CHAPTER ELEVEN

AN EARTHQUAKE AT SAN GIOVENALE IN THE 6TH CENTURY BC (?)

Archaeologists, in the past, have sometime ascribed disturbances and changes at their sites to earthquakes and then drawn far-reaching chronological and other conclusions.[208] However, as there is a "wealth of interesting problems concerning earthquakes in the field of archaeology", recent discussion within the new, interdisciplinary field of "archaeo-seismology" has formulated a number of theoretical and methodological *caveats* against too uncritical assumptions of seismic disturbance,[209] as an explanation of destruction features at archaeological sites. As pointed out by seismologist Emanuela Guidoboni: "In our present state of knowledge, there are only very few cases where an archaeological excavation has demonstrated beyond doubt the destructive effects of an earthquake".[210]

The Borgo NW archaeologists are aware of the difficulties and risks inherent in such assumptions. Yet they feel bound to consider a seismic event as the possible explanation of a number of unusual features of the site.[211] If this is right, it is of importance for Borgo NW but might also have the evidence of Italy's, so far, earliest approximately datable earthquake, older than the first known one in 461 BC reported for the year of the consulship of Publius Volumnius and Servius Sulpicius by Livy (3.10.6) and Dionysius of Halicarnassus (10.2.3): *eo anno ... terra ingenti concussa motu est*.[212]

EARTHQUAKES IN ITALY

Before going into the particulars of the evidence for such an assumed Borgo NW earthquake in Etruscan times, the hypothesis calls for some general comments on the seismic situation of Italy and on the results of recent historical seismology.[213] Three main questions arise in our context: how often do earthquakes occur in Italy, how can we date them and to what extent do such events produce an "earthquake awareness" in those exposed to the terrible experience or to the fear of it, an awareness possibly likely to influence building techniques and to explain anomalous construction praxis.[214]

Modern seismology tries to understand and, even though only remotely possible, to predict the disastrous consequences of the immensely slow and irresistible powerful movements of the tectonic plates of the earth's crust. The need to gain a time perspective of these plates and on the resulting tensions and destructive outbursts of seismic energy has produced the so-called "earthquake catalogues", i.e. lists of historically known earthquakes, their frequency, location, magnitude and intensity. Italy, Greece and Turkey, with their crucial position at the interface of the Eurasian and African tectonic plates, with their early urbanism and long tradition of literacy have a dense record of observations and speculations around the brutal activity of Poseidon, the Earthshaker.[215] Such observations were summarized by Gianotto Manetti in the pioneering first earthquake catalogue, *De terrae motu libri tres* of 1457, followed by numerous later, ever more complete ones culminating in the recent, impressive volumes by a number of Italian scholars, *Catalogo dei forti terremoti in Italia dal 461 a.C. al 1980* (1995)[216] and its companion *Catalogue of ancient earthquakes in the Mediterranean area up to the tenth century* (1989, English edition 1994).[217] In this context archaeology can become an important ally to the seismologists by finding and dating earthquakes not known from literary sources and thereby enriching their catalogues.

In Italy modern seismic research has documented some 346 rather well ascertained earthquakes in 2441 years, i.e. on the average one quake every seven years. A look at the four maps of the distribution and dates of early, historically known earthquakes in

[208] A paramount example is Schaeffer 1948, esp. pp. X–XII, 1–7 and 534–567.
[209] Cf. *Terremoti in Italia* 1995 and *Stabilità del suolo* 1997.
[210] Cf. Guidoboni 1996; Helly 1998.
[211] Blomé, Nylander & Pohl 1996; Blomé & Nylander 2001; Backe Forsberg 2005.
[212] Guidoboni 1989, 116, no. 009.
[213] Cf. recent literature: Guidoboni 1989; Boschi 1995; Stiros & Jones 1996; Waldherr 1997; Olshausen & Sonnabend 1998.
[214] The author experienced a violent earthquake in Iran in September 1962 with 20,000 dead; cf. "Sudden death" in Nylander 1969, 37–46 and Nylander 1997. While this chapter was being written in September 1999, Istanbul and then Athens were struck by disastrous earthquakes with many thousands of victims in Turkey and hundreds in Greece. A couple of months later, in March 2000, an earthquake of moderate magnitude struck various places not far from Rome, fortunately not as strong as that which struck Umbria and, above all, Assisi as recently as in 1997. In August 2000, moderately strong earthquakes occurred in northern Italy.
[215] Cf. Waldherr 1997, 221f.; Mylonopoulos 1998.
[216] Boschi 1995.
[217] Guidoboni 1989.

Fig. 123. Crack in the rock Na in room Ab from the north.

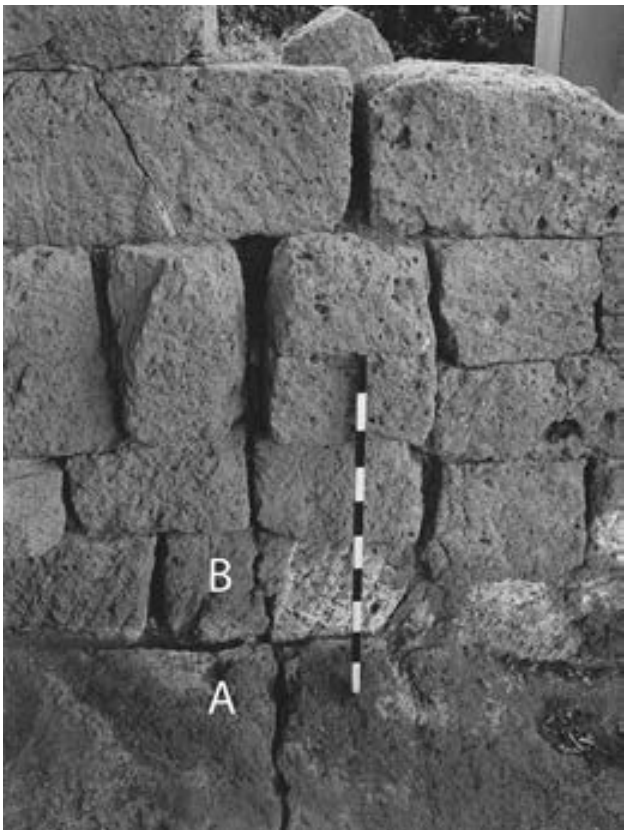

Fig. 124. Cracks in the tufa rock (at A) and the wall D3, block II:5 (at B).

the Mediterranean area published by E. Guidoboni and her colleagues will reveal their frequency and distribution.[218] But such maps do not always reflect objective facts but instead a slanted and complex source situation. In the early period of 760–303 BC, the Greek sphere is politically and culturally more advanced than early Italy, a fact reflected in the proportion of reported earthquakes: 24 Greek against only six Italic. But with Rome's increasing domination in Italy and the Mediterranean, in the years 287 BC to AD 100, the source situation changes parallel to the political integration and more extensive literacy at the centre of power: we now find 38 Italic quakes as against 30 in the eastern Mediterranean. Rome, of course, was not more hit by earthquakes than other places but now, instead, had more literate observers apt to remember and to be remembered. A similar situation is observed for the period AD 201–499, albeit now reversed due to the growing dominance of eastern Rome and Constantinople: 44 east Mediterranean quakes as against only 15 Italic, with 14 for Constantinople against eight for Rome. Finally, during the 500 years of the period AD 501–995, medievally dark Italy gives us only 16 quakes against 51 in the loquacious Byzantine world. All this means that the political, cultural and social background situation of the data complicates the overall situation. In any case, we can be quite sure that the number of 346 Italic quakes within 2,441 years, i.e. on the average one every seven years, is a minimum, much lower than reality.

This conclusion is amply confirmed by the better documented

Fig. 125. Crack in the tufa blocks in wall L1 continuing into the bedrock Na, seen from the south.

[218] Guidoboni 1989, 414–421, summary maps 760–303 BC; 287 BC–100 AD; 201–499 and 501–995.

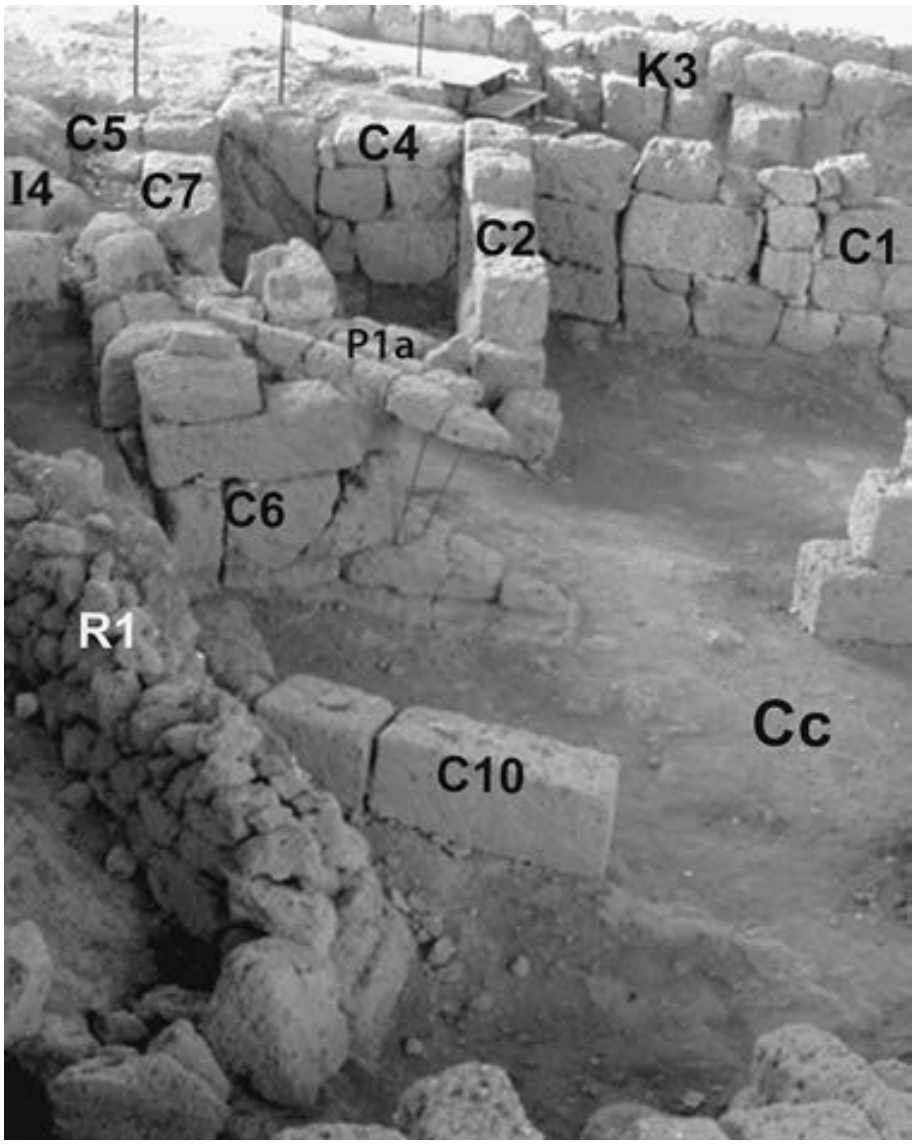

Fig. 126. Crack in the rock under House C, wall C6 (under the metal support for the Period 3 post-earthquake water channel P1a).

seven centuries from 1304 to 1980: in Italy we get 231 known earthquakes in 676 years, i.e. one quake every three years. During the 20th century Italy has had as many as 40 quakes, of which eight were of considerable intensity, with all in all more than 150,000 victims and causing immense destruction.[219] Such quakes are not spread out over the entire peninsula but mostly concentrated in certain geologically and seismically sensitive areas, and this means that in certain areas the memory and tradition of such events will have remained strong and alive. Even though Latium and Etruria are not within the most critical seismic zone, i.e. the Appennine chain, we know that in the past the Viterbese region has been struck several times, e.g. in 1349 and in 1695, and there will have been other seismic disturbances not mentioned in any sources. Some may remember the fairly strong earthquake which in 1971 partly destroyed Tuscania, only 26 km from San Giovenale: "20 morti, 140 feriti e oltre 4000 senzatetto … complessivamente 60% degli edifici risultò danneggiato".[220]

In short, even if there were fluctuations within this general earthquake frequency pattern, there is quite some probability that seismic disturbances were not unfamiliar to the people of the area and that there will have been enough such experience within a generation or two to produce what we might call an "earthquake awareness" in many people. We know from ancient texts that earthquakes—*motus terrae*—and rumblings of the earth—*sonitus, fremitus, mugitus terrae*—were known, much feared and terribly serious things, the very worst signs—*ostenta*—of divine displeasure and warning to be imagined.[221] The Etruscan *libri rituales* devote much discussion as to how to interpret such signs, and Cicero, Livy, Seneca and others often dwell on these phenomena.[222] The threat of quakes is one of the themes in the

[219] Between 1894 and 1981, Greece suffered eight major quakes with magnitudes between 5.9 and 6.9; cf. Ambraseys 1996. In the Troad about 25 quakes were recorded between 1912 and 1975; cf. Rapp 1982.

[220] For Tuscania, cf. Boschi 1995, 540f.

[221] Thulin 1909, 86f.; Pfiffig 1975, 140–142.

[222] Cf. Waldherr 1997, 130f.

Fig. 127. Crack in wall C6, detail of *Fig. 126*.

well-known Etruscan "Prophecy of Vegoia".[223] All this is enough to show that earthquakes and the fear of such were a fact of life in Etruria and Rome,[224] and enough to consider a seismic disturbance in the San Giovenale area as theoretically possible.

EARTHQUAKE IN BORGO NW (?)

A number of vertical fissures and cracks run on and around the Borgo and, not least, through the walls of the buildings in the Borgo NW area. This is in itself not surprising. Such cracks may be due to the slow and timeless strains and stresses endured by the soft tufa stone and can occur when the friable and load-carrying tufa blocks react to changes of temperature and humidity. However, a number of these cracks continue down into and along the bedrock, running in a rough north–south direction. There can be little doubt that such cracks and fissures were caused contemporaneously by the very same force which, as far as we understand, is most likely accounted for by the assumption of a seismic disturbance. This assumption is strengthened by the existence of a number of other substantial cracks and fissures in the bedrock running in the same north–south direction, one of which has caused the big chunk of rock to slide down the slope, causing the partial disappearance of some of the constructions (especially in the Na-area, room Ab, and cuttings Q6 and Q7) and the displacement of part of the fortification wall and the rock beneath.

Some series of cracks through walls and ground, running north–south, are particularly noticeable:

1. A big part of the rock Na, of the cuttings Q6-Q7, of the construction Ma-Mb and the fill and the room Ab were destroyed and partly slid down the north-west slope (*Fig. 123*).

2. Terrace foundation Mc, connected with the major fissure in the tufa rock, goes behind the Mc foundations into north-east direction through major destruction onto the Nb-Nc-area.

3. House D, the crack of wall D3 (*Fig. 124*) continues in the Lane K bedrock, through House B's destroyed room Bb and the two walls L1-L2 of the Drain L (*Fig. 125*) and then goes through area Na and meets the Mc fissure.

4. House C, the crack of room Cb, of wall C6 (*Fig. 126*, in the centre picture, and *Fig. 127*) and the bedrock seems to go on to wall L3 of the Drain L. House C, in addition, displayed possible repairs on the upper walls, where the archaeologists documented a number of clay mudbricks, fragments of tiles and broken pottery.

We wonder whether perhaps the majority of these cracks, fissure and destruction may have occurred at the same time and were caused by a minor earthquake, if so probably one with a distant epicentre but still destructive at San Giovenale.

Crevice, crack and chronology

In a seismically sensitive region, an earthquake causing fissures in the ground and the tufa walls to crack can occur any time. Thus, the assumed Borgo NW earthquake (?) could date at any moment between the late 7th century BC and the Swedish excavation in AD 1956. However, a number of puzzling features on the site may perhaps assist in locating this hypothetical seismic event more precisely in time. In the later 6th century BC, a number of radical changes were undertaken by the inhabitants of the Borgo NW area. House C and the nearby Lane K were suddenly filled in with a huge, approximately 1 m thick fill, consisting of earth, rubble, broken tiles and pottery. On top of this fill,

[223] Thulin 1906, 3–8; Thulin 1909, 52f.; Pfiffig 1975, index "Vegoia"; Valvo 1989. Cf. also Barzanò 1989.

[224] Cf. G.H. Waldherr, "Naturkundliche Erdbebentheorie, Erdbebenprognose und Bebenprophylaxe in der Antike" (lecture given at 8. Corso intensivo 'cultura sismico locale', 14–20 October 1998, Ravello). I am grateful to Prof. Waldherr for his kindness to send me his unpublished lecture manuscript.

the new wall C11/K4 is laid out which does not respect the old plan of the house and which, in addition, blocks the nearby Lane K. The result is a new building on a much higher level of which there remains only its south wall with its strong foundation. In the eastern part of House C, close to the rising tufa rock, the fill is strengthened by the addition, on top of some fill material, of a sequence of clumsily coordinated blocks facilitating the access to the newly constructed Well P1. This radical reorganization of the House C-area seems to have been accompanied by other important changes in the surroundings. The Area R was partly filled in, and so were parts of courtyards Cc and Bc and new levels established. The A-area was remodelled on a higher level and new and quite different constructions were built. It is not always possible to prove that all these changes were contemporaneous, but there is quite some probability.

In short: at some point a major fill operation and an ensuing reorganization of the area took place. It is tempting to connect this far-reaching reconstruction with the assumed earthquake that had cracked the walls of several of the Borgo NW buildings. But there may be more: on the floor level beneath the Great Fill in House C was found broken pottery and a number of chunks of mudbrick-like clay and fragments of tiles, at least one of which decently preserved. It is as if a roof and the upper, mudbrick parts of the walls had collapsed. An analysis of the pottery found on the floor and of that in the Great Fill about the floor tends to indicate an approximate date of *c*. 550 BC for the material of the floor deposit and a date of *c*. 530 BC for the latest material in the fill.