XVIII.—The Overgrazing of Ranch-Lands in Ancient Italy

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This article is summarized in section VI.

Most of the great sheep and cattle raising countries of our time have had to contend with the growing evils of overgrazing and erosion. The governments of South Africa and Australia have for years been making studies and taking energetic measures to combat something they regard as the greatest menace to the prosperity and very existence of their countries.[1] In our own country, the problem of conserving the range and water resources of the Western States has confronted every administration since the time of Gifford Pinchot and Theodore Roosevelt. The urgency of the problem today may be measured by the flood of books, pamphlets, and magazine articles recently coming off the nation's press.[2] The reading of some of these has suggested to me the probability that the spectacular decline of the greatest grazing areas of the ancient world — southern Italy and Etruria — was to a large extent brought about by overpasturage. There seems to me good reason to doubt the validity of the current explanation of the economic decay of those two regions. To think with Strabo and Toynbee that the shock of Hannibal's invasion was a knockout blow from which southern Italy has not to this day recovered is a case of oversimpli-

[1] The Government of the Union of South Africa has sponsored studies and projects for the purpose of checking the deterioration and erosion of pastures. See T. D. Hall, "South African Pastures: Retrospective and Prospective," *South African Journal of Science*, 31 (1934) 59–97; G. V. Jacks and R. O. Whyte, *Vanishing Lands* (New York, 1939) 152, 278–297; H. H. Bennett, *Soil Conservation* (New York and London, 1939) 922–925. On similar studies and projects carried out under the auspices of the Government of Australia, see Jacks and Whyte 66 ff.; Bennett 932-937.

[2] On the subject of erosion of pasture lands, in addition to the works cited in note 1, see also the following: Paul B. Sears, *Deserts on the March* (University of Oklahoma Press, 1935); Jean-Paul Harroy, *Afrique, Terre qui Meurt* (Brussels, 1944); W. R. van Dersal, *The American Land* (Oxford University Press, 1943) 150 ff.; F. Osborn, *Our Plundered Planet* (Boston, 1948); W. Vogt, *Road to Survival* (New York, 1948); Bernard DeVoto, "The West Against Itself," *Harper's Magazine* (Jan. 1947); L. Velie, "They Kicked Us Off Our Land," *Collier's* (July–August 1947); Stewart Chase, *Rich Land, Poor Land* (New York, 1936) 102 ff.; Roy M. Robbins, *Our Landed Heritage* (Princeton, 1942) 398 ff.

fication.[3] Undoubtedly the second Punic war did cause enough destruction of life and property to produce a temporary disruption of the economy of the southern part of Italy, but it seems absurd to suppose that the physical damage inflicted by ancient warfare was more permanent than that produced by the wars of our century. Yet most of the countries in which were fought the greatest battles of World War I managed to recover in less than twenty years.

Notwithstanding the importance of the Punic wars and the Roman conquest of the Mediterranean in bringing about the agricultural revolution of the second century B.C.,[4] it would be erroneous to suppose that these events alone sufficiently account for the transition from grain growing to viticulture or pasturage. Nor can the depredations wrought by Hannibal's soldiers up and down the length of the peninsula be regarded as productive of anything more than a temporary interruption of the agriculture of a fertile region. The remarkably rapid recovery of northeastern France from the devastation inflicted by the Germans during World War I proves that even the destructiveness of modern war need not have permanent effects. "The ravages of war are superficial: where land is good they do not cause it to be abandoned, nor do they produce a revolution in the use to which the land is put, if that use is already the most remunerative."[5] That Hannibal's invasion of Italy did not initiate the shift from field farming to the cultivation of vines or the rearing of cattle is clear from a study of the agricultural conditions of Latium, which largely escaped the ravages which Hannibal inflicted on other parts of Italy.

I

In Latium the tendency to abandon the cultivation of cereals was in evidence even before the Second Punic war.[6] A proper understanding of the causes for this development calls for a brief description of Latian agricultural life during the first three centuries

[3] Strabo 6.3.5; 6.3.11; A. J. Toynbee, *A Study of History* (London, 1934) 2.313.

[4] On the social and economic conditions after the Punic wars, see M. Rostovtzeff, *Storia economica e sociale dell' impero romano* (Firenze, 1933) 14 ff.; T. Frank, *An Economic History of Rome* (Baltimore, 1927) 95 ff.; A. A. Trever, *History of Ancient Civilization* (New York, 1939) 2.130 ff.

[5] Hugh Last, *CAH* 9.4.

[6] Frank, *op. cit.* (note 4) 92; Werner Sombart, *Die römische Campagna* (Leipzig, 1888) 126 ff., discusses the displacement of small farmers in Latium by the great landlords and the development of pasturage.

of the Republic. The soil of Latium was of volcanic origin and, though young and thin, was extremely fertile. It was once heavily forested with beech, oak, fir, and pine. According to Theophrastus (*Hist. Plant.* 5.8.3), the Etruscans used to cut trees large enough to serve singly for the keel beams of their great ships.[7] After the coastal plains were cleared, it was not long before they were settled by a large number of farmers attracted by the richness of the soil and the abundance of the crops which these plains were capable of producing. This region was by no means a "forbidding landscape," nor did the Latin and Volscian pioneers have to exert much energy in breaking in "this narrow plot of dour Italian soil."[8] In time this part of Latium became densely populated, and there sprang up a cluster of cities such as Ardea, Lanuvium, Gabii, Praeneste, Nemi, Velitrae, Signia, and Norba whose wealth and splendor rivalled that of the famous South Italian city of Sybaris. The gold and precious ornaments with which the ancient lords of these cities adorned themselves and their homes were imported from the distant lands of the Baltic and Mesopotamia.[9] The source of all this wealth was agriculture. The grain produced in this region was sufficient not only to support the cities mentioned above but also to supply Rome whenever the need arose (Livy 4.25.4; 4.52.4).[10] But the pressure of a growing population created a demand for a larger area to cultivate, so that it was necessary to deforest the hillsides and eventually the steeper slopes of the mountains. At the same time the need for timber for ships and houses eventually denuded the entire Volscian range and the Sabine ridge from Praeneste to Monte Gennaro. When rains beat upon these denuded and cultivated slopes many square miles in area, their very steepness increased the velocity of the flow and multiplied many times the erosive power of the water and the size and quantity of the rocks and sediment carried down and deposited upon the plains below. The uplands, once smooth and rich, became, like Attica as described by Plato (*Critias* 110E), "the skeleton of a sick man, all the fat and soft earth having wasted away, and only the bare

[7] See H. Nissen, *Italische Landeskunde* (Berlin, 1883–1902) 1.432; Last, *CAH* 7.342.

[8] A. J. Toynbee, *op. cit.* (note 3) 2.16.

[9] Frank, *op. cit.* (see note 4) 7; M. R. de la Blanchère, *Un chapitre d'histoire pontine* (Paris, 1889) 18 ff., 32 ff.; Frank, *American Economic Review* (Cambridge, Mass., 1919) 267–276; E. Pais, *Storia critica di Roma durante i primi cinque secoli* (Roma, 1913–1920) 1.623 ff.; L. Homo, *Primitive Italy* (London, 1926) 71.

[10] See also Livy 2.9.6; 2.34.4; Dion. Hal. 5.26; 7.1.

framework being left"; with the rivers and normal channels choked and clogged, the fertile grain fields of the ager Pomptinus became water-logged and were converted into a green, slimy swamp, the breeding place of the malaria-carrying mosquito.[11] The attempt to preserve the hillside farms by an elaborate system of drainage-works (cuniculi)[12] in order to divert the rain water from the eroding mountain gullies into underground channels was only a temporary expedient, especially since the farmers, evacuating the flooded

[11] On the Pontine Marshes, see de la Blanchère, *op. cit.* (see note 9) 57 ff.; Frank, *Econ. Hist.* 8; id. *Roman Imperialism* (New York, 1914) 19; A. Ruhemann, *Die pontinischen Sümpfen* (Leipzig, 1900); T. Berti, *Paludi pontine* (Roma, 1884) 57 ff.; R. Lanciani, *Ancient Rome in the Light of Recent Discoveries* (Boston, New York, 1894) 50 ff.; id. *Wanderings in the Roman Campagna* (Boston, New York, 1909) 2–5; G. and F. Tomassetti, *La Campagna romana, antica, medioevale e moderna* (Roma, 1910–1926); L. Homo, *op. cit.* (see note 9) 67 ff.; T. Ashby, *The Roman Campagna in Classical Times* (New York, 1927); H. Nissen, *op. cit.* (note 7) 1.254–263, 432; Ellsworth Huntington, "Changes of Climate and History," *Am. Hist. Rev.* 18 (1913) 229.

The works cited above, though excellent in many respects, cannot be regarded as infallible guides to an understanding of the ancient Campagna. Many of them are unscientific and are lacking in geological, ecological, medical, and economic information. With the exception of Frank, they ignore the effects of erosion in bringing about the transformation of that once fertile region into a malarial swamp. Some writers (Berti 58, Ruhemann 98, de la Blanchère 20 ff.), mistaking effect for cause, attribute the depopulation of the Pontine district to the Volscian wars, just as Lucan (7.391 ff.) blamed it on the civil war between Pompey and Caesar. The wars, of course, had little to do with it. The country became depopulated when erosion had rendered it swampy and malarious. E. C. Semple, *The Geography of the Mediterranean Region* (New York, 1931) 452, assumes apparently without warrant that the marshes resulted from a slow subsidence or buckling of the coast (see also Ruhemann 96). Others, again, Homo and Lanciani, for example, misled by the legendary and unscientific tradition of the ancient annalists (as reflected by Livy 1.13, 19; 2.19; Cic. *de Rep.* 2.11), assume that the Campagna had been a swampy and malarious district before historic times, an assumption which even the nineteenth century writers, Berti and de la Blanchère, would unhesitatingly reject. Lanciani, indeed, ignoring the works of Berti and de la Blanchère, accepts as his authority on the subject the book of Brocchi who wrote in 1820 (see *Wanderings in the Roman Campagna*, 2).

Though the best writers on the Roman Campagna, strangely enough, belong to the nineteenth century, none of them was aware of the role of the anopheles mosquito as the transmitting agent of malaria. Like the ancient Romans (for example, Ovid, *Met.* 15.626 ff.; Sil. Ital. 8.379 ff.) or the early farmers of Illinois, all of them thought malaria was an infectious emanation of the soil when covered with water. Since the discoveries of Ross and Grassi in 1897, it has become common knowledge that malaria is transmitted by anopheles mosquitoes, of which there are over two hundred species throughout the world, though only twelve of them are really important as malaria vectors. Most of these prefer fresh water and an average temperature above 68 degrees F. for at least two months of the year. In the temperate zones the water must be quiet such as that in marshes, ponds, and lakes. Some tropical species, however, prefer water in motion.

[12] On the *cuniculi*, see de la Blanchère, *op. cit.* (note 11) 57 ff.; id. in *DS* s.v. "Cuniculus"; Frank, *Econ. Hist.* 7; Semple, *op. cit.* (note 11) 450.

lowlands, began to clear and cultivate the slopes higher and higher up. Thus was repeated in Latium the destruction of the soil that brought to an end the brilliant and luxuriant Greek settlement of Sybaris towards the end of the sixth century. But Sybaris, which once produced wheat for Athens (Timaeus *ap.* Athenaeus 12.519B; Soph. *Tript. ap.* Plin. *NH* 18.65; Diod. 12.9.2), became no less a deserted, malaria-ridden village than Latian Gabii, Fidenae, or Ulubrae were in the days of Horace (*Ep.* 1.11.7, 30; Lucan 7.392 f.; Juvenal, *Sat.* 10.99 ff.; Propertius 4.1.34). Of the existence of those flourishing and splendid cities and towns, which lay submerged beneath the Pontine marshes, we would scarcely be aware, were it not for their mention by Vergil and Pliny (*NH* 3.9) and the treasures unearthed from their ruins and collected into the Museum of the Villa Giulia. Well might Livy (6.12), surveying this forsaken, feverish wilderness, have marvelled whence came that innumerable multitude of yeoman-warriors, who waged endless wars with the Romans.

It was pasturage to which the farmers of Latium next turned in order to put to profitable use the badly eroded hillsides and the flooded plains. That pasturage was becoming dominant before the Punic wars seems obvious from the fact that when Rome first exacted from Sicily an annual tribute of a million bushels of wheat, the Latin farmers did not oppose the Sicilian importations, although they might easily have voted down the urban tribes had they felt the new competition keenly. Since they apparently made no effort to oppose the admission of foreign grain into Rome or to divert it elsewhere, it is altogether probable that by this time they had lost interest in grain growing and had found in pasturage a satisfactory source of revenue.[13] Consequently those who lay the blame for the abandonment of wheat growing upon the Punic wars and competition from the provinces are as much in error as those who think that the Pontine marshes were caused by the ordinary exhaustion of the soil through loss of mineral content from overcropping. The reason for the displacement of wheat growing by pasturage was that the latter was the only way by which the Latin farmer was able to make use of his land. But since it must be conducted on a large scale and by a few men owning big estates (see p. 280 and note 14), it could not have favored the continued existence of a dense population; the old Latin cities declined and the problem of over-

[13] Frank, *Econ. Hist.* 92.

population — the basic and original reason for deforestation, cultivation of mountain slopes, and deterioration of the land by erosion — was solved only by Rome's aggressive policy towards the rest of Italy (see F. F. Abbott's review of Frank's *Economic History of Rome* in *Am. Hist. Rev.* 26 [1921] 309; Boak, *A History of Rome to 565 A.D.*[3], 60). It was the stimulus of overpopulation that first drove Rome to conquest, not that of a hard land on which subsistence must be eked out by means of the hoe and mattock.

II

As we said just above, pasturage was a most unfortunate alternative for the farmer of small means, since the breeding of cattle and sheep must be conducted on a relatively large scale and requires a deal of capital.[14] Men who had the necessary capital, however, were not lacking at any time and especially after the conquest of the empire had provided unlimited means for the acquisition of wealth. Nor had the Eastern provinces ceased, even in the time of Cicero, to be the source of much of the capital invested in Italy in the great cattle and sheep breeding estates.

Greaves' admirable study of the career of Pomponius Atticus, a typical representative of the landowning gentry of the late Republic, illustrates the methods employed by smart and respectable members of the equestrian class to wring money from the provincial peoples.[15] Though Atticus never stooped to some of the more shady financial operations of which many members of his class were frequently guilty, he was able, nevertheless, by speculating and by lending money to return from Athens to Rome with a colossal fortune.[16] Shortly after his return he inherited much wealth and property from his uncle (Nepos, *Att.* 13.2; Cic. *ad Att.* 4.1.4;

[14] Last, *CAH* 9.5; Frank, *Econ. Hist.* 58; T. Rice Holmes, *The Roman Republic* (Oxford, 1923) 1.108.

[15] On Atticus, see I. M. Greaves, *Ocherki iz istorii rimskago zemlevladenia*, "Notes on the History of the Roman System of Landproprietorship" (St. Petersburg, 1899) 1.252 ff. See also Alice H. Byrne, *Titus Pomponius Atticus* (Bryn Mawr, 1920) 3 ff.; M. Rostovtzeff, *Storia econ.* 15 ff.; Drumann-Groebe, *Geschichte Roms*, 5.5–87.

[16] During his stay in Athens, Atticus speculated in houses and estates in southern Greece; he also was a partner in several tax-collecting firms (*societates publicanorum*), which enjoyed banking monopolies and financed industrial and commercial enterprises throughout the East (Greaves, *op. cit.* 257 ff.). He made personal loans, in addition, to private individuals, corporations, and cities (Greaves 260). See Frank, *An Economic Survey of Ancient Rome* (hereafter abbreviated, *ESAR*) 1.244, 342–347; G. Colin, *Rome et Grèce de 200 à 146 avant J.-C.* (Paris, 1905) 259 ff.

12.45.3). He then went into the Roman real estate business, and erected in the business district near the forum large office and commercial buildings and apartment houses, which he, like other landlords of the time, was able to rent for extravagant sums because of the great demand for office and living quarters then prevailing in Rome.[17] Some of the capital thus acquired he invested in several suburban properties, of which a few were, no doubt, pleasure-villas located around such recreational spots in Latium as Alba, Tibur, or Praeneste, while others were income-producing estates used for extensive market-gardening or else for the growing of vines, as at his extensive estates at Nomentum and Arretium, which might easily yield an income of 7,000 HS per jugerum (Pliny, *NH* 14.50 f.).[18] But the bulk of his capital was invested in sheep and cattle ranching in Apulia (Cic. *ad. Att.* 4.19.1; Varro, *RR* 2.2.1; 2.10.11). Greaves conjectures that Atticus, ever trying to expand his sheep and cattle breeding activities in Apulia and finding his own pastures too small for his needs, made use of the local *pascua publica*, which were especially extensive in southern Italy. The *pascua publica*, as is well known, had been acquired by the Roman state soon after Hannibal's withdrawal from Italy and were subsequently leased by the government through companies of publicans to the grazing magnates on payment of a small tax (scriptura) proportional to the number of their livestock.[19] From one of Cicero's letters (*ad Att.* 2.15.4) it appears that Atticus had actually taken possession of some public lands. These, commonly known as *agri occupatorii* (Appian, *Bell. Civ.* 1.7.10; Livy 28.46; 42.10; *Dig.* 43.26; *Cod. Just.* 8.9), had been grabbed up first by the patricians and later by other large landowners, who thus dispossessed and crowded the small property-holders off the land.[20]

The grazing interests found also other means to enlarge their properties. They bought up farms cheaply from peasants unable to pay their taxes, or took them over for bad debts, or even by armed

[17] Greaves, *op. cit.* 295–303.

[18] *Ibid.* 306–314.

[19] *Ibid.* 321–330. On the *scriptura*, see M. Rostovtzeff, *Geschichte der Staatspacht in der röm. Kaiserzeit* (Leipzig, 1902) 410; F. Kniep, *Societas Publicanorum* (Jena, 1896) 69; cf. Varro, *RR* 2.1.16.

[20] On *agri occupatorii* see Greaves, *op. cit.* 329 ff.; Max Weber, *Römische Agrargeschichte* (Stuttgart, 1891) 126–128; Karlowa, *Römische Rechtsgeschichte* (Leipzig, 1885–1892) 1.90 ff.; Lange, *Röm. Altertümer* (Berlin, 1876–1877) 1.522, 570; G. Humbert in *DS* s.v. "Agrariae Leges"; P. Terruzzi, "La legislazione agraria in Italia all' epoca dei Gracchi," *Rivista d'Italia*, 2 (1926) 669–671.

force without any legal process (Appian, *BC* 1.7; Seneca, *Epist.* 90.39). "If no price," says Juvenal (14.145 ff.), "will persuade the owner to sell, you will send into his green corn by night a herd of lean and famished cattle, with wearied necks, who will not come home until they have put the whole crop into their ravenous bellies; no sickle could make a cleaner sweep." Thus came into being those "latifundia-sovereignties," which, when protected by the authorities, assumed the role of oppressors and persecutors in their neighborhoods (Martial 10.79). In time, there grew up among the owners of large estates the fear that other big property holders would surpass them in importance (Horace, *Epist.* 1.6.21). This obsession, which gave rise to what Pliny the Younger calls "pulchritudo iungendi," (*Epist.* 3.19) and Juvenal (14.125) "adquirendi insatiabile votum," caused them to do their utmost to expand their holdings more and more. Whether the Roman landowner in evicting small farmers and poor peasants from their land displayed the same degree of ruthlessness as the feudal lord during the Merovingian period or the cotton planter whom Olmsted reported in his *Journey in the Black Country* (page 329, New York, 1860) as driving the settlers from the bottom lands of the Mississippi, may be doubted, but so well had the ancient landlord succeeded, according to Greaves, that by the time of Augustus all references to peasants and descriptions of small farms and estates had a more or less archaic character.[21] The disappearance of the small farmer meant the decline of grain growing in Italy; hence the necessity, so deplored by Varro (*RR* 2 *praef.* 3), of importations from Africa and Sardinia.

For many reasons pasturage was an ideal type of investment for members of the Senate and for busy men of affairs. Senators, constrained partly by the Claudian Law of ca. 218 (Livy 21.63.3) partly also by rigid social custom from engaging in commerce, banking, or industry, were compelled to find new outlets for their

[21] On the growth of the large estate, see Greaves, *op. cit.* 134–184; A. Schulten, *Die römischen Grundherrschaften* (Weimar, 1896) 12 ff.; E. Dramard, "Étude sur les latifundia," *Séances et travaux de l'Académie des sciences morales et politiques*, 143 (1895) 554 ff.; E. Beaudouin, "Les grandes domaines dans l'empire romain," *Nouvelle revue historique de droit français et étranger* (1897) 543 ff.; O. Hirschfeld, "Der Grundbesitz der röm. Kaiser," *Kleine Schriften* (Berlin, 1913) 516 ff.; G. Salvioli, *Il capitalismo antico* (Bari, 1929) 44–58, 110 ff.; G. Bloch, *La République romaine* (Paris, 1913) 153 ff., 158 ff.; J. Toutain, *The Economic Life of the Ancient World* (New York, 1930) 230 ff.; W. E. Heitland, *Agricola* (Cambridge, 1921) 154 ff., 164–174, 203, 248; T. Frank, *ESAR* 1.111, 233, 248, 369; 5.169–175; H. A. Wallon, *Histoire de l'esclavage dans l'antiquité* (Paris, 1879) 2.343 ff., 367 ff.; M. Rostovtzeff, *History of the Ancient World* (Oxford, 1927) 2.165.

surplus capital in landed estates;[22] and, although quite a few senators probably acquired estates suitable for other kinds of agricultural production, most of them doubtless saw that pasturage alone would permit them to delegate the management of their estates to procurators or stewards without much risk or loss of efficiency. They were, consequently, left free, as absentee landowners, to live in Rome or close enough to the city to receive summonses to attend special meetings of the Senate at short notice and to devote their entire time to politics and social affairs. Pasturage was similarly appealing to men of Atticus' class, whose business activities demanded their constant presence in Rome or compelled them to make extended journeys abroad (Cicero, *ad Att.* 4.15.2), and to those of Varro's stamp, who, though eager to enjoy the profits from pasturage, were loath to forego the social and cultural life of the capital and were, therefore, unable or unwilling to live on their estates and, except for an occasional visit, to give their estates that close personal supervision, which Mago, Varro himself, and Columella regarded as indispensable for successful farming.

Nor was the possibility of absentee-ownership the only attractive feature of pasturage in the eyes of rich Roman investors. Pasturage was also a very profitable investment. It was remunerative in the second century when the censors first began to lease to the graziers public land in the South in parcels of 500 jugera. Within a few years the graziers had become so greedy that they incorporated into their estates most of the unleased lands without payment of rent and kept the aediles busy imposing fines upon them for their unlawful encroachments.[23] Their ruthlessness in driving off the land thousands of small peasant freeholders became a commonplace of literature from Sallust to Seneca and Juvenal (Sall. *Jug.* 41.8; Tibullus 2.3.41–3; Sen. *Ep.* 90.39; Juv. 14.140–155; 16.36–9; Appian, *Bell. Civ.* 1.7; in Apulia, Apuleius, *Met.* 9.35–8; in the Provinces, Dio Chrys. *Or.* 46.7). The employment by the Roman graziers of such illegal and violent methods for acquiring or expanding their estates was motivated by the same desire for quick and easy returns as that which impelled the Western cattlemen of the nineteenth century to destroy the buffaloes and Indians of the plains from Texas to Montana. In both cases the investment was smaller in relation to profits than for any other kind of capital-

[22] Cf. Frank, *ESAR* 1.74; J. Toutain, *op. cit.* (see note 21) 245–246.
[23] Cf. Last, *CAH* 8.334 ff.

istic agriculture. Livestock can be pastured all the year round on land which, too rough and rugged for tillage or fruit growing, was obtainable at small unit cost. Then, too, since cattle, sheep, and hogs can be driven to market over long distances and from the most remote and inaccessible districts, transportation charges, which greatly increase the production costs of wine and grain, were practically eliminated. Lastly, pasturage at all times has one decided advantage over the other branches of agriculture, in that to produce the same gross returns it requires a much smaller investment in labor. For example, in Varro's day one shepherd (*RR* 2.10.11) was considered sufficient to care for a flock of from 80 to 100 sheep, and nowadays, with the help of a couple of dogs, a single herder can tend a flock of two or even three thousand.[24] In short, the major portion of the capital invested could be used for stocking the range and for improving the herd by the purchase of pedigreed animals. One disadvantage only, if that be a disadvantage, did the grazier in ancient Italy have to contend with: ranching in order to be most profitable had to be conducted on a large scale and on large estates. Apart from the greater efficiency of a large estate as against a small, the Italian climate made it desirable in some places for the stockman to have pastures at different levels (*CAH* 9.5), on the hills in summer, in the winter on the plains. To contain both kinds of grassland, the estate must be of wide extent. This fact alone would account for the aggressive and ruthless manner in which pastoral estates were acquired during the last two centuries of the Republic.

Since ranching was a favorite form of capital investment, it ought to be needless to prove that there was an active demand for animal products in Rome and in other populous centers, had not some writers of the nineteenth century popularized the idea that the Romans were not meat eaters. Plautus in his day mentioned markets containing beef, lamb, mutton, and pork. At that time as well as later, herds of cattle and sheep accompanied the Roman armies on their march. Moreover, it was only natural that the influx of wealth into Rome from the provinces and the growth of the patrician, official, and business classes should bring about a

[24] J. Frank Dobie in his book on the American Southwest, *A Vaquero of the Brush Country* (Dallas, 1929) 272, speaks of herding a flock of 1,500 sheep. Cf. E. N. Wentworth, *America's Sheep Trails* (Iowa State College Press, 1948) 398 ff.; J. Russell Smith and M. Ogden Phillips, *Industrial and Commercial Geography* (New York, 1946) 618.

sharp advance in the retail price of animal products.[25] This fact explains why Cato, as reported by Cicero (*de Off.* 2.25), Columella (6 *praef.*), and Pliny (*NH* 18.5), emphatically asserted that all kinds of pasturage, good, bad, and indifferent, paid off better than any other kind of agriculture, and why rich Italians of the interior, for instance Cluentius (Cic. *pro Cluent.* 161 ff.) and the Plancii of Atina (*pro Plancio* 8–9), owed their fortunes to grazing.[26] It was also, says Frank (*ESAR* 1.367), because of the steady demand for meats, cheese, and milk that Varro (*RR* 1.7) placed a higher premium upon good meadow land than did Cato himself. The hog business also flourished. Although vast quantities of pork were sent south from the pig farms of Etruria and the Po Valley (Polybius 2.15; 12.4.8; Strabo 5.1.12; Frank, *ESAR*, 5.167.281; Orth in *RE* s.v. "Schwein"),[27] there still was a demand in Rome, especially among the servants in the great houses, for the pork and lard produced on Horace's Sabine estate (Greaves 113), or shipped by Trimalchio from Campania (Petronius 76).[28] Also very profitable, at least at Varro's time of writing, was the breeding for the Roman luxury market of peacocks, thrushes, geese, ducks, teal, fieldfares, and other edible fowls (Varro, *RR* 3.2.15; 3.4.2; 3.6.3; 3.7.10; 3.12.13; Pliny, *NH* 10.45). Deer, hare, wild boars, and the like were also sold in the Roman market. The paddocks and preserves in which these animals were kept were located mostly in Etruria; but some breeders of wild game and water-fowl, like T. Pompeius, failing to find enough space in Italy for the purpose, enclosed immense areas in southern Gaul (Varro, *RR* 3.12.2).

[25] Last (*CAH* 8.337) points out that Cicero's quotation of Cato's remark that pasturage offered the best returns implies that the demand for wool, mutton, and beef in Rome had increased since the defeat of Carthage and the conquest of the Mediterranean. Cf. Frank, *CAH* 8.337; *ESAR* 5.163; *Econ. Hist.* 415; O. Seeck, *Geschichte des Untergangs* (Berlin, 1897) 1.371, 380; H. Nissen, *op. cit.* (see note 7) 2.92. Additional material on the Roman consumption of meat may be found in my article, "Transportation in Imperial Italy," *TAPhA* 77.226–230.

[26] Cf. E. H. Oliver, *Roman Economic Conditions to the Close of the Republic* (Toronto, 1907) 59 ff.

[27] On the economic life of Cisalpine Gaul, see G. E. F. Chilver, *Cisalpine Gaul, Social and Economic History from 49 B.C.* (Oxford, 1941) 129; Nissen, *op. cit.* (note 7) 2.55; Last, *CAH* 8.11; Frank, *ESAR* 5.107 ff.

[28] Swine were raised in Campania during the entire Imperial period. Trimalchio (Petronius 76) shipped pork from there in the time of Nero. See Cardinali, *Dizionario epigraphico*, 3.297; J. Day, "Agriculture in the Life of Pompeii," *YCIS* 3 (1932) 174. Various passages of the *Codex Theod.* refer to consignments of Campanian and Samnian pork to Rome.

When one realizes the size and extent of the livestock industry that was carried on in the greater part of central and southern Italy, in Latium and Etruria, and also very intensively in Cisalpine Gaul, one is most surprised to learn that Italy was unable to satisfy the demands of the Roman and Italian market, and that it was necessary to import meats and other animal products from Spain, Gaul, and Sicily. Sicily, glorified from the days of Stesichorus and Pindar as a land "rich in flocks" (Pindar, *Ol.* 1.12), sent to Rome, according to Strabo (6.2.7), "cattle, hides, wool, and the like."[29] During the Social War (Cic. *2 Verr.* 2.5; Frank, *ESAR* 3.280) the Sicilian cattle trade was of great service to Rome, when Italian supplies of beef had been cut off by the enemy. A part of the Sardinian swine production, according to Pais, was exported to Rome during the imperial period.[30] From Spain the Romans imported live cattle in large numbers (*Expositio Totius Mundi*, 59), probably also salted beef (West 32), live hogs (Varro, *RR* 2.4.10), and bacon (Martial 13.54). But the most important of the Spanish exports were the excellent hams, cured and shipped to Rome in large quantities "to the no small profit" of the Cantabri and the Cerretani, who inhabited the oak forests on the southern side of the Pyrenees.[31] The reputation which these hams possessed in Rome from the beginning to the end of the Imperial period was equalled only by that of the hams produced by the Menapii of Gaul (Varro, *RR* 2.4.10; Strabo, 3.4.11; Martial, 13.54; *Edict of Diocletian*, 4.8; *Expositio Totius Mundi*, 59). Besides hams Gaul supplied not only Rome but also "most parts of Italy" with vast quantities of salted hogmeats (Strabo 4.3.2; 4.4.3), as well as some cattle (Columella, *RR* 6.1), hides (Pliny, *NH* 9.14), live geese, and goose feathers (Pliny, *NH* 10.27.53). But of all the Gallic products the cheese of Nimes and Toulouse acquired the greatest celebrity (Martial 12.32; Pliny, *NH* 11.240: Laus caseo Romae; ubi omnium gentium bona comminus iudicantur).[32] Even Britain, according to

[29] Cf. Scramuzza, "Roman Sicily," *ESAR* 3.241, 278, 351; Cic. *In Verr.* 2.2.74–75; E. S. Jenson, *The History of the Province of Sicily* (Boston, 1919) 84 ff.

[30] On Sardinian exports to Rome, see E. Pais, *Storia della Sardegna e della Corsica* (Roma, 1923) 2.502.

[31] On Roman imports of meat from Spain, see L. C. West, *Imperial Roman Spain* (Oxford, 1929) 32, 33, 35; J. J. van Nostrand, "Roman Spain," *ESAR* 3.181; M. P. Charlesworth, *Trade Routes and Commerce of the Roman Empire* (Cambridge, 1924) 166, 273; Oertel, *CAH* 10.408.

[32] Cf. L. C. West, *Roman Gaul, the Objects of Trade* (Oxford, 1935) 23, 56–60; M. P. Charlesworth, *op. cit.* 195–196, 278; C. Jullian, *Histoire de la Gaule* (Paris, 1908)

Strabo (4.199), sent her own small quota of cattle and hides.[33] In addition to meats and other strictly animal products, Rome received from Sicily (Frank, *ESAR* 3.283 ff., 352) the mullets and lampreys for which the Sicilian waters were famous, from Gaul a fish sauce called *muria* (Frank, *ESAR* 3.585–6), and from Spain important consignments of pickled fish, garum, and oysters, which greatly supplemented the not inconsiderable fisheries of the Italian coasts (Frank, *ESAR* 3.181 ff., 199 ff., 206 ff.). Thus at no time throughout the entire Imperial period could the insatiable demands of the Roman and Italian consumer be completely filled by the livestock farms of the peninsula. And what astonishes us most is the fact that animal foods of all kinds were imported from the western provinces as early as the age of Augustus, when Italian agriculture was enjoying the greatest productivity in its history.

If the consumption of meat and fish in Rome was great, so was the demand for wool, both in its raw state and finished form. Cotton was generally used for making sails, curtains, and theatre awnings, and to a limited extent for clothing, while linen, though worn in Egypt since prehistoric times, was little used in Italy before the third century except by the emperors and the very rich.[34] The same was true of silk. Wool, therefore, was the only raw material from which were manufactured all the clothes worn by rich and poor, by slave and senator, all the blankets and spreads, the rugs

5.327; A. F. Magerstedt, *Die Viehzucht der Römer* (Sonderhausen, 1859) 100; F. Cumont, *Comment la Belgique fut romanisée* (Brussels, 1914) 34–35; A. Grenier, "La Gaule romaine," *ESAR* 3.445. Switzerland also sent cheese to Rome; cf. Herdi, *Die Herstellung und Verwertung von Käse im griech.-röm. Altertum* (Diss. Bern, 1918) 11; F. Stähelin, *Die Schweiz in römischer Zeit* (Basel, 1931) 412.

[33] Full information on exports from Britain may be found in the works of Charlesworth, *op. cit.* (see note 31) 215; R. G. Collingwood and J. N. L. Myres, *Roman Britain and the English Settlements*[2] (Oxford, 1937) 243; Collingwood, "Roman Britain," *ESAR* 3.111.

[34] On the manufacture of linen cloth by the ancient Egyptians, see Petrie, *The Arts and Crafts of Ancient Egypt* (Edinburgh and London, 1909) 147; Maspero, *Manual of Egyptian Archaeology*[6] (New York, 1926) 336.

On the use of cotton among the Romans, see L. M. Wilson, *The Clothing of the Ancient Romans* (Baltimore, 1938) 2; E. C. Semple, *op. cit.* (see note 11) 309 ff. Flax was grown in Italy during the prehistoric period, cf. Pignorini, *Bull. dell' Inst.* (1878) 3–4. It was grown also in Roman times near Tarquinii in Etruria (Livy 28.45.15) and was used for making sails. On linen clothing, see L. M. Wilson, *op. cit.* 2; Axel Persson (*Staat und Manufaktur im römischen Reiche* [Lund, 1923] 74) has shown that in the Imperial period there were only two important centers of linen manufacture, one at Ravenna in the Po Valley (see Büchsenschütz, *Hauptstätten des Gewerbfleisses im klass. Altertum*, 77), the other at Vienna in southern France (*Not. Dign. Occid.* 2.358 f.).

and carpets.[35] To satisfy this almost universal demand, production in Italy alone was inadequate, although sheep were raised there by the million, a single Calabrian ranch keeping at least 250,000 head (Pliny, *NH* 33.135), and although the textile industry was the most important if not the sole industrial activity of Tarentum, Canusium, Luceria, and Brundisium in the South, of Parma, Padua, Verona, and Milan in the North, of Pompeii,[36] and of Rome itself. Despite the tremendous production of wool and textiles in Italy, it was still necessary to import from abroad: Asia Minor, particularly Laodicea, sent some of the finer textiles and garments worn by the rich; Gaul, and to a small extent Britain (*Edict of Diocletian*, 19.36), exported most of the heavy hooded overcoats and the coarse woolen cloaks that were worn by the soldiers and the poorer classes (Frank, *ESAR* 5.291; 3.586); Spain, even then an important sheep-raising country, especially on its central plateau and in the Guadalquivir valley, shipped to Rome large quantities of raw wool, unique both for its softness and its golden color (Strabo 3.2.6; Juvenal 12.38 ff.; Martial 4.28; 5.37.7; 8.28.6; 9.61; 12.63.1; 12.65.5; 12.98.1), as well as some very beautiful fabrics woven in Salacia (Strabo 3.2.6; Pliny, *NH* 8.191; Ptolemy 2.5.3) and in the famous textile city of Cordova (Frank, *Economic History of Rome*, 459).[37] Italy, therefore, was a deficit and importing country with respect to all animal products. We can safely assume, then, that the Italian livestock industry was most profitable, never suffering at any time from overproduction and having for the disposal of its products a large and lucrative market. It must have stood in extremely favorable comparison with grain growing, which was handicapped by serious disadvantages no matter where it was carried on: grain grown near the coast was exposed to foreign competition; if in the interior, it could not profitably be shipped to Rome and other large coastal markets because of the difficulties and high costs of transportation. No wonder Afer could boast to Martial (4.37) of making six hundred thousand HS a year from his sheep farm at Parma. But perhaps even that was "small potatoes" compared with the incomes of the large ranchers such as Domitia Lepida (Tac. *Ann.* 4.27; 12.65.1)

[35] Cf. Frank, *ESAR* 5.163; F. Orth, *RE* s.v. "Schaf," also s.v. "Lana" esp. 610–612; F. Oertel, *CAH* 10.394.

[36] On the Pompeian clothing trade, see F. Oertel, *CAH* 10.392; Rostovtzeff, *Storia econ.* 112.

[37] See notes 29, 31, 32; also Frank, *ESAR* 3.203; Thouvenot, *Essai sur la province romaine de Bétique* (Paris, 1940) 234 ff.; 247, 265.

and Caecilius Isidorus (Pliny, *NH* 33.135), who pastured sheep in southern Italy numbering in the hundreds of thousands. Verily, pasturage was a road to Mammon in ancient Italy.

III

It has already been shown that the profitable and attractive features of pasturage encouraged heavy capital investments and the expansion of ranching at the expense both of the public domain and of the small farms throughout Italy, especially in Etruria and the South. Most writers on this subject, such as Greaves, have given abundant proof that pasturage was conducted extensively. But no one to my knowledge has yet pointed out that it was carried on also intensively and to the detriment of the country and the industry itself. Yet in the light of the history of this industry during recent centuries in Spain, the United States, and elsewhere, it seems obvious that, when the grazier has expanded the area of his ranch as far as he can, he then begins a more intense exploitation of the land already under his control by overstocking and overgrazing it. That the ancient grazier, like his modern counterpart, also practiced "land butchery" was to be expected in view of the attractions of immediate profit; but before attempting to prove it, we ought first to mention some of the effects of large-scale ranching observed in Spain, Scotland, South Africa, and the American West.

Before the reign of Philip II the woolen industry had become the chief source of Spain's national wealth and the export of fine wool did much to help restore her unfavorable balance of trade. To promote this industry the Catholic Kings gave the Mesta, the powerful Wool Growers' Association, many special privileges at the expense of the small farmer, who was forbidden to fence his fields against the migrating sheep.[38] The sheepmen were given the right to use the common lands and rights of way and water over broad *cañadas reales*, or royal sheepwalks, along which flocks were driven northward in April from La Mancha and Estremadura and back again in September. Three million *transhumantes* annually ravaged Castile;[39] moving along as always in compact bunches, with their

[38] Julius Klein, *The Mesta: A Study of Spanish Economic History* (Cambridge, Mass., 1920); C. E. Chapman, *History of Spain* (New York, 1931) 104, 227, 229; C. Jannet, *Grandes époques de l'histoire économique* (Paris, 1897) 301 ff.

[39] Klein, *op. cit.* 26, has shown that the estimates of five and seven million are entirely too high for the 16th century. Except for the decade 1520–1530, the number

hoofs cutting up the sod and pounding it hard, and their sharp incisors and split upper lips biting down below the roots of the grass, they soon sheared, hammered, and scarred those Castilian grasslands into a virtual desert.[40] Even the forests on the mountain slopes did not escape destruction. By removing the understory of small trees and low vegetation and by compacting the upper layers of the soil with their hoofs they could within twenty years destroy a forest as effectively as the lumberman's axe. All this, together with the herders' baneful practice of burning off old grass and shrubs each spring to provide greener and more succulent grazing, finally laid that entire region of grassland and forest open to the erosive power of seasonal torrents and flash floods. Thus the country from Madrid southwards beyond Toledo, which early travelers once described as a farmer's paradise, was turned into one of the most arid and desertlike wastes in Europe.[41]

Scotland, whose topography is similar to that of southern Italy, provides another good example of regional suicide brought about by overgrazing. In the southern part of that country commercialized sheep raising was introduced before the twelfth century. Not long after that the forests were severely damaged, and, though forest grazing was restricted by law, the deterioration went on to the point of complete destruction. On the moors the heather and succulent grasses were "sheeped off"; only the coarser plants — bracken and moormat — were left. In the hope of encouraging a good stand of grass, the herders frequently burned these moorlands off; that made their condition worse. Thus exposed to heavy rains, the land began to melt and creep, forming "screes," or small landslides, which occasionally would break away and come down upon hillside villages, when trampled or rubbed against by the sheep. In other places, where the ground was left bare, dry soil was blown

of *transhumantes* never exceeded three million. Chapman (*op. cit.* 325), however, asserts that the Mesta, when Philip II came to the throne, possessed seven million sheep.

[40] J. H. Mariéjol (*L'Espagne sous Ferdinand et Isabelle*, 227 ff.) contends that the migrants left ruin and solitude behind them wherever they went, from the Estremadura to the mountains of Leon and Galicia. See also H. Cavaillès, "La question forestière en Espagne," *Annales de géographie*, 14 (1905) 318 ff.

[41] H. H. Bennett, *op. cit.* (see note 1) 904; B. E. Fernow, *History of Forestry* (Toronto, 1911) 350 ff.; José Ortega y Gasset, *Invertebrate Spain* (New York, 1937) 159 ff.

off by high winds; in the Culbin district was formed a small Sahara.[42]

Pasturage, South Africa's greatest source of agricultural wealth, has paradoxically become a national menace. It is the cause of widespread soil erosion, which General Smuts a few years ago called the biggest problem "before the country, bigger than any politics." Some of the richest grazing lands were so badly abused by overgrazing, *kraaling*, indiscriminate firing, and other forms of veld mismanagement that they have become parched and burning deserts.[43] The ecological climax has been put in such a state of unbalance as to give the appearance of a change of climate, similar to that which has occurred in Mediterranean countries since the birth of Christ. Seventy-five years ago, the Orange Free State, for example, had a humid climate; and the luxuriance and excessive wetness of the veld was considered an obstacle to pastoral farming. Now the rich grasses are gone, the rivers and water-holes have since dried up, and the veld is badly gullied. The same amount of rain still falls from the sky, but instead of remaining to water plants it tears more gullies through the land, and is gone. But the South African veld is not in as bad a state as the overgrazed pastures of East Africa, where the natives, like the Navajo Indians, measure their wealth in terms of livestock, and scourge the land with their ever-multiplying herds of scrub cattle.[44] When the cattle exhaust the pastures and die off from starvation, they are replaced by sheep and, as a last resort, by goats. Then, as in Greece and southern Italy today, when the goats have eaten off everything down to the last stick, nothing remains but an eroding, solitary waste.[44a]

[42] H. H. Bennett, *op. cit.* (see note 1) 46; E. W. Fenton, "The Influence of Sheep on the Vegetation of Hill Grazings in Scotland," *Journal of Ecology*, 25 (1937) 424 ff. According to Fenton, Scotland is a "sheep-ridden country": "The cumulative effect of sheep grazing over a period of time reaches considerable magnitude. It is not an exaggeration to say that within historic times sheep farming has altered the appearance of a large part of Scotland." The sandstorm which occurred at Culbin is still a mystery, but was no doubt the result of some kind of land abuse. See H. M. Batten, "The Tragedy of the Culbin Sands," *Natural History*, 38 (1936) 143 ff.

[43] Cf. Bennett, *op. cit.* 922 ff.; J. P. Harroy, *op. cit.* (see note 2); F. Osborn, *op. cit.* (see note 2) 118; W. Vogt, *op. cit.* 255.

[44] In the cattle-breeding area of East Africa (Bantu) the possession of numerous herds confers greater social prestige upon the individual than the ownership of extensive lands. See Melville J. Herskovits, "A Preliminary Consideration of the Culture Areas of Africa," *American Anthropologist*, 26 (1924) 50–63; also Gilberto Freyre, *The Masters and the Slaves* (New York, 1946) 312 f.

[44a] On the damage that goats can do to trees, see Varro, *RR* 1.2; 2.3; A. Seidensticker, *Waldgeschichte des Altertums* (Frankfurt a. O., 1886) 1.243; 2.252. In Greece,

In the United States equally disastrous results followed the establishment of a cattle empire on the southwestern plains after the Civil War. Even as early as 1880 some ranges had been depleted and were beginning to erode. But the really serious damage did not become apparent until the present century. According to estimates of the Department of Agriculture in 1936, the grazing capacity of the range in 13 western states has been reduced by more than half; the entire range, once capable of supporting 22 million animal units (a unit is 1 cow or horse, or 5 sheep), can carry scarcely half that number now. Today vast spaces, where grass once grew belly-high to a horse, have had the topsoil skinned off beyond recovery. Ordinary rains become washouts, which cut the range up into gullies or arroyas and dump into the rivers a layer of soil that took nature a thousand years to make. Mountain streams once clear and sparkling now flow, like the rivers of ancient Greece (Theognis 959 f.), thick and turgid with silt. The Rio Puerco, for example, which drains a large area of overpastured and eroding range land in New Mexico, dumps erosional waste into the Rio Grande much faster than that mighty river can carry it off. Above the great Elephant Butte Dam, the bed of the Rio Grande has been rising in places at the rate of five feet in nine years as a result of the silt pouring into it from its tributaries, the Puerco and the Chama, and is now higher than the surrounding country and the city of Albuquerque. In the spring of 1937 the river broke through the dikes, inundated a town, washed out a highway, and swamped the rich irrigated lands of the valley. Between Santa Fe and Albuquerque almost two-thirds of the irrigated farming country has been waterlogged and converted into a breeding place for mosquitoes. Thus extensive-intensive pasturage, whether conducted in southern Italy or in New Mexico, can by stripping large areas of vegetative coverage, bring about within the same region the development of two kinds of badlands side by side, the one arid and barren, the other waterlogged and swampy, both equally useless for agricultural purposes (Cic. *de Leg. Agr.* 2.71: arena aut paludes).

IV

The foregoing description of the evil effects of overgrazing in modern times naturally leads one to inquire whether the deteriora-

the goat was everywhere, and his depredations were particularly serious, and still are. See A. Zimmern, *The Greek Commonwealth*[5] (Oxford, 1931) 45; H. Michell, *The Economics of Ancient Greece* (New York, 1940); F. G. Renner, "Erosion, Trojan Horse of Greece," *National Geographic Magazine*, 92 (1947) 809.

tion of southern Italy during Republican and Imperial times was not in a large measure the result of the same kind of land abuse. Unfortunately in the case of ancient Italy the evidence on the size of the migrating flocks and the extent of the damage they wrought is meagre and unsatisfactory. Ancient writers were not interested in such matters. They tell us only that some Apulian and Calabrian ranch-lands were as large as provinces (Seneca, *Ep.* 87.7; 90.39; *De Ira* 1.21.2; *De Ben.* 7.10; cf. Frontinus, *De Controv. Agror.* 53), too big to ride around on horseback (Hor. *Sat.* 1.6.58; Col. *RR* 1.3.12), and too broad for a kite to fly across (Petronius 37; Persius, *Sat.* 4.26; Juv. *Sat.* 9.54 f.). The poets, however, make occasional and incidental references to thousands of cattle and sheep pastured in southern Italy, Latium, and Etruria (Tibullus 2.3.42; Juv. *Sat.* 8.180; Statius, *Silvae* 4.5.17; Ovid. *Met.* 4.635; cf. Greaves, *op. cit.* 147). When Pliny the Younger rode to his villa at Prattica, he saw numberless flocks and herds on the lush winter pastures along the Latian coast (*Ep.* 2.17.1). Horace, too, in one of his odes (*Carm.* 3.29.21: iam pastor umbras cum grege languide . . .), tells how his way was barred by an endless procession of sheep moving mountainwards for the summer.[45] But the most explicit and valuable piece of evidence is the Elder Pliny's statement (*NH* 33.135) that the freedman C. Caecilius Isidorus owned at the time of his death in 8 B.C. a ranch in Calabria of 4,116 herdsmen, 3,600 span of oxen, and 257,000 sheep, which would be considered a tolerably large ranch even in Wyoming or Australia. Yet that ranch was probably not exceptional in size in view of his small number of herdsmen as compared with the vast hordes maintained by some of the other Calabrian proprietors, whose armed and mounted herdsmen had constituted a public menace ever since the days of Spartacus and Catiline (Sall. *Cat.* 46). Though suppressed from time to time, they had become increasingly more unruly and dangerous, so that Tiberius eventually had to appoint a quaestor in southern Italy solely to keep order on the grazing-tracks (*calles* or *tratturi*) leading from the plains to the mountains. Nevertheless in the year 24 A.D., fearing that another Spartacus might succeed in stirring up the herdsmen around Brundisium to strike for freedom, he sent troops from Rome to disperse them (Tac. *Ann.* 4.27), since the slave-establishments of Calabria and Apulia, daily assuming huge

[45] Frank (*Econ. Hist.* 58) refers also to Varro. *RR* 2.1.16; 2.2.9–11; *LL* 5.36; Pliny, *Ep.* 2.17.28.

dimensions at the expense of the freeborn population, were a constant menace to the security of the state. No wonder that Domitia Leipida, though a rich and powerful member of the imperial family, was speedily put to death by Nero for endangering the peace of Italy through her failure to control her armies of shepherds in Calabria (Tac. *Ann.* 12.65.1; Suet. *Nero* 34.5). We may, therefore, safely infer that the number of sheep which Domitia possessed must have greatly exceeded that assigned by Pliny to the freedman Isidorus. That the Calabrian ranch lands were being overstocked during the Imperial period becomes something more than a mere possibility.

Even during the Republic, when the livestock industry was still in its infancy, Apulia began to suffer the effects of overpasturage. In 185 B.C. there took place a shepherds' revolt which assumed such proportions that it was suppressed only after the arrival of Lucius Postumius, the supreme commander of the southeastern military district (Livy 39.29.8; 39.41.6). Of the slaves taking part in the uprising he put 7,000 to death;[45a] the rest he presumably returned to their owners, as was done in the case of a similar uprising in Etruria several years before (196 B.C.: Livy 33.36.1). Since some of the Apulian shepherds probably did not take part in the revolt at all and perhaps only a minority of those who did were put to death, we may regard 7,000 as a fraction of the total number of the slaves tending sheep in Apulia. Let us tentatively accept 7,000 as the actual figure. Even so, since a single shepherd was able to tend a small flock of 100 sheep and in the case of large flocks perhaps several times that number (Varro, *RR* 2.10.11), we may conservatively estimate the number of animals pastured in the grazing section of Apulia early in the second century B.C. at not less than 700,000. But in setting up this minimum we have discounted, perhaps too sharply, the number of shepherds as well as the number of sheep each shepherd was able to tend; it seems reasonable to suppose, therefore, that the actual number of sheep pastured in Apulia during the Republic was well above one million head. In view of the immense damage which less than three million *transhumantes* inflicted upon the forests and pasture lands of

[45a] I can see no reason to suspect the credibility of Livy's figures cited in the text. He could hardly have had a personal motive for exaggeration as Caesar might have had when reporting the number of his opponents.

Catholic Spain,[46] whose grazing area alone was incomparably greater than the entire province of Apulia, one can readily see why Apulia, though fertile and prosperous in early times, never recovered from the effects of the Hannibalic war (Strabo 6.3.11). By the last century of the Republic the erosion of the uplands and waterlogging of the coastal plains had converted the Apulian seaboard from Brundisium northwards to Sipontium into one of the most pestilential districts of the western Mediterranean. The Lagune of Salapia, for example, had in ancient times been navigable for great seagoing merchant ships and the city of Salapia had been a large seaport (Strabo 6.3.9; Lucan 5.377), but by the end of the Republic that lake was completely silted up and had become a dangerous malarial swamp, so that the city of Salapia had to be abandoned for a more healthful site (Vitruv. *de Arch.* 1.4.12; Cic. *de Leg. Agr.* 2.71). The Apulian coastal region was a potential death-trap even for Caesar's army (*Bell. Civ.* 3.2) and for travelers embarking for Greece (Cic. *ad Att.* 11.22). Cicero (*ad Att.* 8.3.4) called Apulia the most depopulated part of Italy (inanissima pars Italiae); a century later, Seneca (*Ep. Mor.* 87.7) referred to it as a desert. When Crispinus, says Juvenal (*Sat.* 4.27), bought a mullet for 6,000 HS, he paid more for it than he need have paid for a large Apulian estate. No wonder that an ancient etymologist, whose idea seems to have been passed on by the early medieval writer Paulus (*Hist. Lang.* 2.21), in all seriousness once suggested that the name Apulia was derived from a Greek verb meaning "to destroy": Apulia a perditione nominata!

This deterioration of the soil resources of Apulia can, I think, be explained by reference to experience with the livestock industry in South Africa and Australia. Compared with these great countries ancient Apulia was a small province having an area of about 4,760 sq. miles, a considerable part of which was used for the growing of grain (Appian 7.6; Polybius 3.100 ff.; 10.1.8; Varro, *RR* 1.2.6: quod triticum Apulo conferam; Cic. *ad Att.* 10.7.1; Hor. *Carm.* 3.16.25; Col. *RR* 3.8.3; Statius, *Silv.* 5.1.122; Symmachus, *Ep.* 6.22). Nevertheless there were concentrated in this area, at least from October to May, well over a million sheep, besides thousands of cattle (Varro, *RR* 2.2.1; Col. *RR* 6 *praef.* 4), horses (Polybius 2.24.11;

[46] J. Klein, *op. cit.* (see note 38) 306, 321; Cavaillès, *op. cit.* (see note 40) 319; Albert Girard, "L'Espagne à la fin du XVII[e] siècle," *Revue de synthèse historique*, 26 (Fév.-Juin, 1913) 99–115.

Liv. 24.20.16; Varro, *RR* 2.7.1; Col. *RR* 6.27.2; Strabo 6.3.9; Schol. on Juv. *Sat.* 1.155), and mules. Assuming that two-thirds of the province was used for sheep ranching, we find that there were at least 300 sheep for each square mile of pasturage. Experience with sheep farming in Australia has shown that it is impossible without doing permanent injury to the plains to pasture more than 10 sheep per square mile with 10″ of rainfall, and not more than 70 with 20″ of rainfall.[47] Now the annual rainfall of Apulia, which in Horace's day was notorious for its aridity (Hor. *Epod.* 3.16: siticulosa Apulia; *Carm.* 3.30.11: pauper aquae Daunus; *Sat.* 1.5.88–91; Cic. *de Leg. Agr.* 2.71; Strabo 6.3.5; Philostratus, *Vit. Soph.* 2.1.9), was probably then as now never much above 20″ and the most of that would come down in a deluge during the rainy season and as quickly run off.[48] If so, then Apulia must have been greatly overstocked and overgrazed. Erosion would naturally follow and along with it the decline of property values to which Juvenal alludes, depopulation, and the formation of malarial swamps. Strabo (6.3.5), speaking of Calabria, blamed Hannibal's war for the ruin and depopulation of that once rich and populous district, whose 13 cities were reduced except Tarentum and Brundisium to small, dilapidated villages. But in the light of modern experience, we may rather agree with Sir Thomas More, "Sheep, wont to be so meek and tame and so small eaters, now become great devourers. They consume, destroy, and devour whole fields, houses, and cities." Sheep, not Hannibal, destroyed South Italy!

Overgrazing, however, was not the only pernicious feature of the livestock industry. Far more serious to the preservation of

[47] See Smith and Phillips, *op. cit.* (note 24) 618 ff.; A. E. V. Richardson, "The Problem of Soil Erosion in Pastoral Areas," *Pastoral Revue*, 45 (1935) 1055–1057; M. Holmes, *The Erosion-pastoral Problem of the Western Division of New South Wales* (*Public Geography*, Sydney, Australia, 1938).

[48] See J. F. Bogardus, *Europe* (New York, London, 1934) 29 ff. He writes (637) that the average rainfall of S. Italy is about 23.2 inches, of which only 5.5% comes down in summer. Cf. W. G. Kendrew, *The Climate of the Continents* (New York, 1942) 269 ff.; E. C. Semple, *op. cit.* (note 11) 85 ff., 92 ff. According to Colamonico in his monograph, *La pioggia a Bari. Studi corologici sulla Puglia* (Bari, 1915), the mean annual rainfall at Bari from 1885 to 1914 was 565.4 mm. = 22.26 inches; Eredia, "Le precipitazioni atmospheriche in Italia," *Annali dell' Ufficio Centrale Meteorologico e Geodinamico*, Series 2, 27 (Roma, 1908) 234–236, gave a slightly higher report, namely 589.7 mm. or 23.26 inches. Cf. Gino Arias, *La questione meridionale* (Bologna, 1919) 1.12. In Lecce (ancient Calabria) the rainfall is somewhat greater than in Apulia; the mean annual rainfall from 1875–1905, according to De Giorgi, *Note statistiche sul clima di Lecce e della Penisola Salentina* (Lecce, 1915) 35, was 612.0 mm. or 24.09 inches.

the soil, water, and forest resources of a country is the herdmen's practice of burning off trees and dry grass in the fall to provide better spring pasturage — a custom which has been almost universal wherever the sheep industry has prevailed. The annual firing of forest and pasture lands invariably aggravates the damage wrought to small shoots and to the moisture-retaining turf by the sheep themselves. This practice did immense damage to the forests and grass lands of Catholic Spain. In the Pyrenees it caused destruction of forests, the decline of water resources, the flooding and devastation of the upper Gascogne at a cost of hundreds of lives and millions of dollars. Great rivers such as the Gironde and the Tagus, which in Strabo's time (3.3.1) were navigable for hundreds of miles, were blocked with sand and other erosional debris and were rendered useless for shipping unless dredged at great expense.[49] In the dying continent of Africa it has been the firing of the wooded savannas and grassy steppes that has contributed most to the regression of flora and the degrading of the vegetation toward the lower subclimax.[50] The Sahara has been marching south at the rate of half a mile per year; the Turkana in Kenya Colony at the rate of 6 miles. In the Orange Free State, which a century ago was described as a luxuriant prairie, the overstocking and burning of the veld has brought about the ecological degeneration of vegetal cover, severe soil erosion, increasing desiccation, and perhaps even a change of climate.[51]

The burning of pastures, which has caused so much damage in modern sheep-raising countries, was a very ancient practice. We find mention of it in the Bible (*Exodus* 22.6; *Isaiah* 9.18), in Xenophon's *Oeconomicus* 18.2, in Vergil's *Georgics* 1.84, and much to Adam Dickson's amazement it is recommended by Pliny (*NH* 17.4) and by Columella (*RR* 6.23) and Palladius (*RR* 9.4).[52] But nowhere in the ancient world was it more commonly practiced than in Apulia. When the Apulian burns the soil, says Lucan (9.182 ff.), in order to make grass grow on the overgrazed plains (depastis campis) and get

[49] See Cavaillès, *op. cit.* (note 40) 326; id. "Le déboisement dans les Pyrénées françaises," *Revue de Paris*, 106 (Paris, Nov. 15, 1903) 287 ff.

[50] Cf. J. P. Harroy, *Afrique, Terre qui meurt* (Brussels, 1944); Jacks and Whyte, *op. cit.* (see note 1) 61 ff.; W. Vogt, *op. cit.* (see note 2) 240 ff.; E. P. Stebbing, *The Forests of West Africa, and the Sahara; A Study of Modern Conditions* (London and Edinburgh, 1937).

[51] See notes 1 and 43.

[52] Adam Dickson, *The Husbandry of the Ancients* (Edinburgh, 1788) 2.314.

fresh herbage for winter, then Mount Gargano and the fields of Vultur and the pastures of warm Matinus light up the countryside with a blaze of fire. In an equally vivid manner Silius Italicus (*Pun.* 7.364 ff.) speaks of the "numerous fires which the shepherd sees from Gargano's top, when the upland pastures of Calabria are burnt and blackened to improve the grass." That the overgrazing (depastio) and the repeated burning of wooded hills and grassy plains must have produced the same results in southern Italy as mentioned above in the case of Spain, the Pyrenees, and many parts of Africa, is not open to doubt.

One of the most damaging results of the destruction of vegetal cover by burning and overgrazing is the shattering of the hydrologic cycle. Though the amount of water that falls may not be reduced, it is certain that rapid run-off reduces the amount of water available to man. One of the effects of the breaking of this cycle in ancient Apulia was the excessive dryness of that district, to which attention has already been called. But pasturage in southern Italy had another catastrophic effect on the hydrologic regime. The rivers alternated between floods and periods of low water. The discharge of the Aufidus varies now from a maximum of 65,000 to a minimum of less than 2,000 cubic feet per second.[53] It probably did so then. The poet Horace, born not far from the "far-sounding Aufidus" (*Carm.* 4.9.2), makes a sharp contrast between the floods of that wild, thundering river (*Carm.* 3.30.10: violens obstrepit Aufidus) and the dryness of Apulia (pauper aquae Daunus), a contrast which an American writer could make between floods of the Rio Grande and the parched range of New Mexico. No doubt Horace, and perhaps Silius Italicus (*Pun.* 8.629: fundoque imo mugivit anhelans Aufidus), was as much impressed by the sudden transformation of the Aufidus from a dry, gravel-strewn stream into a frothy, roaring torrent as was A. M. Champion during his visit to Kenya Colony.[54] Standing on a hill one forenoon, he writes, in the middle of a district which had within the short space of twenty years been grazed to death, he saw a heavy rainstorm over it and within half an hour heard a continuous roar like thunder; looking through field glasses in the direction of the sound, he saw

[53] Cf. Nissen, *op. cit.* (see note 7) 1.337.

[54] A. M. Champion, "Soil Erosion in Africa," *The Geographical Journal*, 82 (1933) 136; the problem of erosion as a result of the natives' breeding too many cattle is discussed by Bennett, *op. cit.* (see note 1) 925–930. See note 44.

wave after wave of red frothy water coming down the river. Wave succeeded wave like a rapidly rising tide until what had a moment before been a dry river course became a raging torrent 12 feet deep and 70 yards across. The water was coffee-colored and thick with tons of soil swept down from the hills. Like this African river and all rivers having naked and eroded watersheds, the Aufidus roared down from Mount Vultur (4,365 feet) with its burden of silt, gravel, boulders, and trunks of trees; these blocked the flow into the sea and caused the flood waters to back up, break out through the dikes (Hor. *Ep.* 1.14.28 f.), and sweep over the low-lying fields (Hor. *Carm.* 4.14.25: Volvitur Aufidus . . . cum saevit horrendamque cultis diluviem minitatur agris; Sil. Ital. 10.319: tumidas in campos Aufidus undas eiectat; 11.507: umentes rapido circumdat gurgite campos; 10.171). It destroyed the crops (Sil. Ital. 11.507: stagnis intercipit arva refusis). The swollen earth-laden floods of the Aufidus illustrate for Horace (*Sat.* 1.156) the penalty of the superabundance of wealth: "Raging Aufidus sweeps away, bank and all, those who delight in copious abundance, but the man who wants only what he needs, neither draws water thick with mud, nor loses his life in the flood." He obviously has the Aufidus also in mind when he described the turgid eloquence of Lucilius as muddy: "His stream runs muddy and often carries more that you would rather remove than leave behind (*Sat.* 1.10.50; cf. *Sat.* 1.4.11: cum flueret lutulentus)." Though the Aufidus in flood might, like the Greek Achelous (Sophocles, *Trach.* 9–20) or the Scamander (Hom. *Il.* 21.237), be symbolized by a roaring bull, in summer at least its shrunken and sluggish stream bends and meanders through the mud flats of the Apulian plains just as the cold and slimy Ufens drives with uncertain course his black and muddy current through the Pontine fields (Sil. Ital. 1.52; 8.382; Verg. *Aen.* 7.801; Claudian 1.257). Another interesting characteristic which Horace (*Sat.* 1.1.58 f.) observed about the Aufidus was the undercutting of its banks and the deepening of its channel, a phenomenon which Vergil ascribed to the Ufens (*Aen.* 7.801: gelidusque per imas Quaerit iter valles . . . Ufens), and which has been happening on a larger scale to the Rios Puerco and Chaco that flow through the most overgrazed and eroded territory of the American Southwest.[55]

The floods which Horace witnessed in Apulia, it should be noticed, were taking place in another well known wool-growing

[55] Cf. Bennett, *op. cit.* (see note 1) 247–250.

region, the Calabrian district of Tarentum (Varro, *RR* 2.2.18; Hor. *Carm.* 2.6.10; Strabo 6.3.9; Col. *RR* 7.2.3; Pliny, *NH* 8.190–191; Mart. 5.37.2; 8.28.4; 12.63; 13.135; Calp. 2.69). The Galaesus, which flows into the Gulf of Tarentum about five miles south of the city (Livy 25.11.8), habitually flooded the plains along the coast (Verg. *G.* 4.126: niger umectat culta; Mart. 12.28.4: saturat Calabris culta Galaesus aquis), after breaking through the earth and gravel dikes built to protect the fields (Varro, *RR* 1.14.4).

It should be pointed out here that the floods on both the Aufidus and the Galaesus were no doubt in part the result of the deforestation of the mountainous country through which these rivers flowed. But that deforestation was not the work of the woodsman's axe, since lumbering was never extensively carried on in that part of Italy. That the overgrazing of those watersheds precipitated the floods is practically certain. Modern experts on forestry have demonstrated that grazing can have the same effects on forest soils as fires and heavy cutting, though the rate of destruction may be slower. Overgrazing of forest ranges can produce serious conditions within ten to twenty years and in extreme cases in a shorter period. The progressive impairment of forest lands by overgrazing usually manifests itself in the thinning of the understory of small trees and low vegetation, the perceptible thinning of the litter layer, compaction of the upper soil layers, and the breaking of the surface network of fine roots. Before long the older trees become unthrifty and finally die, the stand gets progressively thinner, and the forest is eventually ruined, since heavy rains beating down on such compacted soils start gullies which expose the larger roots. In Wisconsin, for example, the run-off has been estimated to be 60 times as great and soil losses nearly 100 times as great from a pastured as from an unpastured forest.[56] The history of Spain provides an even better illustration. During the Roman period and the Middle Ages, Castile was still heavily forested and was so even in the fourteenth century, according to the famous *Libro de la Monteria*, a royal hunting-book, which describes extensive woodlands in all

[56] See *Soils and Men* (Yearbook of Agriculture, 1938, U.S. Dept. of Agriculture) 744. In the vast domain of grazing country, writes Bennett (see note 55), represented by the arid and semiarid Southwest, soil erosion following overgrazing has caused severe denudation of an enormous area of uplands, even to the extent of essentially 100% damage in some localities. On Aug. 16, 1929, a heavy rain in southern Utah swept from a 50% slope of sheep range country great quantities of soil and practically all the grass.

parts of Castile,[57] but during the reign of Ferdinand and Isabella, as Cavaillès and Klein have shown, the ravages of the enlarged and royally protected flocks of the Mesta during their annual migrations contributed far more to the deforestation and desolation of Spain than the building of the American silver fleets and the numerous Armadas.[58]

The floods which tumbled down from the mountains of southern Italy were undoubtedly increased in violence by the intensity of the rainfall for short periods of the winter season. In some Mediterranean countries records up to eight inches a day are not uncommon, and sometimes a large percentage of the annual rainfall will drop in a few hours. Commenting on the destructive effects of such rains in mountainous areas, W. G. Kendrew in his admirable work *The Climate of the Continents* (New York, 1942), points out (279) that the river-beds, dry, wide, and gravel-strewn in summer, often become filled in a few hours in winter by swollen torrents, and the mountain slopes, rapidly swept bare of their soil, are left to glare in the dazzling sunshine which soon follows.[59] In Lucania even gentle rains, if continued over a period of time, often lead to disastrous results, causing the clay to melt, slide, and flow in streams; vast stretches of a country, whose name once meant "woodland," become an infinite waste of white clay, a sea of chalk, monotonous, treeless, and as lifeless as the surface of the moon. Thus the incidence of torrential rains upon bare pastures and naked mountains more naturally explains the decline of land values (Juv. *Sat.* 4.27), depopulation (Cic. *ad Att.* 8.3.4), and the existence of deserts (Sen. *Ep. Mor.* 87.7) in southern Italy than the temporary devastations of Hannibal's war with Rome.

Unfortunately, however, the destructiveness of water erosion is seldom confined to upland meadows or mountain slopes. The silt, sand, and other debris which floods sweep down from eroding watersheds soon aggrade their channels; their mouths get clogged; the

[57] On the forests of Roman Spain, see R. Thouvenot, *Essai sur la province romaine de Bétique* (Paris, 1940) 19–20.

[58] J. Klein, *op. cit.* (see note 38) 306, 321; H. Cavaillès, *op. cit.* (see note 40) 318 ff. See also L. de la Laurence, "Les forêts d'Espagne," *Revue des Eaux et Forêts*, 28 (1889) 481–496.

[59] See also B. E. Fernow, *History of Forestry* (Toronto, 1911) 335–349; E. C. Semple, *op. cit.* (note 11) 92. On the effects of torrential rains on the denuded sections of Southern Italy, see especially the interesting article of H. v. Trotta-Treyden, "Die Entwaldung in den Mittelmeerländern," *Petermanns Mitteilungen aus Justus Perthes' geographischer Anstalt*, 62 (1916) 250

sediment-laden waters pour over the lowlands and form marshes, swamps, or lagunes. Thus in ancient Apulia as well as in the valley of the Rio Grande two kinds of badlands can exist side by side: sandy wastes and useless swamps (Cic. *de Leg. Agr.* 2.71: arena aut paludes). The frequent flooding of Apulian rivers turned a formerly healthy and productive coastal plain into one of the most virulent malarial swamps in southern Italy.[60] During the Republic the people of the ancient city of Salapia were obliged to move to a healthier site (Vitruv. *de Arch.* 1.4.12; Cic. *op. cit.* 2.71); in 49 B.C. Caesar's troops encamped in Apulia and around Brundisium were struck down by malaria before embarking for Greece (Caes. *Bell. Civ.* 3.2); writing from Brundisium, Cicero (*ad Att.* 11.22.2) reported he could hardly endure the malignity of that region. No wonder this part of southern Italy became depopulated (Cic. *ad Att.* 8.3.4). Curiously enough some writers explain the prevalence of malaria as the result of depopulation, an explanation which is almost as unscientific as Lucan's idea that malaria in Latium was caused by the civil war between Pompey and Caesar (Luc. 7.391 f.).

The Apulian seaboard was not the only part of southern Italy where malaria was prevalent. The coasts of Lucania, according to Nissen 2.889, were deserted and infected with malaria, a statement not to my knowledge confirmed by classical sources, but probably correct in view of the similarity between Lucania and Apulia in climate, geography, and economic conditions.[61] In fact, Strabo (5.4.13; cf. Nissen 1.335; Ciaceri 2.207), in his description of the west coast, remarks that Paestum was an unhealthy place because the Silarus just five miles north of the city had turned the coast lands into a marsh, since the floods were unable to find an outlet into the sea as a result of the silt blocking its mouth. Very likely the rugged and mountainous country through which the Silarus flowed had been partially deforested to build ships for the Roman navy during the Punic war (Livy 26.39.5); after the war, the whole region drained by the Silarus and its tributary the Tanagra and extending from Eburum southward to the coast, was incorporated into the public domain and leased to the cattle barons (*CIL* 1.638; Frank, *ESAR* 1.112 f.). In spite of the Gracchan land law, which deprived the cattle men of the use of a part of this

[60] W. H. S. Jones, *Malaria* (Cambridge, 1907) 68, thinks that malaria was brought into southern Italy by Hannibal's Carthaginian troops.

[61] Cf. E. Ciaceri, *Storia della Magna Grecia* (Milan, Rome, Naples, 1927) 2.207.

territory, the region was still in Vergil's time and later a great cattle country (Verg. *G.* 3.146; Hor. *Epod.* 1.27; *Ep.* 2.2.177; Varro, *RR* 2.1.16; 2.2.9; Juv. 8.179; cf. Greaves 135, 141, 322). One may, therefore, conclude that grazing, though possibly not the original cause of the deforestation of the Silarus River basin, was at least an important factor in preventing second growth and regeneration of the forests.

Of the districts of Lucania, Bruttium, and Calabria, which lie beside the Gulf of Tarentum, we can say little for want of ancient evidence. We do know, however, that the South Italian littoral was a rich grain market and exported grain to Greece (Soph. *Tript. ap.* Pliny, *NH* 18.65; Diod. 12.9.2; cf. Ciaceri 2.209; Rostovtzeff, *Storia Econ.* 10); but that, as in Sicily (Strabo 6.2.5–6), after the Punic wars grain fields were replaced by cattle and sheep enclosures. Metapontum, for example, whose coinage in early times bore the symbol of ears of corn (Strabo 6.1.15; Ciaceri 2.209), was in Varro's time nothing but a sheep pasture (*RR* 2.9.6). The same was true of Heraclea and the valley of the Sybaris and Crathis Rivers (Aelian, *Hist. Nat.* 12.36; Pliny, *NH* 31.13). All these districts, according to Strabo (6.1.11; cf. also Dio Chrys. *Or.* 33.401 M.), had by the time of the Empire fallen into decay and ruin, a result which Strabo naively blames on the Punic wars but which probably was a form of regional suicide. In short, Tarentum was the only Gulf city of any size and even that was largely forsaken (Frank, *ESAR* 5.136). On account of the recurrent flooding of the Galaesus, malaria was probably as prevalent here as at Paestum and along the Apulian seaboard. From the fact that Celsus (*De Medicina* 3.6.15) twice mentions Heraclides of Tarentum as an expert on the subject of malaria, Jones infers that Tarentum and its neighborhood were as badly infected as the coast-line of southern Italy is today.[62]

V

More extensive and noxious than any Apulian or Lucanian marsh, the deadly Maremma stretched along the coast of Etruria from the Arno almost to the Tiber. During the early centuries, that vast undulating plain had been as productive of timber and grain as the Pontine district of the Campagna (Diod. 5.40.3; Liv. 2.34; 4.12; 22.3: regio erat in primis Italiae fertilis; cf. esp. 28.45.15–

[62] Jones, *op. cit.* (note 60) 82.

16). At the high tide of Etruscan civilization in the sixth century B.C. its economy was capable of supporting some of the oldest and most magnificent cities of Italy.[63] Their prosperity had not greatly declined even after the Etruscan power was broken and Rome became the mistress of the peninsula. Livy (28.45) tells us that in 205 B.C. Caere, Volaterra, Rusellae, and Populonia supplied Scipio with grain, flax, timber, iron, and other materials for his invasion of Africa. After the Punic wars, however, their decline was rapid. The great iron-smelting city of Populonia, opposite the island of Elba, was eclipsed in the making of finished wares first by Arretium in 205 B.C. (Liv. 28.45) and later by Puteoli (Diod. 5.13; cf. Frank, *ESAR* 1.179 f.).

This decline of the coastal cities in population and industrial importance was preceded and conditioned by changes in the agricultural life of the region. The small farmer was being displaced by the large landlord; grain production was giving way to pasturage. Whether these changes in agriculture came about, as in Latium, because of local conditions — deforestation, soil deterioration, and erosion — or because of the economic consequences of the Roman conquest of the Mediterranean Basin — concentration of wealth in the hands of a small investor class, influx of foreign slaves, and the competition of the provinces in the production of grain — is difficult to determine. It is, however, almost certain that most of the territory had been converted to pasture by the second century, because the slaves, who revolted in 196 B.C. and were suppressed only by a regular Roman army commanded by a praetor (Liv. 33.36.1), must have been as unsupervised as the armed and dangerous herdsmen that gave Rome so much trouble in Apulia (Liv. 39.29.8; 39.41.6), at Brundisium (Tac. *Ann.* 4.27), and in Sicily (Diod. 34.36). Sixty years later, Tiberius Gracchus, passing through this part of Etruria on his way to Spain, was struck by the number of imported slaves, the dearth of native inhabitants,

[63] On Etruria and the Etruscans, see P. Ducati, *Etruria antica* (Florence, 1925); G. Dennis, *The Cities and Cemeteries of Etruria*[3] (London, 1883); G. Dottin, *Les anciens peuples de l'Europe* (Paris, 1916) 128–137; E. Pais, *Storia critica di Roma durante i primi cinque secoli* (Roma, 1913–1920) 1.345–361; D. Randall-MacIver, *The Etruscans* (Oxford, 1927); G. de Sanctis, *Storia dei Romani* (Turin, 1907–1923) 1.117–155; 434–436; H. Nissen, *op. cit.* (see note 7) 1.435; A. Piganiol, *Essai sur les origines de Rome* (Paris, 1917) 61–67; D. Randall-MacIver, *Encyclopaedia Britannica* s.v. "Etruscans"; L. Homo, *op. cit.* (see note 9) 54 ff.; J. Toutain, *op. cit.* (see note 21) 209 ff.; A. Minto, *Populonia, la necropoli archaica* (Florence, 1922); J. Falchi, *Vetulonia e la sua necropoli antichissima* (Florence, 1891); I. M. Greaves, *op. cit.* (see note 15) 496 ff.

and the desolate condition of the country (Plut. *Ti. Gracchus* 8.7). But the deplorable social and economic conditions witnessed by Tiberius were not as bad as those which developed later. At least the Aurelian Way, which ran from Rome up along the Etrurian coast, could be used without risk to a traveler's health until perhaps the end of the first century A.D. Pliny the Younger (*Ep.* 5.6.1) tells us that he was warned by a friend to avoid that route to his estate near the Umbrian border — the first indication, except for an obscure reference by Tibullus (3.5.1), that the Etrurian seaboard had become a malarious region.[64] As time went on that part of the country was evidently becoming too unsafe for travel between Rome and Spain, since the coastal route was bypassed by a long detour via Rimini and Bologna (*CIL* 11.3281–3284; cf. Kubitschek, *Österr. Jahreshefte*, 5 [1902] 40). What was the cause, one may ask, for the conversion of that rich and healthy region into the horrible Maremma? Perhaps there were several. Possibly too many trees were cut for timber; possibly, also, grain was raised, as in the valley of the Chiana, on slopes that ought never to have been ploughed. Nevertheless, it is significant that never until pasturage was conducted on a large scale did Etruria manifest obvious signs of decay, erosion, desolation, and the Maremma. With good reason could the Elder Pliny, surveying the effects which the large estate produced in Etruria, make the statement: Latifundia Italiam perdidere (*NH* 18.35).

VI

We may now conclude with a summary of the results of our investigation. In the historical introduction to this study (sections I and II, pp. 276–289), we found reason to believe that even before the Punic wars erosion in Latium compelled a shift from wheat growing to pasturage, not because the soil became exhausted from overcropping but rather because overpopulation had necessitated deforestation and cultivation of hillsides and steep gradients so that the erosive effects of seasonal rains and flash floods rendered the area increasingly unsuitable for agriculture. After the Punic wars pasturage became extensive and profitable in other parts of Italy, particularly in the South. This later development came

[64] Cf. Caes. *Bell. Civ.* 1.34; *CIL* 11, p. 416, 511; Plin. *NH* 14.67; 32.21; Rutil. Nam. *De Reditu* 1.223 ff., 281; Nissen, *op. cit.* 1.299; H. Dessau, *Geschichte der römischen Kaiserzeit* (Berlin, 1924–1930) 2.412 ff.

about from a variety of reasons: as an aftermath of the Hannibalic invasion the Roman state appropriated large tracts of devastated and confiscated land and abandoned farms, which were made available by lease or sale to grazing magnates; the Roman occupation of the provinces started a flow of capital and slave labor into Italy and created markets for meats and wool by raising the living standards of the upper and middle classes in Italian cities. All these factors combined to favor a vast expansion of the livestock industry and, as in Catholic Spain and in the American West, an intensive exploitation of the land beyond its grazing capacity. Particularly was this true of Calabria and Apulia, where ranches were to be found perhaps the equal of any in Wyoming or Australia. Thus Apulia, Calabria, Lucania, and Etruria began even during the Republic to show the same signs of deterioration and regional suicide as we find in some great cattle and sheep raising countries today: progressive degeneration of forest and pasture lands, disturbance of the hydrologic cycle, destructive floods followed by long periods of drought, increasing aridity and desiccation, the formation often within the same area of deserts and marshes, prevalence of malaria, apparent changes of climate, depopulation, and social decay.

This phenomenon of desolation and decay did not escape the observation of the Romans themselves but was variously explained. Strabo, like some modern historians, saw it as the consequence of the physical damage wrought by the Hannibalic invasion. For Lucretius (2.1157–1174) and for St. Cyprian (*ad Demetrianum* 3) three centuries later it apparently meant the inevitable senescence of the universe. Tiberius Gracchus, whose reenactment of an earlier second century prototype of our Taylor Grazing Act restricting the number of animal units allowed to graze on public lands (167 B.C.: Cato *ap.* Aulus Gellius 6.3.37: Appian, *Bell. Civ.* 1.8) implies a recognition of the problem of overgrazing, more correctly attributed it, as did Pliny (*NH* 18.35), to social injustice, landlordism, or the latifundia-system. From the evidence analyzed in this study one may reasonably infer that southern Italy was not an isolated community unable to this day to recover from the shocks of the Hannibalic invasion but rather an integral part of the Mediterranean economic system into whose orbit it fell after Rome conquered the provinces, thereby unleashing new economic forces which led step by step to the Italian agricultural revolution, land abuse, regional

suicide, depopulation, and permanent ruin. This is as far as our evidence will allow us to go.

While this investigation is not an attempt to explain the decline and fall of the Roman Empire and is not designed as a contribution to the theory of soil exhaustion as a factor in the decay of ancient civilization, it does seek to demonstrate that the overgrazing of ranch-lands was a contributing cause of the decay of a significant portion of ancient Italy.