The Case of the Missing Radiocarbon:

Was the Great Heathen Army's Diet Deficient in Carbon-14?

Dr. James J. S. Johnson

example of Repton Viking skeleton, where 5 silver coins (~AD872-AD875) were buried
Photo credit: Martin Biddle

> Our **bones** are scattered at the grave's mouth, as when one cuts and cleaves wood upon the earth. (**Psalm 141:7**)

It's hard to understand why serious amounts of radioactive Carbon 14 are "missing", in Viking bones, unless you realize that a lot of it was never there to start with. The "**Great Heathen Army**" invaded England, from Scandinavia,

during the late A.D. 800s (specifically, the A.D. 860s and 870s), replacing previous Viking "hit-and-run" raiding with seizure and occupation of English lands: Nordic Vikings by the thousands had arrived, with intentions to stay! **(1)**

IVAR "the Boneless" Ragnarsson [photo credit: AncientPages.com]

[NOTE: to this day ***no*** skeletal remains have been found of **Ivar the Boneless**!]

The raids on England escalated further [i.e., escalated beyond quick hit-and-run plundering] in 865/6, when **'a great heathen army'** took up winter quarters in East Anglia. … The leaders appear to have included **Ivar the Boneless** and his brother Halfdan, sons of the [Viking] Ragnar Lodbrok, as well as another 'king' called *Bagsecq*, and several 'earls' ….

The annals in ***Anglo-Saxon Chronicle*** afford a good sense of the course of the [great heathen] army's campaign in the late 860s, as it moved [often on horseback] from East Anglia into Northumbria in 866, from Northumbria into Mercia in 867, and back north into Northumbria in 868, before returning via Mercia to East Anglia in 869. …

The disarticulated [skeletal] remains of at least 250 people (mainly men in their prime, but also including some women), from the charnel

> excavated at Repton, Derbyshire, in 1980-[198]6 … [*appears to be part of the Great Heathen Army*] known to have wintered at Repton in 873-4; and it has been suggested that the charnel [to the extent that the bones show of signs of violent deaths] represents the mass burial of members of the army who died at this time from an epidemic of some kind.

[*Quoting* Simon Keynes, **THE OXFORD ILLUSTRATED HISTORY OF THE VIKINGS** (Oxford University Press, 1999; edited by Peter Sawyer), page 52-55.]

Ironically, skeletal remains of those vicious Vikings, tested by radiocarbon methods, have illustrated once again that radiometric dating is not the always-accurate-and-authoritative "sacred cow" that we have been told it is**.(2)**

Sorting out human skeleton bones at Repton, Derbyshire (photo credit: CNN)

Can we confidently use Carbon 14 radiometric dating, on a disinterred skeleton, to discern when someone died, centuries ago?

If a portion of the expected Carbon 14 is "missing" in a Viking skeleton, could it be that it never was there in the first place?

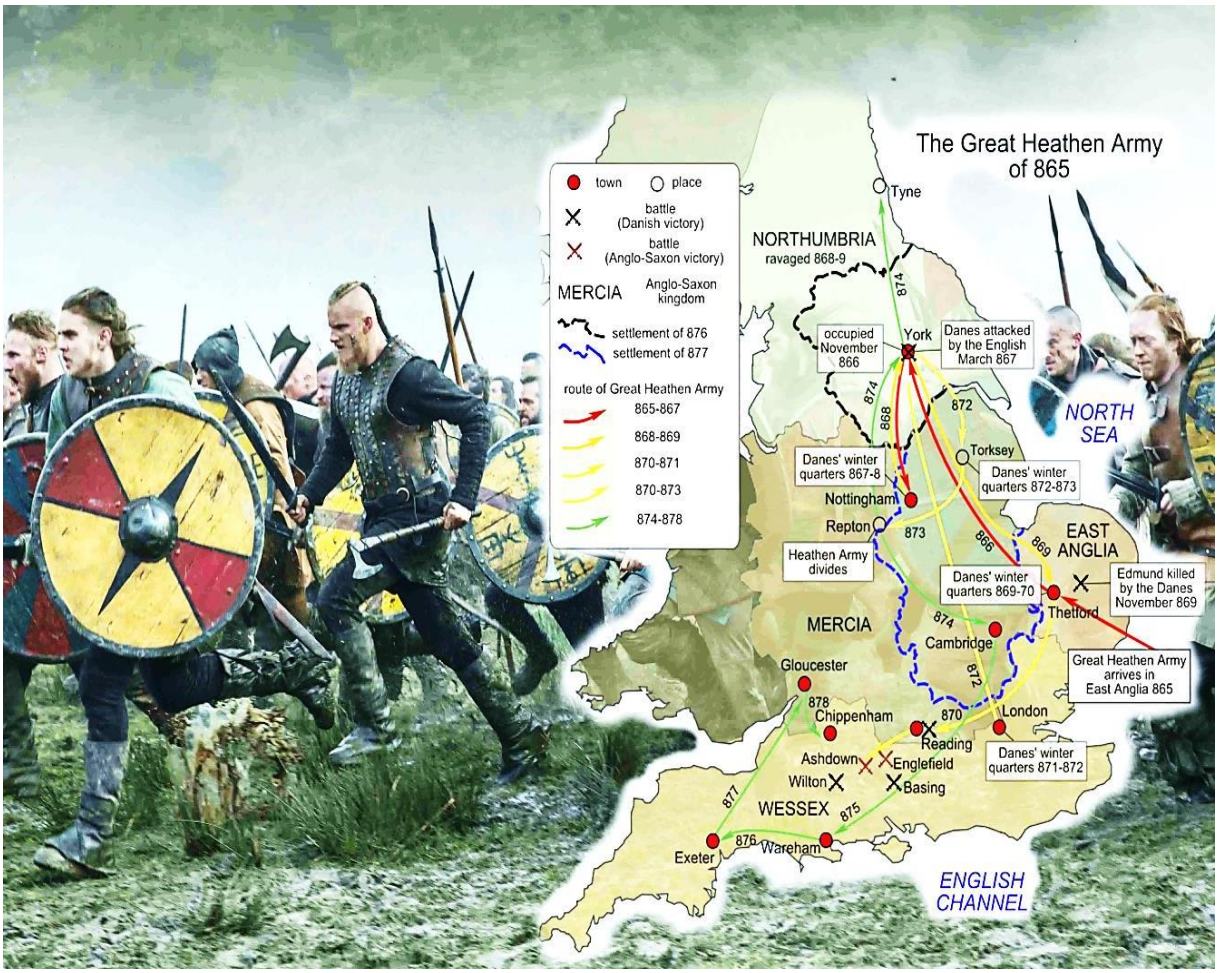
In particular, must we sometimes qualify some Carbon 14 testing outcomes by eyewitness reports that describe the deceased's diet?

As we shall see, investigating this question requires collecting empirical science data, yet the ultimate answer requires forensic science analysis, including verified reports from reliable eyewitnesses**.(3)**

Consider the case of a mass burial of about 250 (some say about 300) skeletons in Derbyshire, England.

Do these skeletons represent Vikings who belonged to the Great Heathen Army [Old English: ***mycel hæþen here***], Scandinavian warriors who over-wintered in the Derbyshire village of Repton during A.D. 873/874?

Because eyewitnesses indisputably reported the **Great Heathen Army**'s historical presence, then and there, many modern historians concluded that the 250-to-300 mass-grave skeletons (in Derbyshire) were those of Scandinavian Vikings who invaded England as the "Great Heathen Army", during A.D. 865-879.**(1)**



GREAT HEATHEN ARMY (image credit: History Channel)

However, some empirical science investigators, using routine Carbon 14 radiometric dating methods, rejected that timeframe as matching the buried bones, arguing that the bones must be a century or so older, based upon the residual Carbon 14 found inside the unearthed bones.**(4)**

> Archaeological evidence for the Viking Great Army that invaded England in AD 865 is focused particularly on the area around St. Wytan's church in Repton in Derbyshire. Large numbers of burials excavated here in the 1980s have been attributed to the over-wintering of the Great [Heathen] Army in AD 873-874. Many of the remains were deposited in a charnel, while others were buried in graves with Scandinavian-style grave goods.
>
> Although numismatic [including 5 silver "pennies" minted during the period of AD872 to **AD875**, physical evidence that clashes with radiocarbon date-of-death conclusions that assign skeleton burials during the AD600s or AD700s!] evidence corroborated the belief that these were the remains of the Great Army, **radiocarbon results** [which were routinely interpreted at chronology ranges in the A.D. 600s or 700s] **have tended to disagree.**

[*Quoting* Jarman, Biddle, et al., page 1 (article cited in Footnote # 2 below).]

Viking bones unearthed at mass burial site at Repton, Derbyshire, England
(CNN photo from Ashley Strickland article 2-2-AD2018)

So, *who was right, and who was wrong*?

Did the disinterred bones belong to men who died in the A.D. 600s or 700s? If so, why was there no historical record of a Viking army occupying Derbyshire during the A.D. 600s or 700s?

Notice that England's historical records not only provided eyewitness accounts of the Great Heathen Army invading and occupying Derbyshire by the thousands, during the late A.D. 800s, English historical records also indicate that the opposite was true in earlier centuries – i.e., Derbyshire was virtually free of seafaring Nordic invaders during the A.D. 600s and 700s**.(1),(2)**

As a forensic science problem, the radiometric dating results clashed with all of the available eyewitness accounts – proving that something was wrong with either the historical records or the radiocarbon analysis. Were the eyewitness accounts in error? Or was the radiometric dating methodology invalid?

Of course, Carbon 14 radiometric dating methods use several assumptions**.(2),(5)** So, if one of the basic assumptions is invalid (i.e., incorrect), the conclusions that rely on that erroneous assumption will likewise be invalid (i.e., incorrect).

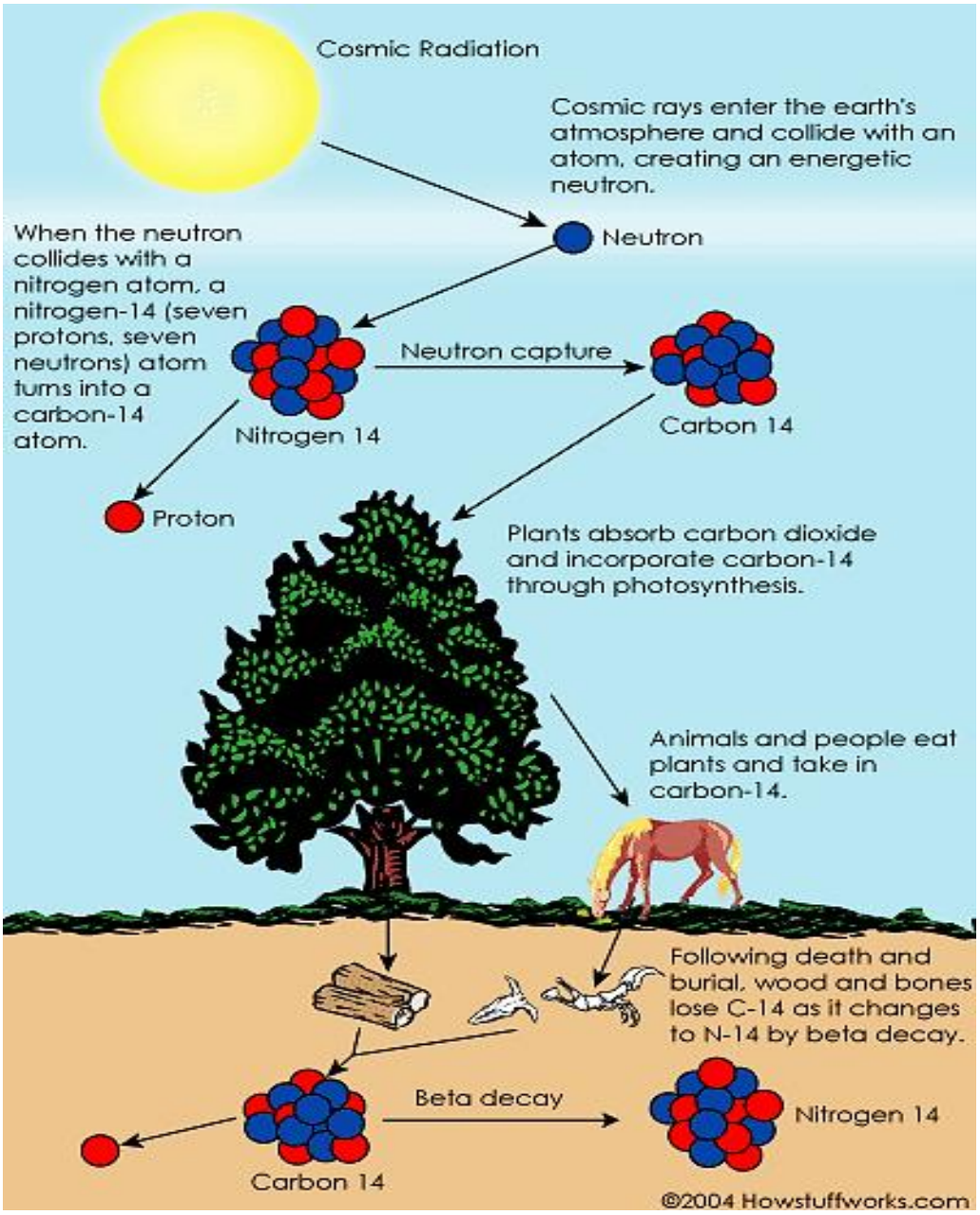
Could it be that one of the usual assumptions, used in Carbon 14 radiometric dating, is wrong, for measuring time-of-death data, for human skeletons such as those deposited in the mass grave at Repton, in Derbyshire?

To answer this question, consider the basic logic underlying radiometric dating:

> The carbon-dating technique cannot be used to date rocks … but it can be used to date things that were once living—things that contain carbon. Here's how it works. Sometimes nitrogen 14 changes into carbon 14 high in the atmosphere [where sunlight contacts air].
>
> Over time, however, the carbon 14 decays back into nitrogen 14. Since plants "breathe" [i.e., take in] carbon dioxide, their leaves, stems, and seeds contain some carbon 14 in their structures along with the more common isotope, carbon 12.
>
> Once they stop living, they stop taking in new carbon 14 [*via photosynthesis processes that require the plants to be living*] and the unstable carbon 14 already there [*especially in the form of digestible*

carbohydrates] begins to decay back into nitrogen 14, while the stable carbon 12 remains. By measuring the amount of carbon 14 left sometime after the plant dies, you can calculate (in theory) how long ago the plant died. Since animals eat plants [or eat animals that eat plants], their deaths can be dated in the same way.

[*Quoting* John D. Morris, ***THE GEOLOGY BOOK*** (Green Forest, AR: Master Books, 2007), page 50.] ***And, it is justifiably assumed, that <u>humans</u> acquire (and release) C-14 <u>the same</u> as do animals.***



Thus, the "normal" radiometric dating scenario presumes that human skeletons will contain organic material—with steadily decaying Carbon 14—that is traceable to plant photosynthesis that incorporated atmospheric carbon dioxide into plant carbohydrates, such as fruit sugars or starches within grains or root vegetables.**(5)**

Moreover, as herbivores graze on plant food, radiocarbon within photosynthesis-fixed carbohydrates can be converted metabolically into animal proteins—such as amino acids derived from eating terrestrial livestock like cattle, sheep, goats, or swine.**(4)** So humans can acquire Carbon 14 directly, from eating plants, as well as indirectly, from eating herbivores (or from eating carnivores who ate herbivores).

Notice that the vital assumption here, which quickly affects the mathematics of radiometric dating, is that ***human skeletons contain residual Carbon 14 acquired from predominantly "terrestrial" (i.e., land-food-based) diets***. However, eating lots of finfish (such as cod, salmon, trout, herring, etc.), and/or shellfish (such as shrimp or crab), nixes that vital assumption!**(6)**

VIKING SARDINES (image credit: Runemarks)

Yet what kind of diet were the Scandinavian Vikings known for? Seafood, especially fish – and lot so it! So don't look for fish to have the same concentration of Carbon 14 that one receives from eating bread, beef, beets, or dairy products.**(4),(6)**

Meanwhile, the metabolic difference in Carbon 14, between "terrestrial" and "marine" diets, requires that radiocarbon dating methods be adjusted, to account for how a mostly-marine (i.e., fish-dominated) diet produces human radiocarbon counts that are much less than diets comprised of mostly-terrestrial (i.e., more plant-derived) foods.**(4),(5),(6)**

This dietary reality is discussed, below, in a radiocarbon study of bones from Greenland Vikings, whose habit of eating fish (and other seafood) is historically well-documented (and undisputed).

> Bone samples from the Greenland Viking colony provide us with a unique opportunity to test and use ^{14}C dating of remains of humans who depended upon food of mixed marine and terrestrial origin. We investigated the skeletons of 27 Greenland Norse people excavated from churchyard burials from the late 10th to the middle 15th century. The stable carbon isotopic composition (813C) of the bone collagen reveals that the diet of the Greenland Norse changed dramatically from predominantly terrestrial food at the time of Eric the Red around AD 1000 to predominantly marine food toward the end of the settlement period around AD 1450. We find that it is possible to ^{14}C-date these bones of mixed marine and terrestrial origin precisely when proper correction for the marine reservoir effect (the ^{14}C age difference between terrestrial and marine organisms) is taken into account. From the dietary information obtained via the S13C values of the bones we have calculated individual reservoir age corrections for the measured ^{14}C ages of each skeleton. The reservoir age corrections were calibrated by comparing the ^{14}C dates of 3 highly marine skeletons with the ^{14}C dates of their terrestrial grave clothes. The calibrated ages of all 27 skeletons from different parts of the Norse settlement obtained by this method are found to be consistent with available historical and archaeological chronology. . . .

Bone Dating

The ^{14}C dating of bone is by now technically well established, relying on refined chemical extraction techniques combined with accelerator mass spectrometry (AMS) (for example, Brown et al. 1988). Since very small, even submilligram-sized, samples of bone collagen can be dated with AMS, it has become possible to select the best samples from a skeleton, minimizing problems with degradation and contamination. If the bone is reasonably well preserved, AMS ^{14}C ages as well as stable carbon isotopic ratios can be determined reliably for skeletal remains of archaeological interest without destroying the object. If the bone

collagen is of terrestrial origin, the measured (conventional) ^{14}C age is converted into a true calendar age by using the global tree-ring calibration curve (Stuiver and Polach 1977). However, this simple procedure is not applicable when the bone collagen is derived in part from marine carbon which, due to the marine reservoir effect, appears several hundred ^{14}C years older than the corresponding terrestrial carbon. This seriously constrains the dating of bones of people who have had access to food protein from the sea. Therefore, archaeologists have generally distrusted the precision of ^{14}C dates of human bones. But precise 14C dating of human bones is so attractive to the archaeologist that it is highly desirable to add bone to the list of datable material. To extend the calibration of measured ^{14}C ages to "marine" bones one needs to know both the marine food fraction and the reservoir age, that is, the age difference between the atmosphere and the particular region of the sea at the time the protein was produced."

[*Quoting from* Jette Arneborg, Jan Heinemeier, Niels Lynnerup, Henrik L. Nielsen, Niels Rud, & Arny E. Sveinbjornsdottir, "Change of Diet of the Greenland Vikings Determined from Stable Carbon Isotope Analysis and 14C Dating of their Bones", ***RADIOCARBON***, 41(2):157-168 (1999), at page 157.]

REPTON ARCHEOLOGY DIG SITE (photo credit: Archaeology News Network)

In other words, unless the dietary difference is adjusted for, the skeletons of piscivorous Vikings (who ate literally tons of fish during their lives!) appear to be about a century (or more!) "older" than what they really are, because they appear to have been decaying (and thus losing) Carbon 14 much longer than they actually have been.**(4)**

Thus, the simple reality, of course, is that the Viking bones' (supposedly) "missing" portion of the residual Carbon 14 was never there to start with!

So, *what is the* take-away lesson *we can learn from these Viking skeletons?*

For starters, note this *limerick lesson* that I composed, to identify the most relevant forensic evidences:

SEAFOOD DIETS SKEWED CARBON 14 "DATING" OF VIKING BONES

***300 skeletons were* found,**
***Decaying C-14 in the* ground;**
***But the bone "dates' were* odd,**
***Due to diets of* cod —**
***Proving carbon "dates" often aren't* sound.**

BURIED BONES OF VIKINGS AT REPTON (photo credit: Martin Biddle)

Scientific sleuthing, like detective work in a whodunit mystery, requires more than observing physical evidences**(3)** – we need to learn from reliable eyewitnesses with personal knowledge of the relevant events, in order to properly interpret the evidentiary meaning of physical clues that we see today. Unlike the empirical science practice of observing experiments in the present, ***past events are no longer visible***, so the need for reliable eyewitnesses is an unavoidable reality.

Eyewitness reports must be verified as reliable (or not), of course, so observing -- i.e., carefully examining -- physical evidence is useful (and often needful) for ***corroborating*** (or *contradicting*) an eyewitness report**.(3)**

However, the other side of the coin is that ***empirical science findings must be critiqued by reliable eyewitness reports, if past events are being investigated***. It is a forensic science fundamental that we need reliable witnesses to understand physical effects caused by unique events of the no-longer-observable past.

Thus, unusual historical events—such specific battles, or crimes, or traffic accidents, or a worldwide Flood (or even your own birthdate!)—require more than merely observing physical effects that exist in the present, such as fingerprints, rubber skid-marks, or blood-spatter.**(3),(7)**

When it comes to reliable eyewitnesses, who can report the real facts about our origins, we need Genesis. God is the perfect eyewitness: He was there, He observed it all, He remembers perfectly, He is always truthful, and He is perfectly capable of communicating accurate and relevant information in human language.

In other words, if we don't trust Genesis, it is our own fault (**John 5:44-47**).

REFERENCES

(1) John Haywood, ***THE PENGUIN HISTORICAL ATLAS OF THE VIKINGS*** (London: Penguin Books, 1995), pages 12-13 & 62-63. Much of the foregoing study appears, albeit in modified format, in "Something Fishy about Radiocarbon-Dating Viking Bones", ***Creation Research Society Quarterly***, 54(3):213-216 (winter 2018), as well as in a condensed version, published as "Viking Bones Contradict Carbon-14 Assumptions", ***Acts & Facts***, 47(5):21 (May 2018), at http://www.icr.org/article/viking-bones-contradict-c14-assumptions/ .

(2) Recently evolutionists have been embarrassed by the presence of Carbon 14 (a/k/a "C-14") in coal, oil, fossilized wood, natural gas samples, and even in many kinds of dinosaur bones, where evolutionary theories do not permit C-14 to be. *See, e.g.,* Jake Hebert, "Do Young C-14 Results Reflect Contamination?", ***ACTS & FACTS***, 42(7):20 (July 2013); Brian Thomas & Vance Nelson, "Radiocarbon in Dinosaur and Other Fossils", ***CREATION RESEARCH SOCIETY QUARTERLY***, 51(4):299-311 (2015). In this study it is the proportional *lack* of Carbon 14 that presents a dating problem to the empirical scientists who glibly dismiss the applicational relevance of forensic science principles. For a short podcast (on this topic), listen to "Why One-Size-Fits-All Radiocarbon Dating Doesn't Work", ICR podcast (8-24-AD2018), at https://www.icr.org/article/one-size-fits-all-radiocarbon-dating-doesnt-work/ .

(3) James J. S. Johnson, "There's Nothing Like an Eyewitness", ***ACTS & FACTS***, 45(12):20 (December 2016) (**this article features the WWII eyewitness report of NST's own Mimi Fossum!** --- "Do we need reliable eyewitness reports to know the real truth about non-repeating historic events? In a word, yes. After the fact, historical causes routinely leave behind physical effects, often with observable characteristics such as fingerprints, tire-tread impressions, or DNA. These can provide reliable inferences about what occurred at a specific location and time… [yet], for complete accuracy, there is nothing like a reliable eyewitness [who] can report relevant observations—about who, what, how, or why—that otherwise could leave a mystery misunderstood or unsolved. … Eyewitness testimony relies upon honesty, opportunity to observe, an accurate memory, and testimonial clarity. These forensic principles apply to the challenging task of reconstructing unique actions that happened in the past, because these events (unless recorded on film or video) can't be seen in the present. This applies to learning about past occurrences as different as the sinking of a German warship or how sea creatures got fossilized along with land-roaming dinosaurs."), available at http://www.icr.org/article/theres-nothing-like-eyewitness .

(4) Catrine L. Jarman, Martin Biddle, Tom Higham & Christopher Bronk Ramsey, "The Viking Great Army in England: New Dates from the Repton Charnel", ***ANTIQUITY*** (online version, 2018), pages 1-3 of 17 (posted February 2018, at https://doi.org/10.15184/aqy.2017.196). Pages 2-3 of this article says: "Although several samples [perhaps from clothing] were consistent with a ninth-century [A.D.] date, a number [of samples, especially those taken form human bones] dated to the seventh and eighth centuries AD, and thus seemed to belong to an earlier phase of activity … [so] identification of those buried in the [Repton]

charnel as members of the Great Army has been brought into question. [citing prior literature].” Pages 6-7 of this article discuss the need to adjust radiocarbon-dating calculations to account for lower levels of C-14 originally accumulated in the bones of people who habitually eat large amounts of fish and other seafood.

(5) John D. Morris, ***THE GEOLOGY BOOK*** (Green Forest, Arkansas: Master Books, 2007), page 50.

(6) Jette Arneborg, Jan Heinemeier, Niels Lynnerup, Henrik L. Nielsen, Niels Rud, & Árný E. Sveinbjörnsdóttir, “Change of Diet of the Greenland Vikings Determined from Stable Carbon Isotope Analysis and ^{14}C Dating of their Bones”, ***RADIOCARBON***, 41(2):157-168 (1999).

(7) James J. S. Johnson, “Genesis Critics Flunk Forensic Science 101”, ***ACTS & FACTS***, 41(3):8-9 (March 2012). See also James J. S. Johnson, “What Good Are Experts?”, ***ACTS & FACTS***, 41(11):8-10 (November 2012).

><> JJSJ profjjsj@aol.com

Repton Viking skeletons, where 5 silver coins (~AD872-AD875) were buried.
Photo credit: Martin Biddle