Old Teeth Add Climate to the Story of Industrial Disease

A cemetery study suggests colder, darker years may have worsened childhood vitamin D deficiency in industrial-era England.



Old teeth and a burial record sit on a table near a dim window, suggesting research into climate and childhood health in industrial-era England.

Scientists studying a centuries-old cemetery in northeast England say climate swings may have helped make childhood disease worse during the **Industrial** Revolution. According to Phys.org reporting on a new study in Frontiers in Environmental Archaeology, researchers reexamined teeth from people buried at Coach Lane, a Quaker cemetery in North Shields, to ask whether changes in **sunlight** during the Little Ice Age contributed to vitamin D **deficiency**.

That matters because the usual story about Industrial Revolution disease is already crowded. Between roughly 1760 and 1840, England shifted from a farming-based economy toward an industrial one. Many people lived and worked in polluted, crowded, badly housed places. Children could spend long hours indoors or in smoky cities, with little access to direct sunlight. Those conditions helped make **rickets** common. Rickets is a disease in which growing bones fail to harden properly, often because the body lacks enough vitamin D, a nutrient humans can make when ultraviolet light from the sun reaches the skin.

The new research does not argue that climate was the only cause, or even the main cause, of illness. Instead, it adds another layer to a complicated picture. The contested question is one historians and scientists often face: when several forces overlap, how do we decide which ones mattered most? **Pollution**, **poverty**, working conditions, housing, diet, cultural habits, **latitude**, and sunlight can all affect health. Climate may have made those existing problems harder to escape.

The Little Ice Age was a long cooling period, running from the 13th through the 19th centuries, linked in the article to heightened volcanic activity and lower solar activity. Major volcanic eruptions can send particles into the **atmosphere** that block some sunlight. Lower solar activity means the sun is producing slightly less energy than usual. For people living before vitamin supplements, electric lighting, or modern public health systems, even small changes in sunlight could matter if they affected how much ultraviolet light reached children's skin.

The Coach Lane cemetery offered researchers a rare combination of physical evidence and written records. It was used from 1711 to 1829, and 236 burials were recovered when the site was excavated in 2010. The researchers studied 30 teeth from 21 unidentified people. Teeth are useful because they grow on a fairly regular biological schedule.

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The team looked at **dentin**, the inner layer of a tooth, to find mineralization failures. Mineralization is the process by which tissue becomes hard and calcified; failures can leave signs that the body was not getting what it needed during growth.

Those marks do not automatically prove rickets. Tooth development can be affected in more than one way. But when failures appear at regular intervals, separated by normal dentin, they can point toward episodes of vitamin D deficiency. Because teeth form during infancy and childhood, the researchers could estimate the age at which a person experienced these problems, even if they could not identify that person by name.

The written records helped with a different question: what was happening in the wider environment when this community was young? The graves were not marked, so the researchers could not connect a specific tooth to a specific person in the burial register. But the register listed ages and years of death for many people. By subtracting age at death from year of death, the researchers estimated birth years for 109 community members.

The pattern they found was striking but not simple. Of those 109 people with known birth years, 91 were born within 10 years after a major volcanic **eruption**. Forty-one were born during periods when low solar output and volcanic activity happened at the same time. The researchers suggest that these darker or cooler periods may have reduced children's access to the ultraviolet light needed for vitamin D, especially when combined with indoor labor, heavy clothing, pollution, and poor housing.

North Shields itself was changing during this period, from a fishing village into an industrial port. That makes the site especially useful, but also harder to interpret. If disease signs appear in the teeth and bones of people from this community, are they evidence of industrial hardship, climate stress, poverty, or all of these at once? A clean answer would be easier to teach, but it would probably be less true.

There is also a caution here about how evidence from the past should be used. The study works at the community level, not the individual level. It can show overlap between birth years, climate conditions, and signs of childhood deficiency, but it cannot reconstruct every child's daily life. It cannot say whether a particular family kept a child indoors, whether that child had a poor diet, or exactly how smoky the air was around that home.

Still, the study challenges a narrow version of the Industrial Revolution story. If climate helped shape disease risk, then human health was not just a result of factories and cities, and not just a result of nature. It was produced where human systems and environmental conditions met. That is the difficult part: blaming only climate can hide social choices, while blaming only society can miss the physical conditions people had to live through.

Written from reporting by Phys.org.

THINK IT THROUGH

1. **If many causes contributed to rickets, how should historians decide how much importance to give climate compared with poverty, pollution, and labor conditions?**

   > **A strong answer:** A strong answer should discuss evidence, limits of causation, and the danger of reducing a complex problem to one explanation.

2. **Does adding climate to the explanation risk letting industrial society off the hook, or does it make the history more accurate?**

   > **A strong answer:** A strong answer should weigh whether environmental explanations can coexist with responsibility for human-made conditions.

3. **What kind of additional evidence would make the researchers' argument more convincing, and what questions would probably remain unanswered?**

   > **A strong answer:** A strong answer should identify useful data such as diet, housing, work patterns, or local pollution while recognizing the limits of studying unidentified remains.

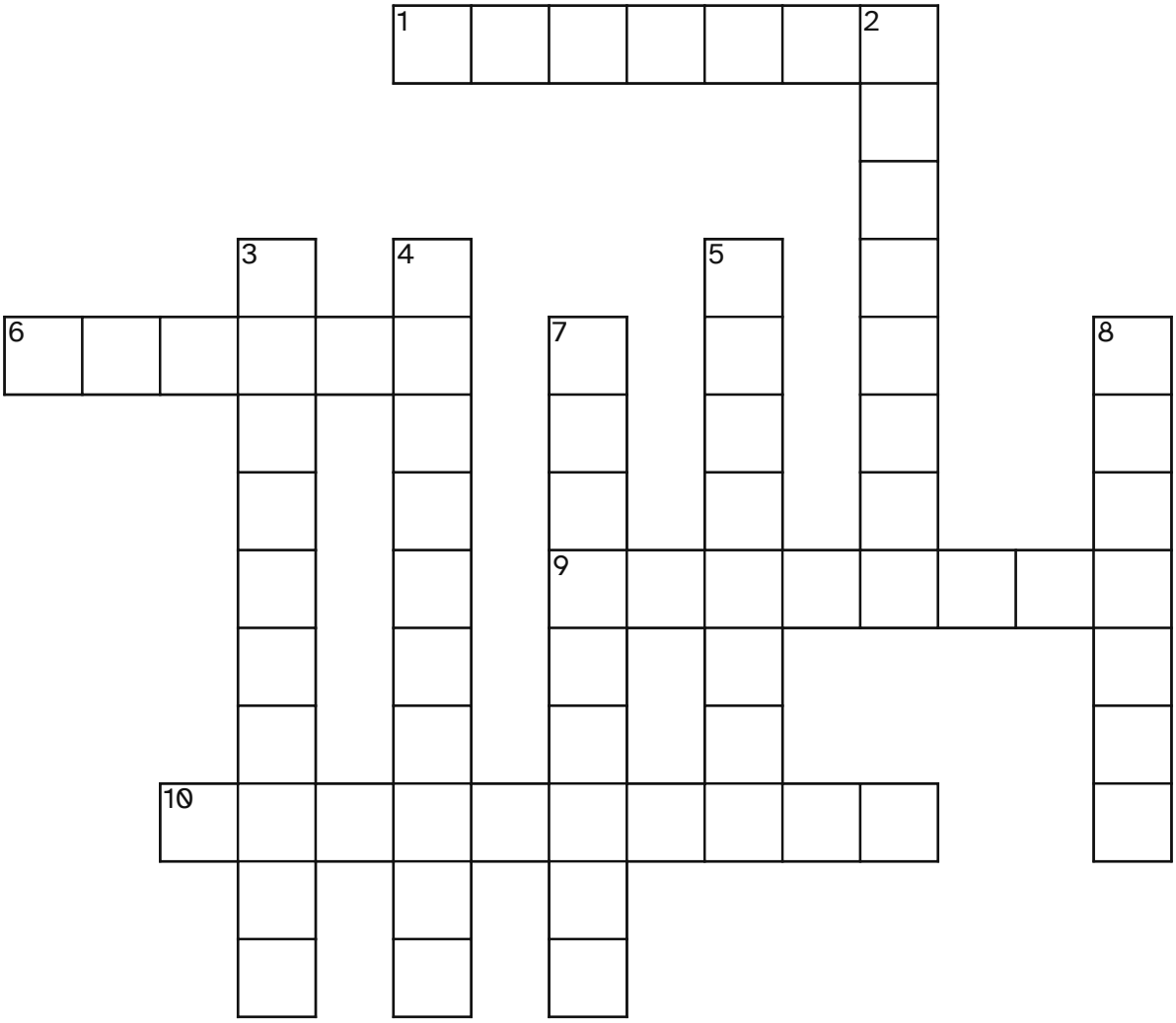
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ATMOSPHERE DEFICIENCY DENTIN ERUPTION INDUSTRIAL
LATITUDE POLLUTION POVERTY RICKETS SUNLIGHT

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ACROSS

1 Childhood illness marked by bones that fail to harden

6 Hard tooth layer beneath enamel

9 Distance north or south of the equator

10 Lack of a nutrient or other need for healthy growth

DOWN

2 Solar rays reaching Earth

3 Layer of gases surrounding Earth

4 Related to factories and large-scale production

5 Volcano's violent release of ash, gas, and rock

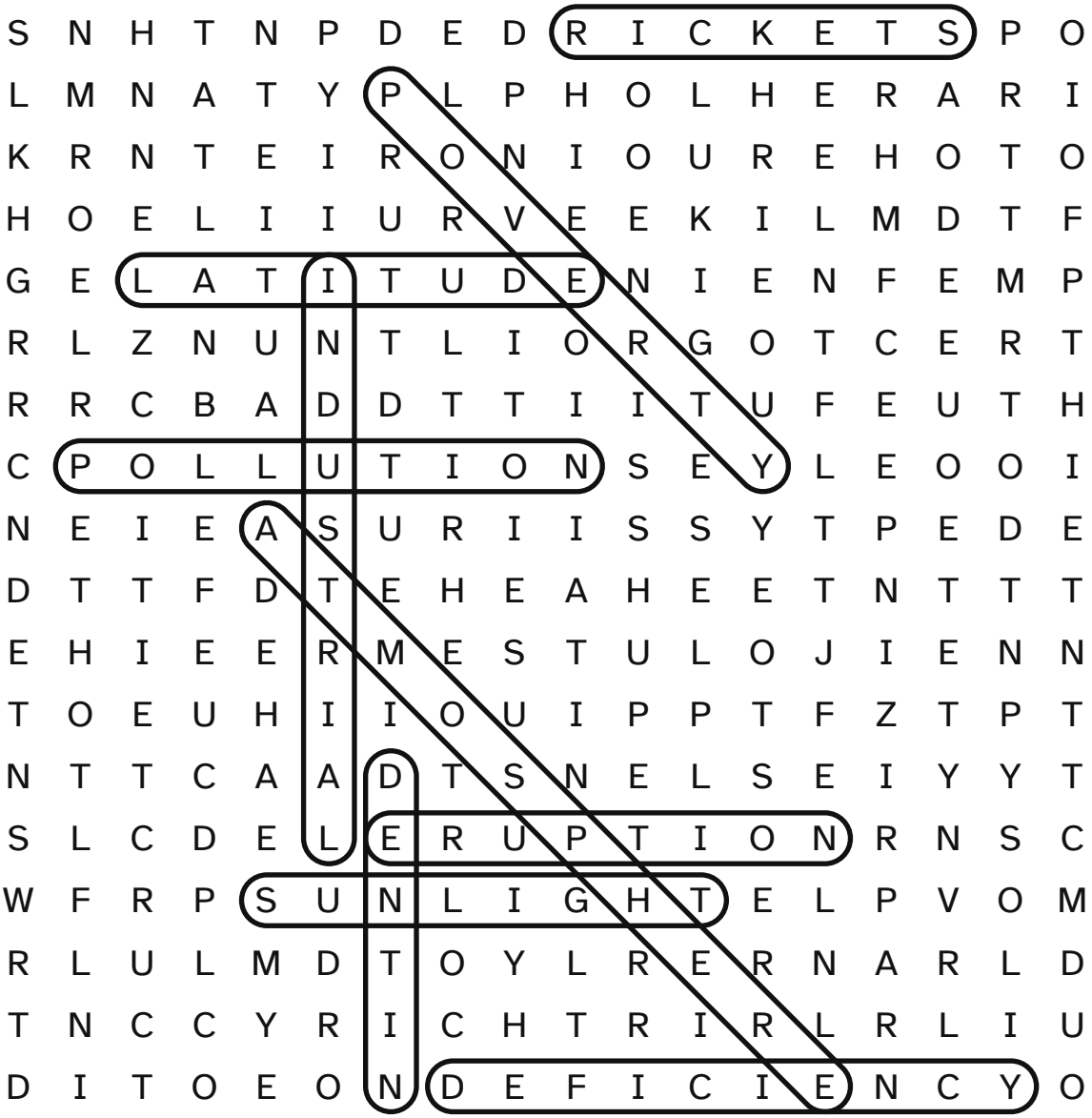
7 Harmful material added to air, water, or land

8 State of lacking money and basic resources

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Old Teeth Add Climate to the Story of Industrial Disease

— answer key

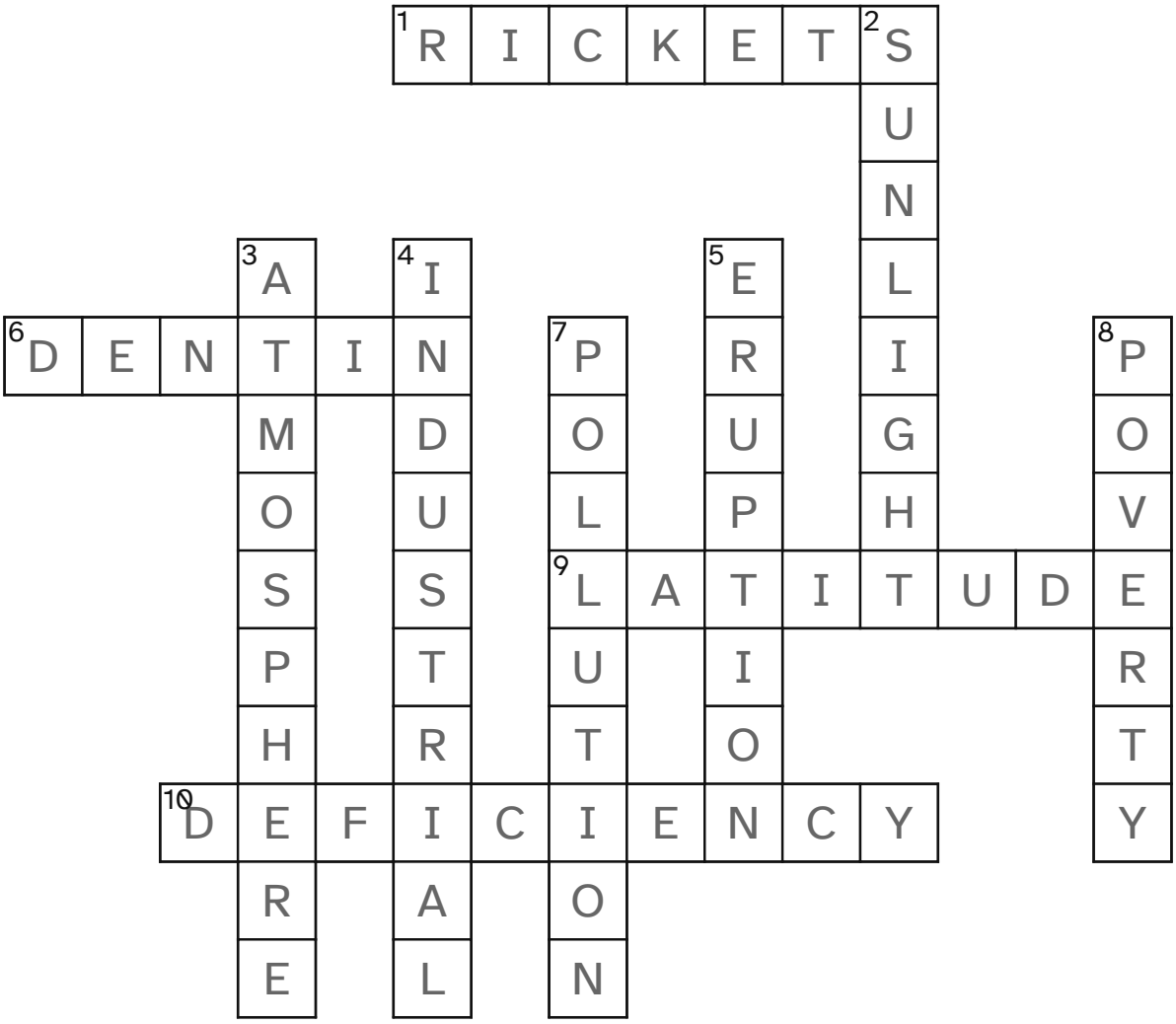


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Phys.org

"Centuries-old cemetery helps scientists link climate shocks to Industrial Revolution disease"

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https://phys.org/news/2026-11-centuries-cemetery-scientists-link-climate.html

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