

Ethnohistory and Osteology in Southern Ontario

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Where ethnohistorical resources are available, they should be regarded as essential to skeletal biology in providing a means of checking interpretations derived from osteological analyses. A careful rereading of the Jesuit Relations shows a number of instances where information has been available that could have been used to check osteological research methods and conclusions. Palaeodemography is an especially contentious area, and one in which the Jesuit Relations prove instructive. The paper will examine one aspect of adult age assessment in human biological research in Ontario in an attempt to pinpoint valid intersections of ethnohistory and anthropology.

The Jesuit Relations and Allied Documents are reports and letters sent by Jesuit missionaries to their superiors in France and Rome, collected and edited a hundred years ago by R.G. Thwaites (1896 - hereafter cited as JR), and especially valuable because the original texts are printed beside translations. The Jesuits knew a wide variety of aborigines, in the Maritimes, down the St. Lawrence, the nomadic inhabitants of the forests from the St. Lawrence to north of the Great Lakes, and the agriculturalists of present-day Ontario. Here I will refer mostly to Huron Iroquoian speakers, but occasionally to Algonquian speakers, there being no apparent discrepancies between the settled and nomadic groups in regard to the topic under discussion.

Ramsden (1996) has suggested that the very existence of the *Jesuit Relations* has prevented Ontario archaeologists from asking and answering the big questions. I believe the *Jesuit Relations* actually can provide important analogies and a methodological check.

Where are the old folks?

Twenty years ago, I analyzed an Ontario Iroquoian cemetery called Grimsby under salvage conditions (Jackes 1988; Kenyon 1982). I knew that the Grimsby people must have suffered high mortality: the cemetery dates to a period of war, famine and disease. Indeed, there did seem to be almost no old people. Yet by the then accepted methods of palaeodemographic analysis there were almost as many old people as in earlier sites in Ontario. I determined to understand this problem, and wrote an (unpublished) manuscript entitled "Where are the Old Folks?" (cf. Weiss, 1973:78).

Weiss' (1973) monograph on *Demographic Models for Anthropology* showed that archaeological mortality was quite different

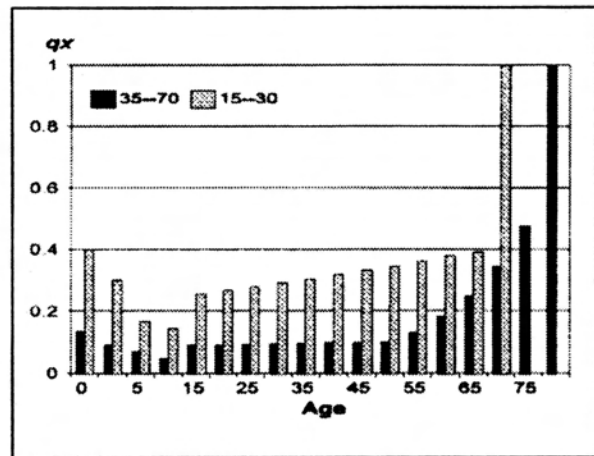


Fig. 1. Probability of death (q_x) by 5 year age categories, except for infants 0 to 11 months, plotted from Weiss (1973) model tables. In the highest (15--30) and lowest (35--70) mortality models, 12% and 55% respectively of deaths of adults over 20 occur at ≥ 50 years.

from the mortality experienced by modern populations. Weiss pointed out that in archaeological populations it seemed everyone had died by middle age, and his models suggested that adolescent and young adult mortality was also high (Figure 1 shows the probability of death by age groups provided by Weiss' highest and lowest mortality model tables). Weiss (1973:59,61) expressed concerns about age estimations and "the fertility requirements" in samples with high adult mortality.

Weiss' model was taken as fact by the anthropologists who were studying Libben, an important Woodland site just south of Lake Erie in Ohio, dated AD 800 to 1100. Work on the age assessment of the ~1,300 people buried there has led to many papers just dealing with Libben age assessment techniques (e.g., see the series of

papers in the *American Journal of Physical Anthropology*, V. 68, No. 1 for 1985). But the demographic analysis has not been reassessed.

Nancy Howell (1976, 1982) published two papers which are important in this context. The first suggested that we should expect uniformity over time in human population

structure. In the second, she pointed out that the Libben site demography - as published - was quite extraordinary: basically, she was asking 'how could the people of Libben have had a functioning society when there were no grandmothers and grandfathers?' No one answered her question, though at the same time

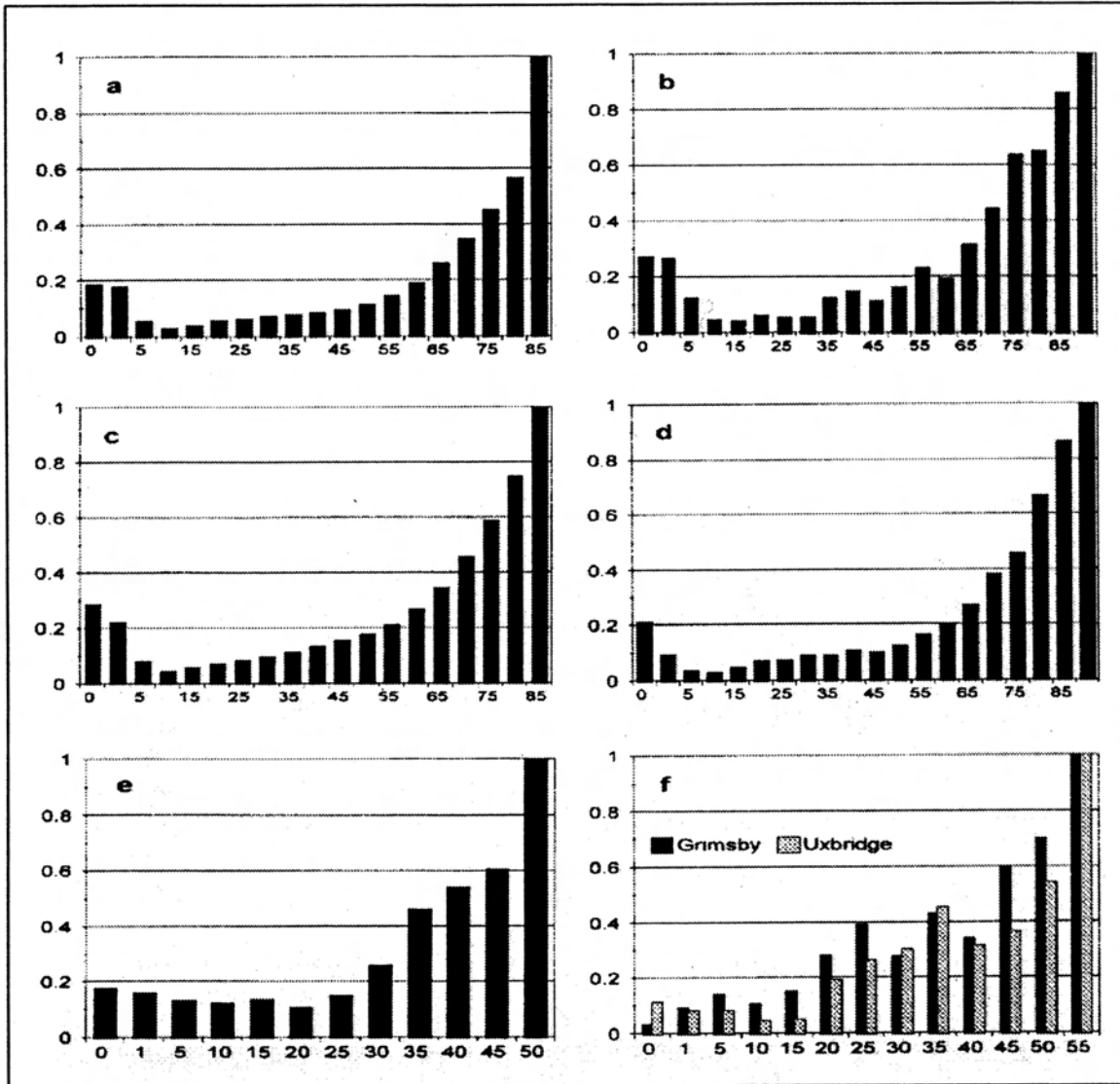


Fig. 2. Comparison of probability of death (q_x) on the Y axis, across age categories on the X axis (as per Fig. 1), among model, historical and archaeological data: (a) UN model data "Latin America" (64% of deaths of adults over 20 occur at ≥ 50 years); (b) Geneva AD 1625-1649 (56% of adult deaths are at ≥ 50 years); (c) Tourouvre AD 1670-1719 (50% of adult deaths are at ≥ 50 years); (d) French Canada AD 1640-1729 (57% of adult deaths are at ≥ 50 years); (e) Libben (last age category assumed to be 10 years: 6% of adult deaths are at ≥ 50 years); (f) Ontario Iroquois (adult ages smoothed: Grimsby 5% and Uxbridge 10% of adult deaths are at ≥ 50 years).

Bocquet-Appel and Masset (1982) were suggesting that adult age estimation techniques must be reassessed.

A series of graphs (Fig. 2a-f) will illustrate the problem. Fig. 2a models the probability of death for a group of modern populations based on data from United Nations (1982) surveys. The pattern (termed "Latin America") is what one might expect in a high mortality society - the sort of mortality which characterized Colombia, Central America, Peru, the Philippines, Sri Lanka and Thailand in the mid-20th century. It "shows high mortality during infant and childhood years, high mortality again during young adult years and relatively low mortality during the older years" (United Nations 1982:10). In other words, it shows a pattern which should be similar to that of Weiss' model tables after infancy. However, in fact, 64% of adult deaths occur over age 50.

Was mortality similar in the recent past? The data selected to illustrate past mortality in Fig. 2 does not represent demographic crises - periods of epidemics or famines, but the 17th and 18th centuries were a period of demographic stress in western Europe (Macfarlane 1997:20).

Fig. 2b shows the probability of death at various ages for the generation born in Geneva from AD 1625 to 1649 (Perrenoud 1978). Fig. 2c does the same for Tourouvre, a town in northwestern France, for about 265 households between AD 1670 to 1719 (the deaths of adults married between 1665 and 1699 and the deaths of children born between 1670 and 1720, Charbonneau 1970). Fig. 2d shows the pattern derived from records on the 4,630 French who died in Canada between AD 1640 and 1729 (Charbonneau 1975).

The pattern is much the same across all four sets of data. Some people do survive into their nineties: nearly two thirds of the adults die after age 50 in the UN model table, but in the historical records, the proportion of adults dying after age 50 is closer to half.

So we might expect around 50% of adults to die after age 50, although this could be a little lower if a population was undergoing increase. It is worth repeating that the 17th century was a period of increased mortality in Europe, and that continental Europe suffered higher mortality levels than England. Thus these graphs illustrate a minimum number of old folks rather than a maximum, for many areas of Western Europe historically.

Let us turn now to archaeological examples, starting with Libben (Fig. 2e) - a huge site, carefully excavated and studied. The researchers (Lovejoy *et al.* 1977) arbitrarily calculated the last age category as 50-59 years because they did not expect anyone to die over age 60. And, according to their reconstruction, only 6% of Libben adults died after reaching age 50.

Van Gerven and Armelagos (1983: 355-56) wrote that our difficulty in giving ages to individuals over 50 is unimportant because "only a small percentage (usually between 1% and 10%) of skeletal remains fall in ... the interval (above 50-55)". While this proportion may be true of populations undergoing rapid increase, it is generally believed that rates of population increase were low for prehistoric populations (Weiss 1973; Hassan 1981).

What we were accepting was a crude death rate (CDR) for Libben of about 50 per 1000 (see Table 1: the CDR equals the crude birth rate [CBR] since Lovejoy *et al.* 1977 stated that the population was stationary). As Lancaster (1990:35) has written with regard to these sorts of estimates for prehistoric sites, "the estimates for the crude death rate are too high", since he maintains that the CDR cannot be greater than 45 for any length of time.

Fig. 2f shows two Ontario Iroquois sites, Grimsby and Uxbridge. Grimsby is the Neutral cemetery where we could expect to see extraordinarily high mortality because we know that it represents the period from AD 1620 to 1650 when the Neutral underwent virtual extinction - their society completely disappeared by 1651.

Uxbridge, a large precontact site just south of Lake Simcoe in Ontario, dated ca. AD 1500, was well-studied by Pfeiffer (1983). During this period there was tuberculosis, but there were probably as yet no introduced European diseases, trade disruptions, or firearms. But what do we find? The percentage of old people is barely larger than that for Grimsby.

While the two Ontario adult age distributions are different (the statistical significance of the difference is .02), they are much more similar than one would expect. To demonstrate this, Fig. 3 illustrates how there should be a high number of individuals over age 50 among the dead in a declining population. In comparison, Uxbridge and Tourouvre are different at the .00000 level, this despite the fact that Uxbridge and Tourouvre should be quite similar (see Figure 5 below).

Fig. 4 summarizes the argument so far, and shows that the percentage of people 50 years and over, in archaeological sites is far below that for historical sites.

The Jesuit Relations provide an answer

This lack of old people seemed especially curious, because the Grimsby burial practices appear to indicate special status for elderly adult males.

The *Jesuit Relations* certainly tell us that the Jesuits knew many elderly people, even in a time of disruption, epidemic, famine and war. They tell us that the old men were of central importance.

- an old man of 80 died November 21, 1634 - his daughter, already a very old lady, died April 24, 1635 (*JR VIII*: 135)
- a good old man about 70 years old, a widower, was baptized with two of his granddaughters (*JR XVII*: 79)
- an old man aged about 80 years, who had no other ailment save that of his old age, was baptized (*JR XVII*: 99, 101)
- a woman of 70 cured of a fever, had been named Anne at her baptism three years earlier (*JR XXIII*: 123)
- a woman about 80 years of age was dying (*JR XXIII*: 131)
- a poor woman of 60 gave her one possession - a beaver robe - to be the chapel carpet (*JR XXIII*: 131)
- old woman of about 80 (an Algonquin) had been blind for a long time (*JR XXIII*: 223)
- one man about 70 years of age had a fever and another, "almost as old" fell down (*JR XXVI*: 221)
- a man 60 years of age (*JR XXVI*: 285)
- among the Arendaronnon Hurons there was a good old man, a Christian over 100 years old (*JR XXVII*: 29)
- an old man of 70 who had lost the use of an arm through "a stroke of paralysis" (*JR XXVIII*: 77)
- André was 70 years old (*JR XXX*: 49)
- the conversion of an old man of 80 -he was called François (*JR XXX*: 99, 107)
- one of the Hurons captured with Father Jogues by the Iroquois was an old man of 80 (*JR XXI*: 19).

It is obvious that these are not exact ages -for one thing they are clearly rounded to the nearest decade. Can we rely on them at all? One method of age assessment the Jesuits used

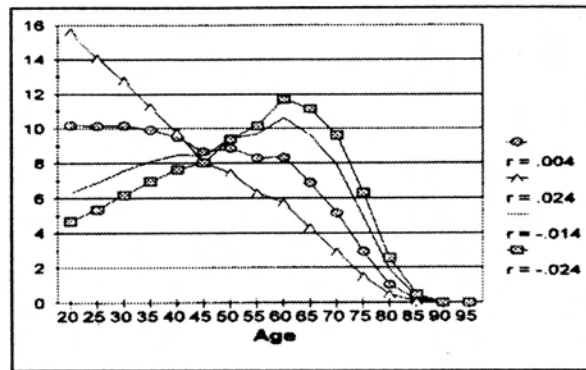


Fig. 3. Inflation in the proportion of adults dying at ≥ 50 years (as a percentage of all adults ≥ 20 years) in declining populations using West I models for the highest level of general mortality (Coale and Demeny 1983). West I calculated at $r = -.014$ and $-.024$, compared with populations undergoing minimal and marked increase, West I at $r = .004$ and $.024$.

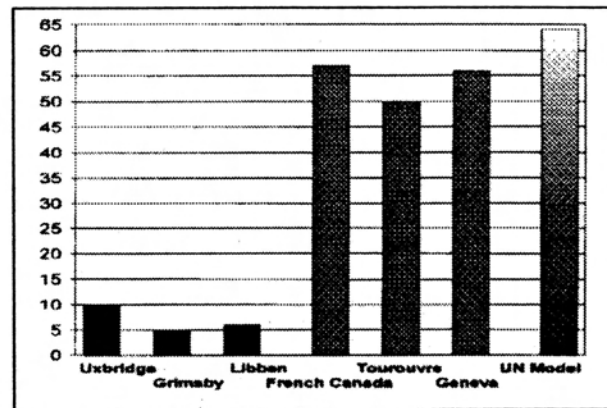


Fig. 4. Comparison among archaeological (Uxbridge, Grimsby, Libben), historical (French Canada, Tourouvre, Geneva) and model (Latin America pattern) adult age at death data, illustrating differences in the deaths of those ≥ 50 years as a percentage of all adults ≥ 20 years.

must have been generational relationships, for example a woman of Miskou who had seen three or four generations (*JR XXX*: 135).

There are also the references such as that to Joachim Tsindacaiendoua who was 80 years old when he died. He had a grandnephew, but his grandson was dead. His daughter died soon after, described as "*une femme fort vieille*" (*JR VIII*: 135).

One can expect exaggeration, perhaps. For example "a good old man Adam who was the most aged of the Algonquins -they intended to kill him with a rope in order to rid themselves of a burden that greatly oppressed them although this worthy man has no other malady than that

which he began to contract more than a hundred years ago". He was sent to the Hospital at St. Joseph near Quebec to be cared for by the nuns (*JR XX: 239*). (The carrying of those unable to walk is well-recorded, and not only by the Jesuits. Mary Rowlandson, a captive in New England, describes those who "carried their old decrepit mothers"; Van Der Beets 1973: 53).

Peoples' memories could be checked against the activities of the French from soon after 1600 along the St. Lawrence, and many French came and went, and lived in Huronia from 1610 onwards. There is good reason to suppose that recorded events, together with the passage of generations, and the movement of villages every 10 years or so, allowed people to have a very clear idea of relative ages among the Hurons. In fact, the Jesuits very often give ages, especially of children, or talk about events in years:

- "a woman who came 9 or 10 years ago from a village of the Neutral nation" (*JR XXX: 109*);
- "a young Iroquois captive, a woman of about 25 years" (*JR XXX: 109*);
- "a young man only 20 to 22 years old" (*JR X: 75*);
- "a young Huron about 30 years old" (*JR XL: 227*).

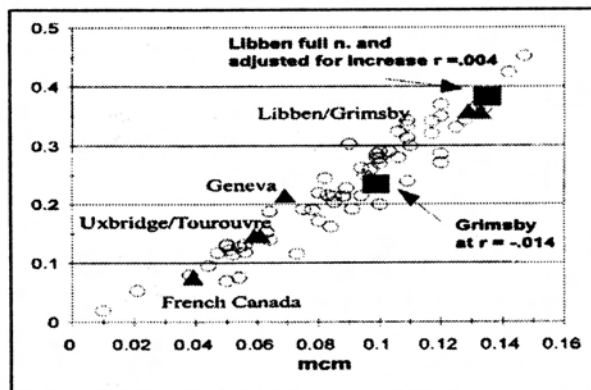


Fig. 5. Comparison among age at death distributions using two demographic estimators: mean childhood mortality (mcm) and the ratio of subadults aged 5 to 14 to individuals over 20 (J:A).

To take only Volume XI of 1636-1637 as an example:

- baptized a man aged 50 (*JR XI: 19*);
- an important man about 45 years old (*JR XI:85*);
- a boy about 17 years old died (*JR XI: 107*);
- a child 4 or 5 years and another 9 or 10 years (*JR XI: 121*);

- a man about 50 (*JR XI: 125*);
- a girl about 12 (*JR XI: 127*);
- a girl about 7 (*JR XI: 137*).

Or Volume VIII of 1634-1636:

- a girl of 18 to 20 (*JR VIII: 27*);
- a girl of 2 (*JR VIII: 133*);
- a boy about 5 and a man of 40 to 50 years (*JR VIII: 137*);
- a man of about 80 (*JR VIII: 137*);
- a girl of 2 and her brother about 17 years (*JR VIII: 253*);
- a girl about 16 (*JR VIII: 257*);
- a boy of 15 or 16 (*JR VIII: 277*);
- a girl about 2 and her sister about 16 years old (*JR VIII: 279*).

We know a certain amount about some of the old people mentioned initially above. For example:

- the widower of about 70 was off to trade for 3 months; he was willing to give up smoking; he went to Mass with his granddaughters on New Year's Day 1639 (*JR XVII: 79*);
- the old man of 80, François, had to make a journey of 5 or 6 leagues at Christmas time through 3 or 4 feet of snow (*JR XXX: 99,107*).

The Jesuits certainly believed that old men were capable of great endurance: for example, the journey by canoe from Huronia to the St. Lawrence, which took more than a month and often involved severe hardships. The old man captured with the Jesuit Father Jogues by Iroquois who was around 80 was put to death when he complained that he is too old to go to a strange land (*JR XXXIX: 183*), although he was returning to Huronia from Trois-Rivières at the time of his death.

An interesting point is that the Huron stated to the Jesuits that the number of old people in their population had much decreased after the arrival of the Jesuits (*JR XXXIX: 137*).

Nevertheless, there still were very old people: for example, concern was expressed because "there are some old people who are simply too old to flee from the Iroquois, who can only wait in the cabins for death to come" (*JR X: 51*).

We begin to get an idea of what the Jesuits meant by their various age estimates: a boy of 10 was "*ce petit enfant*" or "*le petit*" (*JR VIII:251*); a male of 17 was a boy still; one of 25 to 30 was a young man; someone of 45 was a man; an old man was 70 to 80. Very old - "*fort*

ag e" - referred to a man 80 years or more. Those who were already old were those whose memories were failing (*JR XI: 191*).

Now that we have an idea of what the Jesuits meant when they talked about "old men", it is instructive to see what they had to say about the role of old men in the society.

- "We pay especial attention to the old men (*les anciens*), inasmuch as they are the ones who determine and decide all matters, and everything is ordered by their advice" (*JR X: 15*).
- "It is the old men who have control there, and upon whose judgment depend the decisions made (in the council meetings of the villages)..."(*JR X: 213*).
- The old men relate fables (*JRVIII: 121*), they are the ones who know the "superstitions" (*JRVIII: 145*) and the old men interpret the dreams of the sick (*JR X: 175, 201*).
- The old men approve the new captain (*JR X: 235*).
- The decision to hold the great Feast of the Dead is made by the old men (*JR X: 27*).
- When the Jesuits wished to repair their cabin, they spoke about it to the Captain of the village, who immediately assembled the old men (*JR X: 247*).
- The old men are consulted before the Captain decides to have a meeting (*JR X: 253*).
- When there was an important issue with the Jesuits (concerning the burial of two Frenchmen), the Captain came to speak to them on behalf of the old men of the whole country (*JR X: 305*). Even more worrisome was what to do about the murder of a young Frenchman. Then an elder spoke on behalf of all the people of all the eight nations in the Huron country at an important meeting called to discuss the murder (*JR XXXIII: 235*).

And there are many references to the respect paid to the old - they are the ones who speak, they ask questions, the young are timid before the old (*JR XI: 87, 213; XIV: 254*).

No clear statement is made about the number of old people in a village. One passage (*JR VIII: 145-147*) causes some confusion. It discusses the fact that the Jesuits found a few elderly Hurons to be troublesome, "the obstinate ones attached to their superstitions and evil customs". This passage seems to refer to two, or

three men in the village who were both "old" and, according to the Jesuits, "obstinate". A possible reading might be that there were only two or three old men in the village, but this would ignore the fact that a number of elderly people were baptized, and thus not at all "obstinate" in the eyes of the Jesuits.

Health and disease amongst the Huron

Can we show that Huron were healthy enough for us to expect there to be as many old people as among Europeans?

Osteologists know very well that agricultural North Americans were very much afflicted by bone pathology, and especially by dental pathology. There were high frequencies of sinusitis (Varney 1994). Champlain (Biggar III: 125) noted the smoke in the long houses, stating that it could lead to blindness in old age. The Jesuits also suffered from the smoke in the cabins of the Huron. But it is clear that some cabins were draughty (cf. *JR XVII: 17*). Chronic infection and reinfection is a good possibility here, but perhaps not more so than in northern Europe, though the crowded long houses would certainly have encouraged the spread of respiratory disease.

According to the Relation of 1639 "... go to visit them in their cabins - you will see ... nothing, ... but fire and smoke, ... naked bodies ... mingled pell-mell with the dogs, which are held as dear as the children of the house, and share the beds, plates, and food of their masters. Everything is in a cloud of dust, and ... you will not reach the end of the cabin before you are completely befouled with soot, filth, and dirt" (*JR XVII: 13, 15*) -Lalemant often seems critical and complaining. Nevertheless, the smoke and dogs were also Le Jeune's chief complaint with regard to Montagnais housing (*JR XXXIX: 109, 111*), and Br euf also mentioned that the smoke was very thick (*JR X: 93*), because their cabin had no draughts.

Dogs milled around day and night. But the absence of domesticated animals other than dogs, and the drier, colder winter climate of Ontario may well have improved general health in comparison with Europe. Certainly, the 29 Jesuits themselves suffered barely a day of illness in their 35 years in Huronia, despite all their hardships, and some of them were well into middle age (*JR X: 15, 101*). Two Jesuits were ill in August 1637, and the autumn of 1636 saw most of them ill, with 'flu-like symptoms, but that was virtually the only illness recorded (*JR XI:13; XIII: 101-115*). There are very specific

statements on this. For example, though crowded in a bark cabin for the six-month-long winter "no one complains of his head or his stomach; we do not know what diarrhoea, colds, or catarrh are" (*JR X*: 101).

What other factors may have counterbalanced the negatives? The diet could be reasonably varied and the Jesuits, though likely to complain about the lack of seasoning in the food, considered it "not so bad", this quotation is from a context in which Brébeuf was trying to warn potential missionaries of the great discomfort they would experience in Huronia (*JR X*: 93, see also 103). Du Peron (*JR XV*:163) describing the food given to him upon his arrival in Huronia, says "I assure Your Reverence that this food was delicious to me", and then continues on to say that the Jesuits also eat the food of the Hurons -corn porridge and a flagon of water, morning and evening.

Housing, bedding, clothing, water, hygiene are important considerations in the spread of disease.

Huron villages were moved every 8 to 15 years, and the long houses frequently burned (*JR VIII*:105). The bedding was easily disposable bark or boughs covered with a rush mat and skins. Sagard discussed methods of lice removal (Tooker 1967: 22), but lice are not mentioned by the Jesuits. Brébeuf stated that the fleas were worse than in France during some seasons of the year (*JR X*: 91), and found the summer mosquitoes troublesome, but, he wrote, "...all and every one of us find everything almost as comfortable as life is in France" (*JR X*: 101).

People were away from the Huron villages all summer and autumn, the women and children living in temporary cabins in the fields, the men away trading, on war parties, fishing or hunting (e.g. *JR X*: 53).

Heidenreich (1971: 148; and see Tooker 1967: 23) notes that there is no indication that the French found Huron hygiene to be lacking, or their villages to be offensive (but see Saunders *et al.* 1992: 121). Brébeuf in 1637 made a comment which I take to mean that defecation and urination were dealt with hygienically: "there is no impropriety" while travelling by canoe from Quebec to Huronia (*JR XII*:121). While Le Jeune complained that the Montagnais had filthy habits (*JR VI*:263-269), there are specific references to the Montagnais, in settling down along the St. Lawrence, washing their vessels and excluding rubbish from their settlement (*JR XII*:137).

Sweat baths, followed by the drinking of cold water and washing or bathing, might be an improvement over the situation in Europe: Macfarlane (1997: 254) states that the 16th and 17th centuries marked the low point of bathing in England and France.

The water of Ontario could not have been worse than the water of European cities (Macfarlane 1997: 22). Le Jeune in 1634 (*JR VI*:275) described how the Montagnais actually did not drink cold water, and the Jesuits were surprised that the Huron drank water only when travelling, going for months without drinking, since their thin cornmeal broth "serves as meat and drink" (*JR XV*:163).

Clothing was noted as being fairly minimal, and people were often almost naked (even in winter -*JR X*: 265). Beaver fur coats were worn for a limited amount of time, since as soon as the guard hairs were worn off, the coats were taken to the St. Lawrence for trading (Trigger 1985: 136). There is no mention of lice as a problem in these furs.

In fact, the Jesuits considered the inhabitants of New France to be healthy - there are several references to the people being taller than the French, robust, agile and attractive (*JR VI*:229; *VIII*:159; *XV*:155): "...these savages (are) well formed, strong, of good mien, endowed with natural good sense"-this is from a letter of 1635 (*JR VIII*:175). Brébeuf wrote "...the Hurons have at hand the means of supplying a living, if not luxurious, yet adequate and healthful" (*JR XI*: 7).

The Jesuits regarded Canada as healthy in general. Of the French on the St. Lawrence, they said: "The country is very healthful, remarkably few diseases being seen here and the children are very comely and easy to rear" (*JR XL*: 217). French Canadian infant mortality rates at around 180 per 1000 in the late 17th century were quite low for the period (Nault *et al.*, 1990; cf. Table 1 here).

Since there is a common assumption that Europeans tend to overestimate the ages of non-Europeans whom they see as "old before their time", or "old at age 30" (cf. Weiss 1973:12), it is worth noting that the Jesuits mention nothing in these terms, quite the reverse. On Cape Breton Island, the Jesuits recorded "old men of eighty and a hundred years, who have hardly a grey hair" (*JR VIII*: 159). The closest approximation to perception of non-Europeans as appearing old, is that the daughters of "old" men may be seen as "very old". It seems possible that the Jesuits, interested in the strength,

youthfulness and health of men they knew to be "old", made an effort to find out roughly how old these men actually were, and there can be no doubt that the Jesuits made lists of the names and estimated ages of those they baptized.

It seems very likely that people the Jesuits knew were quite long-lived. They certainly knew that people lived long enough to have grandchildren, that they lived long enough for their sons to become important captains of villages (*JR VIII*: 133). A captain could live long enough to be succeeded by his grandson (Tooker 1967: 47), and the Jesuits reported that the Huron lived long enough to be considered keepers of "mysteries so hidden that only the old men, who can speak with credit and authority about them, are believed" (*JR VIII*: 117).

Why did Libben have no old people?

The methods of age estimation used for Grimsby and Libben must underage older adults consistently: the problem centres on the use of articular surfaces on the innominate (see Jackes 1992). The method is used by the Libben researchers, and by all other researchers who have worked on large North American samples (even though the actual age changes to the innominate of North American aborigines are unknown).

There are other methods of age assessment which could give more accurate ages: the best chance for accuracy may come from an examination of the cross-section of tooth roots (Jackes 1992). This technique has never been applied to a large sample of adults in an archaeological site, and the dental pathology of horticulturalists in North America will limit the value of the approach.

Fig. 5 shows a technique that allows comparison among age at death distributions, when there are different age assessment techniques, and other biases such as under representation of infants and non-aged incomplete adults.

This technique focuses on the ratio of child to adult deaths, with especial emphasis on children because they can be given more accurate ages. We see here that archaeological skeletal samples spread across quite a wide range, and that archaeological and historical data can be made to agree very closely indeed, in that Uxbridge and Tourouvre are virtually identical. This suggests that there is not complete disparity in the demographic values between archaeological material and historical or modern data.

We must start by assuming that Howell was right - that there are basic biological variables underlying the human experience of fertility and mortality, the determinants of our population structure. When this biological uniformity seems to be disturbed, as is apparently the case with archaeological data, then we should question our methods. Several hundred years of research into the biological and social foundations of human population structure should not be set aside in response to samples that are likely to be incomplete or biased, and methods that have not been tested adequately.

Grimsby - representing the violent and tragic end of an Iroquoian nation in AD 1650 - is almost off the graph. Those people did have a mortality experience which was extraordinary. For Grimsby, the mortality estimators, mean childhood mortality (mcm) and ratio of childhood to adult deaths (J:A) are far too high for a population in decline. The only possible interpretations of this are: (1) that we have a very poor idea of the population structure of a group undergoing rapid extinction and that we should not expect lowered fertility; or (2) that there is a disproportionate number of children buried in the cemetery, a bias caused by the adults dying elsewhere - as warriors, prisoners or refugees - or being buried elsewhere. The second is much more likely given what the Jesuits have told us of the last years of the Neutral nation (and see Jackes 1994 with regard to the effect of famine, disease and war on fertility). Fig. 5 and Table 2 demonstrate that an extreme adjustment to the Grimsby data would be required to bring them into the expected range for a declining population. For example, one could postulate that around 50 adults were missing from the cemetery and that the rate of decline was about 3% p.a. ($r = -.030$). Even this type of adjustment would do no more than bring the Grimsby data close to the Uxbridge point on the graph.

Most of the points at the high end of the graph in Fig. 5 are late Woodland samples in which population increase might require an adjustment of methods for calculating demographic values. We can add to Libben those 38 (adult?) individuals for whom no ages could be estimated (ignoring the 10% of the cemetery said to be unexcavated - Lovejoy *et al.* 1977) and gain an mcm of .123 and a J:A of .336. In order to find an equivalent level of childhood mortality, we must calculate Coale and Demeny (1983) West I at $r = .024$ (Table 2). It is reasonable to assume that we must adjust for

population expansion occurring as agriculture intensified just south of the Great Lakes; nevertheless such a high rate of increase would be unexpected and would very likely not be maintained over a long time period.

Table 2 reveals that Libben is likely to have had many more old folks than current methods reveal. In fact, the figure of 29% of adults ≥ 50 years, suggested by the calculation of West 1 at $r = .024$, is likely to be an absolute minimum. The crude death rate or crude birth rate would be 110, suggesting that the demographic values are impossibly high; a total fertility rate of 12 is extremely unlikely (see Jackes 1994). The chances are that we should reduce the fertility rate to something like half, as with a calculation of West 1 at $r = .004$, which would give an estimate of those over 50 years as making up about 42% of adult dead.

Conclusion

In sum, skeletal biologists have relied on flawed techniques when they have stated that societies of the past had no elderly. While in archaeological sites adult mortality appears more or less completed before 60 years of age, it is much more likely that archaeological mortality was generally similar to historical mortality. As Nancy Howell pointed out years ago, such short life spans were fairly implausible. The Jesuits, despite the disruptions to life in Canada in the first half of the 16th century, believed many individuals to be much older than 60, and considered these old men central to the social life. The conclusion -that our present argument could be extended to other skeletal populations - is not hard to draw.

Acknowledgements

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Table 1 - Calculated demographic values assuming a stationary population

Samples	Uxbridge adults smoothed by equal distribution n = 457	Grimsby 26 unknown age adults distributed proportionately n = 373	Libben unknown not included n=1289	Geneva 1625-1649	French Canada 1640-1729 ^c	Tourouvre 1670-1719
infant probability of death ($1q_0$)	.114 ^a	.035 ^a	.175 ^a	.271	.211	.285
crude birth rate / crude death rate ($1/l_1e_0$)	^b 40 / 1000	^b 45 / 1000	^b 50 / 1000	41 / 1000	28 / 1000	40 / 1000

^a Almost certainly too low because of infant under-representation.

^b This figure is partly determined by infant and child representation, partly by adult age assessments; when the population is stationary, CBR = CDR.

^c Immigration means that this data should be calculated with adjustments.

Table 2 - Coale and Demeny (1983) West 1 calculated so as to provide childhood mortality values equivalent to Libben and suggest percentages of adults 50 and over in increasing and declining populations.

West 1 at $r =$ ^a	mcm	J:A	TF ^b	% ≥ 50/≥ 20
0.0	.064	.146	5.4	44.3
0.004	.073	.170	6.1	41.5
0.024	.012	.338	11.6	28.7
-0.014	.040	.084	3.8	54.3
-0.024	.028	.054	3.1	61.3

^a The figures for $r = 0$ are adjusted using the formula: e^{rx} where: e = the base of the natural logarithm; r = the growth rate, here e.g. (24/1000) and (-24/1000); and x = the midpoint of age range. It has been established that the age distribution given by this formula is equivalent to that given in the published West 1 tables (Coale and Demeny 1983). Note that previous work by the author has used the Carrier (1958) approach, but this contained an error in calculation.

^b Total fertility (TF) here is calculated using an adult male:female ratio of 1:1 and assumes the period of child-bearing to be 30 years.