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Dental health and affiliations of inhabitants of the ancient Greek colony in Metaponto, Italy (6th - 3rd century BC)

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2011-03-23
http://hdl.handle.net/10539/9210

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The teeth are the hardest part of the human body and can often survive in the ground even under unfavourable conditions. The teeth are often the only part of a human skeleton excavated from the burial ground. They can provide information about the individual's health, habits and biological affiliations. Similar to any other part of the human body the teeth undergo evolutionary changes in time. They are sensitive to changes in hygienic habits, diet, and to physiological changes during their development in childhood (Hillson 1996, Larsen 1997).

1.7. The aim of the study

The aim of this study is to evaluate dental health of the rural population of Metaponto and establish its affiliations to other populations using dental traits.

With respect to dental health previous assumptions can be treated as testable hypotheses and tested accordingly:

1) It is assumed that dental health reflects the general health status of the population. This hypothesis will be tested by comparing the prevalence of caries, periodontal disease, hypoplasia and periapical abscesses with palaeopathological findings on bones in the Metapontine material. Further, it is assumed that the systemic diseases, signs of which have been found in the skeletons of the rural sample, can worsen the dental conditions in the population. This hypothesis can be tested by comparing the dental health of individuals with and without signs of systemic diseases.

2) If dental health reflects overall health status it can be used to falsify notions of well being of the inhabitants of Metaponto derived from classical history and archaeological studies.

3) It is assumed that urban living conditions in ancient Greece were generally better than that of rural people. That assumption will be tested by comparison of the dental health of the rural and urban samples.

4) Whether and to what extent the dental health of the colonists was affected by new environmental conditions encountered in occupied lands will be shown by comparison of dental conditions of the rural Metapontines with the dentition of various European and world-wide populations. Dental health of populations living in extremely poor conditions (slaves) or in very harsh environment (nomadic populations) and modern populations of a traditional economy similar to that of the ancient Greeks will provide contrast to dental health status of the Metapontines.

In an attempt to establish biological affiliations of the rural people quantitative and qualitative dental traits will be used to test the hypothesis that the biological distance of the rural population is smallest to the Greeks, the colonists' population of origin. The hypothesis of gradual assimilation of local Italic populations into the Greek culture as indicated by the archaeological evidence from the rural cemetery in Metaponto will be tested on a biological level.

Finally, the author will try to ascertain whether the people from the chora of Metaponto buried their relatives in family plots as suggested by the analysis of grave goods. If so, the hypothesis tested here will be that the people buried in the family groups show more biological similarities to each other than it would be expected between the people in the entire rural population of Metaponto.

Detailed questions regarding the above hypotheses are listed in the following chapters of the thesis.

2. SKELETAL AND DENTAL MATERIAL

2.1. General description of the skeletal material

A total of 272 human skeletons were recovered from the four burial sites Pantanello, Saldone, Sant'Angelo and Pantanello Sanctuary Celeste in the rural area surrounding the Ancient city of Metaponto. This represents the largest skeletal sample ever excavated from the rural areas of the territories colonised by the Greeks.

The sites are located Northwest of Metaponto, between two rivers, Basento to the Southwest and Bradano to the Northeast, which flow into the Gulf of Tarent of the Mediterranean Sea (Figures 1.3-2, 2.1-1). More detailed plans and maps of the excavated area and of the archaeological material from the sites can be found in Carter (1990a, 1998a).

The burials were dated to 600-250 BC. One of the most reliable and accurate methods of dating the burials from this period is the analysis of pottery associated with the graves. From the written historical sources and analysis of styles in which the pottery was decorated, archaeologists can date the burial to within 10 years (De Juliis 1977, Elliott 1998, Burn 1998). By combining date estimates based on various types of pottery and grave goods it was possible to date the majority of burials from the rural necropolis of Metaponto (Carter 1998a, Morter and Hall 1998). Among 272 burials with the skeletal remains only three burials (1%) could not be dated at all for lack of cultural and archaeological information. About 70% of burials with preserved skeletons were dated within the range of 10-50 years. For the remaining 30% of burials the dating range was broader and in a few cases as broad as five centuries, despite various dating techniques used including chemical methods (Carter 1998a). The proportion of burials

with dentitions which could be dated within a close range of 10-50 years was 77.3% and similar to the proportion in the entire skeletal sample.

The first of these rural necropoleis, Saldone, was associated with the remains of a single farmhouse. It was excavated in 1976 by an American team and yielded 30 burials with bone fragments of 14 individuals (Carter 1990a). In 1979, the same team excavated Sant'Angello Vecchio, another rural burial ground, also near an individual ancient farmhouse. This necropolis added the bone fragments of 6 individuals to the previously obtained skeletal material. Fragments of one inhabitant were also found near the Sanctuary of Celeste in 1978 while the team surveyed an area of the farmhouses scattered through the fields (Figure 1.3-2). The largest burial ground is the Pantanello cemetery, located 3.5 km Northwest of the borders of the city of Metaponto. This site was discovered and excavated during the summer and fall of 1983, 1984 and 1986 (Figures 2.1-1 and 1.3-2). A total of 320 burials with fragments of human skeletons belonging to 251 individuals were recovered there during four archaeological campaigns (Carter 1980, 1990a,b, 1998a).

2.12 Urban sample - reference material and its brief description.

Remains were also obtained from an urban cemetery of the city of Metaponto (Figure 1.3-2).The Crucinia cemetery was excavated by Italian classical archaeologists in the 1960's and early 70's and from these excavations there were no skeletal remains preserved for the present study (De Siena and Carter, personal communication, archives and field notes of the Museum of Metaponto). The second part of this urban burial ground was excavated recently by another Italian team of classical archaeologists from the Museum of Metaponto. In the summer and fall of 1991, 1992 and 1993 the team excavated over six hundred graves from which human bone fragments of some 412 individuals were recovered. The author performed a preliminary anthropological

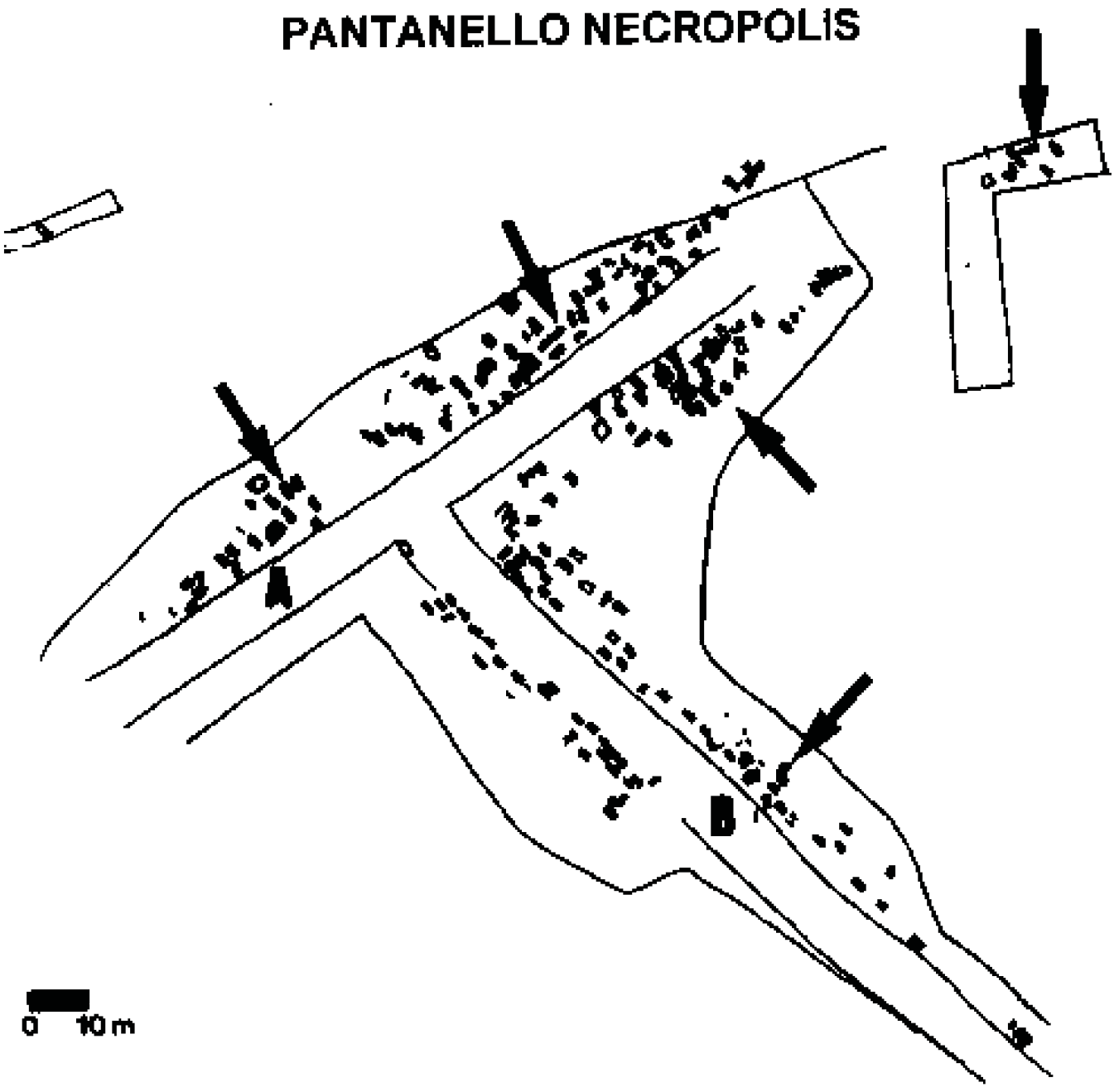


Figure 2.1-1. Schematic plan of the excavated area of the largest rural necropolis at Pantanello (modified from Carter 1998). Burials were placed along two ancient roads, Basento Road (A) and Division Line Road (B). The arrows point to the rectangles each representing a single burial.

analysis of the new skeletal material from the urban cemetery in the fall of 1991 and 1992 (R. Henneberg 1991, 1992, unpublished reports). Some 240 skeletons were excavated at that time. In July 1993 the rest of the skeletal sample from Crucinia was examined by the author and M. Henneberg together and preliminary analysis was conducted on the material (Henneberg et al. in preparation). Detailed studies of the entire skeletal sample from Crucinia are in progress.

These urban remains will be used as a reference sample to compare and contrast with the rural populace that comprises the focus of this thesis.

2.13. State of preservation of the skeletal material from rural Metaponto.

The systematic anthropological analysis of the skeletal sample from the rural area of Metaponto was begun in 1985 and was being carried out by a small team of physical anthropologists including the author under the direction of Professor M. Henneberg recently of the University of Adelaide. The work on the skeletal material started with a thorough cleaning and reconstruction of the broken bones. As can be seen in Table 2.13-1, the state of preservation of the skeletal material varied widely and is described here in four categories: 1) complete: all bones of an individual were present and in good condition, 2) nearly complete: bones of all major parts of the body diagnostically important for sex and age determination were present (such as the skull, pelvis, long bones, teeth and ribs), 3) fragmentary: one or more major parts of the skeleton were missing (e.g. skull or pelvis was missing, or skeleton was in many small pieces), 4) very fragmentary: only pieces of various bones were preserved (in one case only one tooth was found within the burial) (Henneberg and Henneberg 1998a) (Tables 2.13-1 and 2.13-2).

The Table 2.13-1 below shows the proportion of skeletons preserved in each category while in the Table 2.13-2 (see the end of this chapter) state of preservation of each individual skeleton is described according to the adopted four category scale.

Table 2.13-1. State of preservation of the skeletons from the rural area of Metaponto.

Category	Number of skeletons				total	
	Pantanello		Other burial grounds		All	
	N	%	N	%	N	%
complete	-	-	-	-	-	-
nearly complete	77	30.7	7	33.3	83	30.9
fragmentary	114	45.4	11	52.4	125	45.0
very fragmentary	60	23.9	3	14.3	63	23.2
Total	251	100.0	21	100.0	272	100.0

Several factors contributed to the state of preservation. Individuals were buried in several types of graves. The most elaborate tombs, and the least common (24%) were made from stone and arranged as stone boxes with heavy stone covers (cysts and sarcophagoi) (Figure 2.13-1). The second type were ceramic tile containers of various construction in which 44% of the individuals in the Pantanello necropolis were buried (Figure 2.13-2). The third category of burials, consisting of earthen graves or pits (fossa), was also common (32%) (Carter 1990a, 1998a) (Figure 2.13-3). Each type of burial produced different conditions under which the body decomposed along with the different potential for mechanical damage during the time the body rested in the grave.

The excavated area has been under intensive cultivation for centuries. The movement of soil during agricultural activities and environmental phenomena such as floods, and later use of heavy equipment on the fields induced breaking of the stony



Figure 2.13-1. The tomb number 350, unearthed during the last season of archaeological excavations at Pantanello in the summer 1986 (with the author at the side). The stone lid was taken off from the sarcophagus revealing the almost complete skeleton of a young female (25-30 years old). The bones were fragile and scattered, presumably the result of flooding. The burial was dated to 458-438 BC on grounds of pottery found inside the tomb. Among the grave goods were 11 vases, metal ornaments, alabastron (an expensive vessel made of onyx and popular as a gift) and a unique engraved mirror with a mythological scene at the back. Grave offerings found in this tomb placed it among the richest in the rural necropolis (Carter 1998a).



Figure 2.13-2. The burial number 327. The body was placed in a cappuccina, a tomb made from terracotta tiles. No grave goods were found in this tomb and therefore the dating was 470-275 BC. based entirely on the type of the tomb. Despite the nearly complete skeleton excavated from the soil, conditions inside the tomb made bone brittle and crumbling. The surface of the bone was also damaged. The male, 35-45 years old had some lipping on bodies of lumbar vertebrae.



Figure 2.13-3. The burial number 347 and dated to 410-370 BC on grounds of pottery surrounding the body. A near complete well preserved skeleton of a 60-x years old male was found in a simple earthen grave called fossa. The individual had extensive lipping on vertebral bodies and fused together atlas, axis and the third cervical vertebrae.
The photograph shows the last stages of excavation of the skeleton before the bones were lifted from the soil and placed in the wooden box.

covers and tiles which then fragmented the more fragile bones inside the boxes. The use of modern methods in agriculture such as chemicals, to improve soil quality also had an impact on the preservation of some of the skeletons. Natural conditions such as water drainage through various types of soil, air passing through the stone boxes, small animals exploring graves and plants growing in the vicinity of burials added to the damage. In extreme cases, however rare, excavated burials contained whole skeletons, but the bones were affected by chemicals, water and air and disintegrated under even the most careful handling in the field.

Other factors could also contribute to the final preservation and difficulties encountered in analysing the material. During the first years of excavations (1974-1985) there was no physical anthropologist present who was adequately trained to excavate human skeletons in various soil conditions. Due to the salvage nature of this operation little time could be devoted to a single grave. The lack of experience in excavating the human skeletons among classical archaeologists further contributed to the state of bone preservation. Finally in a few cases the bones were disturbed by grave robbers seeking ancient Greek grave goods.

Despite often poor preservation of the human remains from the rural Metaponto (Table 2.13-1), in 93% of the unearthed skeletons it was possible to determine sex and establish age at death of the individual. Results of sex determination and sex ratio are summarised in the Table 2.13-3 (next page).

Table 2.13-3. Proportion of females, males, children and unsexed individuals from the rural necropoleis of Metaponto.

Burial site	No of individuals					
	Female	Male	F/M ratio	Children and youths	Unsexed	Total
Pantanello	128	68	1.88	42	13	251
Saldone	6	4	1.50	3	1	14
Sant'Angelo	2	4	0.50	0	0	6
Celeste	0	1	-	0	0	1
Total	**136**	**77**	**1.77**	**45**	**14**	**272**
Proportion(%)	50.0	28.3		16.5	5.1	99.9

The reference sample from the urban cemetery was in a similar state of preservation as conditions at both cemeteries in the Metaponto area in general and during excavations, did not differ much from each other. Among 412 individual skeletons in the total sample excavated at Crucinia there was no complete skeleton , 9% were nearly complete, 52.4% in fragmentary condition and 38.6% very poorly preserved. It was possible to establish sex and estimate age for around 90% of individuals in this sample.

2.14. Other studies conducted on the rural sample

Other studies of the skeletal material from the rural area of Metaponto consisted of reconstructing body size, typing major blood groups on bones, craniometry and facial reconstructions, observations and descriptions of pathological conditions, observations of epigenetic traits and other variations on human skeletons, palaeodemography, and of ecological observations to estimate the caloric needs of the Pantanello population (Henneberg and Henneberg 1987, 1990a, 1990b, 1993, 1998a, Henneberg et al. 1992). A preliminary study to establish whether the cemetery was divided into family plots was also conducted using selected cranial, dental and biochemical characteristics

such as metopism, markers of major blood groups etc. (Henneberg and Henneberg 1998b).

2.2. General description of the dental material

The study of the dentition of the population from ancient Metaponto from the three rural burial sites and also from the urban site was conducted exclusively by the author. Number of teeth recovered for each individual and total number of teeth in the rural and in the reference urban sample are shown in the Tables 2.2-1, 2.2-2 and 2.2-3.

It should be noted that the number of individuals and number of teeth in both samples in each particular investigation fluctuated due to the preservation of the material, conditions of the teeth, for example dental wear and the nature of the problem addressed.

a) rural sample - size and state of preservation

The data collection and analysis of the material from the rural necropoleis began in 1985 and was continued during 1986, 1988, 1990, and 1991.

The dental material analysed in this study consisted of 2325 teeth from 163 adults and permanent dentition of 13 sub adults (Table 2.2-3).

Approximately 60% of teeth were in their sockets or loose but with matching pieces of maxilla and mandible (Figure 2.21-1). The remaining 40% of teeth were found loose in the graves and with no corresponding fragments of the maxilla or mandible. The total number of permanent teeth recovered was 2473 including those of sub adults, and total of 3037 sockets were available for examination.

The average number of teeth per individual recovered during excavation was 14.4 for males and 14.2 for females and the difference between sexes was not statistically significant. For children, this ratio was 10.5 permanent teeth per person as the age of the children varied from 2 to 18 years, and for the youngest children only molars (erupted

or germs) were considered in the analysis. In the entire sample the number of teeth per individual recovered and available for observation was 14.1. This ratio compared well with values for other archaeological dental samples world-wide and used for various analyses (Table 2.2-4). The dental material from Metaponto was then as representative of the entire dentitions as in other archaeological samples allowing further comparisons between populations.

Very few individuals in the sample had complete sets of teeth preserved at death and even fewer had complete dentition recovered during excavation (Table 2.2-1). While only one female out of 104 had a complete set of teeth available for examination this was the case for 5 out of 59 males. The difference was statistically significant as tested with Chi-squared test for proportions in independent samples (Snedecor and Cochran 1982).

In most individuals the teeth were well preserved. However in few cases the entire set of dentition was affected by high soil pH due to chemicals used in modern farming. In such cases the tooth enamel surface was damaged, limiting the author's observations. Some teeth, but very few, were damaged mechanically *post mortem*, when the enamel was chipped off the tooth surface during excavations or cleaning and the damage made measurements of some tooth diameters impossible and other observations unreliable. In such cases the damaged tooth was excluded from the studies. When the tooth diameters could not be measured due to extensive wear or caries, the tooth was still included in the other parts of the analysis. Detailed rules according to which the data on teeth were collected are described in the Methods section.

b)urban sample - reference material, its size and state of preservation

The comparative data from the urban dental sample were gathered during the 1991, 1992, and 1993 as the field work on the Crucinia necropolis and the preliminary analysis of the skeletal material progressed. For the purpose of this thesis collecting of

dental data in this sample was finished when the total number of individuals with teeth examined, approximated the total number of individuals with teeth in the rural sample regardless of sex ratio and number of sub adults. At this time the total number of skeletons with teeth from Crucinia necropolis and population characteristics of the entire urban skeletal sample were still unknown because the examination of the urban material was not completed.

Total number of 2035 permanent teeth and 2509 sockets were available for examination from 175 individuals (90 females, 76 males and 9 subadults).This comprised the reference sample (Table 2.2-3).

The general state of preservation of the urban dental sample was similar to the rural one.

TABLES

Table 2.13-2. List of skeletal material from rural area of Metaponto.

Sex, age and state of preservation. Burial dating.

Females are described as F, males as M, children and youth as Ch, unsexed individuals as ?, probable females as F?, probable males as M?. Age is in years or in months if "ms" is added. An asterisk in the column "dentition" indicates that at least one tooth or a fragment of a jaw with tooth sockets is present.

For dating of the burials see Carter, 1998a.

No	Tomb #	Dating average yrs BC	Sex	Age	State of preservation General	Dentition
	PANTANELLO					
1	82 10-3	450	F?	adult	very fragm.	
2	82 12	291	?	35-x	fragm.	
3	82 13-6	300	M	40-45	nearly complete	*
4	82 18-2	300	Ch	5-6	one tooth only	* fragm.
5	82 19-2	360	M	30-40	fragm.	
6	82 21-2	360	F	25-30	nearly complete	*
7	82 22.1	458	F	45-55	nearly complete	*
8	82 24-1	300	F?	40-x	very fragm.	
9	82 25-1	0	F	25-35	fragm.	*
10	82 26	360	F	30-40	fragm.	
11	83 27-5	446	F	30-35	fragm.	*
12	83 28	360	F	45-55	fragm.	*
13	86 29-5	450	Ch	new born?	very fragm.	
14	83 32	300	M	50-70	fragm.	*
15	83 35	450	F	30-40	fragm.	*
16	83 36,a	375	F	30-40	fragm	
17	83 36,b	375	M	35-45	fragm.	*
18	83 36,c	375	F	25-30	fragm.	
19	83 39-4	500	M	40-50	fragm.	
20	83 41-3	425	Ch	new born	fragm.	
21	83 42-1	415	Ch	2	nearly complete	*
22	83 43-1	340	F	40-50	nearly complete	*
23	83 44-1	298	Ch	1	very fragm.	
24	83 45-1	375	Ch	2	fragm.	*
25	83 46-1	313	Ch	5-6	nearly complete	*
26	83 47-3	300	F	40-50	fragm.	
27	83 48-8	404	F	25-50	very fragm.	
28	83 49	445	F	35-40	nearly complete	*

29	83	50-4	410	F	30-35	fragm.	*
30	83	52	325	M?	15-19	fragm.	*
31	83	53-4	450	M	30-35	nearly complete	*
32	83	54-8	463	F	20-25	fragm.	*
33	83	55-2	346	F?	25-50	fragm.	
34	83	56-4	461	Ch	18-24 ms	fragm.	*
35	83	57-1	300	F	20-25	nearly complete	*
36	83	59	375	F	35-45	nearly complete	*
37	83	62	315	F	60-70	fragm.	fragm.
38	83	62-2	315	?	adult	very fragm.	
39	83	64-2	338	F?	30-40	fragm.	fragm.
40	83	66-5	430	F	22-27	fragm.	*
41	83	67	300	F	70-x	fragm.	*
42	83	68 A	310	M?	25-40	very fragm.	
43	83	69-11	406	F?	25-30	nearly complete	*
44	83	70-3	445	F	25-30	fragm.	*
45	83	71-24	303	F	20-25	nearly complete	*
46	83	72-2	300	F	70-x	nearly complete	*
47	83	73-2	300	?	adult	very fragm.	
48	83	74-4	305	F	60-x	fragm.	*
49	83	75-6	292	M	25-30	fragm.	
50	83	76-7	393	F	50-60	nearly complete	
51	83	77-1	450	Ch	3-6	very fragm.	
52	83	78-7	290	M	60-70	nearly complete	*
53	83	79-3	300	F?	40-50	fragm.	*
54	83	80-1,a	294	F	25-30	nearly complete	
55	83	80-1,b	294	M	50-60	nearly complete	*
56	83	80-2	294	F	40-50	nearly complete	*
57	83	81-3	485	F	25-30	fragm.	*
58	83	82	300	F	20-24	nearly complete	*
59	83	83-1	373	F	25-30	fragm.	
60	83	84-3	373	?	adult	very fragm.	
61	83	85-1	294	M	25-30	nearly complete	*
62	83	86-7	422	F	35-45	fragm.	*
63	86	87	410	Ch	2-4	very fragm.	*
64	83	88	423	Ch	3	very fragm.	*
65	83	90-2	300	?	20-40	very fragm.	
66	83	91	300	F	25-30	fragm.	*
67	83	92	300	F	40-50	nearly complete	*
68	83	93-3	288	M	70-x	fragm.	*
69	83	94-5	288	M	20-25	nearly complete	*
70	83	95	423	Ch	10-14	very fragm.	*
71	83	96-3	341	F?	20-25	very fragm.	*

72	83 97	373	F	20-25	fragm.	*
73	83 98-3	450	Ch	2-6	very fragm.	
74	83 99	300	F	25-35	nearly complete	*
75	83 100-5	300	F	25-30	fragm.	
76	83 101-2	300	F?	20-40?	very fragm.	
77	83 102-4	288	F	70-x	fragm.	
78	83 103-4	288	M	20-25	nearly complete	
79	83 104-4	300	?	adult	very fragm.	
80	83 106	405	M	25-30	fragm.	*
81	83 107	420	M?	25-40	very fragm.	
82	83 108-2	488	Ch	0-1 inf.	very fragm.	
83	83 110	390	F	50-60	nearly complete	*
84	83 111	299	F	25-30	nearly complete	*
85	83 114	375	Ch	12-18 ms	fragm.	*
86	83 115	410	F	22-25	nearly complete	* fragm.
87	83 116	390	Ch	new born	very fragm.	
88	83 116-4	390	Ch	3-4	fragm.	*
89	83 117	385	M	30-40	nearly complete	*
90	83 118	360	F	30-40	fragm.	
91	83 119	299	M?	25-35	very fragm.	*
92	83 124	340	M	20-25	nearly complete	*
93	83 125	313	F	25-30	nearly complete	*
94	83 127	385	M	70-x	nearly complete	*
95	83 128	392	F	40-60	fragm.	* fragm.
96	83 129	480	F	60-x	fragm.	*
97	83 130	496	Ch	8-10	fragm.	*
98	83 131	513	F	35-45	nearly complete	*
99	83 132	294	F	22-25	nearly complete	*
100	83 133	300	F	50-60	nearly complete	*
101	83 136	419	F	20-25	nearly complete	*
102	83 137	500	F	35-40	fragm.	*
103	83 142	395	F?	25-30	nearly complete	*
104	83 143	309	F	40-50	fragm.	*
105	83 144	296	F	30-35	nearly complete	*
106	83 145-4	350	M	30-35	nearly complete	*
107	83 149-4	445	F	30-40	nearly complete	*
108	83 150	300	M	25-x	very fragm.	
109	83 151	450	Ch	3-4	nearly complete	*
110	83 152	379	M	40-50	nearly complete	
111	83 153	395	M	25-35	fragm.	*
112	83 154	398	F?	30-40	very fragm.	
113	83 155	345	F	30-40	fragm.	*
114	83 156-6	350	Ch	0-11mos,ir	very fragm.	

115	83 158	538	F	30-40	fragm.	* fragm.
116	83 160	373	M	40-50	nearly complete	*
117	83 162	373	Ch	10-14?	very fragm.	
118	83 164	380	F?	20-25	very fragm.	*
119	83 188	458	M?	50-60	fragm.	
120	83 189	303	F	50-x	fragm.	
121	83 190	293	M	22-25	nearly complete	*
122	83 191,a	550	F	35-45	very fragm.	
123	83 191,b	550	Ch	+/-6mos,in	fragm.	
124	83 192	300	Ch		fragm.	
125	83 195-5,a	309	F	25-40	fragm.	
126	83 195-5,b	309	Ch	6-7	fragm.	*
127	83 196	478	F	30-40	fragm.	*
128	83 197-2	373	F	25-40	very fragm.	
129	83 198-5	392	F	30-40	fragm.	*
130	83 209	433	M?	20-25	fragm.	*
131	83 210,a	470	F	25-30	fragm.	*
132	83 210,b	412	Ch	?	very fragm.	
133	83 212-7	404	F	15-19	fragm.	*
134	83 213	395	F	35-40	fragm.	*
135	83 215-1	458	M?	30-40	very fragm.	*
136	84 216-4	385	M	25-30	fragm.	*
137	84 217	457	F	25-35	nearly complete	*
138	84 218	458	F	35-45?	fragm.	*
139	84 219-1	390	F	25-30	fragm.	*
140	84 219-1-B	390	F?	30-40	very fragm.	*
141	84 220-3	455	M	30-35	nearly complete	*
142	84 221	455	M	25-30	fragm.	* fragm.
143	84 222-3	391	F?	20-25	fragm.	*
144	84 223	483	F	40-50	nearly complete	*
145	84 224	513	F?	adult	very fragm.	
146	84 225-1	458	M	30-40	fragm.	*
147	84 226	385	F	30-40	fragm.	
148	84 228	412	M	20-25	fragm.	*
149	84 229	395	M	50-60	nearly complete	
150	84 231-1	387	M	20-25	fragm.	*
151	84 232	300	M??	25-x	very fragm.	
152	84 233	288	?	adult	very fragm.	
153	84 234-1	373	M?	60-x	fragm.	*
154	84 235	429	F	20-25	fragm.	*
155	84 236-3	468	F?	40-50	fragm.	*
156	84 238	373	F?	adult	very fragm.	
157	84 239-1	425	Ch	1-1.5	fragm.	*

158	84 240-3	445	M	30-40	fragm.	
159	84 241-1	375	Ch	4-5	fragm.	*
160	84 242-1	375	Ch	0-1,inf.	very fragm.	
161	84 243-5	297	F	25-30	nearly complete	
162	84 244	450	M	25-30	fragm.	*
163	84 245-4	424	F	40-50	nearly complete	*
164	84 246-3	450	M?	70-x	fragm.	*
165	84 247a,b-f	600	M?	50-x	fragm.	*
166	84 248-3	440	Ch	2	fragm.	*
167	84 249	458	M	60-x	fragm.	*
168	84 250-4	425	F?	adult	very fragm.	
169	84 251	420	F	60-x	nearly complete	*
170	84 252-9	427	F	25-30	fragm.	*
171	84 253-3	300	F	70-x	fragm.	*
172	84 254-2	310	F?	25-x	very fragm.	
173	84 255-2	445	F	60-x	fragm.	*
174	84 256-6	450	Ch	2	fragm.	*
175	84 257-1	300	F	40-50	nearly complete	*
176	84 258-5	298	F	70-x	nearly complete	* fragm.
177	84 259-7	420	F	50-60	fragm.	*
178	84 260-1	450	F	50-60	fragm.	*
179	84 261-2	450	F	30-40	fragm.	*
180	84 263	450	Ch	0-1,inf.	very fragm.	
181	84 265-2	480	M	50-60	nearly complete	*
182	84 266	466	M	30-35	nearly complete	*
183	84 268	373	Ch	2-3	fragm.	*
184	84 269	375	Ch	0-2ms.	very fragm.	
185	84 270	288	?	adult	very fragm.	
186	84 271	390	Ch	0-3ms.	very fragm.	* fragm.
187	84 272	480	?	adult	very fragm.	
188	84 272-1	480	M	40-50	fragm.	*
189	84 273-2	480	M	60-x	fragm.	*
190	84 275	458	M	60-70	nearly complete	*
191	84 276-1	563	M	25-40	nearly complete	*
192	84 277-4	575	F?	18-22	fragm.	*
193	84 278-1	505	F	30-35	nearly complete	*
194	84 280-1	360	M	50-60	nearly complete	*
195	84 281-4	360	F	40-50	fragm.	*
196	84 285	373	M?	25-35	very fragm.	
197	84 286	0	?	adult	very fragm.	
198	84 290	300	F	40-50	fragm.	*
199	86 292	508	M?	18-22	fragm.	*
200	86 293	442	F	27-32	nearly complete	*

201	86 294	450	F	60-x	fragm.	*
202	86 295	459	Ch	12-15	fragm.	*
203	86 296	475	F	35-40	nearly complete	*
204	86 299	590	F	25-35	fragm.	*
205	86 300	450	M?	22-27	fragm.	*
206	86 301	665	F?	35-45	fragm.	*
207	86 302	390	F	50-60	nearly complete	*
208	86 303	403	F	25-30	nearly complete	*
209	86 306	386	?	15-18	fragm.	*
210	86 307	425	Ch	3-6ms.inf.	fragm.	
211	86 308	460	Ch	0-6ms.inf.	fragm.	
212	86 310	450	F	22-27	fragm.	*
213	86 311	450	?	adult	very fragm.	
214	86 312	448	Ch	0-6ms.inf.	very fragm.	
215	86 313	458	M	30-35	fragm.	*
216	86 314	360	F?	25-30	very fragm.	*
217	86 315,a	405	M?	25-30	very fragm.	*
218	86 315,b	405	Ch	3-7	very fragm.	
219	86 317	340	M	25-35	very fragm.	
220	86 318	380	F	25-30	fragm.	*
221	86 320	600	?	15-19	fragm.	*
222	86 321	460	M	15-19	very fragm.	
223	86 322	400	M	30-40	fragm.	*
224	86 324	450	F	60-x	nearly complete	*
225	86 326	445	F	50-x	fragm.	*
226	86 327	373	M	35-45	nearly complete	* fragm.
227	86 328	313	F	25-x	very fragm.	
228	86 329	450	M	50-60	nearly complete	
229	86 330	405	Ch	12-24ms.in	very fragm.	
230	86 331	434	F	30-40	fragm.	*
231	86 334	425	M	25-35	nearly complete	
232	86 335	450	F	50-60	nearly complete	*
233	86 336	456	M	40-50	nearly complete	*
234	86 337	467	Ch	0-3ms.inf.	very fragm.	* fragm.
235	86 338	375	M	30-40	nearly complete	*
236	86 339	474	F	20-25	fragm.	*
237	86 340	460	F	30-35	fragm.	*
238	86 341	390	F	25-30	very fragm.	* fragm.
239	86 342	396	M	30-35	fragm.	*
240	86 343	311	M	50-x	fragm.	*
241	86 345	393	Ch	1-6ms.inf.	very fragm.	*
242	86 346	390	Ch	4-5	nearly complete	*
243	86 347	390	M	60-x	nearly complete	*

244	86 350	448	F	25-30	nearly complete	*
245	86 351	395	M	40-50	nearly complete	*
246	86 352	395	F	30-35	nearly complete	*
247	86 354	435	F	20-25	nearly complete	*
248	86 356	600	F	30-35	nearly complete	*
249	86 357	600	F	20-25	very fragm.	*
250	86 358	475	F	20-25?	nearly complete	*
251	86 359	458	?	adult	very fragm.	
	"CELESTE"					
252	78 Sanc.	0	M	25-35	fragm.	*
	"SALDONE"					
253	1 (SS-2),a	458	F	40-50	fragm.	*
254	1 (SS-2),b	458	Ch	+/- 2	very fragm.	*
255	7	444	Ch	0-1	very fragm.	
256	8	440	F??	30-40	fragm.	*
257	12	430	Ch	8-12	fragm.	*
258	15	465	F	25-30	fragm.	*
259	16	435	M?	40-50	fragm.	*
260	15A,16A,18	425	?	adults	very fragm.	
261	20	432	M?	25-30	fragm.	*
262	21	389	F	20-25	nearly complete	*
263	24	405	M?	25-30	fragm.	*
264	25	390	M	35-45	nearly complete	*
265	26	423	F	35-45	fragm.	*
266	27	405	F	50-60	fragm.	*
	SANT'ANGELO					
267	N.T. F-6	450	F	22-25	nearly complete	*
268	S.T. F-6	440	M	60-x	nearly complete	*
269	1	449	M	25-30	nearly complete	*
270	79,F-6,G-6	373	M	25-30	fragm.	*
271	79,H-6	430	F	70-x	nearly complete	*
272	79,G-6 1,3	430	M	50-60	nearly complete	*

Table 2.2-1. Dental remains from rural necropoleis (Puntanello, Saldone, Sant'Angelo and Celeste).

No	Tomb No	Burial dates range in yrs BC#	Sex	Age of indiv.	No of teeth*	No of tooth sockets**	No of teeth lost before death
				FEMALES (F, F?, F??)***			
1	21-2	370-350	F	25-30	5	14	
2	22-1	525-390	F	45-55	5	18	3
3	25-1	-	F	25-35	23	26	
4	27-5	467-424	F	30-35	6	6	
5	28	370-350	F	45-55	7	20	6
6	35	500-400	F	30-40	9	11	2
7	43-1	350-330	F	40-50	2	7	
8	49	460-430	F	35-40	20	24	3
9	50-4	420-400	F	30-35	30	31	
10	54-8	470-455	F	20-25	3	3	
11	57-1	325-275	F	20-25	26	28	
12	59	400-350	F	35-45	13	26	3
13	66-5	460-440	F	22-27	28	29	
14	67	325-275	F	70-x	13	21	4
15	69-11	420-391	F?	25-30	26	30	
16	70-3	460-430	F	25-30	3	3	
17	71-24	312-293	F	20-25	6	6	
18	72-2	325-275	F	70-x	11	14	3
19	74-4	330-280	F	60-x	11	15	2
20	79-3	320-280	F?	40-50	4	4	1
21	80-2	304-283	F	40-50	24	32	4
22	81-3	490-480	F	25-30	10	15	1
23	82	325-275	F	20-24	19	22	
24	86-7	440-403	F	35-45	14	16	1
25	91	318-282	F	25-30	4	4	
26	92	325-275	F	40-50	17	19	2
27	96-3	354-328	F?	20-25	15	15	
28	97	470-275	F	20-25	1	1	
29	99	325-275	F	30-35	29	30	
30	110	400-380	F	50-60	20	24	1
31	111	317-281	F	25-30	11	14	
32	125	325-300	F	25-30	25	28	2
33	129	525-435	F	60-x	7	13	6
34	131	525-500	F	35-45	11	15	

35	132	313-275	F	22-25	19	19	
36	133	325-275	F	50-60	2	4	2
37	136	435-403	F	20-25	30	31	
38	137	505-495	F	35-40	18	18	
39	142	410-380	F?	25-30	12	15	1
40	143	325-292	F	40-50	14	26	1
41	144	305-287	F	30-35	24	31	
42	149-4	455-435	F	30-40	16	25	2
43	155	360-330	F	30-40	4	7	
44	158	550-525	F	30-40	1	1	
45	164	400-360	F?	20-25	21	21	
46	195-5	341-276	F	25-40	4	4	
47	196	485-470	F	30-40	12	13	
48	198-5	414-370	F	30-40	10	10	
49	210	480-460	F	25-30	26	28	1
50	212-7	421-387	F	15-19	16	16	
51	213	420-370	F	35-40	11	12	1
52	217	470-444	F	25-35	8	19	4
53	218	468-447	F	35-45	15	26	
54	219-1	400-380	F	25-30	21	21	
55	219-1-B	400-380	F	30-40	6	6	
56	222-3	469-440	F?	20-25	14	14	
57	223	495-470	F	40-50	13	25	
58	235	446-412	F	20-25	8	14	
59	236-3	480-456	F?	40-50	8	13	3
60	243-5	311-282	F	25-30	2	9	5
61	245-4	467-452	F	40-50	26	32	
62	251	460-380	F	60-x	8	21	4
63	252-9	439-415	F	25-30	17	17	
64	253-3	325-275	F	70-x	2	16	13
65	255-2	490-400	F	60-x	3	17	5
66	257-1	325-275	F	40-50	14	14	
67	259-7	440-400	F	50-60	2	2	1
68	260-1	460-440	F	50-60	7	11	
69	261-2	460-440	F	30-40	28	29	1
70	277-4	600-550	F?	18-22	28	28	
71	278-1	520-490	F	30-35	23	26	3
72	281-4	370-350	F	40-50	16	18	2
73	290	325-275	F	40-50	9	28	8
74	293	450-400	F	27-32	13	27	7
75	294	460-440	F	60-x	9	10	1
76	296	480-470	F	35-40	23	23	
77	299	820-360	F	25-35	2	2	
78	301	950-450	F?	35-45	8	11	3

79	302	400-380	F	50-60	19	22	2
80	303	426-379	F	25-30	31	32	
81	310	460-440	F	22-27	4	6	1
82	314	370-350	F?	25-30	4	4	
83	318	400-360	F	25-30	30	30	
84	324	460-440	F	60-x	13	20	6
85	326	456-433	F	50-x	5	5	
86	331	442-427	F	30-40	18	19	1
87	335	460-440	F	50-60	19	22	1
88	339	480-467	F	20-25	29	32	
89	340	480-440	F	30-35	12	12	
90	341	400-380	F	25-30	13	13	
91	350	458-438	F	25-30	28	28	
92	352	420-370	F	30-35	18	30	4
93	354	440-429	F	20-25	9	9	
94	356	900-275	F	30-35	30	32	
95	357	900-275	F	20-25	16	16	
96	358	500-450	F	20-25	8	8	
97	Sal-1	525-390	F	40-50	20	22	2
98	Sal-8	447-433	F??	30-40	28	28	
99	Sal-15	475-454	F	25-30	22	25	3
100	Sal-21	406-371	F	20-25	27	28	
101	Sal-26	440-406	F	35-45	5	7	
102	Sal-27	425-384	F	50-60	2	8	5
103	SA-F-6N	460-440	F	22-25	27	27	1
104	SA-H-6	441-419	F	70-x	9	16	7
				sum	1477	1845	145

MALES (M, M?, M??)***

1	13-6	320-280	M	40-45	17	17	
2	32	325-275	M	50-70	8	8	
3	36	500-250	M	35-45	4	4	
4	53-4	460-440	M	30-35	17	18	1
5	78-7	305-275	M	60-70	2	25	8
6	80-1	304-283	M	50-60	27	29	2
7	85-1	313-275	M	25-30	5	12	2
8	93-3	300-275	M	70-x	9	9	
9	94-5	305-275	M	20-25	32	32	
10	106	425-385	M	25-30	29	29	
11	117	400-370	M	30-40	2	5	
12	119	323-275	M?	25-35	11	11	

13	124	350-330	M	20-25	28	29	
14	127	408-362	M	70-x	4	4	
15	145-4	360-340	M	30-35	28	32	
16	153	420-370	M	25-35	13	14	
17	160	470-275	M	40-50	3	3	
18	188	525-390	M?	50-60		11	4
19	190	310-275	M	22-25	28	32	2
20	209	441-424	M?	20-25	28	30	
21	215-1	525-390	M?	30-40	3	5	
22	216-4	400-370	M	25-30	26	26	
23	220-3	470-440	M	30-35	17	17	
24	225-1	525-390	M	30-40	5	10	
25	228	443-381	M	20-25	27	27	
26	231-1	409-364	M	20-25	4	9	1
27	234-1	470-275	M?	60-x	4	4	
28	240-3	460-430	M	30-40		11	6
29	244	460-430	M	25-30	28	29	1
30	247	600-450	M?	50-x	1	3	
31	249	525-390	M	60-x	15	15	
32	265 2	525-425	M	50-60	9	11	
33	266	480-452	M	30-35	21	22	
34	272-1	525-435	M	40-50	16	17	
35	273-2	525-435	M?	60-x	18	22	4
36	275	525-390	M	60-70	9	19	
37	276-1	575-550	M??	30-40	15	15	
38	280-1	370-350	M	50-60	7	25	8
39	292	513-503	M?	18-22	31	31	
40	300	460-440	M	22-27	20	20	
41	313	525-390	M	30-35	5	5	
42	315	440-370	M?	25-30	17	21	
43	322	420-380	M	30-40	28	28	
44	327	470-275	M	35-45		3	2
45	336	469-442	M	40-45	32	32	
46	338	475-275	M	30-40	12	25	5
47	342	420-371	M	30-35	5	5	
48	343	322-300	M	50-x	2	15	4
49	347	410-370	M	60-x	17	29	6
50	351	420-370	M	40-50	4	5	1
51	Sal-16	450-400	M?	40-50	4	10	6
52	Sal-20	446-417	M?	25-30	18	19	
53	Sal-24	440-370	M?	25-30	20	23	
54	Sal-25	410-370	M	35-45	31	32	1
55	SA-1	466-431	M	25-30	32	32	
56	SA-F-6	460-420	M	60-x	8	11	2

57	SA-FG-6	470-275	M	25-30	27	28	
58	SA-G-6-3	441-419	M	50-60	5	18	12
59	Celeste	-	M	25-35	10	10	
				sum	848	1043	78

CHILDREN and YOUTH ****

1	46-1	325-300	Ch	5-6	6	6
2	52	330-320	Ch	15-19	26	27
3	95-25	443-403	Ch	10-14	3	3
4	130	504-488	Ch	8-10	12	12
5	151	460-440	Ch	4-5	2	2
6	195-5	341-276	Ch	6-7	5	5
7	241-1	475-275	Ch	4-5	6	6
8	268	470-275	Ch	2-3	3	3
9	295	472-445	Ch	12-15	14	14
10	306	400-372	Ch	15-18	27	27
11	320	850-250	Ch	15-19	30	30
12	346	410-370	Ch	4-5	3	3
13	Sal-12	440-420	Ch	8-12	11	11
				sum	148	149

* - Number of teeth with at least a part of a crown available for observation

** - Number of sockets available for observation

*** - F-female, F?-very probable female, F??-probable female, F???-probable female but estimation very difficult
M, M?, M??, M??? - as for females

**** - Measurements and other observations were made only on permanent dentition (on crowns of developing teeth)

- burial dates from Carter (1998a)

Table 2.2-2. Dental remains from urban necropolis Crucinia.

No	Tomb No	Sex	Age of indiv.	No of teeth*	No of tooth sockets**	No of teeth lost before death
			*F E M A L E S (F, F?, F??, F???)****			
1	"Z"	F	18-22	15	17	
2	I	F?	30-40?	3	9	
3	*14*	*F?*	*20-25*	*4*	*4*	
4	70	F?	adult	1	1	
5	97	F?	22-30	19	19	
6	102	F	50-x	19	24	
7	*112*	*F*	*50-x*	1	8	7
8	115	F	50-x	10	14	1
9	117	F?	50-x	4	5	1
10	120	F	25-35	3	3	
11	*126*	*F*	*60-x*		4	4
12	130	F	25-30	20	21	
13	139	F	35-40	6	8	
14	143	F	30-40	5	9	
15	148	F	25-35	22	22	
16	154	F?	30-40?	5	5	
17	163	F?	40-50	27	27	
18	164	F	25-30	14	15	
19	174	F	30-40	9	10	1
20	181	F	25-35	1	7	
21	195	F	22-27	5	5	
22	198	F	25-30	24	28	
23	211	F	40-45	29	32	
24	217	F?	25-35?	2	3	1
25	218	F	20-30	18	21	3
26	223	F?	30-40	3	6	1
27	224	F	20-25	2	2	
28	225	F	45-50	19	20	1
29	227	F	30-40	8	17	8
30	230	F	30-40	29	31	
31	231	F	50-60	9	16	1
32	*249*	*F*	*30-40*	*21*	*26*	4
33	256	F	40-50	3	3	
34	278	F??	35-40	7	7	
35	279	F?	50-x	2	12	7

36	282A	F	25-35	30	32	
37	286	F?	60-x	5	8	3
38	290	F?	50-x	7	7	
39	291	F?	40-60	2	3	
40	302B	F?	15-19	8	9	
41	305B	F	60-x	6	12	6
42	311	F	30-40	1	8	1
43	312	F	30-40	23	32	
44	317A	F	30-40	1	1	
45	325	F	25-30?	26	32	
46	345	F	25-30	23	25	
47	346	F	20-30	27	32	
48	358-2	F	30-40	22	25	
49	362	F	25-30	18	19	
50	365	F	30-50	2	2	
51	366	F	60-70		16	16
52	376	F?	30-40	11	11	
53	391	F	35-45	17	25	5
54	397	F	18-20	31	32	
55	403	F	50-x	2	6	1
56	435	F	40-50	28	31	3
57	436	F	25-30	9	9	
58	448	F	20-25	16	16	
59	453	F	25-30	21	21	
60	456	F	25-30	4	4	
61	458	F	25-35	28	30	2
62	469B	F	60-x	3	16	5
63	473	F	25-30	9	9	
64	482	F?	30-35	17	27	
65	484	F?	40-50	7	8	
66	490	F	25-40	2	12	4
67	508	F	30-40	5	5	
68	521	F	25-35	2	2	
69	524	F?	40-60	15	16	
70	526	F	45-50	25	28	2
71	528	F?	30-35	11	14	
72	531	F	25-30	18	21	1
73	532	F	50-x	2	2	
74	536	F??	30-35	1	1	
75	537	F	25-50	1	1	
76	541	F	20-25	21	22	2
77	544	F	50-60	6	7	1
78	552A	F	25-30	7	7	
79	573	F	25-35	3	3	