

Strand Report by Joe W. Walser III**Strand Leader:**

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Human Osteology

The remains of four nearly complete and very well preserved individuals were recovered from Þingeyrar in the excavation season of 2023. Among these individuals was: one non-adult (Grave 19), two male adults (Grave 16 and 18) and one female adult (Grave 17).

Grave 16. The middle adult (26-35) male individual from Grave 16 (90% complete skeleton) had a stature of 172.6 +/- 3.3 cm. A 1mm size piece of berkristall was found adhered to one of the bones. The individual exhibits ossification of cartilage on the manubrium and R+L 1st ribs. Three pieces of unknown/disorganised new bone formations are present (possible osteochondroma of the 1st rib?). The septum is deviated and the external occipital protuberance showed enthesal change. All proximal phalanges show enthesal changes on the inferior lateral and medial shaft margins. The right and left interosseous crests of the radius and ulna show ossification. The individual showed numerous enthesal changes: R+L soleal lines, R distal fibula superior to the joint surface, R+L anterior patellae, R+L pronator teres insertion (lateral radius, midshaft), R+L inferior aspect of bicipital groove (teres major, latissimus dorsi or pectoralis major). The individual also had spinal osteoarthritis, maxillary and mandibular torus, a periapical lesion on the left maxillary second molar, heavy calculus cover on all teeth and periodontal disease on the maxillary and mandibular portions of the molar and premolar adjacent alveolar bone. Most of the teeth cannot be observed for linear enamel hypoplasia due to the extensive calculus cover, but it can be clearly seen on the maxillary premolars and left 3rd molar and the mandibular lateral incisors.

Grave 17. The young (17-25) female individual from Grave 17 (95% complete skeleton) exhibited severe hip OA with eburnation, porosity, osteophytes, and contour change. Both acetabulae are very shallow but the left one is decreased to half of the expected original size. The left femoral head is malformed, possibly with a healed fracture at the neck, which may be verified following radiography. The left proximal humerus exhibits pronounced enthesal change on the proximal anterior aspect of the shaft. The right os coxa exhibits cystic lesions. The right 1st metatarsal exhibit osteochondritis dissecans on the proximal joint surface. Small cysts are also present in some of the joint articulations of the metacarpals. The individual also has spinal osteoarthritis, ossification of ligamentum flavum in the thoracic spine (T6-T10) and mineralisation of interosseous ligaments on the proximal hand phalanges. Many of the non-metric cranial traits could not be scored due to extensive hair preservation on the scalp. Curiously, both clavicles exhibit rhomboid fossae. Her teeth showed extensive calculus cover, linear enamel hypoplasia on the mandibular canines and periodontal disease of varying degrees on all of the alveolar bone. Numerous textile fragments of differing types (silk, wool, and other) were recovered from the head hair/skull, os coxa, cervical neck bones and other regions of the skeleton. There was also copper alloy staining observable on the right and left ilia.

Ancient DNA Analyses

Teeth were selected as samples where possible as they have shown to provide the best yield of DNA in previous aDNA work on Icelandic samples. In some cases, teeth were not available, and the petrous portion of the temporal skull bone was used instead. The petrous portion samples were cut from the temporal bone using a diamond rotary blade. The teeth were photographed, moulded, and the enamel removed mechanically and stored for isotope analyses and the remaining tooth samples were cleaned and sent for ancient DNA analyses at deCODE Genetics in Reykjavík.

A minimum of 20 samples will be processed for ancient DNA analyses, with 5 of the samples already providing preliminary results. Further samples will be added to this list if more skeletal remains will be excavated in the summer of 2024. The ancient DNA findings could reveal information about the genetic ancestry of the sampled individuals as well as relationships between the individuals buried there and the greater population in general. In some cases, it may be possible to identify some of the individuals by name, using ancient DNA results in combination with Íslendingabók. Lastly, biological sex identifications will be provided for all samples, which is particularly useful for samples where the skeletal remains were poorly preserved and could not be osteologically assessed. It is also likely that phenotype information will be revealed, and there is further possibility that some pathogens will be identified.

Sample List

1. **2021-30-Grave 30** (THR-JON). Jón Þorleifsson. Probable maxillary molar. Wear of 2.
2. **2021-39-83** (THR-83). Oddur Stefánsson. Right central incisor. Wear of 8.
3. **2021-39-82** (THR-82). mandibular molar (probable left 2nd mandibular molar). Wear of 7.
4. **2021-39-84, Grave 7** (THR-84). Unidentified molar. One root is red on the inside. Wear of 6.
5. **2022-6-283** (THR-283). Only occlusal enamel preserved. Wear of 3.
6. **2021-39-81** (THR-81). Root only. Photo taken through bag.
7. **2022-6-21** (THR-21). R maxillary 1st molar. Wear of 3.
8. **2018-28-82** (THR-2882). R petrous portion.
9. **2018-28-343** (THR-28-343). R mandibular 2nd molar. Wear of 2.
10. **2016-14-44** (THR-14-44). R maxillary central incisor. Wear of 5. Linear enamel hypoplasia.
11. **2016-14-46** (THR-14-46). L maxillary 2nd molar.
12. **2016-14-13**. Unidentified mandibular incisor. Wear of 1.
13. **2018-28-84**. Unidentified maxillary premolar. Wear of 2.
14. **2016-14-11** (THR-14-11). R mandibular deciduous 1st molar.
15. **2018-28-3**. R mandibular 1st premolar.

The following individuals will be added to the sample/sequencing list this year (Spring 2024).

Grave 15 (Bjarni Halldórsson)
Grave 16
Grave 17
Grave 18
Grave 19

Results

The following samples have thus far yielded results. Biological sex identification has been completed and can be seen here below. Of the five individuals with available results, two were determined to be female and three were determined to be male. The sex estimation of Oddur Stefánsson and Jón Þorleifsson were in accordance with their known sex from historical documentation and osteological evidence. Meanwhile, the three other samples represent loose finds for which no sex estimations could initially be made. Ancient DNA results thus will further contribute to considerations and reconstructions of palaeodemography at the site. Ancestry, phenotype data, and evidence of genetic relationships between individuals will be available following further sequencing.

Sample	Biological Sex
2016-14-11	XX Female
2016-14-46	XX Female
2018-28-343	XY Male
Oddur Stefánsson, 2021-39-83	XY Male
Jón Þorleifsson, 2021-30-Grave 30	XY Male

Isotope Analyses

A total of six samples excavated from the cemetery at Þingeyrar between 2017-2022 were analysed at Durham University in 2023 for isotope dietary and geographic provenance reconstruction. The isotopes analysed include strontium, oxygen, and trace elements (Sr, Hg, Ag, As, Ba, Cu, Mg, Pb, Zn) in dental enamel (geographic provenance) and carbon and nitrogen in bone collagen (dietary reconstruction). Two of these individuals also underwent incremental dentine analyses to acquire deeper information about changes over time between childhood and early adulthood. Graves 16, 17, 18 and 19 will be sampled for isotope analyses that will be conducted in 2024. Bjarni Halldórsson (Grave 15) will also be sampled for incremental dentine analyses.

Sample list

Museum Number	Individual Name
2017-22-17	NA
2021-39-22	Jón Þorleifsson
2021-39-82	NA
2021-39-83	Oddur Stefánsson
2021-39-84	NA
2022-6-Gröf 15	Bjarni Halldórsson

Trace elements: All analysed trace elements showed values within the expected range, except in the case of lead (Pb). The three named individuals had elevated lead concentrations in their dental enamel, indicating that they were exposed to lead during childhood. Oddur Stefánsson, for example, showed a toxically high level of lead (5.94 ppm), perhaps due to his occupation, social status, and lifespan (older age at death).

Strontium and oxygen: The results indicated that all analysed individuals were born locally (Sr below 0.7092) in Iceland and locally sourced drinking water.

Carbon and nitrogen: Bulk bone collagen (carbon and nitrogen) results indicate that these individuals consumed a mixed terrestrial and marine diet, though the diet was not as heavily marine weighted

and often expected. Carbon values from the dental enamel all fall within the expected range of a diet primarily derived from C3 terrestrial resources (-17.0 to -14.0 ppm).

Incremental dentine analyses: Jón Þorleifsson and Oddur Stefánsson underwent incremental dentine analyses. Jón's results showed increasing marine protein consumption with age, while Oddur's results showed variations in diet potentially associated with changes in geographic residence (he went to study law in Copenhagen around the time of dietary change). These results, along with the results described above and all of the isotope values, will be discussed in detail within the isotope research article currently in preparation for publication in 2024.

The addition of further samples will enable us to acquire enough data to be able to compare with other isotope results from previous studies conducted around Iceland. This will allow us to make considerations about differences or similarities in diet across regions or time, individual trends, and palaeodemography and geographic provenance of the excavated individuals.