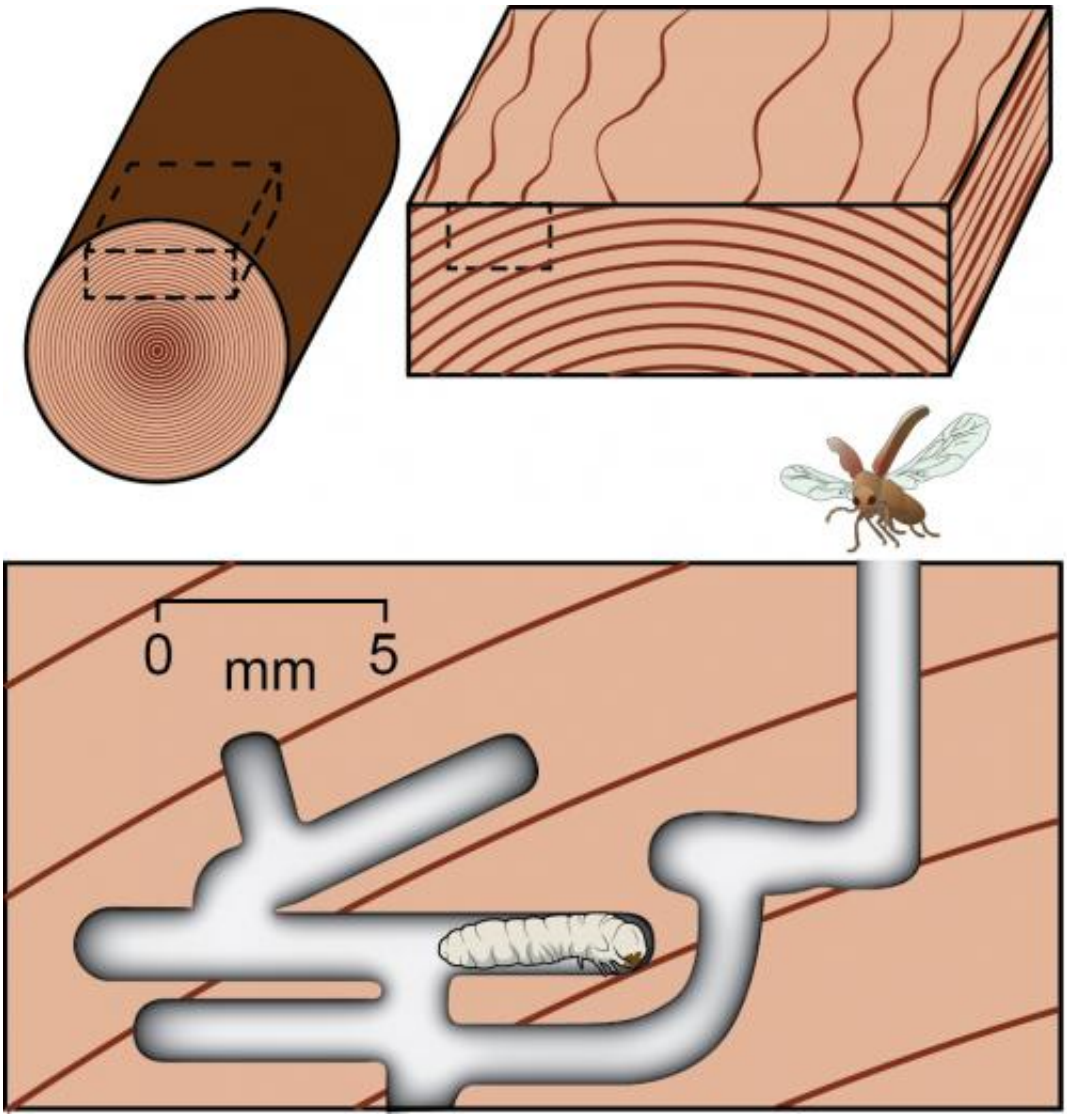
Wormholes from centuries-old art prints reveal the history of the 'worms'

November 20 2012, by Katrina Voss

A new technique is the first of its kind to use printed art as a "trace fossil" to precisely date insect species and to identify their geographical locations. Blair Hedges, a professor of biology at Penn State University, developed the technique and used it to examine art printed from woodblocks spanning five centuries. He then identified the species responsible for making the ever-present wormholes in European printed art since the Renaissance. This image, from a Renaissance woodcut art print, "The Rich Man" by Cornelis Anthonisz (1541), shows printed wormholes. Credit: Rijksmuseum, Amsterdam

By examining art printed from woodblocks spanning five centuries, Blair Hedges, a professor of biology at Penn State University, has identified the species responsible for making the ever-present wormholes in European printed art since the Renaissance. The hole-makers, two species of wood-boring beetles, are widely distributed today, but the "wormhole record," as Hedges calls it, reveals a different pattern in the past, where the two species met along a zone across central Europe like a battle line of two armies. The research, which is the first of its kind to use printed art as a "trace fossil" to precisely date species and to identify their locations, will be published in the journal *Biology Letters* on 21 November 2012.

Hedges explained that most printed "wormholes" were formed in the carved woodblocks by adult insects and not by the worm-like larvae. After landing on a piece of dry wood, beetles lay their eggs in cracks and crevices. The larvae then spend three to four years burrowing inside the wood, nourishing themselves on the wood's cellulose and growing until they enter the cocoon-like pupal stage when they transform into adults. The adult beetles then burrow straight up toward the surface of the wood, exiting to find a mate and to begin the life cycle anew. "The so-called 'wormholes' found in wood—including furniture, rafters, oak floors, and woodblocks that were used to print art in books—are not made by worms as the word suggests; rather, most are 'exit holes' made by those newly transformed adult beetles boring up to the surface and flying away," Hedges said.



A new technique is the first of its kind to use printed art as a "trace fossil" to precisely date insect species and to identify their geographical locations. Blair Hedges, a professor of biology at Penn State University, developed the technique and used it to examine art printed from woodblocks spanning five centuries. He then identified the species responsible for making the ever-present wormholes in European printed art since the Renaissance. These diagrams show the position of a typical woodblock in a hardwood tree, tunneling by a worm-like beetle larva, and an adult beetle emerging through a "wormhole." Credit: S. Blair Hedges, Penn State University

When these wormholes were present in an artist's woodblock, they resulted in empty circles within the inked prints made from the woodblock. "These tiny errors or interruptions in the print serve as 'trace fossils,'" Hedges said. "They aren't the animals themselves but they are evidence of the animal's existence. They show that beetles invaded a particular piece of wood, even if that wood no longer exists." Hedges added that studying the prints, rather than the much rarer woodblocks themselves, provides better and more accurate information. A piece of wood can acquire new wormholes throughout the years, and it is difficult to know whether a particular hole was made 10 years ago or many centuries ago. Even a museum specimen that has been protected in recent years could have wormholes from beetles that landed on it just a few years prior to its arrival in the museum.

"By studying printed wormholes, we are seeing only the wormholes that were made at a specific moment in history," Hedges said. "Because most prints, including those in books, have publication dates, we know that the wormholes in question were made very close to that date, or at least between that printing and the first printing. It's an almost perfect biological timestamp. And in most cases, we also know where the book was printed. For example, if printed wormholes appear on a print made in Bamberg, Germany in 1462, then we know that the beetles that made the wormholes in the corresponding woodblock must have lived in or around that place at that time. So wormholes can tell us when and where a species existed with fairly good accuracy, more than 500 years ago, and that is amazing."

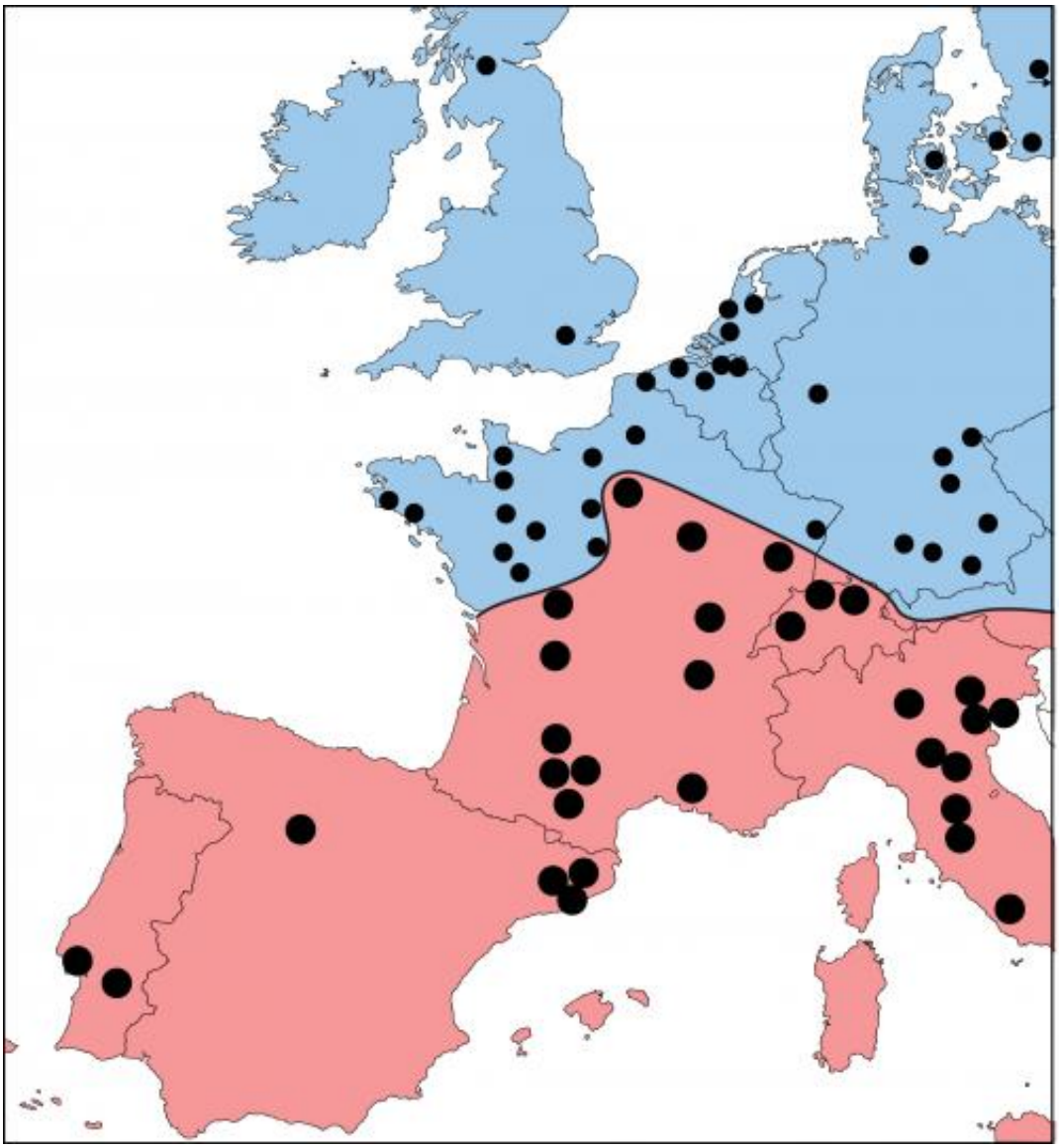
Hedges measured the size of more than 3,000 printed wormholes in works of art and books spanning five centuries, from 1462 to 1899. He found that prints from northern Europe—including England, the Netherlands, Germany, and Sweden—had holes that were small and round, averaging 1.43 mm in width. However, woodcuts from southern Europe—including Spain, Portugal, most of France, and Italy—had

larger holes averaging 2.30 mm in width, as well as some unique tracks, including long holes.

Partially carved woodblock, The Wedding of Mopsus and Nisa by Bruegel (1566), showing actual wormholes. Credit: Metropolitan Museum of Art, New York.

"The species that made the wormholes were identified by a process of elimination. For example, the size of the beetle closely matches the size of the hole made, and most species have preferences for the wood they eat. This left two species as the probable hole-makers," Hedges said. "The northern European wormholes most likely were made by the Common Furniture Beetle, Anobium punctatum. The wormholes in southern Europe most likely were made by the Mediterranean Furniture Beetle, Oligomerus ptilinoides." Hedges added that, by comparing the diameters of the wormholes found in art from many different regions of Europe, he was able to determine that the Common Furniture Beetle

lived only in a geographic area extending northward from northern France, Switzerland, and Austria, while the Mediterranean Furniture Beetle lived only south of that dividing line. "This is surprising because it means that the two species' ranges were in close contact but, oddly, did not overlap along a precise dividing line," Hedges said. "However, today and for the past 100 years, because travel, shipping, and furniture transport tends to spread insects around, we find both species all over northern and southern Europe and elsewhere in the world." Hedges suspects that the contact zone of the two species across Europe may have been maintained for centuries because of competition for the same food source. All of those details of the species' distribution, including the contact zone, were previously unknown.



A new technique is the first of its kind to use printed art as a "trace fossil" to precisely date insect species and to identify their geographical locations. Blair Hedges, a professor of biology at Penn State University, developed the technique and used it to examine art printed from woodblocks spanning five centuries. He then identified the species responsible for making the ever-present wormholes in European printed art since the Renaissance. Thismap of Europe shows the locations of cities (black circles) where prints were found to contain printed wormholes of the northern (blue, 1.4 mm holes) and southern (red, 2.3 mm holes) species. Credit: S. Blair Hedges, Penn State University

Hedges said that this method can be used to study different beetle species in other regions, such as eastern Europe, the Americas, and Asia, and the method even could be used to study earlier time periods. He also predicts that old DNA from the beetles might be recoverable from original woodblocks preserved in museums. "Woodblocks that have been long-preserved in museums have been protected from any recent beetle activity," Hedges explained. "So one exciting possibility would be to examine those woodblocks for traces of DNA from the beetles that made the wormholes, adding a genetic dimension. This research could be done without damaging the rare woodblocks and it would help to confirm identities of the species and their relationships."

Hedges added that his new method has relevance not just to biology, but also to art history. "There are some situations in which a book or print's origin is unknown because a printing location was never added to the text," Hedges said. "Now that we know that different species of beetles existed in different locations in Europe, art historians can determine whether a book was from northern or southern Europe simply by measuring the wormholes."

Provided by Pennsylvania State University

Citation: Wormholes from centuries-old art prints reveal the history of the 'worms' (2012, November 20) retrieved 16 August 2024 from https://phys.org/news/2012-11-wormholes-centuries-old-art-reveal-history.html