

# The Lombard necropolis of Dueville (Northeast Italy, 7th-9th c. AD): burial rituals, paleodemography, anthropometry and paleopathology.

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**Abstract.** *The necropolis of Dueville (Northeast Italy, 7th-9th c. AD) is one of the biggest Lombard necropolis in Italy: at present, more than 500 burials have been excavated. This report regards the anthropological analysis of 217 individuals, 74 sub-adult and 143 adults, excavated from 2000 to 2009. Sex was estimated for 134 individuals and sex ratio was 146 men to 100 women. The pits are west-east oriented, with skulls at west. Skeletons are all supine, with upper limbs lying along the sides or on the chest or on the pelvis; lower limbs are usually outstretched. Most of the people were buried directly in the ground, but for the 19.8% of skeletons there was the evidence of the use of shrouds and for the 7.8% the evidence of the use of wooden coffins. All paleodemographic parameters accord with the ones related to pre-industrialized societies: infant death-rate ( $q_x$ ) in children under 5 years of age was high (28.2%) and life expectancy at birth ( $e_0$ ) was of 24 years.*

*The Lombard population of Dueville was tall (170.9 cm for males and 156.9 cm for females), generally robust and physically homogeneous. The physical type is referable to northern populations. Osteoarthritis was the most common observed pathology for both sexes. Cases of osteomyelitis and osteoperiostitis were observed exclusively in males and they may be associated to infected warfare injuries. Traumas can be observed in 7.8 % of Dueville population and in four cases they can be consider the cause of death.*

**Key-words:** Early Middle Ages, Lombards, Paleodemography, Anthropometry, Paleopathology

## Introduction

Most of the information on Lombard origins, history and practices comes from the *Historia gentis Langobardorum* (History of the Lombards), written by Paul the Deacon in 780 AD. Paul's chief source for Lombard origins, however, is the 7th-century *Origo Gentis Langobardorum* (Origin of Lombard people).

The Lombards (also called Langobards or Longobards) were a Germanic people, originally from Northeast Europe, settled for many years (1st-5th c. AD) in valley of Danube. At the beginning of 6th century, they moved

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on to Pannonia (western Hungary) and then passed into Italy through the Alps in the east (568 AD). During the reign of Alboin (530s-572), they occupied *Forum Iulii*, today's Cividale del Friuli, which became the capital of the first Lombard dukedom. The Lombards then conquered Verona, Bergamo, Brescia, Milan and Pavia. In southern Italy, they founded the dukedoms of Spoleto and Benevento. Originally worshippers of the gods Wotan and Walhalla, the Lombards were for a long time Arian Christians and became Catholics during the reign of King Autari (584-590). For many years, the Lombard monarchy resisted to the Franks, traditional Papal allies, in the struggle in dominating the Italian peninsula.

Desiderius (756-774), the last Lombard king, tried the diplomatic route, giving the hand of his daughter Ermengarda to King Charlemagne, but their marriage was very short-lived, and in 773 AD the Frankish king destroyed the Lombard army at Chiuse di Susa. However, 14 years later, the dukedom of Benevento rebelled against Frankish domination and during the struggle to reconquer the throne, Adelchi – Desiderius's son – died in the battle (Diacono, 780; Delogu, 1980).

Among the Veneto towns, Vicenza and Verona took a dominating position from the strategic point of view, mostly during the early period of the Lombard dominion. While some archaeologists interpreted the roadside findings as a defense system aimed at domination of the territory of Vicenza – one of the 36 Lombards dukedoms (Bordignon Favero, 1985) – the necropolis areas mainly refer to common civil settlements (Settia, 1988). The principal Lombard cemeteries in the Vicenza province are located at Dueville, Malo, Montecchio, Orgiano, Sandrigo and Sovizzo. The Lombard dominion left a deep mark in the Vicenza province, in the form of both place names and legislation.

The necropolis of Dueville was excavated during different campaigns since 1993. At present, more than 500 burials have been excavated under the responsibility of the Veneto Archaeological Superintendence. The Lombard origin of the burials was determined on the basis of grave goods, i.e. presence of weapons (*scramasax*), accessories and other diagnostic features typical of the Lombard culture. The C14 analysis dated the necropolis from the beginning of VII century (second generation of Lombards in Italy) to the beginning of IX century (Carolingian Age). The archaeological data is not clear in determining if all individuals of necropolis were Lombards or locals (the grave goods are generally poor). Some works (Settia, 1993; Delogu, 2004) reveal how it is difficult to find cultural homogeneity in religion, burial rituals and grave goods in the Northern Italy during Early Middle Ages. The same identification of “Lombards” can be problematic because during the migration from the East, many groups joined together, not only Germanic (i.e. Goths, Alamanni, Suebi) but also with Iranian origin (Sarmatians and Roxolani) or Mongolian origin (Huns and Avars). Clear evidences of Lombards and Avars were found by Rubini and Zaio (2011) in a cemetery dated 6th-8th century AD in Molise (Central Italy).

Also the toponym “Dueville” creates ambiguity, because it means “two *villae*” (in the Late Antiquity *villae* were small fortified farms), so that it may derive from the co-existence of two different settlements, one Late Roman and one Lombard.

## Material and methods

During the archaeological campaigns from 2000 to 2009, 217 skeletons were excavated and studied.

### *Age determination*

Skeletal remains have been classified into eight general age groups: five sub-adults (fetuses, less than 1 year old, 1–4 years, 5–9 years, 10–14 years and 15–19 years) and three adults (20–39 years, 40–59 years and 60–*w* years).

Recommendations suggested by Ferembach *et al.* (1980) and the criteria described by Krogman and Iscan (1986) were followed for the classification of sub-adult skeletons. The dental development (Ubelaker, 1989) and the degree of ossification and epiphyseal union of long bones criteria were also observed (Brothwell 1981; Ferembach *et al.* 1980; Krogman and Iscan 1986).

To classify the adult skeletons, the recommendations suggested by Ferembach *et al.* (1980) were followed, and the multi-factorial approach was preferred (Lovejoy *et al.*, 1985). Then, the degree of cranial sutures synostosis (Meindl and Lovejoy, 1985), dental wear (Brothwell, 1981), morphological changes of the pubic symphysis (Meindl *et al.*, 1985; Krogman and Iscan, 1986), and metamorphosis of auricular surface of the ilium (Lovejoy *et al.*, 1985) were employed.

### *Sex determination*

Considered that skeletal dimorphism is not evident in immature skeletons, and that no consensus exists on the methodology that should be adopted, sex diagnosis was not attempted for individuals under 15 years of age. With juvenile and adult skeletons, the classic criteria proposed by Martin and Saller (1957), Olivier (1960), Ferembach *et al.* (1980), Sjøvold (1988), and Bass (1995), were adopted.

### *Demographic methodology*

Alesan *et al.* (1999) summarized the necessary assumptions in order to make a realistic paleodemographic reconstruction: first, that the cemetery was used by only one population, community or group and that they did not use other cemeteries at the same time; second, that all the individuals of that community were buried in the necropolis; third, that the archaeological excavation was complete and anthropological recovery was meticulous and not differential. These assumptions were made to create a stable population model. A population is stable when death rates ( $\delta$ ) and birth rates ( $\gamma$ ) are constant. Under these conditions, the growth rate  $r$  ( $r = \gamma - \delta$ ) and the age distribution of a population will become constant and stable in only a few generations (Pennington, 1996).

The archaeological data show that the population buried in Dueville's necropolis was culturally Lombard. There is no evidence of biological hybridization between the Lombard invaders and the Late Roman locals. For these reasons, the first and second Alesan's assumptions can be considered respected. As regards to the third, the excavation of the necropolis is still uncompleted and the present study must be considered a preliminary report.

In all the five excavation campaigns in different areas of the necropolis, we have found a uniform population, both culturally and physically. It can be reasonably supposed that population was the same in the areas of

necropolis still not investigated.

The life tables were constructed following the modern paleodemographic approach (Acsadi and Nemeskéri, 1970; Weiss, 1973) using classes of five years each, with the only exception of the infants (0 years, 1–4 years and then regularly 5–9 years, etc.). Only 146 skeletons were well-preserved, permitting a sufficient clear attribution in a 5-years class. For bad and poor-preserved skeletons (71 individuals) it was not possible to have such narrow age intervals; so the age intervals used for adults were wider (from 10 to 20 years). This was done to minimize the possible errors in age estimation, especially for middle-aged individuals. Five-year intervals for poor and bad-preserved skeletons were obtained by cubic interpolation (Burden and Faires, 1985) from the cumulative  $d_x$ , and the relative  $d'_x$  was calculated by means of displaying the interpolated cumulative  $d_x$ . Cubic interpolation was considered the most appropriate technique in reproducing demographic profiles (Alesan *et al.*, 1999; Drusini *et al.*, 2001).

Considering that in the necropolis of Dueville there is not anthropological evidence of very old age individuals (over 60), it was established a reasonable upper limit of 60 years as the maximum possible age reached by an old person in that community.

#### *Anthropometric methodology*

Following the recommendations suggested by Martin and Knußmann (1988), skeletons were studied from the morphometric point of view. All measurement, in millimeters, were firstly taken *in situ*, given the general bad conditions of conservations. Where possible, bones were measured again after the recovery.

Particularly skulls and long bones were measured in order to determine physical indices, stature, sex and for comparing data with other medieval skeletal populations.

Determined stature was the mean calculated by two different methodologies: Trotter and Gleser (1958) and Manuvrier (1893).

#### *Paleopathological methodology*

The most common type of *ante mortem* evidences found in archaeological contexts include fractures, arthritis, vertebral pathology, osteomyelitis, congenital conditions or anomalies.

All diagnosis of pathological conditions followed the recommendations of important clinical journals, books and paleopathological texts (Ortner and Putschar, 1981; Merbs, 1989; Auerderheide and Rodriguez-Matin, 1998).

### **Results and discussion**

Table 1 summarizes the distribution per age group and sex of the 217 individuals excavated in the necropolis of Dueville. A sex ratio of 146 men to 100 women (59% of males) was found. This value is significantly different from the range 100:100–105:100 of expected proportions: the two sexes are not well represented in Dueville sample.

The underrepresentation of females is not easily comprehensible. Even considering the unsexed individuals,

proportion differs from the expected one. This fact may depend on the randomness of the studied sample: Bertozzo (1998-99), analyzing the skeletons (145 individuals) excavated in Dueville during the campaigns from 1993 to 1997 in the same necropolis, found a sex ratio of 115 men to 100 females (53% of males), nearer to the expected values. There is no archaeological evidence on a selective access to the necropolis per sex or about the presence of another coeval cemetery. It may be possible that the high number of males reflects the composition of the Lombard society, especially for the first generations in Italy, composed in majority by warriors. However, the definitive analysis of proportions per age and sex in Dueville necropolis must be attempted only after the conclusion of the excavations.

In the studied sample, sex ratio changes per age group: for individuals of 20-39 years of age, the value is 166 men to 100 women (57% of males); for individuals of 40-59 years of age, the value is 94 men to 100 women (48% of males). The high number of died adult males probably reflects the warlike nature of the Lombard peoples. The sample also shows the higher proportions of women for ages over 40; Nagaoka *et al.* (2006) have found similar tendencies in a Japanese medieval population.

The pits are west-east oriented, with skulls at west. Burials are all primary with two exceptions: the secondary burial in the tomb 500 was an adolescent associated with an adult woman; the secondary burial in tomb the 524 was a child associated with an adult (sex not determinable). Generally, infants and adolescents have their own pits and there is no archaeological evidence explaining the secondary burials in tombs 500 and 524. In both cases, the association is between adult and child/young. At the present time, it's impossible to hypothesize family ties in both tombs. The stratigraphic context clearly separates into different chronological moments the primary and the secondary burial, but nothing can be said about how long was the interval and why there were these two exceptions in the necropolis.

Skeletons are all supine. Many different positions can be observed for upper limbs: they can lie both along the sides, or one along the side (equally left or right) and one on the chest or on the pelvis; arms also can be crossed on the chest or on the pelvis. The lower limbs are usually outstretched or moderately flexed.

Most of people were buried directly in the ground, but for the 19.8% of skeletons, there was evidence of the use of shrouds and for the 7.8%, evidence of the use of wooden coffins. Most of depositions with wooden coffins were dedicated to men (62.8% versus 23.2% for females). On the contrary, percentages between sexes for shrouds were similar: 47.1% for women and 52.9% for men.

### *Palaeodemography*

Table 2 shows the life table of the Lombard studied sample. Tables 3 and 4 show life tables, separated per sex, for individuals of 15 years of age or more. Figures 1, 2 and 3 show respectively mortality ( $q_x$ ), life expectancy ( $e_x$ ) and the population pyramid ( $C_x$ ) per sex.

Mortality ( $q_x$ ) had three critical phases. The first one was the perinatal period, from birth to one year of age: 19.4% of population died during the first year of life. Infancy in general was critical for survivorship: in Dueville three children out five reached the adult age ( $q_{0-20}$  39.4). In the adult age we can observe an increasing number of

died individuals from 20 to 35 years. The last cut-off began at 40 years: only 14.4% of the starting population passed 40 years of life. No studied individual survived until 60 years or more.

Life expectancy at birth ( $e_0$ ) was of 24 years. Considering the high infant mortality under 15 years of age and the low percentages of deaths in 5–20 years individuals, we may suppose that life expectancy calculated for the 15–19 age group will be a reliable estimate of the mean life duration. Mean life duration in Dueville was 33 years: this datum is realistic, considering that at the beginning of the 18th century in European countries life expectancy was 40 years (Smith, 1993).

Population pyramid is typical of preindustrialized societies (broad base and narrow top) prior to the demographic transition and with an archaic demographic regime with high fertility and high deaths rates (Ubelaker, 1989; Henneberg and Steyn, 1994; Alesan *et al.*, 1999). In Figure 4, starting from 15 years of age, it is possible to compare the composition of population per age and sex: from 15 to 34 years, males and females are more or less equal. From 35 to 54 years, males overcome females in number. This fact can be explain with different mortality by gender, with women more long-lived than men: from 40 to 49 years male mortality was double than female; from 50 to 54 years was triple and no man passed 55 years. On the contrary, 2.5% of females survived more than 55 years. Nagaoka *et al.* (2006) found similar tendencies in a Japanese medieval population.

#### *Stature and physical indices*

Tables 5 and 6 show stature and physical indices separately in males and females.

Following Martin and Knußmann's classes of stature (1988), we can observe that the mean stature for males was "high" and "above average" for females. Particularly the number of Lombard men of Dueville with high stature was significant: 68% of males were from 167.0 to 174.8 cm high. The value of standard deviation reveals a wider variation in female stature: 68% of female population varies from 150.9 to 162.9 cm high.

The mean value for male humeral diaphyseal index falls into the "rounded humerus" category. This anatomical feature was very common for Lombard men: only 7.5% belongs to the "flat humerus" category. Similar consideration can be applied to women: 92% belongs to the "rounded humerus" category.

As regards the femoral pilastric index, the mean value reveals that *linea aspera* was weakly developed in males and absent in females. In both sexes there was wider variation for this anatomical feature. The two added up classes of "absent" and "weakly developed" *linea aspera* reach very significant values: 81.7% and 83.4% for females.

The tibial cnemic index reveals for both sexes mean values of *euricnemia* (absent flattening): 74% for males and 81% for females showed this anatomical feature.

Some consideration can be proposed deriving from the anthropometric analysis. The high stature and stoutness were typical of northern populations as the Lombards were. At the present, values of stature and physical indices well accord with other data found in other Lombard necropolis in Italy (Corrain and Capitanio, 1979; Brasili Gualandi and Calanchi, 1989; Corrain and Capitanio, 1993). Particularly in Dueville the anatomical features denote very significant homogeneity: this can be explain with a poor degree of gene flow and with a

high degree of consanguinity. It seems that the Lombard population of Dueville, chronologically the second generation of Lombards in Italy, had preserved its genetic pool without significant hybridizations with local people. A compared DNA mitochondrial analysis on different Lombard necropolis (not only Italian) would give more information about the migrations of these people across Europe and Italy.

#### *Pathologies and traumas*

Pathological conditions were observed in 16.1% of the skeletal remains: 68.6% were males, 28.6% were females and 2.8% unsexed individuals. In both sexes osteoarthritis was the most common pathology: 83.3% of males and 88.9% of females suffered from vertebral arthritis with different degrees of seriousness, from initial degradation to very severe damages.

Osteoarthritis was not exclusively connected with age, but also young adults showed evidences of this pathology: it may be explain with heavy physical activities that caused an early degradation, particularly charged to the vertebral column.

Cases of osteomyelitis and osteoperiostitis were observed exclusively in males, respectively 25.0% and 12.5% of pathological men. Both pathologies derive from an infection of the bone. Considering the exclusively sex association, it may be possible that pathologies evolved from warfare injuries.

Traumas can be observed in 17 individuals (7.8 % of Dueville population). Most (76.5%) were charged to men. Six traumas can be ascribed to weapons (5 men and 1 woman). In four cases they can be considered the cause of death (*peri mortem* traumas): three lethal injuries were located on skull, two (both males) probably were connected to throwing weapons.

Traumas were differently distributed in sexes: females showed traumas exclusively on skull and legs; most injuries on males were charged to the upper limbs, both proximal and distal district and maybe they may be related to warfare.

#### **Conclusions**

In Italy, up to the present day, little information is known about Lombards, especially from the anthropological point of view. The necropolis of Dueville, in the Northeast Italy, is one of the biggest investigated with more of 500 burials excavated.

This report on 217 studied individuals gives information about burial rituals, palaeodemography, anthropometry and Palaeopathology; it must be considered preliminary until the end of the systematic excavation in the necropolis.

The studied sample gives some information that can be considered statistically representative of the whole skeletal population and it's possible to attempt some initial considerations. The skeletal population is physically homogeneous: high stature and general post-cranial stoutness, features typical of northern populations as the Lombards originally were. The homogeneity observed in Dueville can be explained with cultural barriers that forbade or discouraged hybridization with the local populations to preserve the Lombard identity, particularly for

the first generations in Italy, when their presence was connected to the military invasion.

The wide chronological window of Dueville, from the second Lombard generation in Italy (beginning of VII century) to the Carolingian Age (beginning of IX century), should be further investigated to evaluate the cultural transition in the Lombard society, from invaders to citizens.

Some aspects in burial rituals could be deeper investigated in order to understand if and when, in Dueville, Lombards had mixed with local populations. Unpublished archaeological data reveals that the most ancient burials in the necropolis were rich in funerary dowries, such as the ones found in Cividale del Friuli, the capital of the first Lombard dukedom (568 AD). The individuals of the present study had poor funerary dowries and maybe they belong to the second phase of the Lombard occupation. Evidence of this transition can be also found in the presence of two other minor burial rituals: maybe the use of shrouds or wooden coffins could be related to not Lombard individuals socially accepted and buried in the necropolis.

Another important element to evaluate is related to traumas. Traumas ascribed to weapons and warfare have to be studied after an accurate chronological review of the different areas in the necropolis, in order to understand if there is a relation between traumas and social transition, with higher number of *peri mortem* injuries during the Lombard military invasion than to the permanent settlement of population.

### **Acknowledgements**

I am indebted with the Archaeological Superintendence of the Veneto Region, in particular with Dr. Marisa Rigoni for the precious collaboration. Sincere thanks to the staff of CAL s.r.l. and Società Archeologica Padana s.r.l. for the support. Special thanks to Dr. Gianpaolo and Alessandra Rodighiero (and collaborators) for support and great enthusiasm. I am also grateful to Dr. Mark Letter for the English revision.



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**Table 1. Composition per age and sex of Dueville skeletal sample**

Age groups	Indeterminable	Males	Females	Total
0	4	0	0	4
1-4	37	0	0	37
5-9	20	0	0	20
10-14	10	0	0	10
15-19	2	1	0	3
20-39	10	63	38	111
40-59	0	15	16	31
60- <i>w</i>	0	0	0	0
	83	79	54	216

**Table 2. Life table per age groups (216 individuals)**

$x$	$D_x$	$d_x$	$d'_x$	$l_x$	$q_x$	$L_x$	$T_x$	$e_x$	$C_x$
0	4	1.852	1.852	100.000	0.019	99.074	2403.581	24.036	5.006
1	37	17.130	17.130	98.148	0.175	358.333	2304.507	23.480	18.104
5	20	9.259	9.259	81.019	0.114	381.944	1946.174	24.021	19.297
10	10	4.630	4.630	71.759	0.065	347.222	1564.229	21.798	17.543
15	3	1.389	1.389	67.130	0.021	332.176	1217.007	18.129	16.782
20	111	51.389	14.186	65.741	0.216	293.240	884.831	13.459	14.815
25			14.105	51.555	0.274	222.512	591.592	11.475	11.242
30			12.887	37.450	0.344	155.030	369.080	9.855	7.833
35			10.210	24.562	0.416	97.285	214.050	8.715	4.915
40	31	14.352	5.007	14.352	0.349	59.241	116.765	8.136	2.993
45			4.307	9.344	0.461	35.955	57.524	6.156	1.817
50			3.243	5.038	0.644	17.082	21.569	4.282	0.863
55			1.795	1.795	1.000	4.487	4.487	2.500	0.227
60	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
216									

*Abbreviations for Tables 2-4:*

$x$  = age (years).

$D_x$  = number of deceased individuals by age.

$d_x$  = percentage of individuals dying during the age interval  $x$ .

$d'_x$  = percentage of individuals dying during the age interval  $x$  after cubic interpolation.

$l_x$  = percentage of individuals surviving to the beginning of the age interval  $x$ .

$q_x$  = probability of dying in the age interval  $x$ .

$e_x$  = life expectancy at the beginning of the age interval  $x$ .

$c_x$  = fraction of the living population in the age class (under the assumption of stationarity).

**Table 3. Life table per age groups in males (79 individuals)**

$x$	$D_x$	$d_x$	$l_x$	$q_x$	$L_x$	$T_x$	$e_x$	$C_x$
15	1	1.266	100.000	0.013	496.835	1895.570	18.956	26.210
20	9	11.392	98.734	0.115	465.190	1398.734	14.167	32.837
25	15	18.987	87.342	0.217	389.241	933.544	10.688	36.417
30	24	30.380	68.354	0.444	265.823	544.304	7.963	33.382
35	15	18.987	37.975	0.500	142.405	278.481	7.333	19.419
40	5	6.329	18.987	0.333	79.114	136.076	7.167	11.039
45	8	10.127	12.658	0.800	37.975	56.962	4.500	8.439
50	0	0.000	2.532	0.000	12.658	18.987	7.500	1.688
55	2	2.532	2.532	1.000	6.329	6.329	2.500	2.532
60	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
79								

**Table 4. Life table per age groups in females (65 individuals)**

$x$	$D_x$	$d_x$	$l_x$	$q_x$	$L_x$	$T_x$	$e_x$	$C_x$
15	0	0.000	100.000	0.000	500.000	2173.077	21.731	23.009
20	2	3.077	100.000	0.031	492.308	1673.077	16.731	29.425
25	12	18.462	96.923	0.190	438.462	1180.769	12.183	35.991
30	16	24.615	78.462	0.314	330.769	742.308	9.461	34.962
35	15	23.077	53.846	0.429	211.538	411.538	7.643	27.678
40	7	10.769	30.769	0.350	126.923	200.000	6.500	19.527
45	10	15.385	20.000	0.769	61.538	73.077	3.654	16.842
50	3	4.615	4.615	1.000	11.538	11.538	2.500	4.615
55	0	0.000	0.000	0.000	0.000	0.000	7.500	0.000
60	0	0.000	0.000	0.000	0.000	0.000	2.500	0.000
65								

**Table 5. Stature and physical indices in males.**

	Stature	Humerus	Femur	Tibia
		Diaphyseal Index	Pilastric Index	Cnemic index
<b>mean</b>	170.9	86.7	102.5	74.4
<b>st. dev.</b>	3.9	6.8	8.3	12.8
<b>n</b>	45	67	71	54
<b>min</b>	161.0	69.6	81.3	58.2
<b>max</b>	180.0	100.0	123.1	96.7

**Table 6. Stature and physical indices in females.**

	Stature	Humerus	Femur	Tibia
		Diaphyseal Index	Pilastric Index	Cnemic index
<b>mean</b>	156.9	84.9	99.6	75.1
<b>st. dev.</b>	6.0	8.3	10.4	7.0
<b>n</b>	21	40	48	27
<b>min</b>	145.0	70.0	72.4	62.9
<b>max</b>	166.5	102.5	127.3	95.0

Fig. 1. Mortality ( $q_x$  in Table 2) for Lombards in Dueville.

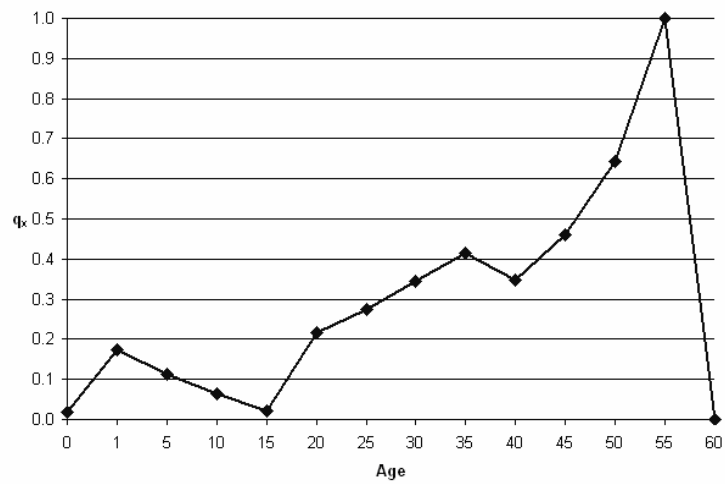


Fig. 2. Life expectancy ( $e_x$  in Table 2) for Lombards in Dueville.

