

## Research article

# A juvenile with compromised osteogenesis provides insights into past hunter-gatherer lives

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## ARTICLE INFO

## Keywords:

Osteogenesis imperfecta  
Pediatric osteoporosis  
Bicondylar angle  
Bioarchaeology of care  
Ontario late archaic

## ABSTRACT

The Late Archaic in northeastern North America (4500–2800 B.P.) pre-dates reliance on pottery and domesticated plants. It is thought to reflect a highly mobile, seasonal migratory foraging/hunting regimen. A juvenile skeleton with pervasive bone wasting and fragile jaws from the Hind Site (AdHk-1), ca. 3000 B.P., southwestern Ontario, provides evidence of the social context of her family group, including aspects of mobility and food management. The well-preserved bones and teeth are considered in bioarchaeological context. Radiographic, osteometric and cross-sectional geometric approaches to assessing musculoskeletal function are presented, plus differential diagnosis of the bone wasting condition. All bones of the probable female (aged approx. 16 yr) show stunting and wasting. Wedged lower vertebral bodies, porous trabeculae, undeveloped bicondylar angles (femur) and abnormally low cortical long bone mass are consistent with chronically reduced ambulation. Few teeth remain in the dramatically resorbed alveoli; slight tooth wear and substantial calculus suggest a modified (soft) diet. Osteogenesis imperfecta type IV is the most probable etiology. The extended survival of this juvenile who may never have walked reflects collective care. The case provides evidence of a past lifeway that appears to have been organized around logistic mobility, including occupational stability and food storage.

## 1. Introduction

Archaeological evidence of past hunter-gatherers around the lower Great Lakes is limited. Across much of northeastern North America, the high mobility and limited material imprint of Archaic peoples make it difficult to fully characterize their lives. Lithic evidence suggests temporal and spatial diversity, from around 10,000 years ago until the introduction of ceramics, at ca. 2800 BP (Ellis, 2013). Sites documenting shelter, resource exploitation and management are rare. Diverse lines of evidence must be explored in the interest of characterizing their adaptive systems (Lovis et al., 2005). By the later, or Terminal Archaic, from about 4500 BP, small family groups appear to have made regular use of cemetery sites (Conolly et al., 2014; Spence and Fox, 1986). The evidence of burial ceremonies and grave gifts demonstrates access to exotic materials and aesthetic mastery. Osteobiographical information about the deceased can provide insights as well.

The environment of the Late/Terminal Archaic hunter-gatherers of southwestern Ontario was a well-watered deciduous forest, known as the “Carolinian biotic province” (Dice, 1943) with a stable, temperate climate similar to current conditions of the region (Karrow and Warner, 1990) (Fig. 1). Small hunter-gatherer bands are thought to have moved

seasonally, following routes dictated by resource availability (Ellis et al., 2009; Spence, 1986). Movement is thought to have occurred within a circumscribed territory with periodic seasonal aggregation. In addition to projectile points, artifacts include bone barbs and many ground stone items, including net sinkers, bannerstones, gorgets, and various tools for woodworking (Ellis et al., 1990, 2009; Williamson and MacDonald, 1998). Although ground stone artifacts and the use of powdered ochre in burials indicate preparatory practices, grinding stones are rare. Based on the presence of exotic materials like native copper and shell found with burials (Conolly et al., 2014; Donaldson and Wortner, 1995; Ritzenthaler and Quimby, 1962), it appears that regular long-distance travel and interaction between widespread social groups occurred. Springtime aggregations at prime fishing locales have long been inferred (Wright, 1963), but this remains speculative, as no such sites have been documented (Ellis et al., 2009). It has been suggested that short term occupation of sites along stream edges and marshes may explain the ephemeral nature of the archaeological evidence (Woodley, 2006).

While there is some evidence of reduced residential mobility in contrast to earlier times (e.g. Ellis et al., 2009, 2015), evidence of Late Archaic people’s continued mobility comes in part from small cemetery

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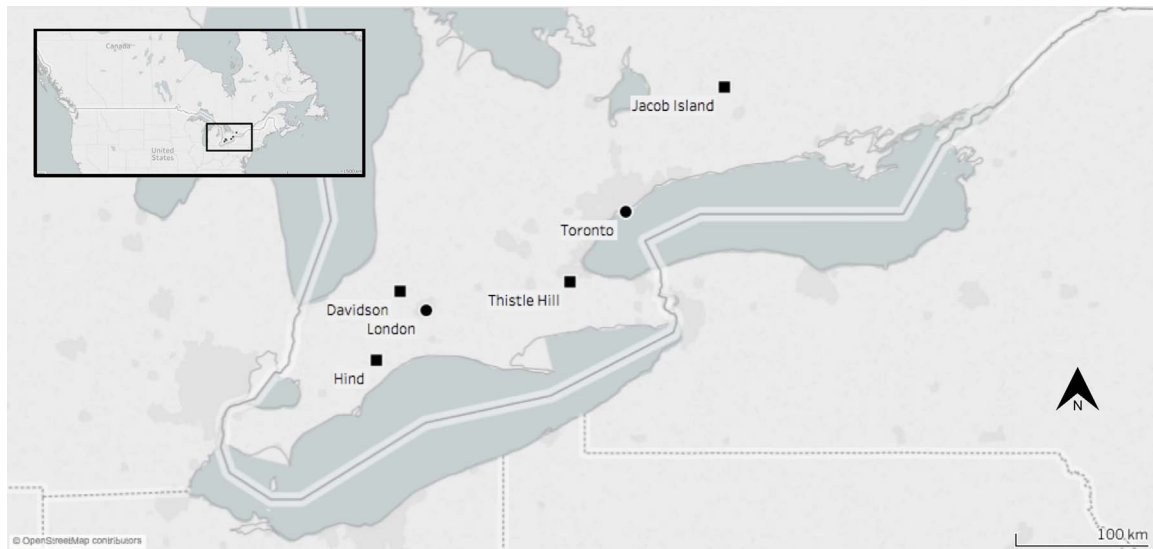


Fig. 1. Map of the southwestern Ontario region, showing locations of the archaeological sites mentioned in the text (squares) as well as modern cities of the region (circles). Map credit: J. Newton.

sites in the region, constructed on sandy knolls along river meanders (Spence, 1986). These cemeteries are associated with the Small Point or Terminal Archaic at ca. 3000 B.P. (Spence and Fox, 1986). They typically include primary burials and cremations, the latter of bone that was burned while fresh, sometimes representing multiple persons. Cremation features are tightly packed and highly fragmented, consistent with their transport to the site in some type of perishable container and interment a long time after the death occurred (Binford, 1963; Pfeiffer, 1974; Spence, 1986).

Available food resources included various mammals and game birds, tree nuts (butternut, walnut, hickory and others), fleshy fruits (plum, cherry, blueberry and others), leafy plants (like sumac, cattail) and grains (including wild rice in some areas) plus many types of lacustrine and riverine fish (Ellis, 2013; Ellis et al., 2009; Monckton, 2013; Needs-Howarth, 2013). Predictable, seasonal events like fish spawning runs, maturation of wild rice (*Zizania*) and nuts could have dictated group movements. Late Archaic stone projectiles are categorized into Broad Point and Small Point groupings. It has been suggested that the former represent the tools of ambush hunting and the latter are associated with bow and arrow hunting (Snarey and Ellis, 2008). Burial gifts at the Hind Site include both types.

The absence of pottery during the Archaic period suggests that food preparation may have focused on drying and roasting, given the absence of grinding stones and vessels for boiling. The limited number of occupational sites and their frequently ephemeral nature limits our knowledge about food storage and preparation. In study of the Late Archaic to date, occupation sites have been considered as spring-summer if they are located near a lakeshore and as winter sites if they are not littoral. The lakeshore sites tend to be poorly stratified lithic scatters, sometimes with hearth and post mold features. Two interior sites – Thistle Hill (Woodley, 1990) and Davidson (Eastaugh et al., 2013; Ellis et al., 2014a,b) – document the use of semi-subterranean houses. The Davidson site (AhHk-54) is the best evidence of a possible Terminal Archaic home base, where rather elaborate family-sized structures date from about 3200–2800 BP. Definitive middens are present, indicating organized disposal of refuse, which in turn suggests reduced mobility (Christopher Ellis; personal communication). The insulating features of the pit houses indicate winter use (Ellis et al., 2015). However, concerns have been expressed that the interpretive model of quite-formalized seasonal rounds may be misleading (Ellis et al., 2015:61).

The long presumed adaptive subsistence system during the Late

Archaic of southwestern Ontario conceives small groups of immediate return foragers (as per Woodburn, 1982) exercising residential mobility (as per Oswalt, 1973; Binford, 2001; Lovis et al., 2005) in which the entire group moved regularly, setting up camps at diverse locations, depending on availability of prey species and plant foods. One way in which the collective effort of a foraging group can be economized is to shift away from residential mobility. If at least some food sources are sufficiently predictable and clumped, specialized mobile task groups can travel to those sites, collect and bring surplus food back to people, and the surplus can be stored. It has been argued that logistical mobility represents a shift toward increasing sedentariness, with implications of increased technological and social complexity (Binford, 2001, 1983, 1982; Donahue and Lovis, 2003; Marean, 2016). It has been reasoned that the dense and predictable food resources exploited by logistic mobility systems are most often marine/lacustrine, although plant foods like nuts have formed bases for these systems as well (Arnold and Walsh, 2010; Steward, 1938). Within southern Ontario, it has been suggested that fish and wild rice could have provided predictable, plentiful foods that could be stored (Johnston, 1968), but physical evidence for the sedentism that accompanies logistical mobility is weak. One exception is that of the rather elaborate winter houses being revealed through recent work at the sites of Thistle Hill and Davidson, discussed above. These houses suggest winter settlement stability, hence reduced reliance on residential mobility. Ethnographic analogues suggest that such winter residential stability is facilitated by an increased reliance on stored products (see Ellis et al., 2014a,b, 2015).

Evidence from the skeletal remains of these foragers can expand our understanding of their lives. We describe here the remains of an immature skeleton with systemic abnormalities. We suggest that the survival of this group member can be linked to aspects of social organization. A rigorous approach to the bioarchaeology of care (Tilley and Oxenham, 2011) can be applied. While acknowledging the cautions against over-interpretation (Dettwyler, 1991; Tarlow, 2012), advocates assert that “it is possible, where sufficient evidence exists, to establish the presence of disability requiring support, to posit some of the more straightforward components of the care likely provided in response, and to deduce aspects of social relations and social practice of those involved in caregiving” (Tilley and Cameron, 2014:5). We demonstrate that this contextualization can also provide insights into the life ways of past peoples, thereby contributing to both culture history and behavioral ecology approaches to reconstructing the past.

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