the responsibility of individual property owners who according to Dig. 43. 23. 1. 9 had the right to connect a private to a public

sewer without hindrance, (Dig. 43. 23. 2).

It seems, then, that the dwelling to a public street the owner had to meet. Roman law is silent on it and how they were to be the intramural burial of animal wastes within the dumped within the city.

Currently available evidence indicates that very few reports of his own excavations discovered . . . I have never seen streets through which the which conducted excess street; less frequently through the streets.⁸¹ With one exception into the street were not found houses latrines connected improvised as in VII. iv. into the *cloaca* of the via

On the other hand, although or partly separated from usually unlit and lacking these latrines, with the poet Wedding, was flushed by dug into the porous lava-porous rock allowed fluid excavated from the cessp

Mygind assumes that they were *cellae familiaricae*,

⁶⁹ De aquis 2. 111; T. Ashby, *The Aqueducts of Ancient Rome*, Oxford 1935, 46; (above n. 25) 46.

⁷⁰ Columella 10, 84f.; 11. 3. 12.

⁷¹ Pliny, Ep. 10. 32. 2.

⁷² Juvenal 3. 38.

⁷³ Martial 6. 93. 1; Macrobius, Sat. 3. 16. 15.

⁷⁴ Suet., Vesp. 23. 3.

⁷⁵ These are collected and very briefly discussed by Thédénat in his article "Latrina" in *Daremberg-Saglio* 3. 2, 987-991.

⁷⁶ M. G. Morgan, Glaucia and Metellus, in: *Athenaeum* 52 [1974], 318 n. 19 shows that contrary to Pöhlmann and Friedländer [=Drexel], *stercus* here does not necessarily mean "refuse" rather than "excrement". E. G. Hardy, *Roman Laws and Charters*, Oxford 1912, 153 opts for "refuse"; Homo (above n. 13) 256 has it both ways: «ordures et débris variés».

⁷⁷ Cf. Pliny, Ep. 10. 98 and 99 (Trajan's reply) on an open sewer (a river clogged with sewage) at Amastris.

⁷⁸ Pliny, NH 36. 24. 106 boasts that Rome's sewers were so well constructed that they were not damaged by buildings which collapsed of their own accord or through fire (*pulsant ruinae sponte praecipites aut inpactae incendiis*).

⁷⁹ M. J. Le Gall, *La sépulture Antiquaires de France* 19

⁸⁰ Above n. 10, 31; confirmed 127; misrepresented by Disposal, and Water-Supply [1929], 894 where it is said Daro (Indus valley) almost connected to a sanitary sewer. Water Pollution Control discussion of M-D., see (esp. p. 28).

⁸¹ Mygind 268f.

⁸² W. F. Jashemski, in: *AJA* at I. xx. 5 emptied into a

⁸³ Mygind 275.

⁸⁴ Mygind 309, 314, 315f.

⁸⁵ Mygind 318f.

sewer without hindrance, on receiving permission from the *curatores viarum publicarum* (Dig. 43. 23. 2).

It seems, then, that there was no legal obligation for a home-owner to connect his dwelling to a public street sewer. Such a connection was optional, and it seems that the owner had to meet all the expenses resulting from such an operation. Extant Roman law is silent on the question of where domestic latrines were to be situated and how they were to be constructed. The Romans were legally more concerned about the intramural burial of the dead⁷⁹ than they were about the disposal of human and animal wastes within the city, though, as will be seen, corpses seem to have been dumped within the city.

Currently available archaeological evidence from Pompeii, Ostia, and Rome indicates that very few dwellings were directly connected to street drains. Lanciani reports of his own excavations at Rome: "In the many hundred of antique drains discovered . . . I have never seen a sign of communication with the houses lining the streets through which the drains passed."⁸⁰ At Pompeii almost every house had a drain which conducted excess water from the *impluvium* or peristyle to the surface of the street; less frequently these drains also conducted dirty water from kitchens on to the streets.⁸¹ With one exception (VII. vii. 28), drains leading directly from a latrine into the street were not found by Mygind, and only exceptionally did he find in private houses latrines connected to sewers.⁸² In some cases the connections were crudely improvised as in VII. iv. 7 where a large hole in the floor of the shop leads directly into the *cloaca* of the *via dell'Abbondanza*.⁸³

On the other hand, almost every house at Pompeii had a latrine situated either in or partly separated from the kitchen, or in a separate, very small, doorless room, usually unlit and lacking adequate ventilation through an outside window. None of these latrines, with the possible exception of a large latrine in the House of the Silver Wedding, was flushed by water. All consisted of pits (*sterquilinia*) of varying depths dug into the porous lava-mass directly beneath or not far from the latrine itself. The porous rock allowed fluids to drain away, but solids would periodically have to be excavated from the cesspit, if the latrine was to remain in use.⁸⁴

Mygind assumes that both kitchen-latrines and cesspits in separate small rooms were *cellae familiaricae*, used only by household staff,⁸⁵ whereas *domini* and their

⁷⁹ M. J. Le Gall, *La sépulture des pauvres à Rome*, in: *Bulletin de la Société Nationale des Antiquaires de France* 1980/1981, 148.

⁸⁰ Above n. 10, 31; confirmed by Platner-Ashby, *A Topographical Dictionary* (above n. 6) 127; misrepresented by F. H. Garrison, *The History of Drainage, Irrigation, Sewage-Disposal, and Water-Supply*, in: *Bulletin of the New York Academy of Medicine* 5 [1929], 894 where it is said *excreta* from *insulae* were piped into sewers. At Mohenjodaro (Indus valley) almost every house had a bathroom and a water flushed latrine connected to a sanitary sewer system; C. Webster, *The Sewers of M.-J.*, in: *Journal of the Water Pollution Control Federation* (hereafter JWPCF) 34 [1962], 118f.; for general discussion of M.-D., see M. Wheeler, *The Indus Civilization*, Cambridge 1960, 29-44 (esp. p. 28).

⁸¹ Mygind 268f.

⁸² W. F. Jashemski, in: *AJA* 81 [1977], 217f. and n. 5 notes that wastes from upstairs rooms at I. xx. 5 emptied into a sewer under the *via Nuceria*.

⁸³ Mygind 275.

⁸⁴ Mygind 309, 314, 315f.

⁸⁵ Mygind 318f.

guests employed a variety of portable receptacles (*matellae, lasana, sellae pertusae*) which slaves would eventually empty into the house latrine. This cannot be accepted as anything more than an assumption, since it appears to depend on a passage in Petronius where Trimalchio grants his table companions the opportunity to relieve themselves in his dining room (Satyr. 47. 5). However, an examination of the full context strongly suggests that Trimalchio authorizes his guests only to urinate, not defecate in the *triclinium*: *vel si quid plus venit, omnia foras parata sunt: aqua, lasani et cetera minutalia*.

Trimalchio's *familia* includes slaves one of whose tasks is to handle *matellae*. At the very opening of the *Cena* Petronius portrays Trimalchio playing a ball game which he does not interrupt when a eunuch applies a silver chamberpot to him (Satyr. 27. 3 and 5). After relieving himself, he asks for water, sprinkles it on his hands, and then wipes his fingers on the hair of another slave, presumably a *capillatus*. Since the narrator introduces these events as novelties (*res novas*), it is difficult to know whether Trimalchio's behaviour would have been regarded as socially acceptable. It is quite possible that the novelty of the situation is not that a eunuch⁸⁶ is serving his master with a silver *matella*, but that he is performing this service outside while Trimalchio is engaged in a game.

Yet whatever the interpretation placed on the above passage, it hardly constitutes proof that high-status Romans did not use latrines in their own houses. Trimalchio's words *omnia foras parata sunt* are best taken to refer to a domestic latrine.

It hardly requires emphasis that such practices were extremely unhygienic.⁸⁷ Internal cesspits even when emptied at regular intervals, would be constant sources of major infections and offensive smells. To site a cesspit in a kitchen would have the practical advantage of enabling cooks to dispose of kitchen fluids and garbage without physical inconvenience,⁸⁸ but the risk of food contamination in such combined kitchen/latrine areas must have been very high indeed. A similar combination of rooms was noted by Wikan in slum housing in Cairo where the kitchen "is always next door to the lavatory, and the door to the lavatory is usually in the kitchen. As a result the kitchen is the one place in the flat which is really pervaded by the stench from the lavatory. The lavatory itself is a room of about one metre square with a hole in the floor for waste . . . There is no ventilation and it is a favourite haunt of cockroaches."⁸⁹ A Roman would have found such an arrangement quite familiar.

Latrines at Pompeii are for the most part not provided with running water or washing facilities of any kind.⁹⁰ Toilet paper was not apparently a standard item in

⁸⁶ Cf. Mart. 3. 82. 15–17: *digiti crepantis signa novit eunuchus | et delicatae sciscitator urinae | domini bibentis ebrium regit penem*. For *matellae* made from various, precious substances, see P. Howell, A Commentary on Book I of the Epigrams of Martial, London 1980, 185f.

⁸⁷ J. Scarborough, Roman Medicine, London 1969, 78 seems to find such an arrangement satisfactory.

⁸⁸ The gutter which conducted fluids from the kitchen into the cesspit was called *trua*; Varro LL 5. 25. 118; according to Mygind 313 if wood ash from the stove were thrown into the cesspit it would help to neutralize the smell of the latter, but according to R. Stone, The Shaoyang, China, Night Soil Fertilizer Reclamation Plant, in: Sewage Works Journal 21 [1949], 993 the result of such a combination would be the generation of free ammonia.

⁸⁹ U. Wikan, Life among the Poor in Cairo, London 1980, 20.

⁹⁰ W. F. Jashemski, The Gardens of Pompeii, New York 1979, 53f. found evidence of piped water in latrines associated with baths in the houses of the Centenary, and Julia Felix.

Roman latrines, though Caesius suggests that it was not entirely performed the function of a latrine in Seneca (Ep. 70. 20) who retires to a latrine where, *t adhaerente spongia positum elisit. Hoc fuit morti contumeliosum quid est stultius quam fas spongiae virgae*. The hygienic dubious. In many public latrines at the base of the seats.⁹¹ It is which people rinsed out so as nothing but conjecture, it failed to enter the aperture.

The cesspit/latrine typically established as a Roman set ground "sewage system",⁹² The usual arrangement at water storage at one end of stone at the other. The plan avoiding, or minimizing the Many of the cesspits were dens.⁹⁴ In these cases seeping the position of cesspits discussed by Mygind and cisterns are often provided the streets, and kitchen/la-

The evidence of Cosa and the Romans adopted stances within atrium-type dwellings channelling excess cistern evidence for the discharge

At this point it would *Digest*⁹⁷ it was legally permitted to public *cloacae*. The evidence has been well worth the consequent archaeological evidence since

⁹¹ See for example the plan of the *agora* at Athens, provided 1968, fig. 40; cf. also the *Tunis* n. d., 97.

⁹² J. Bennett, Towns in Roman

⁹³ F. E. Brown, Cosa, The

⁹⁴ Brown (above n. 93) 64.

⁹⁶ Ibid. In the house of Q. nected by a doorway (fi appears to be furnished

⁹⁷ See above p. 408f.

na, sellae pertusae) cannot be accepted and on a passage in opportunity to relieve ination of the full only to urinate, not a sunt: aqua, lasani

idle matellae. At the ball game which he to him (Satyr. 27. 3 his hands, and then apillatus. Since the ult to know whether ceptable. It is quite s serving his master de while Trimalchio

it hardly constitutes houses. Trimalchio's tic latrine.

unhygienic.⁸⁷ Inter-constant sources of then would have the and garbage without a in such combined combination of rooms "is always next door chen. As a result the the stench from the re with a hole in the nt of cockroaches."⁸⁹

th running water or ly a standard item in

catae sciscitator urinae | is, precious substances, ial, London 1980, 185f. d such an arrangement

esspit was called trua; the stove were thrown er, but according to R. lant, in: Sewage Works e the generation of free

found evidence of piped enary, and Julia Felix.

Roman latrines, though Catullus' reference to the *annales Volusi* as *cacata carta* (36.1), suggests that it was not entirely absent. For the Romans a sponge on the end of a stick performed the function of modern toilet paper. The main evidence for this is a passage in Seneca (Ep. 70. 20) where a German *bestiarius* at a gladiatorial training school retires to a latrine where, to quote Seneca, *Ibi lignum id, quod ad emundanda obscena adhaerente spongia positum est, totum in gulam farsit et interclusis faucibus spiritum elisit. Hoc fuit morti contumeliam facere. Ita prorsus; parum munde et parum decenter; quid est stultius quam fastidiose mori?* Martial (12. 48. 7) also refers to *damnatae spongiae virgae*. The hygienic implications of using such an implement are again at best dubious. In many public latrines (*foricae*) a continuous shallow gutter is often found at the base of the seats.⁹¹ It has been assumed that this gutter was filled with water in which people rinsed out soiled sponges.⁹² However, this explanation can be regarded as nothing but conjecture, since these gutters might have served to collect urine which failed to enter the aperture in the face of each latrine seat.

The cesspit/latrine typical of Pompeian houses is also found in houses at Cosa, established as a Roman settlement in BC 273. The town was provided with an underground "sewage system",⁹³ to which it seems domestic latrines were not connected. The usual arrangement at Cosa was for houses to have an underground cistern for water storage at one end of the house and a cesspit dug in unplastered fissured limestone at the other. The plastered cistern is often above the level of the cesspit thus avoiding, or minimizing the risk of water contamination through cesspit seepage. Many of the cesspits were at the rear of houses on plots which sloped towards gardens.⁹⁴ In these cases seeping cesspit fluids would have escaped into gardens. At Pompeii the position of cesspits in relation to underground *impluvium* cisterns was not discussed by Mygind and awaits systematic investigation. At Cosa, as at Pompeii, cisterns are often provided with overflow pipes⁹⁵ to conduct excess water directly into the streets, and kitchen/latrines are situated directly above, or very close to cesspits.⁹⁶

The evidence of Cosa and Pompeii shows that from the third century B.C. to A.D. 79 the Romans adopted standard measures for the disposal of human and kitchen wastes within atrium-type dwellings. In both towns the same solutions were adopted for channelling excess cistern water on to city streets. In both towns there is very little evidence for the discharge of wastes into sewers beneath the streets.

At this point it would be useful to try to determine why, when according to the *Digest*⁹⁷ it was legally permitted, so few property-owners connected their dwellings to public *cloacae*. The expense of installing drains would seem at first sight to have been well worth the consequent improvement in hygiene within a property. Yet current archaeological evidence shows very clearly that the inhabitants of Roman towns pre-

⁹¹ See for example the plan of a very large *forica* (65 seats) at the entrance of the Roman *agora* at Athens, provided by M. Lang, *Waterworks in the Athenian Agora*, Princeton 1968, fig. 40; cf. also the latrines at Dougga: A. Mahjoubi, *Les cités romaines de Tunisie*, Tunis n. d., 97.

⁹² J. Bennett, *Towns in Roman Britain*, Aylesbury 1980, 14.

⁹³ F. E. Brown, *Cosa, The Making of a Roman Town*, Ann Arbor 1980, 42.

⁹⁴ Brown (above n. 93) 64 and figs. 80, 83.

⁹⁵ Ibid. figs. 81, 85-87, 89.

⁹⁶ Ibid. In the house of Quintus Fulvius the *culina* and *lavatio* are separate rooms connected by a doorway (fig. 87); cf. the House of the Skeleton (fig. 89) where the *lavatio* appears to be furnished with a drain laid beneath the surface of the street.

⁹⁷ See above p. 408f.

several possible ex-
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 Pliny the Younger,¹⁰⁴
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ich entered a Roman

E. L. Sabine, *Latrines*
 318; for explosions in
 nt, London 1960, 110;

ontrol, in: JWPCF 44

free from this problem;
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wer systems, see Supple-
 Britain combined Roman
 and York; M. Redknap,
 [1976], 288.

roof flushed this latrine
 to the main collector in
 men in Pompeii, Berlin

s sewage system, see G.
 2; cf. also T. R. Forbes,
), *Health, Medicine, and*

sewer daily. Health engineers today estimate that an individual generates c. 70–80 grammes of solid wastes per day.¹⁰⁶ Since this figure is made up of food as well as body wastes, an estimate of c. 50 grammes p.d. might represent more closely the amount of body waste generated by an inhabitant of a Roman city, this lower figure being preferable, since food wastes were unlikely to enter a Roman *cloaca*. Thus a city the size of Rome with a population of c. 800,000–1,000,000 inhabitants in early imperial times¹⁰⁷ would have produced c. 40–50,000 kgs. of body wastes per day. What proportion of this estimated total entered the sewerage network cannot even be guessed. The *Regionaries* give a total of 144¹⁰⁸ *foricae* for Rome in the fourth century, but this figure is of little value, since it is not known how many seats each *forica* contained, nor do we know what proportion of the population used public latrines. The situation is rendered more complicated by the fact that it is not known how many of Rome's *foricae* were connected to the sewage network. So far only two *foricae* have been discovered at Rome, one of Hadrianic date above shops in the Forum Julium¹⁰⁹, the other in the area sacra del largo argentina¹¹⁰, and the drainage systems of both appear not to have been reported. It can only be assumed that at Rome and Ostia where *insulae* greatly outnumbered *domus*, *foricae* would have been more heavily patronised than at Pompeii where even the smallest *tabernae* have latrines.

If the absence of traps might lead to unpleasant odors as well as to creating risks of explosions inside houses, there were at least two other potentially disagreeable consequences. Firstly, in low lying areas of Rome sewers could back up when the level of the Tiber rose. Thus sewage and waste water which normally flowed into the river via the *Cloaca Maxima* (and other sewers) would be forced back into the network, and up any house connections attached to the main collectors. Secondly, vermin in the sewers would be able to enter houses via any sewer connections. An anecdote in Aelian, HA 13. 6 illustrates the danger in a somewhat spectacular manner.¹¹¹

All these reasons singly or collectively would tend to discourage domestic sewer connections. There is, however, a further reason which might have outweighed those already discussed. Inhabitants of western industrialized societies tend to overlook the fact that flush toilets, while being conducive to high levels of hygiene, are extremely wasteful both of fresh water and of substances which are useful as fertilizers. In many pre-industrial societies without access to artificial fertilizers, human excrement is frequently used as a supplement to animal manures.¹¹² That the Romans

¹⁰⁶ Information kindly given by Mr. Ian Gunn, Senior Lecturer, Department of Civil Engineering, University of Auckland.

¹⁰⁷ K. Hopkins, *Conquerors and Slaves*, Cambridge 1978, 98; for other estimates, see G. Hermansen, *The Population of Imperial Rome*, in: *Historia* 27 [1978], 146.

¹⁰⁸ Jordan (above n. 6) 445 n. 67. J. states without proof that the public latrines were connected with the public sewers; he makes a similar claim for latrines in private houses at Rome, a statement contradicted by the findings of Lanciani, and Platner-Ashby (above n. 80).

¹⁰⁹ M. E. Blake, *Roman Construction in Italy from Nero through the Antonines*, Philadelphia 1973, 18f., pl. I fig. 2.

¹¹⁰ E. Nash, *A Pictorial Dictionary of Ancient Rome* vol. 1, London 1961, pl. 159; M. E. Blake, *Ancient Roman Construction*, in: *Italy from the Prehistoric Period to Augustus*, Philadelphia 1947, 135f., 149f.

¹¹¹ In this case an octopus swims up a house drain each night from the sea to eat pickled fish stored in the house by Iberian merchants.

¹¹² R. H. Thomas, *Wastewater Systems for Taipei*, in: JWPCF 44 [1972], 1611; R. Stone,

used human feces for agricultural purposes is well attested.¹¹³ It is probable that those who emptied cesspits (*stercorarii*) sold their contents to farmers on city outskirts. At Pompeii in cases where cesspits are only deep enough to house a large amphora or *dolium*,¹¹⁴ the vessel when full would probably have been removed by a *stercorarius* and replaced with an empty jar. The references in the *lex Julia municipalis* and the *Digest* to sewage waggons are to be set in this context.¹¹⁵ A few houses at Pompeii have a drain leading from the latrine directly into a garden, but such an arrangement is rare and must have created a permanent stench in the gardens of the houses concerned.¹¹⁶

Thus the domestic cesspit without sewer connections not only benefitted Roman agriculture but also provided a group of unskilled workers in the towns with work which was a source of regular pay,¹¹⁷ even though the work must have involved a high health risk. It seems, then, that *stercorarii* performed the same functions in Roman towns as *koprologoi* at Athens who, according to a recent writer,¹¹⁸ were not public slaves, but private entrepreneurs.

The collection and use of urine by fullers for mordanting certain dyestuffs¹¹⁹ reveals another area of private enterprise in the disposal and commercial exploitation of human wastes in Roman cities. However, the system of collecting urine was not hygienic since the terracotta jars placed in streets and alleyways were unglazed and porous, and sometimes cracked jars burst, spilling their malodorous contents into the streets.¹²⁰ Other methods of collection were both less public and more hygienic; for example, at the Baths of Mithras at Ostia a lead pipe from a urinal ducted fluids directly into a *fullonica* situated in the basement of the baths.¹²¹ However, this arrangement does not seem to have been attested elsewhere.

Insulae at Ostia were sometimes provided with communal ground-floor latrines. No detailed study of these amenities has yet been published, but some details may be gleaned from Packer's monograph on Ostian *insulae*.¹²² Of all the buildings discussed by Packer, only 16 contained positively identified latrines: Reg. I: ii.5; iii. 3, 4; vi. 1; vii. 1; xi. 2, 3; xii. 1. Reg. II: iv. 3; v. 1. Reg. III: i. 9; v. 1; vii. 5; x. 1; xii. 1, 2.

The Shaoyang, China, Night Soil Fertilizer Reclamation Plant, in: *Sewage Works Journal* 21 [1949], 992.

¹¹³ Varro, *RR* 1. 13. 4; Columella 1. 6. 24; 10. 84f.; 11. 3. 12; K. D. White, *Roman Farming*, London 1970, 126, 136f.; Brunt, in: *JRS* 62 [1972], 157f.; J. K. Evans, in: *CQ* 31 [1981], 434.

¹¹⁴ Mygind 319.

¹¹⁵ Above n. 76; Ulpian, *Dig.* 33. 7. 12. 10 *plaustra quibus stercus evehatur*; according to Paulus, *Dig.* 22. 1. 17. 5 the *foricarii* paid a tax to the fisco.

¹¹⁶ House of the Silver Wedding; Mygind 315; White (above n. 113) 433.

¹¹⁷ A recent graffito from Herculaneum records the payment of eleven asses for the removal of ordure: *exempta | ste(r)cora a(ssibus) XI*; K. Schubring, *Epigraphisches aus kampanischen Städten*, in: *Hermes* 90 [1962], 243 n. 3.

¹¹⁸ E. J. Owens, *The Koprologoi at Athens in the Fifth and Fourth Centuries B. C.*, in: *CQ* 33 [1983], 48f.; cf. C. Vatin, *Jardins et services de voirie*, in: *BCH* 100 [1976], 559 for such entrepreneurs at Thasos.

¹¹⁹ P. C. G. Isaac, *Roman Public Works Engineering*, in: *Bulletins of the Department of Civil Engineering, Univ. of Durham*, No. 13, 1958 (repr. 1960), 11.

¹²⁰ *Mart.* 6. 93. 1f.; for urine jars in Ostia, see Meiggs 143.

¹²¹ I. Nielsen-T. Schioeler, *The Water System in the Baths of Mithras at Ostia*, in: *Analecta Romana* 9 [1980], 155f.

¹²² *The Insulae of Imperial Ostia*, Rome 1971.

Reg. V: ii. 8; iii. 3; iii connected to street sewer. reported latrine is in I seater latrine. The revolving doors which g reported by Packer co seem, therefore, to ha were situated in *subsc* ment that "in the tal from the upper floors" in III. v. 1 where an u latrine. Nor does Pack zation that "small dr which ran in a gentle

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¹²³ *Maritimae, Neptune baths*; D. Krencker *Die Stabianer Therm* E. Brödner, *Die rör* 116–118 (*Abortanla* sites: J. B. Ward-Pe fig. 267 (*Cuicul*) whe 8-seater in the Hous Lemée, *Maisons à m* 208f.; for latrines at t vice des Antiquités d been found in houses Rome in Africa, Lon Toynbee–R. Fraser, 172, pl. XLd, 188.

¹²⁴ J. Carcopino, *Le dro Antiq. de France* 77 one inside the town r

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of Mithras at Ostia, in:

Reg. V: ii. 8; iii. 3; iii. 4. No details are given as to whether these latrines were connected to street sewers, or, as at Pompeii and Cosa, emptied into cesspits. The largest reported latrine is in I. xii. 1 where two ground floor shops were converted into one 21 seater latrine. The room preserves traces of a basin situated between the two revolving doors which gave entry to the latrine from the street. Only one other latrine reported by Packer contained a basin (III. vii. 5). Washing facilities in Ostian latrines seem, therefore, to have been as rare as they were at Pompeii. Five Ostian latrines were situated in *subscalaria*: I. vi. 1; vii. 1; xi. 2; xii. 2, 3. Contrary to Meiggs' statement that "in the tall buildings large pipes were provided to carry down the waste from the upper floors" (p. 143), Packer found only one example of such an arrangement in III. v. 1 where an upstairs latrine was connected by a pipe to a downstairs kitchen/latrine. Nor does Packer report any evidence to corroborate Meiggs' further generalization that "small drains led from the blocks to the main drains under the streets, which ran in a gentle slope to the river" (p. 143).

Ostia seems to have lacked Pompeii's generous distribution of private latrines. A reason for this is the preponderance of *insulae* at Ostia which are not all provided with latrines. It is possible also that Ostia's higher water table would have made cesspits of any great depth impracticable. Further research on the drainage systems of the latrines recorded by Packer is essential before any certainty on the subject can be attained. It must also be assumed, as Meiggs does, that the lack of private latrines led to high usage of Ostia's 3 *foricae* as well as of those attached to *thermae* which were accessible to all members of the public, not merely to bathers. As yet 3 *foricae* along with the latrines of the town's 3 *thermae*¹²³ can hardly be regarded as a "very generous supply of public accommodation" (Meiggs p. 586) for a population of c. 20,000 inhabitants. Two dungheaps, one next to the E. gate, the other in the city centre, discovered during the excavations of 1910 and 1920,¹²⁴ suggest other solutions to the shortage of public latrines.

Evidence for the existence of private latrines at Rome is all but non-existent. There is no trace of latrines in the Casa di via Giulio Romano, but it would be hazardous to suppose from this that all Roman *insulae* lacked latrines. The Domus Transitoria had a very large latrine (60-seater), once thought to be "the machinery chamber of a

¹²³ Maritimae, Neptune, Forum. Such latrines were commonly situated in Roman public baths; D. Krencker, *Die Trierer Kaiserthermen*, Augsburg 1929, 185; Eschebach, *Die Stabianer Thermen* (above n. 103) 36f. (the earliest attested of such combinations); E. Brödner, *Die römischen Thermen und das antike Badewesen*, Darmstadt 1983, 116–118 (Abortanlagen). These latrines are particularly well preserved in N. African sites: J. B. Ward-Perkins, *Roman Imperial Architecture*, Harmondsworth 1981, 399, fig. 267 (Cuicul) where latrines have been found in only 3 houses. One of these, an 8-seater in the House of Amphitrite is connected with the street sewer; M. Blanchard-Lemée, *Maisons à mosaïques du quartier centrale de Djemila (Cicul)*, Paris 1971, 108, 208f.; for latrines at the *thermae* of Volubilis, see R. Thouvenot, in: *Publications du Service des Antiquités du Maroc* 11 [1954], 53 who records that no latrines or kitchens have been found in houses at Banasa which lacks street drains. For Madauros, see S. Raven, *Rome in Africa*, London 1969, 90. Leptis (hunting-baths): J. B. Ward-Perkins—J. M. C. Toynbee—R. Fraser, *The Hunting Baths at Leptis Magna*, in: *Archaeologia* 93 [1949], 172, pl. XLd, 188.

¹²⁴ J. Carcopino, *Le droit romain d'exposition des enfants*, in: *Mém. de la soc. nat. des Antiq. de France* 77 [1928], 75f.; Mygind 289 f. refers to 3 refuse heaps at Pompeii, one inside the town near the Porta di Ercolano, two just outside the Porta Stabiana.