

OLD BONES, NEW PROSPECTS

Research and preservation of identified skeletonised individuals
from historical Iceland

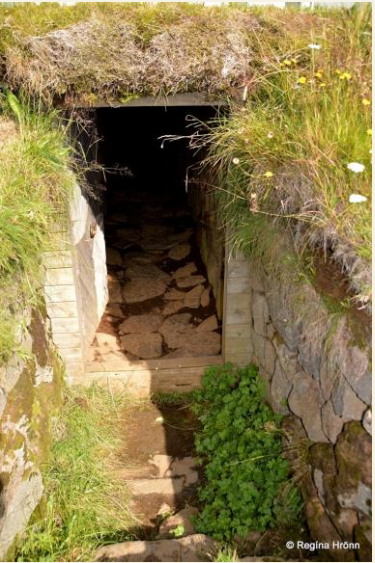


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What is Skálholt?



The 1954 excavation at Skálholt



Retrieving the remains



What comprises the assemblage?

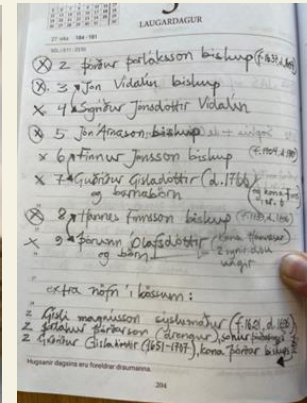
The skeletal samples

- Twelve named individuals already identified and sampled for ancient DNA. Two non-adults among them were also sampled.
- Approximately 50-60 unknown individuals from the same site that will be analysed alongside.

| | | | | |
|--------|------|----------------|---|--|
| XXXII | HF | 8, 26, 26b, 27 | Hannes Finnsson biskup (f. 8.5.1757 ár) | Bls. 122-1; Bls. 160: S Bls. 165: höfuðhár: lengd 1 sm, litur H (ljósskolhærður). |
| XXXIII | PÓ | 9, 28, 29 | Pórunn Ólafsdóttir Stephensen, f.22 ár | Bls. 123-1; Bls. 160: N Bls. 165: h Bls. 170: Lést úr bólu [bólusótt] 1786. |
| XXXIII | ÓH | 9 | 30 Ólafur Hannesson, yngri sonur Ha 1 mánuður | Bls. 124: Ó Bls. 160: Örfúnar beinaleifar ungbarns, inf. A. Þær lágu á fyrri beinagrind |
| XXXIV | S-13 | 9 | Ólafur Hannesson, eldri sonur Ha 1 ár | Bls. 124: Í Bls. 160: Örfúnar beinaleifar ungbarns, inf. b. Krónur 7 barnatanna og tvegg |
| XXXVII | | 31, 32, 33 | | |
| XXXIX | JÁ | 5, 34, 35, 36 | Jón Árnason biskup (f. 1665, d. 8. ca 78 ár) | Bls. 124-1; Bls. 161: S Bls. 165: höfuðhár: lengd 1/2 - 1 sm, litur H (ljósskolhærður), el |
| XLI | | 37 | Gísli Oddsson biskup? | |
| XLII | FJ | 6 | 38 Finnur Jónsson biskup (f. 16.1.1785 ár) | Bls. 126-1; Bls. 161: B Bls. 165: höfuðhár: lengd 5 sm, litur F (ljósskolhærður), grár bla |
| XLIII | GGy | 7, 39, 40 | Guðríður Gísladóttir, kona Finns J ca 59 ár | Bls. 127-1; Bls. 161: N Bls. 165: höfuðhár: lengd 20 sm, litur O-S, mest S (mest dókkha |
| XLIV | FJa | 7 | 41 Staersta barnskistan í gröf Finns J óvíst | Bls. 128: Á Bls. 161: Örfúin bein um 1 árs barns, inf. 1b. |
| XLV | FJb | 7 | Ungbarn. Ónafngreint barnabarn ungbarn | Bls. 128: Á Bls. 161: Örfúin bein ungbarns, inf1, sennilega inf.1a. |
| XLVI | FJc | 7 | Ungbarn. Ónafngreint barnabarn ungbarn | Bls. 128: Á Bls. 161: Örfúin bein ungbarns, inf1, sennilega inf.1a. |

The individuals being sampled

- So far we have identified the relationships between them to some degree. There are at least 3 couples. From one couple there are multiple grandchildren that were interred with the woman and from another couple there are several of their children buried with the woman.
- The known name individuals are dating between 1637-1796 except for the first bishop of Iceland, Páll Jónsson, who was buried in 1211 in the stone sarcophagus.



Why are we doing this?

- Preservation and documentation of the remains
 - Rapidly diminishing preservation
 - The bishopric considers reburial
 - 3D scanning will create a digital record
- Research with modern technology unavailable at time of excavation
 - Ancient DNA
 - AMS & isotopes
 - Data collection before the remains are either too poorly preserved or reburied
- Collaboration with Skálholt bishopric
 - Additions to their exhibition
 - Exhibition at the National Museum?
 - Public outreach and community involvement



Where are we so far and what is next?

Ancient DNA samples have been selected and are currently undergoing analysis.

- They will be used in a greater population study about Icelandic ancestry
- We may also acquire pathological data (e.g. smallpox is thought to have killed several of the individuals)
- Results may provide phenotypic data (physical appearance).
- Most importantly, the data that can identify specific individuals by name and thus also verifies relationships between the parents and children for example.

The samples that will be analysed in this project have all been photographed, moulded, documented, and 3D scanned using Artec systems.

Next phase

- 3D scan all the skeletal remains
- Begin processing the samples that have been selected for radiocarbon and isotope analyses
- Determine feasibility of hair sample analyses
- Osteological analyses
 - Skeletal documentation
 - Radiography
 - Repacking



Intended analyses

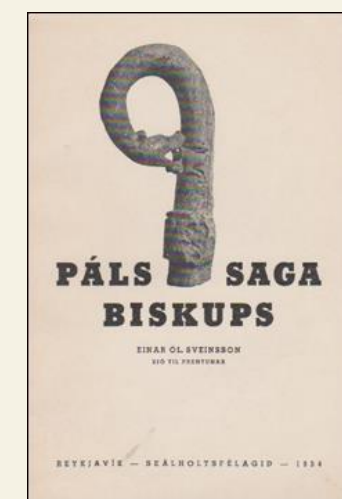
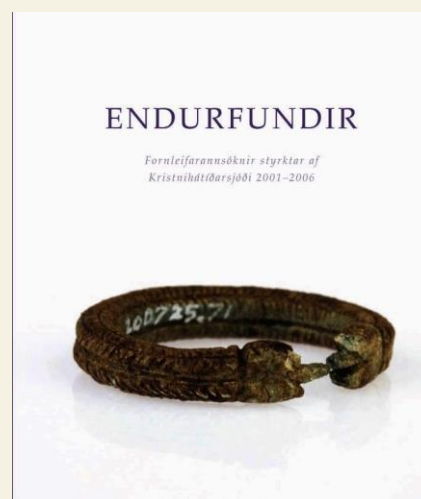
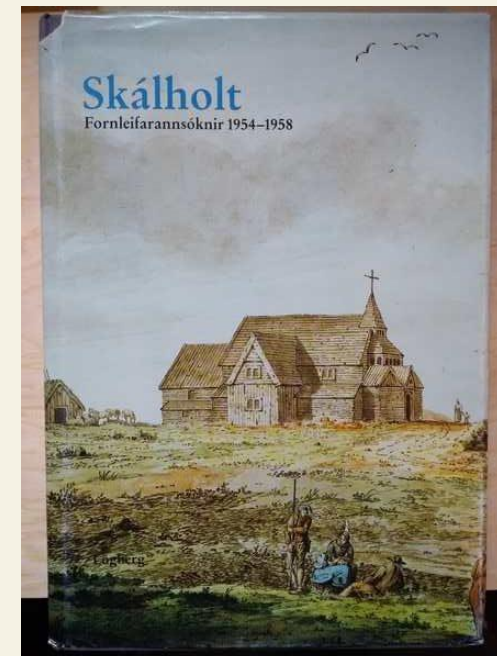
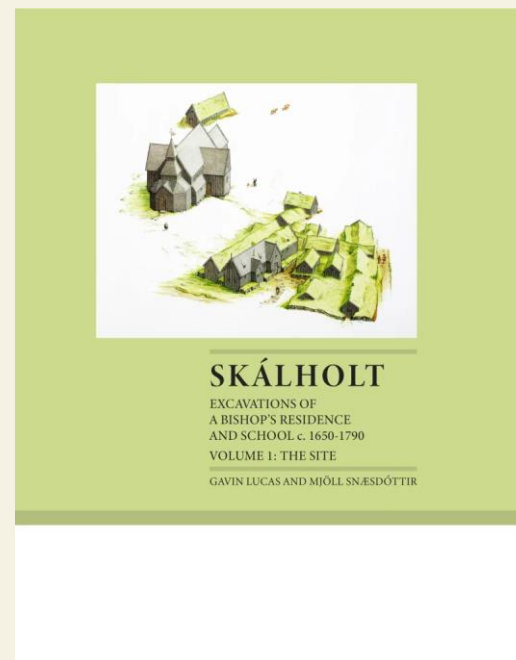
- Osteological analysis that builds upon Dr. Jón Steffensen's work
- Cross-comparison with human skeletal remains from similar social stratigraphy
- AMS radiocarbon dating
- Carbon, nitrogen, and sulphur stable isotope analysis for dietary reconstruction
- Ancient DNA analysis for disease, sex confirmation, ancestry, kinship, and possibly appearance
- 3D scanning to create a digital archive of the skeletal remains
- Cortisol, estrogen, and testosterone hormones in hair samples for stress, health, and growth
- Elemental and isotope analysis of dental enamel for provenance, migration, and pollution
- Ancient DNA of soil and grave samples from the grave of Páll Jónsson (microorganisms and parasites)



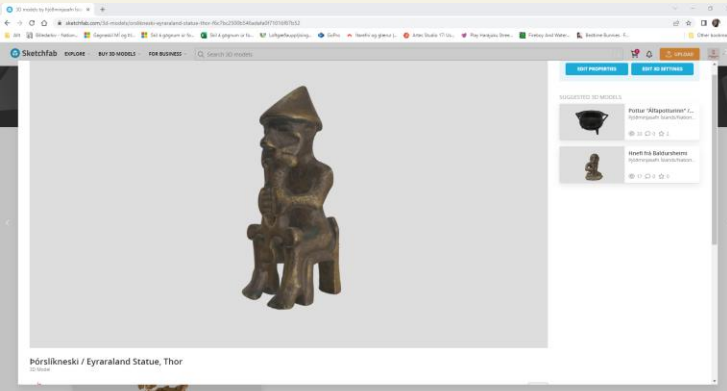
Aside from preservation and scientific research, the project also aims to clarify the identity and relationships between the individuals. The scientific and osteological results will be analysed alongside historical texts and other data from the written record.

Did some of the individuals perish from smallpox as it is written and can this be verified through ancient DNA?

Do isotope values reflect the diet consumed at the bishopric and does it differ from the diet consumed by the non-elite, local population?



3D Scanning at the National Museum of Iceland



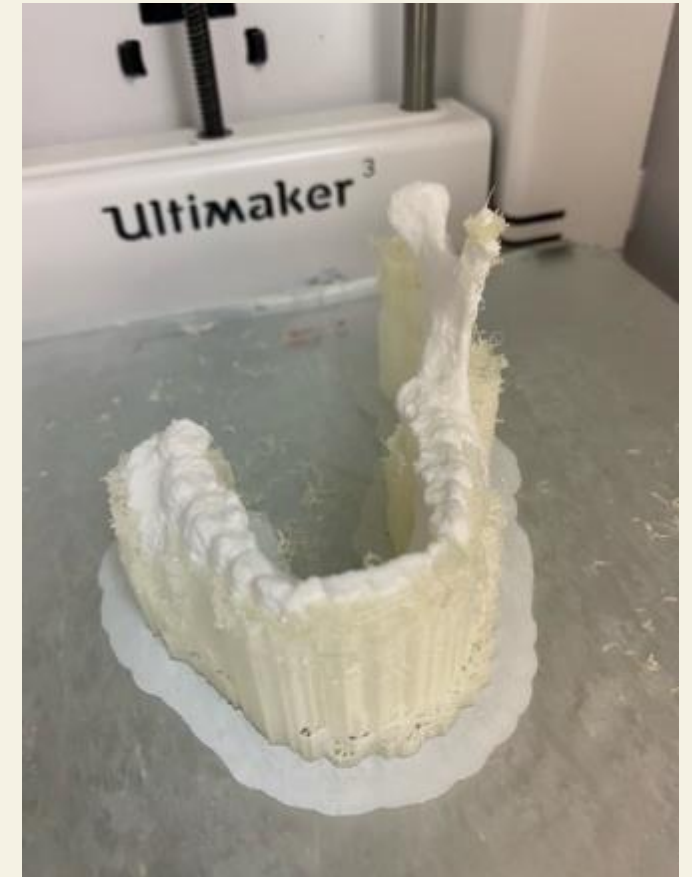
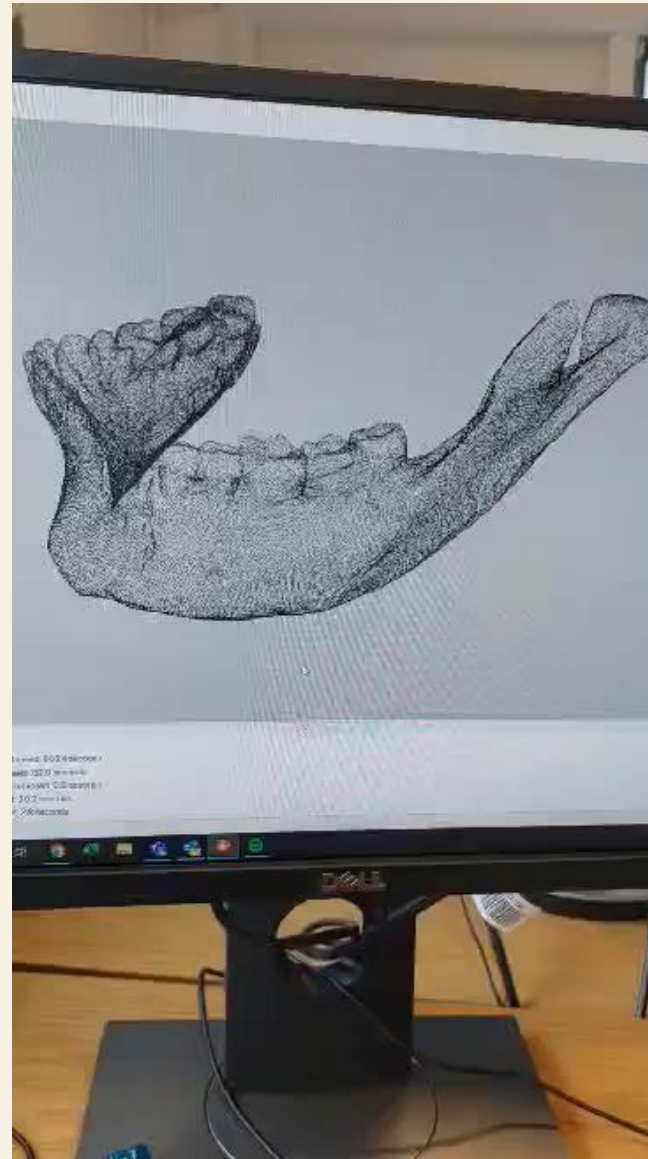
The man from Mosfellsdalur, photogrammetry



Maðurinn úr Mosfellsdal

3D Model

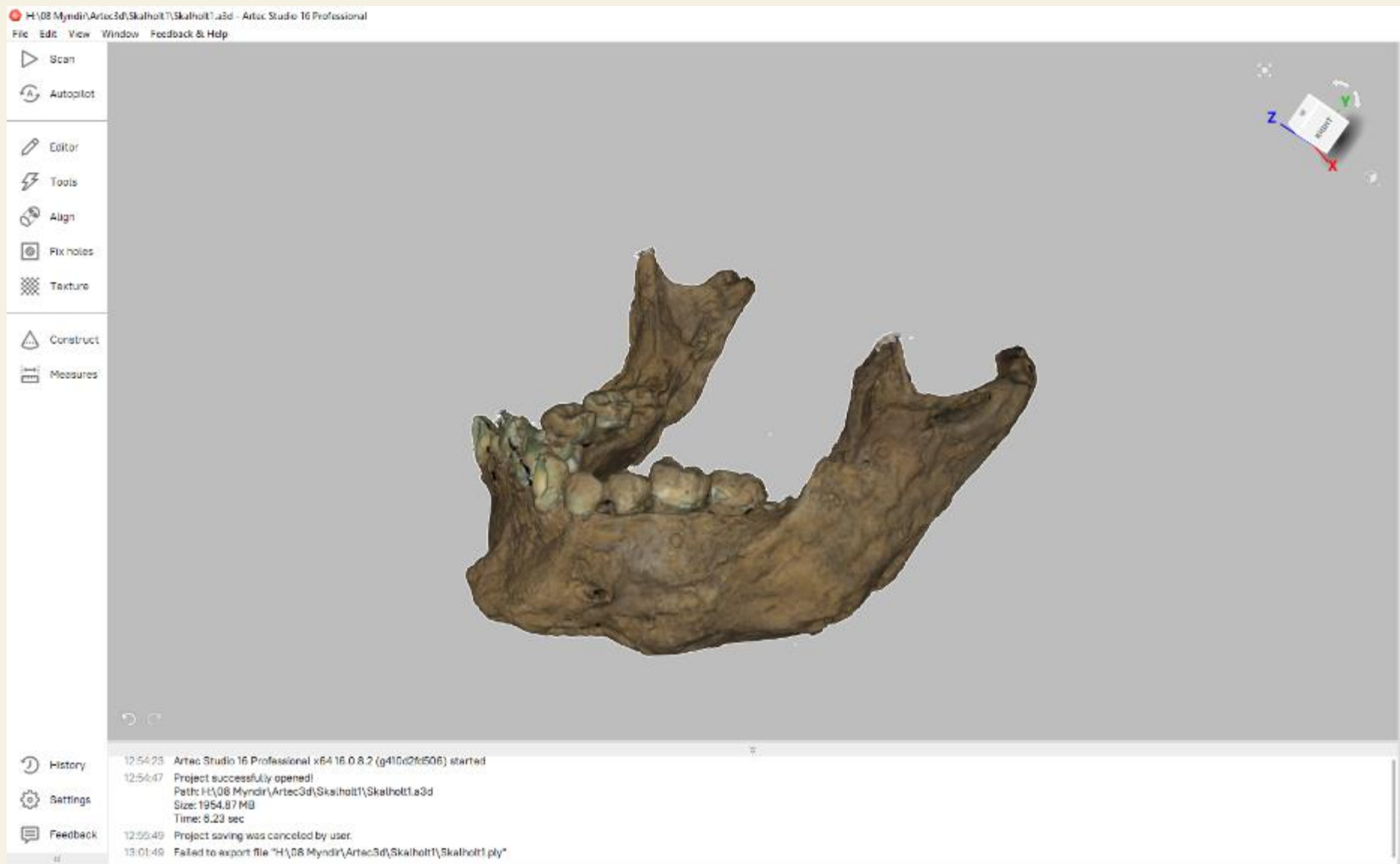
What we can do, and the lady in blue



All the teeth were 3D scanned before they were aDNA sampled



Testing 3D scanning with a poorly preserved child's jaw from Skálholt



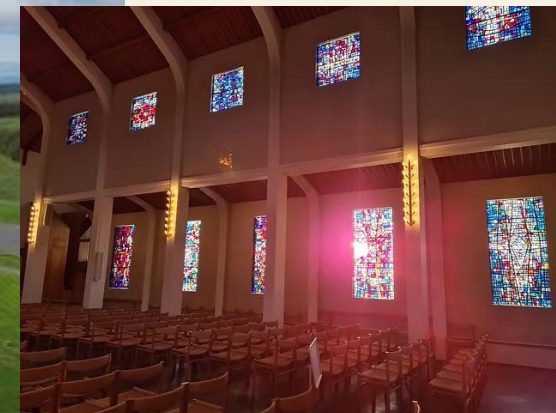
Páll Jónsson (1155-1211 AD), bishop of Skálholt (1195-1211 AD)

Work in progress



In conclusion...

- Unique opportunity to conduct research on known individuals of high-status alongside historical documentation.
 - Shed light on differences in diet and social status
 - Identify non-adults and genetic relationships between individuals
 - Connect folklore and museum objects with the life histories of these individuals (e.g. the dress shown here worn by Þórunn Ólafsdóttir who died at Skálholt from smallpox)
 - Investigate smallpox in Iceland from an aDNA perspective since it does not cause macroscopically observable bone changes
- Create a 3D digital record of the remains, alongside the results from numerous scientific analyses, prior to repatriation to the bishopric and likely reburial.
- Provide new knowledge to the bishopric, the public, and the archaeological record, all of which will be used in future planned outreach events and exhibitions.



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- Prof. Rebecca Gowland, Durham University, bioarchaeology and outreach
- Prof. Janet Montgomery, Durham University, isotope analysis
- Dr. Joanne Moore, Durham University, isotope analysis
- Prof. Agnar Helgason, deCODE Genetics and University of Iceland, ancient DNA
- Dr. Sigríður Sunna Ebenesersdóttir, deCODE Genetics, ancient DNA
- Reverend Kristján Björnsson, Skálholt Bishopric, access and outreach
- The staff of the National Museum of Iceland



**ÞJÓÐMINJASAFN
ÍSLANDS**