

# EGIL'S BONES

*An Icelandic saga tells of a Viking who had unusual, menacing features, including a skull that could resist blows from an ax. He probably suffered from an ailment called Paget's Disease.*

BY JESSE BYOCK



SCIENTIFIC AMERICAN

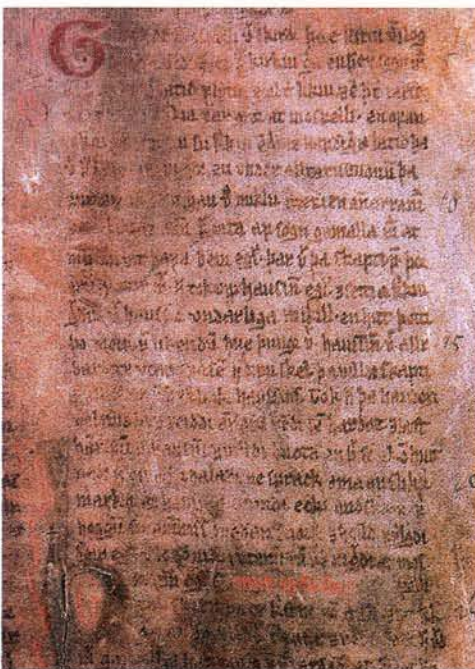


**E**gil, the son of Skalla-Grim, is the most memorable Viking to appear in the Old Norse sagas. Born in Iceland in the early 10th century, he participated in Viking raids and adventures throughout Norway, Sweden, Denmark, the east Baltic lands, England, Saxony and northern Germany. Fierce, self-willed and violent, Egil Skalla-Grimsson was also a fine poet and a man with a sense of ethics. He epitomizes the Viking urge to travel into the unknown world seeking action and fortune. From Athelstan, king of the Anglo-Saxons, he receives valuable gifts and pledges of friendship, but from Erik Blood-Axe, the Viking ruler of Norway, he hears death threats. Combining courage and brawn with high intelligence, Egil survives war and treachery to live to an old age of 80. He dies among his kinsmen in Iceland in about 990, apparently from natural causes stemming from longevity.

For all Egil's heroic stature, however, there is something deeply troubling about his character. Despite his prowess and secure social status, his temperament, as well as his physical appearance, causes alarm. He is portrayed as an ugly, irritable, brooding individual. In this respect, Egil resembles his father and his grandfather, men described as physically menacing. The saga clearly distinguishes them as physiologically different from their kinsmen, who are depicted as fair and handsome.

What set Egil apart was more than simply a small, personal peculiarity. Through prose and verse, the saga tells us that Egil became deaf, often lost his balance, went blind, suffered from chronically cold feet, endured headaches and experienced bouts of lethargy. Furthermore, the saga describes unusual disfigurements of his skull and facial features. These symptoms suggest that Egil may have suffered from a syndrome that results from a quickening of normal bone replacement. The disease, first diagnosed by Sir James Paget in 1877, runs in families and is uncannily similar to Egil's affliction.

Is it really important to determine whether Egil suffered from Paget's disease? I pondered this question at the beginning of my research and considered it again when I realized that the enigma of Egil lies at a nexus of medical science, history, archaeology and liter-



STOFNUN ÁRNA MAGNÚSSONAR

**SAGA PAGE** from the Icelandic manuscript *The Book of Möðruvellir* contains the passage describing Skapti's unearthing of Egil's bones. In the 12th line, one can easily make out: *þar var þá, Skapti prestur*, meaning "Skapti the priest was there at the time."

ary analysis. The answer is yes: such a determination does matter. An understanding of Egil's affliction is a critical step in assembling the evidence needed to evaluate the historical accuracy of the Icelandic sagas. Do sagas provide accurate information about a Viking period 250 years before they were written? Or are they merely flights of fancy and fabrications by 13th-century authors? Historians, literary scholars, archaeologists and linguists have all had their say, but science has scarcely played a role in the debate. At times the subject has stirred so much passion that one scholar promised to maintain his view until forced by death to lay down his pen. The argument would change drastically if a new source of information could be found.

For me, that new source lies unexpectedly in the field of modern medicine. Rather than attributing conflicting aspects of Egil's personality to artistic hyperbole, I believe the descriptions stem from the progress of Paget's disease. In breaking tradition to arrive at these conclusions, I frequently have recourse to another science—philology, the his-

torical and comparative study of language and its relation to culture.

## Family Stories

**T**he Icelandic sagas constitute one of the largest collections of extant vernacular narratives from medieval times. In 31 major sagas and scores of shorter narratives, these texts recount the travels of the first generations of Norse settlers in Iceland, the major Viking outpost in the North Atlantic. Written in prose and studded with verse, the family sagas are set in the period from 870 to 1030. Unlike myths and fantastic tales, which the Icelanders also produced, the sagas are sober in style. With an often stark realism they detail everyday agrarian and political life and describe adventurous Viking voyages, including those to Greenland and Finland. The crucial question that has remained is whether the sagas are the product of a long oral tradition or the invention of authors after Iceland became literate in the 13th century.

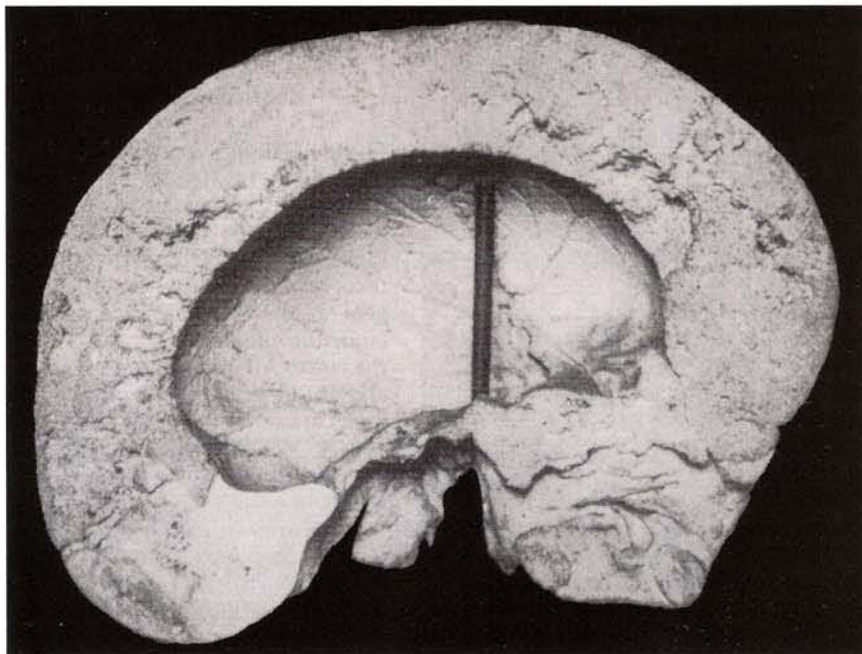
According to *Egil's Saga*, Egil spent his final years with his adopted daughter, Thordis, at the farm of Mosfell, in southwestern Iceland, not far from the present-day capital of Reykjavík. Initially he was buried there in a pagan grave mound. But 10 years later, when Iceland converted to Christianity in 1000, Thordis and her husband, Grim, moved Egil's remains to be interred at a small church built on their farm. About 150 years later a second church was built about 500 meters from the first. Skapti, one of Egil's prominent descendants, exhumed Egil's bones to move them to the new churchyard. The final pages of *Egil's Saga* relate a curious tale about Skapti's findings:

Under the altar some human bones were found, much bigger than ordinary human bones.... Skapti Thorrarinnsson, a priest and man of great

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**FACIAL BONE** that is grossly thickened and symmetrically deformed may result from Paget's disease, a condition in which bone grows drastically out of control. The skull of the warrior Egil, a hero of the Icelandic sagas, may have looked similar to this one of a man who suffered from the disease several centuries ago.





BRITISH JOURNAL OF SURGERY

**THICKENED PAGETIC SKULL**, shown in cross section, does not intrude into the cranial cavity, so that a patient's intellect remains unimpaired.

intelligence, was there at the time. He picked up Egil's skull and placed it on the fence of the churchyard. The skull was exceptionally large, and its weight was even more remarkable. It was ridged all over on the outside like a scallop shell. Skapti wanted to find out just how thick the skull was, so he picked up a heavy ax, swung it in one hand and struck as hard as he was able with

the hammer side of the ax, trying to break the skull. But the skull neither broke nor dented when hit; it simply turned white at the point of impact, and from that result anybody could guess that it could not have been easily cracked by small fry while still covered by skin and flesh.

This passage has often been used to exemplify the untrustworthiness of the

sagas. No matter how realistic the description may seem to be, everyone, so the argument goes, knows that a 150-year-old skull could not possibly have withstood the blow of Skapti's ax.

Modern medical knowledge, however, suggests that we cannot treat this episode as a purely literary device intended to magnify heroic Viking qualities. *Egil's Saga* precisely describes the skull as "ridged all over on the outside like a scallop shell." The precision is striking because the passage marks the only instance in all Old Norse literature that the otherwise well-known words *hórpuskel* (scallop shell) and *bárótrr* (ridged, undulated, waved, corrugated, wrinkled) are used to describe human characteristics. A "scalloped" bone surface, unique in descriptions of Viking heroes, closely matches medical portrayals of Paget's disease. Diagnoses repeatedly list irregularities of the outer skull surface, describing its appearance as corrugated and wavy. Such a feature appears in about one in 15 symptomatic cases.

Physicians have also noted the exceptionally resilient, ivorylike hardness of the afflicted bones. Even the whitening of Egil's skull where Skapti's ax struck is a clear indication of Paget's disease. When subjected to a blow, the soft, pumicelike outer material of the enlarged Pagetic skull gives way to a white, hardened, highly resilient core.

### A Helm's-Rock of a Head

In the saga, Egil himself refers to his head in strange ways. In one poem, written in response to a pardon granted him by his sworn enemy, King Erik Blood-Axe, Egil composed this verse:

*I am not opposed,  
Though I may be ugly,  
To accepting my helm's-rock  
of a head,  
From a ruler.*

Paget's disease may have been responsible for Egil's memorable facial appearance, a subject that over the years has engendered a great deal of creative literary interpretation. The saga offers a detailed description of Egil as he sits at a feast in England after battle. He faces King Athelstan, the ruler who he believes owes him compensation for the death of his brother, Thorolf.

Egil sat upright, but his head hung forward. Egil was marked by prominent features. He had a broad forehead and large eyebrows, a nose that was not long but enormously thick, and lips that, seen through his beard, were both wide and long. He had a



ROYAL COLLEGE OF SURGEONS, ENGLAND

**WHITENING OF PAGETIC BONE**, caused by impact, is apparent in this centuries-old, fossilized parietal bone unearthed in the mid-1700s. A similar whitening occurred when Egil's skull was struck with the hammer side of an ax.



remarkably broad chin, and this largeness continued throughout the jawbone. He was thick-necked and broad-shouldered and, more so than other men, hard-looking and fierce when angry. Well built and taller than others, he had thick wolf-gray hair but was early bald. While he sat as was written above, he jerked one eyebrow down to his chin and lifted the other one up into his hairline; Egil was black-eyed with eyebrows joined. He refused to drink, although drink was brought to him, but alternately he jerked his eyebrows up and down.

King Athelstan does not overlook Egil's threatening stance. Acting to defuse the Viking's anger, Athelstan offers Egil a liberal payment in compensation for his brother's death and thus wins his loyalty.

Although literary license may be assumed, it is curious and highly unusual for the physical features of a saga protagonist to be portrayed in so grotesque a manner, unless the writer was reporting a well-known story. Distortion and hardening of the cranium, changes that are characteristic of Paget's, may lead to leontiasis ossea, or cranial hyperostosis. In this condition, the facial bones thicken, giving an individual a lionlike appearance. This pathology, which may occur as early as the first two decades of life, closely fits the descriptions of Egil. As for the bizarre mobility of the eyebrows, it is conceivable that a person as menacing as Egil learned to exploit his facial distortion and was remembered for its outrageous effect.

Corroborating evidence for a Pagetic diagnosis comes from the saga's description of the problems Egil had in his old age. These difficulties—including loss of balance, hearing and sight, chill in the extremities, headaches and the phenomenon described as a hanging, swaying head—are all major symptoms of advanced Paget's disease. According to the saga, the elderly Egil, after moving in with his son-in-law, Grim, at Mosfell, was walking outside one day when he stumbled and fell. Some of the women who saw this laughed:

"You're really finished, now, Egil," they said, "when you fall without being pushed."

"The women didn't laugh so much when we were younger," said Grim. Egil made this verse:

*The horse of the necklace sways,  
My bald head bangs when I fall;  
My piece's soft and clammy  
And I can't hear when they call.*



HANS HUBER VERLAG

**TENTH-CENTURY SKELETON** of an Anglo-Saxon male shows the ravages of extensive Paget's disease, such as the curved spine and the thickened and deformed long bones of the limbs.

Why would people remember this poem about a head that "sways" and other physical difficulties? One reason is that the utterance is a powerful example of Old Norse verse, encasing personal emotion in a complex and colorful word puzzle. In Viking times, verse was viewed as the gift of Odin, and poetic skill was highly respected. Here the lines reflect the aged warrior's still agile

ability to turn physical disorders into memorable imagery.

Old Norse poetry was a game of puzzles, which, once the rules are understood, supplies us with critical information. The first line carries the understanding: "I have swayings of the neck." In building this image, the author fashioned a Norse poetic circumlocution called a kenning. Kennings are stylistically similar to certain English metaphors, such as calling a camel a ship of the desert. The saga's kenning, *helsis valr* (the horse of the necklace), means the neck. The word "swayings" is built on the verb *váfa*, "to sway or dangle while hanging." Thus, the line in the verse refers to a neck bent under the weight of a head that wobbles.

A drooping, swaying head is not a standard feature of old age; so, too, the graphic description "swayings of the neck" is by no means a common usage in Old Icelandic poetry. I conducted a computer search and found no other occurrences of this combination, so the poet is clearly describing a condition that is unusual and highly personal.

The saga further narrates that Egil becomes blind and is humiliated in his old age by his lethargy and his craving for warmth—all symptoms of Paget's:

Egil became totally blind. One day in winter when the weather was cold, he went up to the fire to warm himself.... "On your feet!" said the woman. "Get back to your place and let us do our work." Egil stood up, walked over to his seat, and made this verse:

*I flounder blind by the fireside,  
Ask females for mercy,  
Bitter the battle  
On my brow-plains.*

In this verse the Icelandic words for "brow-plains" (*hvarma hnitvellir*) mean the part of the face where the eyes meet or are located. The passage is thus unclear as to whether the words refer to the eyes themselves or to the area of the eyes, including the part behind and around the eye sockets. If the former, the words again mean Egil's blindness. If the latter, the phrase expresses the notion that "I bear pain where the eyes meet," suggesting that Egil has headaches. Possibly, both interpretations were intended.

Egil's headaches and chills are consistent with his other symptoms. Victims of Paget's disease sometimes have headaches caused by the pressure of enlarged vertebrae on the spinal cord. They also show a high incidence of arteriosclerosis and heart damage. Atten-

dant circulatory problems, particularly coldness in hands and feet, develop as the heart is overtaxed and blood is diverted from the extremities in order to support the rapid bone remodeling.

### Cold Feet, Cold Women

Another of Egil's laments supplies further information about his chills and cold feet—and of his ability to create clever wordplays.

*Two feet I have,  
Cold widows.  
These frigid crones  
Need a flame.*

In Icelandic, the words are

*Eigum ekkjur  
allkaldar tvær,  
en þær konur  
þurfa blossa.*

Here the poet is skillfully playing on an understood double entendre. In unraveling the puzzle, the Norse audience would know that the key to the stanza is to find another unmentioned word, one that would provide a bridge of meaning. That unmentioned word is *hæll* (heel). When substituted for the word *ekkja*, meaning "widow," it carries a double connotation; it also means

"heel"—that is, "foot." The members of Egil's audience, who enjoyed the intricacies of skaldic verse, would know to replace the words *ekkjur* (widows) and *konur* (women)—both translated here as "crones"—with *hælar*, the plural of *hæll*, meaning both "feet" and "women."

Once the connection with feet is made, the rest is easy. Both nouns are connected with the adjective *allkaldar*, "thoroughly cold." Thus, the passage carries the meanings of "cold feet" and "cold women," both of which sadly afflicted Egil in his later years.

Is there a tradition of Icelandic warrior-poets complaining about women? Yes. But about their cold feet? Hardly.

## Paget's Disease

In 1854 Sir James Paget became surgeon extraordinary to Queen Victoria and, a few years later, surgeon ordinary to the Prince of Wales. Paget's fame rests on his descriptions of several diseases, the most famous of which is osteitis deformans. According to Paget's classic description, this disease of the bones "begins in middle age or later, is very slow in progress, may continue for many years without influence on the general health, and may give no other trouble than those which are due to changes in shape, size, and direction of the diseased bones.... The limbs, however misshapen, remain strong and fit to support the trunk."



Sir James Paget, 1814-1899

Paget's disease is bone growth gone awry. Normal human bones continuously renew themselves, rebuilding completely about once every eight years. Paget's quickens the pace of breakdown and reformation, with the result that the layers of new bone are structurally disorganized, misshapen and considerably larger than the original ones. The cause of the condition could be an inherited weakness of the immune system or a virus, or both.

Paget's is an extremely old disease. The first recorded evidence of the ailment is a grossly thickened Egyptian skull dating from about 1000 B.C. It affects slightly more men than women, and it usually occurs after the age of 40.

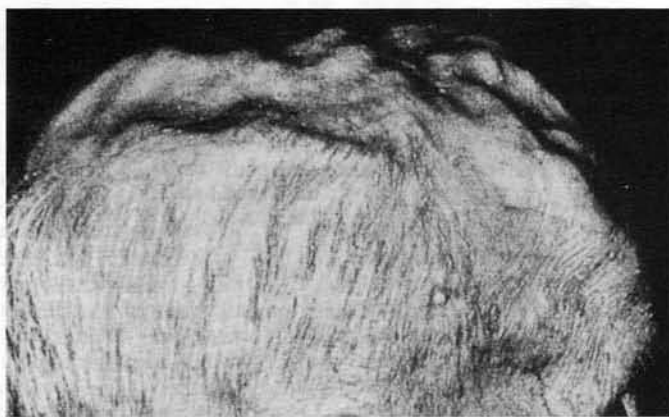
Increasingly, statistics show that osteitis

deformans is not especially rare. British studies estimate that from 3 to 5 percent of all adult males older than 40 in the U.K. have Paget's disease in some form; the frequency may reach 10 percent after age 70. In the U.S. as many as three million people probably have Paget's disease. Of these, up to 25 percent show distressing symptoms. Besides its tendency to run in families, the disease is known to cluster in specific geographical areas, mostly in Europe and particularly in England and France. Even among populations not prone to Paget's, the disease may exist, frequently limited to relatively small areas, such as the town of Avellino in Italy, where a cluster of cases was

found within an extended family.

Pagetic symptoms are frequently misunderstood, and even today many cases have been attributed to the effects of advancing age. In the example of the Avellino family, the affliction was recognized only after an emigrant relative

had been diagnosed in New York City. Accurate diagnosis relies on x-rays or blood tests. These examinations look for increased levels of alkaline phosphatase, a product of the cells that form bone. Urine tests may show an increased amount of hydroxyproline, another product of bone breakdown. Treatment includes drugs, specifically calcitonin and disphosphonates, which slow or block the rate of bone breakdown and formation.



**CORRUGATED HEAD** of a 92-year-old man is a symptom of Paget's. In the mid-1970s he was a patient of Narendra K. Chakravorty of St. Luke's Hospital in Huddersfield, England. Like Egil, his sight was affected, and he was deaf but not mentally impaired.



There is, however, a tradition of recording struggles against one's fate, including enfeeblement. In this instance the lines preserve the memory of a man's private battle with an exceptionally harrowing plight. Despite his condition, Egil still had the acuity to compose clever poetry. James Paget's classic formulation puts it this way: "Even when the skull is hugely thickened and all its bones are exceedingly altered in structure, the mind remains unaffected."

Because Egil's symptoms provide a striking picture of Paget's disease, one might ask whether the unearthing of the bones in the mid-12th century might be the source for the poetry. Could a 13th-century poet, having learned about the condition of Egil's bones, have written verses about the hardness of Egil's head using kennings? The answer is, perhaps yes, at least about the bones. Such a poet, however, would not have known the particulars of Paget's disease and could hardly have expounded on the enlarged bones to construct a detailed portrait of a man with cold feet, chills, headaches, a swaying, hanging head, inconsistent bouts of lethargy, and loss of balance, hearing and sight.

The answer is even more persuasive when we remember that the medieval text simply treats Egil's physical problems as the ravages of time. It makes no connection whatsoever between the bones and any kind of disease. In fact, the saga draws the opposite conclusion. Awed by the size and the resiliency of the skull, it points out how useful such a tough head would be for a warrior. The crucial factor is that the poetry, which may be the oldest element in the saga, independently corroborates the specifics about the bone by giving different details.

Could another disease have caused Egil's problems? I considered conditions that produce similar symptoms, such as osteitis fibrosa, acromegaly (gigantism), hyperostosis frontalis interna, fibrous dysplasia, and osteopetrosis. In each instance, however, critical symptoms do not match. By using all the sources available today, we can diagnose Egil as a probable victim of Paget's disease.

#### Paget's in Scandinavia

I was led to the question of Paget's disease by research intended to explain passages in a medieval saga, but it is now clear to me that the currently accepted statistics about the disease in Iceland, and possibly in all Scandinavia, are certainly inaccurate. Most studies posit an extremely low incidence, or an almost nonexistence, of the condition in this region. This situation exists be-



**SITE OF EGIL'S BONES** was the 11th-century church at Hrisbu. The ruins sit on a small hill, or church knoll. To the right is a smokehouse. The turf-built church would probably have been of somewhat similar design, though larger.

cause little attention has been directed to the effective diagnosis of the pathology. For example, an extensive 1982 study to determine the European distribution of Paget's disease used questionnaire replies by 4,755 radiologists. It found the disease more prevalent in Britain than in any other western European country. The study excluded Norway, Iceland, Sweden and Finland on the assumption that incidences there were very low.

Although uncommon, Paget's disease is more prevalent in modern Scandinavia than these conclusions would suggest. Until recently, the disease was thought not to exist in Iceland. During the past 10 years, however, Paget's disease has slowly but increasingly been found in modern Iceland, a fact unpublished except for a 1981 case study reported in a small journal there by Gunnar Sigurdsson of the City Hospital in Reykjavík. In July 1991, I interviewed Sigurdsson, who informed me he was treating 10 patients with Paget's disease. His observations about the symptoms closely match those of Thordur Hardarson of Iceland's National University Hospital, who was also treating patients with Paget's disease.

To the growing evidence of Paget's in Iceland, we can add the high probability that a saga-age Icelander, and perhaps even a medieval family, could have been afflicted. Recognizing these individuals as victims of Paget's disease begins to fill in the picture of the epidemiological history of the disease in early Scandinavia, providing examples of Paget's at both ends of a 1,000-year period.

Egil's poetry, Skapti's medieval obser-

vation and modern medical knowledge together provide a detailed composite of a Pagetic affliction. With this insight, we do not have to discount *Egil's Saga* to explain the misshapen skull and bones unearthed in the 12th century. On the contrary, we can see that the saga may well contain accurate information. Although we surely cannot conclude that all the sagas are historical truths, Egil's bones strongly suggest that some passages may reliably detail the past.

Is there more work to be done? Yes, for Egil's bones are possibly still buried in the old churchyard at Mosfell. We await the opportunity to unearth his remains for the third time in 1,000 years.

#### FURTHER READING

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