14. Preliminary osteoarchaeological analysis of the disarticulated human skeletal material from Ballyhanna, Co. Donegal

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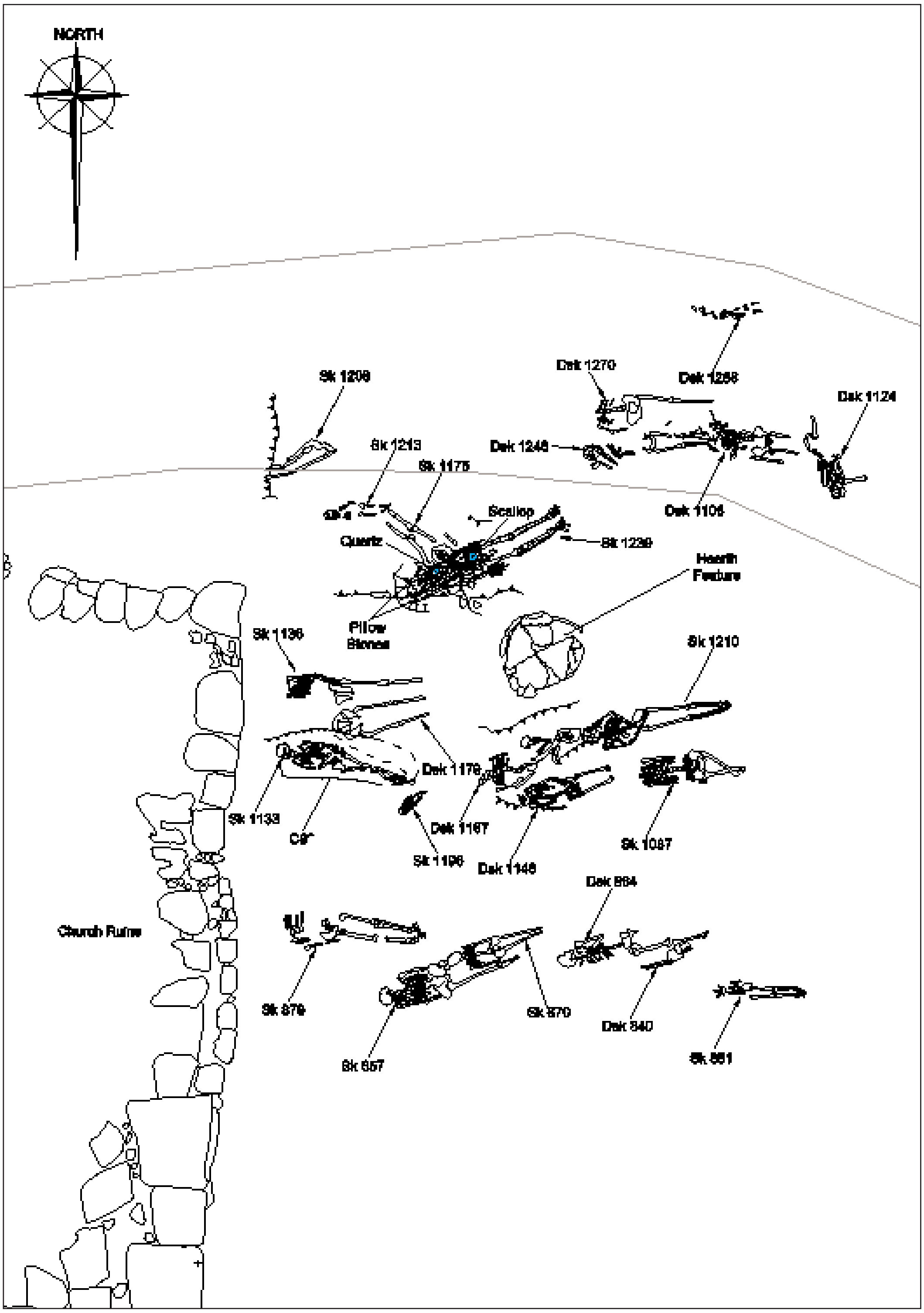
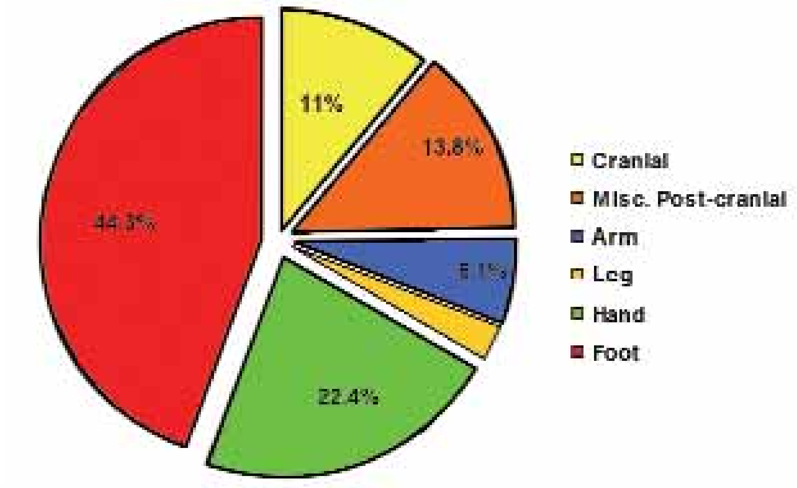
The term 'disarticulated bone' refers to skeletal elements that over time become disassociated from their primary context as a result of a variety of factors, including animal activity, erosion and, not least, human behaviour—such as grave-digging. In the case of the disarticulated bone assemblage recovered during the excavation of a medieval church and cemetery at Ballyhanna, Co. Donegal (Ó Donnchadha 2007; MacDonagh, this volume), the latter is most certainly one of the primary contributing factors leading to the large quantity of disarticulated human bone identified. As with many cemeteries in use over the course of numerous generations, the burial density at Ballyhanna was found to be very high, with consistent intercutting of burials at differing intervals as a result of continual reuse of the cemetery to make way for new interments (Illus. 1). The resulting disarticulated skeletal material includes both adult and juvenile bone fragments and teeth, as well as non-human (animal) bone. It is the purpose of this paper to outline some of the preliminary findings of ongoing osteoarchaeological analysis of this material and to illustrate how data derived can further increase our knowledge of the health and lifestyle of the Ballyhanna medieval population. To date, approximately 70% of the disarticulated assemblage has been analysed. It is important to emphasise that the results reported below are provisional pending completion of this work.

Methodology

The presence of disarticulated or 'commingled' skeletal elements in any human bone assemblage presents challenges for the osteoarchaeologist, beyond the standard osteological investigation of articulated remains. During the excavation at Ballyhanna the disarticulated material was collected and bagged according to individual excavation areas within the cemetery. The first step of the sorting process was to separate all material according to age group (in this case adult from immature bone) and relative completeness, and in turn into a number of categories representing the components of the human skeleton (longbone, hand/foot, etc.). To date, a total of 4,312 complete and relatively complete adult bones and 935 immature (juvenile) complete and relatively complete bones have been identified. Information relating to element, side (L/R) and age were entered into a skeletal inventory to aid further interpretation of the data. The resulting figures illustrated a definitive predisposition towards the presence of complete foot bones (44.3% of total complete elements), followed by hand bones (22.4% of total complete elements) (Illus. 2). Exhumation practice has been cited previously as a factor affecting the variability of skeletal element recovery in commingled material (Ubelaker 2002). One possible explanation in relation to Ballyhanna may be that care was taken during reuse of the cemetery not to disturb existing burials by avoiding, as much as possible, the removal of the larger, more



Illus. 1—Plan of some of the 1,275 skeletons excavated at Ballyhanna cemetery, Co. Donegal (Irish Archaeological Consultancy Ltd).



Illus. 2—Complete adult skeletal elements recovered according to skeletal components.

noticeable bones, such as the arm and leg bones (6.1% and 2.3% representation respectively)—resulting in a higher incidence of disturbed bones of the extremities, being hands and feet.

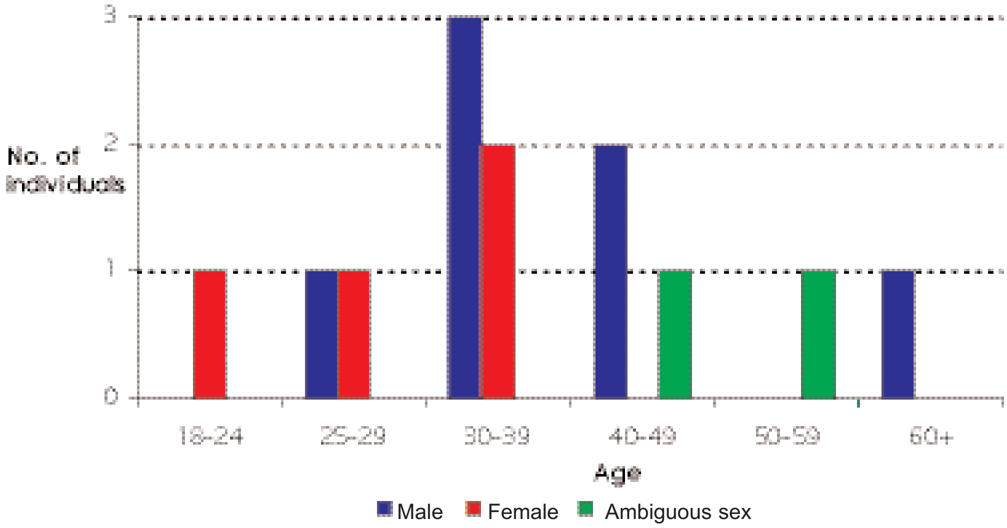
Minimum number of individuals

The minimum number of individuals (MNI) count is one of the most popularly applied systems of quantification in the analysis of any type of disarticulated assemblage. The main objective of this analysis is to determine the MNI represented by the assemblage. To calculate this, all complete bones (i.e. bones that are ≥75% intact) sharing a unique landmark (i.e. a distinctive feature on the bone) are 'sided' according to left and right. The MNI total is calculated on a very simple premise: each individual can have only one left femur (thigh bone), one left humerus (upper arm bone) and so forth. A true MNI count for a bone assemblage considers the bone element, side, age, sex, articulation (i.e. the joint or point at which two or more bones meet)—or occlusion in the case of sided teeth (i.e. the surface of the tooth that meets the tooth above)—and metrically corresponding bones (i.e. bones that appear to belong to the same individual based on size) in order to calculate the total.

In cases of large assemblages where primary context information is absent, most osteoarchaeologists will simplify the process by identifying the most recurrent bone in the assemblage, the total number of which will equal the absolute MNI accounting for all complete skeletal elements in the assemblage. The right fifth metatarsal bone (i.e. the bone preceding the 'little toe' in the foot) was the most recurrent bone among the adult disarticulated material and gives an MNI total of 121 adults. This figure in combination with the MNI count of 51 juveniles (represented by the number of left pelvises) totals a minimum of 172 individuals represented by the Ballyhanna disarticulated assemblage.

Age, sex and stature

To determine the number of individuals present beyond duplication of skeletal element and side it is useful, where possible, to consider the age, sex and stature of at least some of the



Illus. 3—Sex distribution according to age.

adults represented. This means putting aside complete bones that can help to provide this information during the sorting process. Complete longbones are separated to determine stature; complete mandibles (lower jawbones) and pelvises are separated to determine biological sex. In both incidences only the most recurrent bone (e.g. left tibia, left pelvis) is considered so as not to overlap individuals. The most recurrent adult bone deemed observable for the purpose of sex and age in the material was the left pelvis. Using standard osteological aging and sexing methodologies (Lovejoy et al. 1985; Buikstra & Ubelaker 1994), a total of 28 pelvises could be aged, with 13 pelvises suitable for determining sex. Each of the specimens was assigned to one of five sex categories and eight age categories as outlined in Table 1. The pattern of recovery of pelvises would appear to be evenly dispersed according to age and sex, with perhaps a slight bias towards pelvises assigned to the young adult age range (18–35 yrs; n = 13). The sex trend appears to indicate that both sexes have mortality in early to middle adult years, with no females present in the mortality figures for middle to later years (Illus. 3).

Table 1—Summary of age and sex of observable pelvises

No. of individuals	Age range (yrs)	Sex*
3	18–24	1 F
4	25–29	1 F?, 1 M
6	30–34	2 M
1	35–39	2 F, 1 M
4	40–44	2 F
4	45–49	1 A
4	50–59	1 A
2	60+	1 M
Total = 28	**Average = 35–39 yrs**	**Total = 13**

* F = female, F? = probable female, M = male, M? = probable male, A = ambiguous sex.

The stature trend was determined by applying the Trotter and Gleser technique (Trotter & Gleser 1952) of measuring longbone lengths on an osteometric board and applying a regression formula to translate this initial figure into height during life. The right tibia (shinbone) was used for stature estimation as the most recurrent complete and suitable bone for measurement (n = 15). The results indicated an average stature of 161.2 cm, where the maximum height was recorded as 167.3 cm and the minimum as 151.5 cm. The male/female ratio of stature in this incidence cannot be determined as the skeletal elements required to assign a sex—e.g. the pelvis or cranial bones—were not present owing to disarticulation.

Health and disease

During the sorting process, bones of particular interest, usually those exhibiting pathological change, were set aside and recorded separately. The health and disease trend of the adult disarticulated material reflects that of the articulated skeletons (McKenzie, this volume) in that pathological changes on the bones are relatively commonplace. Unfortunately, owing to the absence of articulating skeletal elements, in cases of diseased disarticulated bone the distribution of lesions cannot be mapped over the entire skeletons of individuals. As a result, neither a differential diagnosis nor the prevalence rate of various diseases according to age/sex can be formulated. At best it is possible to identify isolated incidences of trauma, which, by their nature, are relatively self-explanatory. One such case is that of a right first metacarpal (the bone preceding the thumb digit) exhibiting a well-healed Bennett's fracture.

The level of healing of this fracture indicates that the injury was more than likely sustained earlier on in the life of this adult. A fracture of this kind can occur as a result of a fall onto a flexed thumb and has been connected with occupational activities such as horse-riding (Brickley & Western 2006, 90–151). In almost all cases of Bennett's fractures, dislocation of the bone from the wrist occurs. The injury often requires some sort of medical intervention to ensure reduction of the dislocation and to minimise malformation of the joint (Western 2006, 34). It would appear in this case that the joint surface is well aligned, with the fracture line clearly visible. Although some marginal bony growth has resulted in minor deformity of the joint surface, it is quite possible that the individual had the injury attended to medically in one way or another, which is suggested by the good level of healing.

Conclusion

The results outlined above offer a brief overview of some preliminary findings on the Ballyhanna disarticulated human bone assemblage. It is important to remember that this material represents a considerable volume of both adult and juvenile remains. Despite the inherent problems encountered when attempting to interpret data derived from commingled bone, it is hoped that we will glean some valuable information on the health and lifestyle of all those individuals represented in the collection.

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