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PALEODONTOLOGY OF HUMAN SKELETAL REMAINS. PONTECAGNANO (SALERNO), VII—IV CENTURIES B. C.

ABSTRACT. — This paleodontologic study concerns a population sample discovered in the necropolis of Pontecagnano (Salerno). The skeletal remains date back to the VII—IV centuries B. C. We analysed 2831 permanent teeth belonging to 137 individuals of different ages from both sexes. The sample included also 5 youths; the dentitions are not complete either due to poor preservation or ante *or* post mortem *losses of several teeth. A statistical survey about their metrical and morphological traits shows a certain homogeneity in the population sample, either considered as a whole or divided into two groups (VII—VI; V—IV). Yet we notice some differences: for example there is a greater variability in the VII—VI century sample, especially among females, caused by socio-economical interferences (diet stresses) due to the invasion of this territory by populations of Etruscan culture. These interferences caused a great asymmetry between antimeres and a lower dimorphism between the sexes. Since such phenomena diminish in the later period (V to IV) we can suppose a gradual amalgamation of the population and better socio-economical conditions.*

KEY WORDS: Skeletal remains — Odontology — Pontecagnano — VII—IV centuries B. C.

PREFACE

Necropolis of Pontecagnano (Salerno—Italy). Odontology of entombed skeletons (VII—IV centuries B. C.).

A big necropolis was discovered in Pontecagnano, not far from Salerno. It has been an object of interest for about thirty years (D'Agostino, 1964; 1979). During the excavations, still continuing, about 3000 tombs were discovered. The necropolis (or better, the many necropolis situated one upon the other, the most famous of which are those of the Iron Age), contains tombs dating back to a period running from the Late Neolithic to the III century B. C. Skeletal remains of a rather late period were found in more than 1000 tombs; their funeral objects date the tombs of the last millenium almost precisely: 323 tombs date back to the IX—VIII centuries; 290 to the VII—VI and 392 to the V—IV. There are also about 100 tombs without objects and they cannot be dated. Most tombs of the IX—VIII centuries contain cremated corpses, but those of VII—VI and V—IV centuries contain only a few. This subdivision (IX—VIII; VII—VI; V—IV) reflects three historical stages of the peopling of Campania: 1) Greek stage (X—VII centuries B. C.); 2) Etruscan stage (VII—VI centuries B. C.); 3) Osca civilization (V—IV centuries B. C.). This gives us an opportunity, at least in a hypothetical way, to analyse somatic characteristics of Pontecagnano populations during protohistoric and historical periods for about a millenium.

This research about the odontology of these ancient populations and particularly about those of the VII—VI and V—IV centuries, analyses the changes in tooth shape and size in order to discover any possible consequences of the not always peaceful contact between populations of different cultures and customs. Such analysis has already been attempted under an anthropologic point of view in two researches (Lombardi et al., 1984). To diagnose the VII—VI centuries burried individuals' sex and age of death we followed the methods used by Ferembach et al. (1979), while concerning the skeletons of the V—IV centuries we followed the diagnosis of Pardini et al. (1982).

We analysed 35 individuals (21 males and 14 females) of the first period (VII—VI) and 102 individuals (53 males, 44 females and 5 youths) of the second period (V—IV). As for the youths we only analysed the size factor because, according to Greene et al. (1967), in this kind of analysis we cannot take the sex into account; in fact it is very difficult to distinguish the sex in young individuals.

RESEARCH MATERIAL AND METHODS
STATISTICAL PARAMETERS USED

We analysed the metric and morphological traits of 137 individuals — 74 males, 58 females and 5 youth (about 12—15 years old). There are only 2831 teeth: in fact, of the 132 adult individuals, only 109 have both the maxilla and the mandible, 7 have only the maxilla and 16 only the mandible. Moreover not all the alveolar arches are complete (so some teeth are missing for this reason), some teeth were lost *"intra vitam"* or *"post mortem"* and some others are agenesiac or have never grown (they are still in the alveolus). We find the same problem for the young individuals who, with a complete dentition (28 teeth) for this age group (12—15) should have 140 teeth, but in reality only 90 teeth remain: although they still have the upper and lower jaws, we noticed some teeth missing due to *"post mortem"* incidents or to lack of alveolar parts.

The overall losses of teeth of each type are presented in *tables 1 and 2*.

Two minimum (MD_1 and BL_2: Selmer-Olsen, 1949; Ashton et al., 1950 b; Hrdlička, 1952) and two maximum (MD_2 and BL_2: Remane, 1927; Weidenreich, 1937; Martin, Saller, 1956; Senyürek, 1959) mesiodistal and buccolingual diameters were measured.

The adult crown height was not measured because most teeth show much occlusal wear. Every measurement, expressed in mm, was taken twice on the teeth of both arches. Possible errors were tested by the analysis of variance. Measurements were taken with a vernier caliper which can make errors of about 0.05 mm. Teeth affected by caries, teeth lacking the crown because of damage after death, and teeth showing III or IV wear level were discarded from sampling (Hunter et al., 1960; Goose, 1963).

Morphological traits concern the crown of upper and lower incisors, canines and molars. Also in this analysis teeth affected by caries or showing high wear were not taken into account. The morphological variants considered were: shovel-shaped incisors (Hrdlička, 1920); upper canine tubercle (Scott, 1977); Carabelli's tubercle in the first maxillary molar (Dahlberg, 1963); number of molar cusps (Nelson, 1938; Dahlberg, 1949).

All the results (metrical and morphological) were examined statistically with single teeth. Sta-

TABLE 1 *Missing teeth in adults*

MAXILLA																	
Teeth missing due to	M^3	M^2	M^1	P^2	P^1	C'	I^2	I^1	I^1	I^2	C'	P^1	P^2	M^1	M^2	M^3	Total
Loss of alveolar parts	39	25	27	17	16	18	17	24	24	21	17	15	19	23	36	44	377
Losses intra vitam	4	6	10	5	5	1	—	1	3	4	3	6	8	9	6	8	79
Losses post mortem	5	—	3	6	9	14	28	28	35	28	15	5	9	1	4	15	205
Agenesias	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9	19
Teeth still in the alveolus	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3
Incomplete eruption	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Total	62	31	35	28	30	33	45	53	62	53	35	26	36	33	46	77	685
MANDIBLE																	
Teeth missing due to	M_3	M_2	M_1	P_2	P_1	C_1	I_2	I_1	I_1	I_2	C_1	P_1	P_2	M_1	M_2	M_3	Total
Loss of alveolar parts	12	7	8	8	6	6	9	12	13	12	10	7	9	6	9	12	146
Losses intra vitam	13	16	19	4	6	1	3	10	8	3	—	2	6	14	12	13	130
Losses post mortem	6	1	—	4	7	8	12	24	15	12	10	8	6	2	1	2	118
Agenesias	25	—	—	1	—	—	—	—	—	—	—	—	1	—	—	24	51
Teeth still in the alveolus	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	5
Incomplete eruption	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	58	24	27	17	19	15	24	46	36	27	20	17	22	22	22	54	450

TABLE 2. *Missing teeth in youths*

MAXILLA																	
Teeth missing due to	M^3	M^2	M^1	P^2	P^1	C'	I^2	I^1	I^1	I^2	C'	P^1	P^2	M^1	M^2	M^3	Total
Loss of alveolar parts	—	—	—	1	—	1	2	2	4	3	3	1	—	—	—	—	17
Losses intra vitam	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1
Losses post mortem	—	—	—	—	1	2	1	2	1	—	—	—	—	—	—	—	7
Agenesias	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Teeth still in the alveolus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
Teeth never erupted	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	3
Incomplete eruption	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
Total	0	0	0	1	1	4	3	4	5	3	3	1	0	0	1	4	30

MANDIBLE																	
Teeth missing due to	M_3	M_2	M_1	P_2	P_1	$C_,$	I_2	I_1	I_1	I_2	$C_,$	P_1	P_2	M_1	M_2	M_3	Total
Loss of alveolar parts	—	—	—	—	—	—	1	2	2	2	1	—	1	—	—	—	9
Losses intra vitam	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Losses post mortem	—	—	—	—	—	1	2	1	—	—	—	—	—	1	2	—	7
Agenesias	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Teeth still in the alveolus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
Teeth never erupted	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
Incomplete eruption	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Total	0	0	0	0	0	1	3	3	2	2	1	0	1	1	2	4	20

tistical parameters of metrical data are: average ($\bar{x}$); standard deviation (σ); variability coefficient (CV) for both diameters (BL_2, MD_2); correlation coefficient (r) between measures BL_2 and or MD_2 of one tooth with that of the other teeth of the same side. "r" values were tabulated. We used the parameter χ^2 to point out the diverse frequencies of the morphological data. We calculated the area in mm^2, to test the size differences between the male and female jugal teeth (Garn et al., 1977) in the overall sample and between the groups. Such analysis was also used to determine the sexual dimorphism (Garn, 1967 b; Perzigian, 1976). With the calculation of $d = \frac{S - D}{S + D/2}$ for both MD_2 and BL_2 of each pair, we tested the possible asymmetries between antimere pairs.

METRIC ANALYSIS OF THE DENTITION

Tables 3, 4, 5, 6 present the usual statistical parameters of the two diameters (MD_2 and BL_2), for the separate sides, of both the upper and lower jaws for each sex. The choice of the maximum value for both diameters was suggested by the necessity of a comparison with other human groups previously studied. The values of σ and CV are usually so low that a certain general homogeneity must be acknowledged. In accordance with other authors (Dahlberg, 1949; Moorrees et al., 1964; Garn et al., 1968; Perzigian, 1976; Coppa et al., 1982), if we put into increasing order the values of the two diameters of each tooth, we notice that MD_2 of $C^{\prime}$, upper and lower, is the least variable measure:

right male side

$C^{\prime} < M^1 < I^1 < P^1 < M^2 < I^2 < P^2 < M^3$

$M_1 < C_{\prime} < M_2 < P_2 < M_3 < P_1 < I_1 < I_2$

left male side

$C^{\prime} < P^1 < I^1 < I^2 < P^2 < M^2 < M^1 < M^3$

$M_1 < C_{\prime} < I_2 < P_1 < P_2 < M_2 < M_3 < I_1$

unlike that of $M3$ which is usually the most variable tooth. On the other hand, in the females, we find the least variability of this diameter in $M1$ followed by $C^{\prime}{}_{\prime}$:

right female side

$M^1 < P^1 < C^{\prime} < P^2 < M^2 < M^3 < I^2 < I^1$

$C_{\prime} < M_1 < I_2 < P_1 < M_3 < M_2 < I_2 < P_2$

left female side

$M^1 < C^{\prime} < P^2 < M^2 < P^1 < I^2 < M^3 < I^1$

$M_1 < P_1 < M_2 < P_2 < C_{\prime} < I_1 < M_3 < I_2$

I^1 is the most variable tooth in this sex.

As for BL_2, it is interesting to notice that in males and females' upper and lower jaws (right side and left side) $M1$ is the tooth showing the least variability, whereas any generalization about other teeth is impossible. Anyhow we can say that $P2$ is always less variable than $P1$; $I2$ is usually more changeable than $I1$, as it has already been noticed by Harris et al. (1980b) among the Ticuna Indians. Coming to a conclusion, in accordance with Butler (1939) and Dahlberg (1945), we may say that the mandibular teeth, except $M3$, are the most variable.

TABLE 3. *Standard statistical parameters relative to MD_2 diameter*

MAXILLARY TEETH

Statistical description of MD_2 diameter

MALES

Right side	N	$\bar{x}$	σ	CV	min	max	Left side	N	$\bar{x}$	σ	CV	min	max
I^1	28	8.5	0.5	6.4	7.2	9.5	I^1	24	8.7	0.6	6.9	7.7	10.0
I^2	31	6.5	0.6	8.6	5.5	7.8	I^2	29	6.6	0.6	8.6	5.7	8.1
C'	41	7.6	0.4	4.9	6.8	8.4	C'	38	7.5	0.4	5.4	6.0	8.1
P^1	45	6.6	0.5	7.8	5.8	8.7	P^1	47	6.6	0.4	6.0	5.8	7.6
P^2	46	6.4	0.6	10.1	5.2	9.7	P^2	43	6.3	0.5	8.7	5.6	7.5
M^1	39	10.3	0.6	5.9	8.7	11.6	M^1	38	10.3	1.2	11.6	9.5	11.5
M^2	44	9.4	0.8	8.3	8.5	10.7	M^2	31	9.2	0.8	8.8	8.1	10.9
M^3	24	8.8	1.0	11.2	6.3	10.9	M^3	12	8.6	1.1	12.6	7.2	10.5

FEMALES

Right side	N	$\bar{x}$	σ	CV	min	max	Left side	N	$\bar{x}$	σ	CV	min	max
I^1	17	8.2	1.1	13.6	4.7	9.5	I^1	21	8.3	1.0	12.8	4.6	9.5
I^2	30	6.4	0.7	11.2	5.0	7.6	I^2	31	6.3	0.7	10.5	4.4	7.6
C'	36	7.4	0.5	6.5	6.0	8.3	C'	35	7.4	0.5	6.4	6.0	8.3
P^1	34	6.4	0.4	6.5	5.9	7.5	P^1	34	6.5	0.6	8.8	5.9	9.0
P^2	36	6.3	0.4	6.7	5.4	7.0	P^2	34	6.3	0.4	7.1	5.2	7.2
M^1	34	10.3	0.5	5.0	9.4	11.4	M^1	34	10.3	0.5	4.9	9.4	11.4
M^2	35	9.3	0.7	7.5	8.1	10.6	M^2	37	9.4	0.7	7.4	7.9	11.2
M^3	21	8.5	0.7	8.8	6.9	9.5	M^3	22	8.6	0.9	10.6	6.6	10.2

TABLE 4. *Standard statistical parameters relative to BL_2 diameter*

MAXILLARY TEETH

Statistical description of BL_2 diameter

MALES

Right side	N	$\bar{x}$	σ	CV	min	max	Left side	N	$\bar{x}$	σ	CV	min	max
I^1	28	7.7	0.9	11.4	6.5	7.9	I^1	24	7.2	0.4	5.6	6.6	8.1
I^2	31	6.4	0.5	8.6	5.0	7.8	I^2	29	6.5	0.5	7.9	5.6	7.9
C'	41	8.4	0.5	6.5	6.6	9.6	C'	38	8.4	0.6	7.1	5.9	9.5
P^1	45	8.8	0.6	6.9	7.3	9.8	P^1	47	8.7	0.5	5.7	7.8	9.8
P^2	47	9.1	0.7	7.7	7.6	10.9	P^2	42	9.1	0.5	5.7	7.7	9.9
M^1	39	11.4	0.6	5.2	10.6	13.6	M^1	39	11.2	0.5	4.8	10.0	12.6
M^2	44	11.1	0.7	6.1	10.2	12.4	M^2	32	11.0	0.7	6.7	9.8	12.4
M^3	24	10.9	1.2	10.7	7.8	12.7	M^3	12	10.5	1.0	9.7	9.5	11.8

FEMALES

Right side	N	$\bar{x}$	σ	CV	min	max	Left side	N	$\bar{x}$	σ	CV	min	max
I^1	17	6.9	0.5	7.8	5.8	7.8	I^1	21	6.9	0.6	8.7	5.9	7.3
I^2	30	6.2	0.5	8.2	5.3	7.2	I^2	31	6.2	0.4	6.8	5.5	6.7
C'	36	8.1	0.5	6.0	7.3	9.3	C'	35	7.9	0.4	5.3	6.9	8.5
P^1	34	8.6	0.6	7.2	7.5	10.1	P^1	33	8.5	0.6	7.1	7.2	9.5
P^2	35	8.9	0.6	7.3	7.8	10.6	P^2	34	8.7	0.6	6.5	7.7	10.2
M^1	35	11.1	0.6	5.2	10.2	12.1	M^1	34	10.9	0.4	3.9	9.9	11.7
M^2	36	10.9	0.6	5.6	10.0	12.2	M^2	37	10.7	0.5	4.7	9.7	12.0
M^3	21	9.9	0.8	8.4	8.3	11.4	M^3	22	9.9	0.8	7.7	9.0	12.2

TABLE 5. *Standard statistical parameters relative to MD_2 diameter*

MANDIBULAR TEETH

Statistical description of MD_2 diameter

MALES

Right side	N	$\bar{x}$	σ	CV	min	max	Left side	N	$\bar{x}$	σ	CV	min	max
I_1	36	5.3	0.4	8.1	4.4	5.9	I_1	38	5.3	0.4	8.0	4.5	6.4
I_2	52	5.9	0.5	8.3	4.7	7.3	I_2	50	6.0	0.4	6.2	4.9	6.7
C,	60	6.8	0.4	6.3	5.4	7.5	C,	54	6.8	0.4	5.9	6.1	7.5
P_1	53	6.7	0.5	7.3	5.4	7.7	P_1	57	6.7	0.4	6.5	5.7	7.7
P_2	50	6.8	0.5	6.9	6.0	8.0	P_2	49	6.7	0.4	6.7	6.0	8.2
M_1	44	11.0	0.6	5.6	9.3	12.5	M_1	44	11.1	0.6	5.4	10.1	12.6
M_2	52	10.4	0.7	6.7	9.3	12.4	M_2	51	10.6	0.7	6.8	8.9	12.9
M_3	37	10.1	0.7	7.0	8.7	12.2	M_3	38	10.2	0.8	7.5	8.6	11.7

FEMALES

Right side	N	$\bar{x}$	σ	CV	min	max	Left side	N	$\bar{x}$	σ	CV	min	max
I_1	35	5.3	0.6	11.0	4.5	6.7	I_1	34	5.3	0.6	11.6	4.5	7.8
I_2	41	5.9	0.4	7.5	4.9	7.0	I_2	35	5.6	1.1	19.2	4.9	6.5
C,	47	6.5	0.4	6.2	5.7	7.4	C,	45	6.5	0.5	7.9	4.6	7.8
P_1	48	6.5	0.5	7.6	5.8	7.6	P_1	49	6.5	0.4	6.4	5.6	7.7
P_2	43	6.5	1.0	15.5	5.6	8.0	P_2	47	6.6	0.5	7.4	5.6	7.5
M_1	34	10.8	0.7	6.6	9.5	12.2	M_1	34	10.8	0.6	5.9	9.8	11.8
M_2	38	9.5	0.9	9.1	8.5	11.5	M_2	36	10.2	0.7	6.9	8.9	11.7
M_3	22	9.8	0.8	8.5	8.5	11.5	M_3	27	9.7	1.2	12.3	6.3	11.7

TAB. 6. *Standard statisticai parameters relative to BL_2 diameter*

MANDIBULAR TEETH

Statistical description of BL_2 diameter

MALES

Right side	N	$\bar{x}$	σ	CV	min	max	Left side	N	$\bar{x}$	σ	CV	min	max
I_1	36	6.1	0.3	5.8	5.6	7.0	I_1	39	6.1	0.3	5.1	5.3	6.5
I_2	53	6.4	0.4	6.9	4.6	7.4	I_2	51	6.5	0.3	5.3	5.7	7.2
C,	61	8.0	0.5	6.6	6.2	9.0	C,	54	7.9	0.5	6.7	6.7	8.9
P_1	53	7.6	0.5	6.1	6.7	8.6	P_1	57	7.6	0.5	7.2	6.7	8.7
P_2	50	8.2	0.6	7.4	6.3	9.7	P_2	50	8.1	0.6	7.2	6.6	9.4
M_1	44	10.5	0.5	4.9	9.5	11.8	M_1	46	10.7	0.5	4.9	9.5	11.4
M_2	53	10.1	0.6	6.4	9.1	11.7	M_2	51	10.1	0.6	5.9	8.7	11.4
M_3	35	9.8	0.6	5.8	8.8	11.7	M_3	38	9.7	0.8	8.1	7.6	11.0

FEMALES

Right side	N	$\bar{x}$	σ	CV	min	max	Left side	N	$\bar{x}$	σ	CV	min	max
I_1	35	5.9	0.4	7.2	5.2	6.9	I_1	34	5.8	0.5	9.3	4.9	7.7
I_2	41	6.3	0.5	7.9	5.5	7.5	I_2	35	6.1	1.0	17.3	5.3	7.9
C,	47	7.6	0.6	8.2	6.2	9.7	C,	45	7.5	0.6	7.9	6.8	9.6
P_1	48	7.4	0.5	6.8	6.6	8.9	P_1	49	7.4	0.5	7.4	6.4	8.2
P_2	43	7.9	0.8	9.9	6.9	9.5	P_2	47	7.9	0.5	6.8	7.0	9.4
M_1	36	10.3	0.5	5.2	9.4	11.6	M_1	34	10.4	0.5	4.6	9.7	11.7
M_2	39	9.8	0.7	7.3	8.7	10.3	M_2	37	9.9	0.6	5.9	9.0	11.0
M_3	22	9.5	0.7	7.7	8.1	10.9	M_3	27	9.6	0.8	8.7	8.2	11.3

We notice little variability also in the canine tooth (Butler, 1939; Dahlberg, 1945; Garn et al., 1966a; Lombardi, 1975; Potter et al., 1976; Townsend et al., 1979; Brace et al., 1980).

If we apply the method used by Stein et al. (1934), Selmer-Olsen (1949), Barrett et al. (1963), Lunt (1967), we find out that the female sex shows higher variability ($\overline{CV} = 8.10$) than the male ($\overline{CV} = 7.18$), with a t ($= 2.17$) and a P ($= 0.03\,\%$). Stein et al. (1934), had already pointed out such phenomenon but their research concerned only the molar teeth. Lunt (1967) does not find any differences between the sexes, while Barrett et al. (1963) and Selmer-Olsen (1949) notice higher variability among the males.

We calculated the mean value of the coefficient of variation of each type of tooth ($I1 + I2$; C'; $P1 + P2$; $M1 + M2 + M3$) for each sex separately, in order to find out which one caused the previously noticed variability differences between the sexes, which we found to be the incisors. Moreover, if we calculate the mean values of the mandibular and maxillary teeth diameters, we notice that the variability difference is more noticeable in the mandibles:

	males $\overline{CV}$	females $\overline{CV}$	Diff.	t	$P\,\%$
MD_2	6.83	9.35	2.52	2.47	2.0 %
BL_2	6.27	8.00	1.73	2.17	5.0 %

Since in *tables 4, 5, 6* we notice that the mean values of both diameters are usually higher in the males than in the females, we examined these differences with test "t" to see if they were significant. In the maxilla we noticed this significance in BL_2 of I^1, C', M^3 and in MD_2 of P^1; while in the mandible we found it in BL_2 of M_2 and MD_2 of P_2 and M_2. We usually find low values of P (though not significant) especially in the diameters BL_2, in accordance with other authors' results (Lunt, 1967).

After dividing the total sample into two groups (VII—VI centuries B. C.; V—IV centuries B. C.) we used the same system of analysis. As already pointed out in the preface, such division was due to historical considerations. In this case we compared only individuals of the same sex. We have not included the statistical description of the two diameters of each tooth (like in *tables 3, 4, 5, 6*), but we shall send this statistical description to those who will ask for it.

The previously noticed homogeneity between the single teeth of the overall sample is also seen in the separate groups. But if we analyse the total data, in the comparisons between all the teeth we notice a great variability difference between the groups:

	VII—VI $\overline{CV}$	V—IV $\overline{CV}$	Diff.	t	$P\,\%$
males	8.06	6.82	1.24	1.90*	5.0
females	8.85	7.40	1.45	4.23***	0.1
Diff.	0.79	0.58			
t	0.42	0.68			
$P\,\%$	70.0	50.0			

Probability "P" is always significant, especially in the female sex; this phenomenon is absent in the comparison between the sexes of one group, in fact, as shown in the previous prospectus, "t" values give rather high probabilities. We must therefore admit that in size variability there is a great difference between the groups and that the first one shows greater variability especially in the female sex. We shall say something more about the causes of this phenomenon later on.

According to the previous pattern we noticed

TABLE 7. *Calculation of tooth areas (mm²) of individuals of the VII—VI and V—IV centuries B. C.*

MALE TEETH													
Maxillaries	N	$\bar{x}$	σ	CV %	min	max	Mandibulars	N	$\bar{x}$	σ	CV %	min	max
P^1	45	54.1	7.1	13.1	44.0	72.0	P_1	53	45.4	6.3	13.8	28.6	54.6
P_2	47	54.4	9.8	18.1	42.7	80.7	P_2	49	51.8	6.7	12.9	41.0	68.0
M	39	107.1	12.3	11.5	76.9	131.6	M_1	45	106.9	13.8	12.9	49.4	128.8
M^2	44	95.4	13.0	13.6	66.3	116.5	M_2	50	101.1	17.9	17.7	79.2	133.9
M^3	24	90.7	20.0	22.1	45.4	144.4	M_3	35	93.1	11.8	12.7	68.6	119.8
FEMALE TEETH													
Maxillaries	N	$\bar{x}$	σ	CV %	min	max	Mandibulars	N	$\bar{x}$	σ	CV %	min	max
P^1	34	50.9	6.4	12.6	41.0	66.2	P_1	48	43.4	4.4	10.3	34.2	54.5
P^2	36	52.8	6.8	12.9	38.1	66.5	P_2	43	49.4	6.4	12.9	38.9	65.6
M^1	34	106.9	9.1	8.5	90.1	125.9	M_1	33	104.5	11.0	10.6	88.4	128.8
M^2	36	91.7	10.0	10.9	66.9	112.3	M_2	39	92.0	11.9	12.9	73.0	121.0
M^3	21	77.6	10.0	12.8	61.6	95.0	M_3	22	85.6	14.1	16.5	56.9	114.1

that the high variability in both sexes is due to BL_2 of the mandibular teeth (P in the males $= 0.01$; P in the females $= 0.002$). The analysis of the differences of the same diameters between the sexes in separate groups shows that the VII—VI centuries B. C. group lacks significant differences except MD_2 of M_2 ($P = 0.01$). We notice a greater number of significances in the later period, especially about BL_2 of the following teeth: P of $I^1 = 0.02$; P of $C' = 0.01$; P of $M^1 = 0.02$; P of $M^3 = 0.001$; P of $I_2 = 0.01$; P of $C_, = 0{,}001$. If we follow Brace et al. (1980) who supposed that the phenomenon is caused by environment stresses (especially a meagre diet, particularly lacking proteins), we should admit that Pontecagnano population must have suffered a similar situation in the VII and VI centuries. This supposition may find support also in archaeological data and historical sources informing us about an economic decline in the VI century when Paestum (Poseidonia) grew in power over the neighbouring land. This crisis (according to Brace et al., 1980) could have affected the dental diameters, especially male, which had a tendency to assume values similar to the females' (This supposition is corroborated by paleo-pathological data).

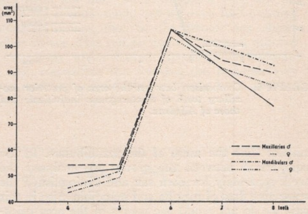
CALCULATION OF THE AREAS OF THE OCCLUSAL SURFACES OF JUGAL TEETH

The occlusal surface area was calculated as the product of the two diameters (Garn et al., 1967b) of the right maxillary and mandibular jugal teeth, which were analysed separately for each sex, in overall sample and separate groups.

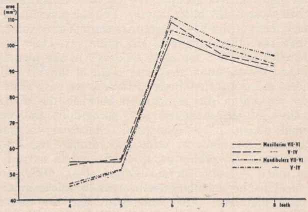
We used only the minimum diameters (MD_1 and BL_1) because they approximate, better than the maximum, the mean area of a type of tooth (expressed by: $\frac{\sum_{i=1}^{N} \bar{x}_i \bar{y}_i}{N^*}$ where: $\bar{x}_i = \frac{MD_1 + MD_2}{2}$ $\bar{y}_i = \frac{BL_1 + BL_2}{2}$. In fact for each tooth: $MD_1 = \bar{x}_i - k_i$ and $MD_2 = \bar{x}_i + k_i$, where k_i is a general difference $k_i > 0$. The differences are obviously the same for each single tooth since $\bar{x}_i$ is the arithmetical mean of MD_1 and MD_2. Likewise: $BL_1 = \bar{y}_i - h_i$, $BL_2 = \bar{y}_i + h_i$. If we calculate the minimum mean area $\frac{\sum_{i=1}^{N} (\bar{x}_i - k_i)(\bar{y}_i - h_i)}{N}$ and the maximum mean area $\frac{\sum_{i=1}^{N} (\bar{x}_i + k_i)(\bar{y}_i + h_i)}{N}$, we notice that the difference from $\frac{\sum_{i=1}^{N} \bar{x}_i \bar{y}_i}{N}$ is lower in the minimum mean area. (N^* means number of the teeth of this type).

The results of the calculation of occlusal surface areas of the teeth are shown in *table 7;* we report *graphs I, II, III, IV,* for a better interpretation of data.

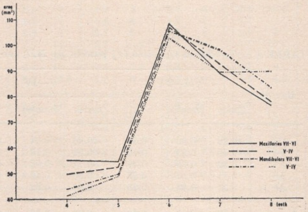
The male teeth areas, upper and lower, are constantly larger than the females' *(graph I).* In both sexes P^1, P^2 and M^1 have larger occlusal surfaces than P_1, P_2 and M_1, while M^2 and M^3 areas are



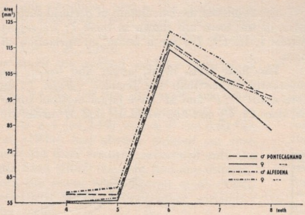
GRAPH 1. *Area of posterior male and female teeth in the overal sample.*



GRAPH 2. *Area of posterior male teeth in separate groups.*



GRAPH 3. *Area of female teeth in separate groups.*



GRAPH 4. *Comparison between the area of posterior maxillary teeth of Pontecagnano individuals and those of Alfedena.*

smaller than the areas of the mandibulars. In the comparison between the groups we analysed the teeth separately for each sex and distinguished the respective data of maxilla and mandible. Also in this case we do not report the results of the area calculation of the four samples; but we shall give these results to those who ask for them. They are nevertheless visualized in *graphs II and III.* We noticed that, while the mandibular male and female teeth of the more ancient group (VII—VI) have larger areas than those of the other one (V—IV), the male maxillary teeth of the V—IV centuries show higher values than the other sample of the same sex. Only the females maintain the same tendency of the mandibulars. So the male maxillary teeth of the VII—VI seem to have suffered a reduction, as we have already noticed in the comparison between the mean values of the diameters (3^{rd} paragraph) and we shall notice in the paragraph concerning sexual dimorphism. Since we wanted to compare our data with those of another group of the Italian territory of about the same period (Coppa et al., 1982), to calculate the maxillary teeth areas we chose maximum diameters (MD_2 and BL_2), like the above mentioned authors *(graph IV).* Alfedena population always shows larger occlusal surfaces both in male and female teeth.

CORRELATION COEFFICIENT (r) BETWEEN THE TWO DIAMETERS

We calculated the correlation coefficients *(r)* between the diameters (MD_2 and BL_2) of each tooth, from C\' to $M2$. We all know that a high or intermediate correlation may indicate the presence of a size factor which influences both (Garn et al., 1968; Coppa et al., 1982). *Table 8* shows *"r"* values of each tooth, for each sex separately, of both population samples; the mean value is presented in horizontal and vertical scheme, still in distinct samples.

Mean values of *"r"* show us that the mandibular teeth have greater correlations. The VII—VI centuries females show greater correlations than the females of the V—IV, while this phenomenon is inverted in the males. Moreover, among the teeth, the canine has higher values, and is followed by $M1$ and $M2$. In accordance with Garn et al. (1968), teeth with high mesiodistal values usually show high values also in the buccolingual diameter. In order to extend the research, we compared the diameters of one tooth with all the others separately for each sex and group. High values of *"r"* were noticed in some cases; an example is the correlation coefficient ($r = 0.79$) between the diameter BL_2 of M_1 and BL_2 of M_2, concerning the V—IV centuries B. C. females. If we visualize the values of these diameters on a cartesian plane and calculate the regression line, we notice that the value pairs tend to keep close to the line. On the other hand *"r"* values sometimes approximate to zero ($r = 0.01$) (MD_2 diameter of P_1 with BL_2 of C_1 in the V—IV centuries B. C. females): in this case value pairs locate points casually distributed on the plane. The correlation coefficient between two contiguous teeth (apart from the individual) is usually higher. We generally notice a positive correlation; so, the size factor seems to influence every tooth within the sample population. The same kind of research can be made by analysing the data of Alfedena population (Coppa et al., 1982) although the authors did not point out this phenomenon. It is important to notice (although their interpretation is difficult) that *"r"* values between the diameters of P_1 and those of the other teeth are nearly always negative; so we might suppose a peculiar trait in this population.

TABLE 8. *Correlation coeficient (u) between the MD_2 and BL_2 diameters*

Maxilla	VII—VI			V—IV			Mandible	VII—VI			V—IV		
	males	females	$\bar{x}$	males	females	$\bar{x}$		males	females	$\bar{x}$	males	females	$\bar{x}$
C'	0.20	0.80	0.50	0.50	0.64	0.57	$C_,$	0.12	0.91	0.61	0.29	0.48	0.38
P^1	—0.40	0.23	0.09	—0.09	0.16	0.03	P_1	—0.12	0.06	0.09	0.14	0.27	0.20
P^2	0.33	0.35	0.34	0.11	0.02	0.06	P_2	—0.78	0.04	0.41	0.10	0.20	0.15
M^1	0.11	0.54	0.32	0.66	0.46	0.56	M_1	0.53	0.79	0.66	0.74	0.40	0.57
M^2	0.37	0.34	0.35	0.49	0.32	0.40	M_2	0.36	0.71	0.52	0.66	0.62	0.64
$\bar{x}$	0.19	0.45	0.32	0.33	0.32	0.33	$\bar{x}$	0.02	0.50	0.44	0.38	0.39	0.39

SEXUAL DIMORPHISM IN TOOTH SIZE

This analysis follows the methods of Garn et al. (1967b) and the same scheme of work of the previous paragraphs. Besides the usual statistical parameters, *table 9* shows the values of the differences between the diameters, the percentage values according to the sexual dimorphism formula ($M/F-1$) per cent, and the dimorphism ranking, indicated from 1 to 14 (rank 1 to the tooth with the highest percentage value and rank 14 to the tooth with the least sexual dimorphism). In this research we analysed both diameters of maxillary and mandibular teeth; but in the table, for BL_2 diameters we report only the values of the degree of dimorphism. Either in absolute terms or in percentage, the highest sexual dimorphism for MD_2 is up to M_2 followed by C_l, while the lowest concerns $I_{1;\,2}$ and M^1. In the case of I_1 the difference between the mean values of MD_2 is even negative. Female $I_{1,\,2}$ usually show greater MD_2 than the corresponding male teeth. For BL_2, I^1, followed by C^l, shows the highest degree of dimorphism; M^2, P^2, I_2 have the lowest dimorphism. The research done in separate groups (VII to VI and V—IV) shows that the more recent sample gives the same results of the whole group. On the other hand not only do we notice a very low dimorphism in some teeth, but we even find negative values in others, that is, the female sex shows higher values. This can be due to the small number of the sample which does not permit generalizations. In fact, concerning the females, the research may have analysed individuals who might have been re-

TABLE 9. *Percentage and rank of sexual dimorphism in single teeth*

	Males			Females			DIF.	DMF %	R	
	N	$\bar{x}$	σ	N	$\bar{x}$	σ			MD	BL
I^1	28	8.5	0.54	17	8.23	1.12	0.27	3.3	6	1
I^2	31	6.53	0.56	30	6.43	0.7	0.10	1.5	10	11
C'	41	7.57	0.37	36	7.44	0.48	0.13	1.7	9	3
P^1	45	6.63	0.52	34	6.4	0.41	0.23	3.6	4	9
P^2	46	6.43	0.65	36	6.27	0.42	0.16	2.5	7	13
M^1	39	10.31	0.61	34	10.3	0.52	0.01	0.1	13	8
M^2	44	9.39	0.78	35	9.29	0.69	0.10	1.1	11	14
I_1	36	5.3	0.43	35	5.35	0.59	—0.05	0.0	14	7
I_2	52	5.89	0.49	41	5.86	0.44	0.03	0.5	12	12
C'	60	6.83	0.43	47	6.51	0.4	0.32	4.9	2	2
P_1	53	6.69	0.49	48	6.46	0.49	0.23	3.6	5	6
P_2	50	6.79	0.47	43	6.5	1	0.29	4.5	3	5
M_1	44	11.05	0.61	34	10.8	0.71	0.25	2.3	8	10
M_2	52	10.04	0.69	38	9.5	0.86	0.54	5.7	1	4

DIF. = *Difference*
DMF % = (M/F — 1.00) %
R = *Rank*

TABLE 10. *Percentage incidence and rank of sexual dimorphism in single teeth in some population samples*

	Pima Indians		Ponte-Cagnano		Lapps		Japanese		Swedes		Javanese		Australian Aborigenes		Caucasian	
	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R
I^1	1.6	7	3.3	6	0.4	6	3.7	7	2.5	8	4.9	2	3.9	4	3.3	11.5
I^2	0.0	14	1.5	10	2.1	11.5	6.0	2	2.6	7	4.5	4	4.2	3	3.7	7
C'	5.3	2	1.7	9	3.6	4	5.4	3	4.8	2	3.9	6	4.5	2	5.9	2
P^1	0.6	8	3.6	4.5	3.1	5	1.4	11.5	2.0	11	2.7	10.5	2.1	13	3.5	10
P^2	0.5	9.5	2.5	7	2.1	11.5	0.0	13.5	1.8	12	1.4	14	2.6	12	3.6	9
M^1	1.7	6	0.1	13	3.0	6	2.0	9	2.1	10	2.9	7.5	3.8	6	3.7	8
M^2	2.0	5	1.1	11	4.6	2	4.3	4	4.2	3.5	4.2	5	3.8	6	4.4	4.5
I_1	0.5	9.5	0.0	14	2.7	8	3.8	5.5	1.7	13	1.9	12	3.3	11	1.3	14
I_2	0.1	13	0.5	12	2.2	10	1.7	10	3.2	5	1.6	13	3.8	6	2.7	13
C_1	6.3	1	4.9	2	4.9	1	6.1	1	6.4	1	5.9	1	6.8	1	6.4	1
P_1	0.4	11	3.6	4.5	2.0	13	1.4	11.5	1.5	14	2.8	9	1.8	14	4.0	6
P_2	0.3	12	4.5	3	2.3	9	0.0	13.5	2.8	6	2.9	7.5	3.4	9.5	3.3	11.5
M_1	2.6	4	2.3	8	2.9	7	2.8	8	2.4	9	2.7	10.5	3.6	8	4.8	3
M_2	2.7	3	5.7	1	4.5	3	3.8	5.5	4.2	3.5	4.8	3	3.4	9.5	4.4	4.5
X	1.7		2.5		2.9		3.0		3.0		3.4		3.6		3.9	

lated, with a genetic trend to greater diameters; a similar phenomenon, but in the opposite direction, may have influenced the survey about the male sex. But also environment stresses (economic crisis, meagre diet, diseases etc.) may have affected the males (Stini, 1969). Perhaps they caused a reduction of the diameters in this sex, with a decrease of the sexual dimorphism in these traits as a result. So the (even if low) sexual dimorphism we noticed in the overall sample, is probably caused by the great number of analysed cases, and anyway it dilutes the interferences of the factors operating on the small sample of the VII—VI centuries.

We compared Pontecagnano data with others we found in the anthropological literature. So we referred to a work by Garn et al. (1967b) which reports data about some modern populations: this research deals only with MD_2. Comparison results are presented in *table 10* which reports the values in $^0/_0$, R (Garn et al., 1967b) and the $\bar{x}$ of $^0/_0$ dimorphism visualized in the last line. In accordance with other population groups, $C_{|}^{1}$ (followed by M_2) shows one of the highest degrees of dimorphism. All the other teeth have such different values both in percentage and in R, that we suppose, every population can be considered a group of its own in this trait. This supposition may be confirmed also by the different mean percentage values of dimorphism. This phenomen is probably due to hereditary factors, whose transmission is still unknown. This hypothesis had already been supposed by Garn et al. (1967b). On the whole, from the mean values of dimorphism percentages we notice that the Pontecagnano population has low dimorphism.

COMPARISON OF TOOTH SIZE WITH THAT OF OTHER MODERN POPULATIONS

This research follows Greene's criteria (1967). According to the author, we cannot analyse the individuals separately for each sex, since it is very difficult to distinguish the sex in young individuals; so we have only one sample including data of both sexes and those of the young teeth.

	$I^{1,2}$	$I_{1,2}$	$P^{1,2}$	$P_{1,2}$	$M^{1,2,3}$	$M_{1,2,3}$	Σ
Pontecagnano VII—VI	29.2	23.8	33.8	31.4	61.1	62.1	241.4
Pontecagnano V—IV	28.1	23.5	30.0	29.0	60.6	61.4	233.2
Pontecagnano total	28.4	23.6	31.3	29.6	60.7	61.6	235.2
White Americans	28.4	23.7	31.9	29.9	61.9	62.8	238.6
Pecos Indians	29.5	23.6	33.5	30.9	63.4	65.0	246.7
Australian Aborigenes	31.9	25.6	35.4	33.0	70.0	71.4	267.8

The first group (VII—VI) has greater sizes than the second (V—IV). We cannot say, with other authors (Lunt, 1967), that this phenomenon shows a gradual decreasing of tooth size during the human history. The chronological period between our samples is very short and we may notice a gradual homogeneity of tooth size from the V century onwards. It is difficult to explain this phenomenon: it could even be due to the small number of individuals of the most ancient group. In the comparison with the contemporary populations shown by Greene et al. (1967), we notice that tooth size of Pontecagnano individuals (considered as a simple group) is decidedly lower than in the Australian Aborigenes'. Molar teeth usually have lower sizes than those of White Americans. On the other hand if we separate the groups of our sample, we notice that the VII—VI centuries individuals and the Pecos Indians have anterior teeth and premolars very similar in size.

ASYMMETRY IN ANTIMERE PAIRS

To examine the possible asymetries in teeth pairs (antimeres), we applied the method used by Garn et al. (1967) to the upper maxillary diameters (MD_2 and BL_2) separately for each sex and group. We noticed that there are not great differences between the antimeres of the most ancient group (VII—VI); the relatively greatest differences in the males concern the incisors ($D : MD_2I^1 = 0.01$; $BL_2I^1 = 0.01$), the premolars ($D : BL_2P^1 = 0.01$), the molars ($D : MD_2M^1 = 0.01$; $BL_2M^3 = 0.02$); in the females they concern the incisors ($D : MD_2I^1 = 0.02$; $BL_2I^2 = -0.02$), the premolars ($D : MD_2P^2 = 0.02$; $BL_2P^2 = -0.02$), the molars ($D : MD_2M^2 = 0.01$; $BL_2M^2 = -0.01$). But the values are so low that other authors would have considered the teeth perfectly symmetric. We can say the same thing about the most recent group (V—IV); in this sample the canine ($D : MD_2C = -0.06$), the second female molar ($D : MD_2M^2 = 0.01$; $BL_2M^2 = -0.06$) and the third male molar ($D : MD_2M^3 = 0.03$) show the relatively highest values of asymmetry. In the first group we find small asymmetries in both diameters, while in the second group the mesiodistal diameters are more influenced by this phenomenon. Anyway, there are more asymmetries in the first group (8 in the males, 7 in the females: about 50 $^0/_0$) than in the second (2 in the males and 4 in the females: about 10 $^0/_0$). If this phenomenon (as Bailit et al., 1970, seem to suppose), is caused by environment factors acting on a hereditary substratum, we may think that the individuals of the first group were more exposed to this influence. Negative values indicate that the right antimere is larger than the left; this phenomenon is more common in the females than in the males (VII—VI centuries: males = 43.7 per cent; females = 62.5 $^0/_0$; V—IV centuries: males = 50.0 $^0/_0$; females = 62.5 $^0/_0$).

MORPHOLOGICAL TRAITS: RESEARCH AND DISCUSSION

The study concerns *I1*, *I2*, *C*, *M1*, *M2*, *M3*. As regards *I1* and *I2* we analysed the "shovel shape" (Hrdlička, 1920); that is when the tooth has a marked enamel edge and a deep fossa on the lingual side at the crown base. We included also the teeth with not so marked edges and shallow fossa (semi-shovel), and the just visible shovel incisors, showing only traces of enamel edge.

As for the canines we noticed the presence of a tubercle (Scott, 1980), but only in the upper canines where this trait is found between the mean lingual tubercle and the marginal distal tubercle, either as a small thickening or as a pronounced tubercle (it can be even more developed than the marginal distal tubercle). As for *M1*, *M2*, *M3* we only counted the cusps: 3 = absence of hypocone; 3+ = absence of hypocone, but presence of a small cusp on the distolingual margin; 4— = hypocone present, though reduced in size; 4 = four well developed cusps. Mandibular molars: 6 = six cusps, only if there is a supernumerary cusp between the metaconid and the hypoconulid (Nelson, 1938); 5 = = five cusps; 4 = four cusps.

TABLE 11. *Percentage values relative to the presence of morphological traits in the overall sample*

MAXILLA		*N*	+	%
Shovel shape		223	143	64.1
Normal		223	80	35.9
M^1	4	167	151	90.4
	4—	167	16	9.6
M^2	4	159	30	18.9
	4—	159	59	37.1
	3+	159	29	18.2
	3	159	41	25.8
M^3	4	74	9	18.2
	4—	74	13	17.5
	3+	74	17	23.0
	3	74	35	47.3
Canine tubercle		166	54	32.5
Carabelli's tubercle		167	3	1.8
MANDIBLE				
Shovel shape		348	52	14.9
Normal		348	296	85.1
M_1	6	185	6	3.2
	5	185	144	77.8
	4	185	35	19.0
M_2	6	198	—	—
	5	138	21	10.6
	4	198	177	89.4
M_3	6	111	9	8.1
	5	111	43	38.7
	4	111	59	53.2

Finally Carabelli's trait on M^1 has always been classified either as an incomplete cusp or as a small furrow. *Table 11* shows the absolute and the percentage frequencies of morphological traits in the overall sample divided into sexes and the percentage total values for sexes and groups taken together. The incisors, especially maxillary ones, show a high percentage of shovel-shapes and their frequencies are considerably higher than those of other populations (Greene et al., 1967; Coppa et al., 1982). This may be due to different methods of research. Maxillary molars show a tendency to a reduction of the hypocone, as already noticed by other authors (Dahlberg, 1949; Greene et al., 1967; Perzigian, 1976; Coppa et al., 1982). M^1 is the most stable tooth, showing four cusps in 90.4 % of the analysed cases. M^2 is more unstable than M^1, but it never reaches the instability of M^3 which has three cusps in 47.3 % of the analysed cases. We also took into account the number of mandibular molar cusps, though some authors (Greene et al., 1967) regard them as indipendent morphological and genetic variants. M_1 usually has five cusps; but in 3.2 % it shows a sixth supernumerary cusp, absent in M_2 but quite frequent in M_3 (8.1 %). Carabelli's tubercle is rare, and never shows a free apex. This seems to contradict Berry (1967) who says that this trait has a great incidence in ancient European groups. But, with reference to this, other authors have already noticed relatively low percentages (Coppa et al., 1982). In accordance with Scott (1980), we did not find any differences between the sexes regarding the incidence of non metrical traits *(table 12)*. Only the percentage difference of the canine tubercle reaches some significance. Only the males show Carabelli's trait; this phenomenon has already been noticed (Berry, 1976); but in our research we cannot support the hypothesis of a higher frequency of this trait in the males, because the number of analysed individuals is too low.

Since we did not find different frequencies of morphological traits between the sexes of the overall sample, we analysed the possible differences between the males of the VII—VI and V—IV centuries; the same study was done with the females. In the males the only significant difference was noticed with M_1 as the following prospectus shows:

VII—VI

	cusps	cases	frequencies	%
M_1	6	21	—	0.0
	5	21	15	71.4
	4	21	6	28.6

V—IV

cases	frequencies	%	χ^2	P %
77	—	0.0		
77	66	85.7	5.88	5
77	11	14.3		

TABLE 12. *Percentage values relative to the presence of morphological traits for each sex separately and their probability levels*

MAXILLA		♂			♀			P (%)
		N	+	%	N	+	%	
Shovel shape		114	74	64.9	104	76	73	> 90
Normal		114	40	35.1	104	38	27	
M^1	4	84	80	95.2	73	67	91.8	98
	4—	84	4	4.8	73	6	8.2	
M^2	4	74	12	16.2	77	16	20.8	25
	4—	74	35	47.3	77	24	31.2	
	3+	74	12	16.2	77	11	14.3	≃ 30
	3	74	15	20.3	77	26	33.7	
M^3	4	31	5	16.1	41	4	9.8	73
	4—	31	4	12.9	41	9	21.9	
	3+	31	7	22.6	41	10	24.4	99
	3	31	15	48.4	41	18	43.9	
Canine tubercle		87	22	25.3	76	30	39.5	≃ 5*
Carabelli's trait		84	3	3.6	73	—	—	100
MANDIBLE								
Shovel shape		178	26	14.6	160	23	14.4	98
Normal		178	152	85.4	160	137	85.6	
M_1	6	98	—	—	78	2	2.6	
	5	98	81	82.6	78	58	74.4	≃ 20
	4	98	17	17.4	78	18	23.0	
M_2	6	112	—	—	78	—	—	
	5	112	12	10.7	78	5	6.4	≃ 60
	4	112	100	89.3	78	73	93.6	
M_3	6	68	6	8.8	42	3	7.1	
	5	68	30	44.1	42	12	28.6	≃ 20
	4	68	32	47.1	42	27	64.3	

We have significant differences also for M_3, but these phenomena are not very important because this tooth shows a high variability. We noticed no significant differences in the females.

We also tested the possible differences between antimeres. We calculated the frequency and the differences within the range of probability between the right and left side of males and females in separate groups. We did not notice great differences, in fact in both sexes the incidence of morphological variants is similar. This, in accordance with some authors (Coppa et al., 1982), is not reliable on since the dichotomic observation of morphological traits may contribute to eliminate differences in phenotype manifestations often present in antimeres.

CONCLUSIONS

The statistical research about metrical traits, dimensions and dental morphologies of Pontecagnano individuals (VII—IV centuries B. C.) shows a remarkable homogeneity in the overall sample. We get more or less the same results if we analyse the sample in separate groups. But we notice some differences that are probably due to a greater variability in the VII—VI group (especially females) compared with the V—IV group. This variability is certainly influenced by the small number of individuals in the sample of the more ancient group, but may find one explanation in the historical context of this period. That populations of Etruscan culture seem to have conquered the ,,Campania" territory of which Pontecagnano is in the extreme southern region, in the VII—VI centuries. These populations and the "Greco-Italiots" intermarried. The probable fusion that followed may be the cause of some peculiarities, like a greater tooth size variability in both sexes, in comparison with the situation we observed in the V—IV B. C. sample. This phenomenon was probaly due to economic interferences like diet stresses, documented either by the historical literature (Modesti et al., 1980) or by pathologic stigmas (Fornaciari et al., 1984) characterizing the teeth of this first group. Such stresses may have caused the greater asymmetry in the antimeres of almost all the VII—VI B. C. individuals (especially females) and a lower sexual dimorphism. This only, if the hypothesis which noticed a gradual dimension decrease in this phenomenon (especially about the male teeth), is still valid. In the following period we notice a lower size variability in males and females; this fact shows a gradual homogeneity in the population, attributable to a certain degree of endogamy characterized by Etruscan populations. So, in the second period (V—IV), in spite of the subsequent „Osche" invasions, the inhabitants of Pontecagnano (placed in a rather marginal geographical position as regards these invasions) kept a certain anthropological individuality. This hypothesis is supported also in the anthropological study of the skeletal remains (Pardini et al., 1982). Better socio-economical conditions, which probably characterized this period led to a gradual disappearance of the asymmetry between antimeres and to a greater sexual dimorphism.

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