

LETTERS

A female figurine from the basal Aurignacian of Hohle Fels Cave in southwestern Germany

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Despite well over 100 years of research and debate, the origins of art remain contentious^{1–3}. In recent years, abstract depictions have been documented at southern African sites dating to ~75 kyr before present (BP)^{4,5}, and the earliest figurative art, which is often seen as an important proxy for advanced symbolic communication, has been documented in Europe as dating to between 30 and 40 kyr BP². Here I report the discovery of a female mammoth-ivory figurine in the basal Aurignacian deposit at Hohle Fels Cave in the Swabian Jura of southwestern Germany during excavations in 2008. This figurine was produced at least 35,000 calendar years ago, making it one of the oldest known examples of figurative art. This discovery predates the well-known Venuses from the Gravettian culture by at least 5,000 years and radically changes our views of the context and meaning of the earliest Palaeolithic art.

Excavators recovered the six fragments of carved ivory that form the Venus (Fig. 1) between 8 and 15 September 2008. The importance of the discovery became apparent on 9 September when the main piece of the sculpture, which represents the majority of the torso, was recovered. Two of the fragments were documented *in situ* and measured in three

dimensions. Four fragments were recovered in connection with water screening and can be localized to a 10-l volume corresponding to a ~3-cm-thick portion of a quarter metre. The pieces of the figurine lay about 3 m below the current surface of the cave in an area about 20 m from the cave's entrance. All of the finds come from the southwest quadrant of a single square metre and were recovered from within 12 cm in the vertical dimension (Fig. 2). Although, owing to their fragility and complex depositional histories, many of the ivory artworks from the Swabian Jura are highly fragmentary, the Venus from Hohle Fels is nearly complete; only the left arm and shoulder are missing. The excellent preservation and the close stratigraphic association of the pieces of the figurine indicate that the Venus experienced little taphonomic disturbance after deposition. The quarter metre in which the figurine was found borders directly on the western edge of the dig, raising the possibility that the missing portion may be recovered as excavation continues.

The figurine originates from a red-brown, clayey silt at the base of ~1 m of Aurignacian deposits. One fragment was attributed to feature 10, a small area rich in charcoal at the base of archaeological



Figure 1 | Side and front views of the Venus of Hohle Fels. Photos by H. Jensen; copyright, University of Tübingen.

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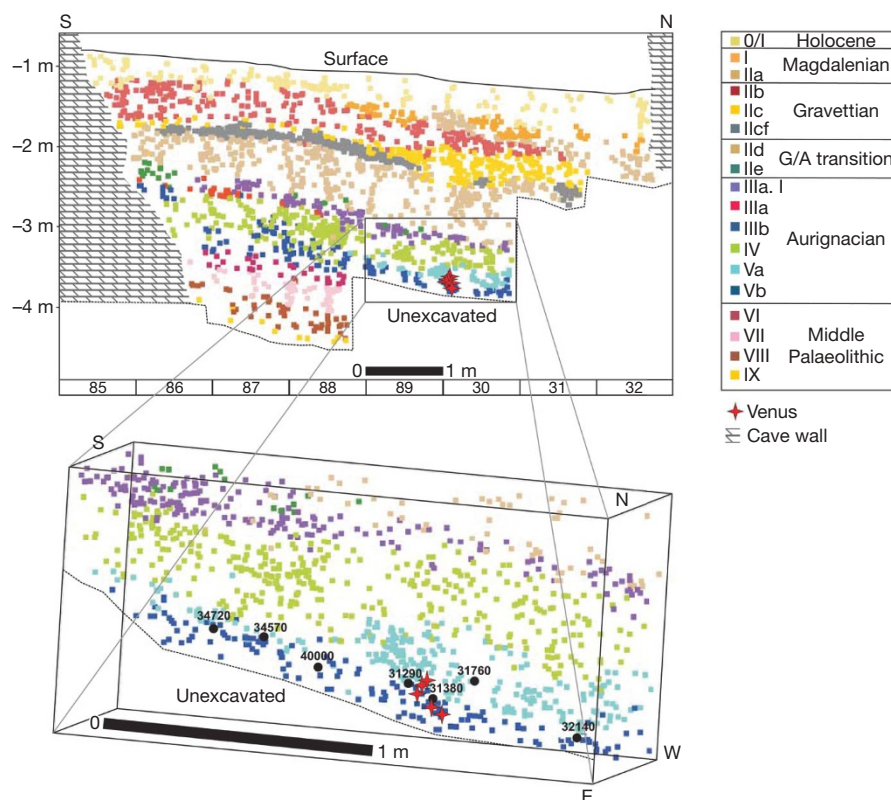


Figure 2 | Stratigraphic position of the Venus of Hohle Fels and associated radiocarbon dates from archaeological horizon Va feature 10 and Vb. The lower plot shows the radiocarbon dates (in years before present) of some of the samples found near the Venus (Table 1). Figure by M. Malina.

horizon Va, directly overlying archaeological horizon Vb. The remaining five pieces were recovered from archaeological horizon Vb, which is an approximately 8-cm-thick deposit of clayey silt directly overlying the sterile clays that separate the Aurignacian from the underlying Middle Palaeolithic strata. The Venus lay in pieces next to a number of limestone blocks with dimensions of several decimetres. The find density in this part of archaeological horizon Vb is moderately high, with much flint-knapping debris, worked bone and ivory, faunal remains of horse, reindeer, cave bear, mammoth and ibex, and burnt bone.

Six new radiocarbon measurements on bone and one on charcoal from feature 10 and archaeological horizon Vb have been made at the Oxford Radiocarbon Accelerator Unit (Table 1). Four of the dates fall between 31.3 and 32.1 kyr BP. Two other dates fall in the range 34.6–34.7 kyr BP. One bone dates from 40.0 kyr BP. The new series of dates on bones from the vicinity of the Venus were all made on collagen processed using ultrafiltration⁶. The amount of collagen ranged from 2.2 to 11.4% in the six bones sampled. Two additional measurements on bone and one on charcoal from the 2002 excavation were made at the Leibniz Laboratory, Kiel, and yielded dates between 33.3 and 35.7 kyr BP. These finds come from the same stratigraphic position 2 m farther to the southeast. The samples from the 2002 excavation were initially classified as belonging to archaeological horizon Va, but on stratigraphic grounds have been redesignated as belonging to archaeological horizon Vb. Five dates of bones recovered during the 2007 excavation from archaeological horizon Va, in a find-rich wedge of sediment between archaeological horizons IV and Vb, were measured in Kiel and fall in the range 31.7–32.3 kyr BP^{7,8}. Previously, a sculpture of a waterfowl and a therianthrop were recovered from archaeological horizon IV, where nine radiocarbon dates measured in Kiel and Oxford on bone fall between 30 and 33 kyr BP⁹. All of the bones measured in Kiel were well preserved and yielded between 6.4 and 18.6% collagen. Most of the bones dated at Kiel and Oxford show anthropogenic modifications, and the two pieces of charcoal from archaeological horizon Vb almost certainly originate from anthropogenic fires.

This wide range of dates from archaeological horizon Vb presents a situation similar to that from the nearby site of Geißenklösterle, where the lower Aurignacian deposit of archaeological horizon III has produced 33 radiocarbon dates between 29 and 40 kyr BP⁸. The same horizon has yielded thermoluminescence dates in the range of 40 kyr BP¹⁰.

There is no simple explanation for the variable radiocarbon dates from Hohle Fels and Geißenklösterle. The noisy signals result from a combination of factors including variable sample preparation, variable levels of atmospheric carbon, taphonomic mixing and excavation error^{8,11,12}. Given the lack of reproducibility within and between radiocarbon laboratories, I prefer to emphasize the stratigraphic context of the finds, and to use the highly variable radiometric dates as rough indicators of age⁸. Although there is no generally accepted calibration for radiocarbon dates over 30 kyr BP, preliminary calibrations suggest that dates of 32 kyr BP correspond to roughly 36 kyr BP in calendar years¹³. If the early dates are correct, the Venus would be even older. The fact that the Venus is overlain by five Aurignacian horizons, containing a dozen stratigraphically intact anthropogenic features with a total thickness of ~1 m, suggests that the figurine is of an age corresponding to the start of the Aurignacian, around 40,000 calendar years ago. The overlying deposits contain rich assemblages of Aurignacian lithics, organic tools and personal ornaments, as well as three examples of figurative art¹⁴. We do not have reliable data on rates of sedimentation and the exact duration of the Aurignacian; however, Hohle Fels is one of the largest and most visible caves in the Swabian Jura, suggesting that it would be quickly occupied by the first Upper Palaeolithic people in the region.

Although much ivory-working debris has been recovered from the basal Aurignacian deposits at Geißenklösterle and Hohle Fels, this sculpture is the first example of figurative art recovered from the basal Aurignacian in Swabia. Unless scenarios involving major taphonomic disturbances and mixing with overlying sediments are considered, the discovery of the Venus of Hohle Fels refutes claims

Table 1 | AMS radiocarbon dates from the Aurignacian and Middle Palaeolithic of Hohle Fels

Laboratory number	Arch. horizon	Material	Modification	Collagen (%)	Date (years BP)	Cultural group
OxA-4979	III	<i>Salix</i> charcoal	—	—	27,600 ± 800	A?
KIA 32056	IIIa. 1	Reindeer metatarsal	Impact	8.0	29,710 ⁺²¹⁰ ₋₂₀₀	A
KIA 32055	IIIa. 1	Cave bear rib	Cut mark	6.6	30,340 ⁺²⁹⁰ ₋₂₈₀	A
KIA 16038	IIIa	Reindeer femur	Impact + cut marks	14.4	29,840 ± 210	A
KIA 18877	IIIa	<i>Pinus</i> charcoal	—	—	30,170 ⁺²⁵⁰ ₋₂₄₀	A
OxA-4601	IIIa	Bone	—	—	30,550 ± 550	A
KIA 18876	IIIa	<i>Pinus</i> charcoal	—	—	31,010 ⁺⁶⁰⁰ ₋₅₆₀	A
KIA 16039	IIIa	Ungulate tibia	Impact	15.7	31,140 ⁺²⁵⁰ ₋₂₄₀	A
KIA 18878	IIIb	<i>Pinus</i> charcoal	—	—	29,780 ⁺³³⁰ ₋₃₁₀	A
KIA 3505	IIIb	Mammoth/rhino bone	Impact	—	29,990 ⁺³⁴⁰ ₋₃₃₀	A
OxA-4980	IV	<i>Salix</i> + <i>Betula</i> charcoal	—	—	28,750 ± 750	A
KIA 32057	IV	Reindeer radius/ulna	Impact	9.5	30,040 ± 210	A
KIA 32060	IV. 6	Long-bone fragment	Tool (retoucher)	6.6	30,110 ⁺²²⁰ ₋₂₁₀	A
KIA 32058	IV. 6	Horse mandible	Impact	3.7	30,420 ± 220	A
KIA 32059	IV. 6	Rib fragment	Tool (chisel)	7.1	30,460 ⁺²⁵⁰ ₋₂₄₀	A
OxA-4600	IV	Reindeer metapodial	—	—	31,100 ± 600	A
KIA 18879	IV	Unidentified charcoal	—	—	31,160 ^{+1,530} _{-1,280}	A
KIA 16037	IV	Reindeer/chamois humerus	Impact + cut mark	14.4	32,470 ⁺²⁹⁰ ₋₂₈₀	A
KIA 16036	IV	Horse femur	Tool (retoucher)	15.5	33,090 ⁺²⁶⁰ ₋₂₅₀	A
KIA 35464	Va	Horse tibia/radius	Tool (retoucher)	9.2	31,750 ± 260	A
KIA 35463	Va	Horse rib	Cut mark	14.2	32,030 ⁺²⁸⁰ ₋₂₇₀	A
KIA 35462	Va	Reindeer vertebra	Cut mark	9.5	32,090 ⁺³⁵⁰ ₋₃₄₀	A
KIA 35460	Va	Mammoth vertebra	—	6.4	32,370 ⁺²⁸⁰ ₋₂₇₀	A
KIA 35459	Va	Horse radius	Tool (retoucher)	10.3	32,550 ⁺³⁰⁰ ₋₂₉₀	A
OxA-19783*	Va. 10	Reindeer tibia	Cut mark	3.8	31,760 ± 200	A
OxA-19859*	Va. 10	Mammoth/rhino rib	Impact	4.5	34,570 ± 260	A
OxA-19860*	Vb	<i>Pinus</i> charcoal	—	—	31,290 ± 180	A
OxA-19780*	Vb	Horse rib	Cut mark	11.4	31,380 ± 180	A
OxA-19779*	Vb	Horse tibia	Tool (retoucher)	3.6	34,720 ± 280	A
OxA-19782*	Vb	Horse hyoid	Cut mark	2.2	32,140 ± 310	A
KIA 16035	Vb**	Horse bone	Impact	17.8	33,290 ± 270	A
KIA 18880	Vb**	<i>Pinus</i> charcoal	—	—	34,190 ⁺³⁴⁰ ₋₃₃₀	A
KIA 16034	Vb**	Ungulate humerus	Impact + cut marks	18.6	35,710 ⁺³⁶⁰ ₋₃₄₀	A
OxA-19781*	Vb	lbex tibia	Impact	4.1	40,000 ± 500	A
KIA 19564	Vib	Red deer metacarpal	Impact + cut marks	16.0	35,760 ⁺⁶⁶⁰ ₋₆₁₀	MP
KIA 19562	Vib	Cave bear metapod.	Possible cut mark	17.7	36,380 ⁺³⁸⁰ ₋₃₆₀	MP
KIA 19563	VII	lbex/reindeer bone	Impact	12.8	36,350 ⁺⁵⁴⁰ ₋₅₁₀	MP
KIA 32054	VII	Cave bear rib	Possible cut mark	6.8	37,940 ⁺⁵³⁰ ₋₅₀₀	MP
KIA 32052	VIII	Reindeer tibia	Probable cut mark	2.9	39,580 ⁺⁶⁰⁰ ₋₅₆₀	MP
KIA 32053	IX	Bone	Impact	4.7	38,560 ⁺⁵³⁰ ₋₅₀₀	MP

AMS, accelerator mass spectrometry; A, Aurignacian; MP, Middle Palaeolithic.

* Previously unpublished dates.

** Originally published as archaeological horizon Va and changed to Vb on the basis of new stratigraphic observations. See ref. 8 for original publication of dates.

that figurative representations and other symbolic artefacts first appear in the later phases of the Swabian Aurignacian^{11,12}.

The Venus shows a range of entirely unique features as well as a number of characteristics present in later female figurines (Figs 1

and 3). Because carvings in mammoth ivory record many details, numerous specific observations can be made that allow comparisons with other Palaeolithic artworks. The vertical axis of the Venus runs parallel to the long axis of the mammoth tusk. The structure of the ivory shows that the two legs are oriented towards the proximal end of the tusk and the shoulders towards the distal end. The preserved portion of the figurine has a length of 59.7 mm, a width of 34.6 mm, a thickness of 31.3 mm and weighs 33.3 g.

The Venus of Hohle Fels lacks a head. Instead, an off-centre, but carefully carved, ring is located above the broad shoulders of the figurine. This ring, despite being weathered, preserves polish, suggesting that the figurine at times was suspended as a pendant. The shape of the preserved part of the figurine is asymmetrical, with the right shoulder elevated above the left side of the figurine. Beneath the shoulders, which are roughly as thick as they are wide, large breasts project forwards. The figurine has two short arms with two carefully carved hands resting on the upper part of the stomach below the breasts. Each hand has precisely carved fingers, with five clearly visible on the left hand and four on the right hand. The navel is visible and correctly placed anatomically.

The Venus has a short, squat form with a waist slightly narrower than the broad shoulders and wide hips. Multiple, deeply incised horizontal lines cover the abdomen from the area below the breasts to the pubic triangle. Several of these horizontal lines extend to the back of the figurine and are suggestive of clothing or a wrap of some kind. Microscopic images show that these incisions were created by repeatedly cutting along the same lines with sharp stone tools (Fig. 3). Such deep cuts into ivory are only possible with the application of significant force.

The legs of the Venus are short, pointed and asymmetrical, with the left leg noticeably shorter than the right leg. The buttocks and genitals are depicted in more detail. The split between the two halves of the buttocks is deep and continues without interruption to the front of the figurine, where the vulva with pronounced labia majora is visible between the open legs. There can be no doubt that the depiction of oversized breasts, accentuated buttocks and genitalia results from the deliberate exaggeration of the sexual features of the figurine.

In addition to the many carefully depicted anatomical features, the surface of the Venus preserves numerous lines and markings. The top of the Venus shows a series of U-shaped incisions on the roughly flat surface formed by the top of the breasts and the shoulders. The shoulders preserve multiple markings, with the short, deep, vertically incised lines along the back side of the figurine being the most pronounced. The breasts and arms also have multiple short, deeply incised lines that add to the three dimensionality of the sculpture. These markings are reminiscent of the various incisions found on other examples of ivory figurines from the Swabian Aurignacian, but, as is true of the others, this depiction is unique^{2,15}. The Venus shows no signs of having been covered with pigments.

Many of the features, including the extreme emphasis on sexual attributes and lack of emphasis on the head, face and arms and legs, call to mind aspects of the Venus figurines well known from the European Gravettian, which typically date from between 22 and 27 kyr BP^{16,17}. The careful depiction of the hands is reminiscent of those of Venuses such as the archetypal Venus of Willendorf—which was discovered 100 years earlier, in the summer of 1908—and a Venus from Kostenki I^{17,18}. Despite the far greater age of the Venus of Hohle Fels, many of its attributes can be found in various forms in the rich tradition of Palaeolithic female representations. Although the Venus has numerous unique features, the presence of a ring for suspension in place of the head, and the upright, oversized breasts and massive shoulders relative to the flat stomach and small, pointed legs are particularly noteworthy.

The new figurine from Hohle Fels radically changes our view of the origins of Palaeolithic art. Before this discovery, animals and therianthrope imagery dominated the two dozen figurines from the Swabian Aurignacian. Female imagery was entirely unknown^{2,15}.

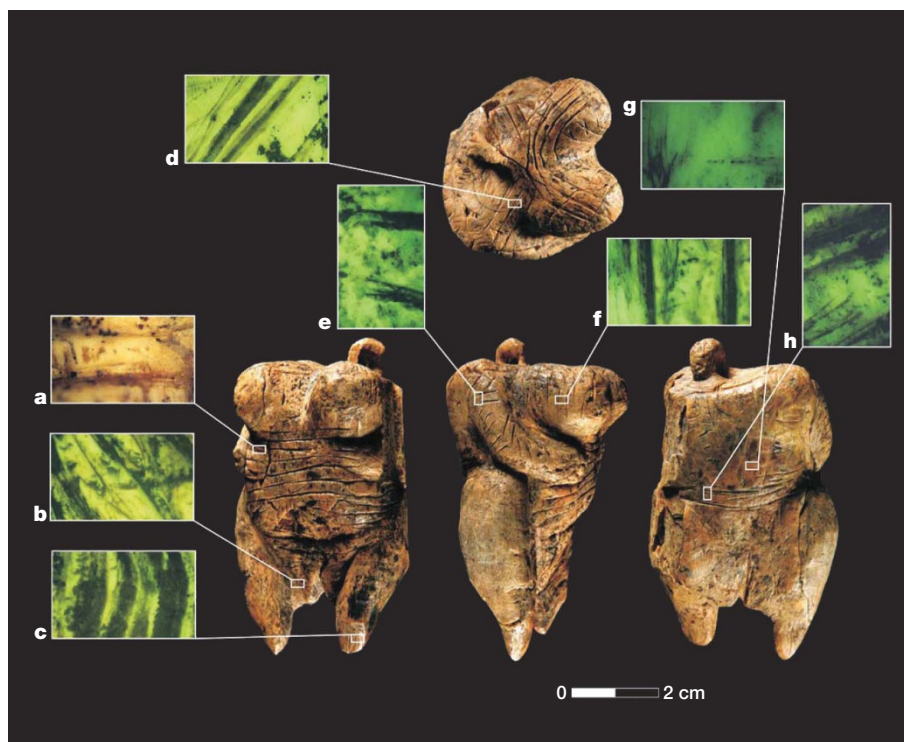


Figure 3 | Views of the Venus of Hohle Fels and photomicrographs documenting the methods of production. Multiple examples of cutting and incising (a–f, h) and surface polish (g). The photomicrographs were made with a Leica DMRX-MPV SP microscope photometer. a, Incident light,

obliquely crossed polars, λ plate; b–h, Incident-light fluorescence mode (Ultraviolet- and violet-light excitation). In a–d, f and g, width of field of view is 2.7 mm; in e and h, width of field of view is 1.6 mm. Photographs by H. Jensen, photomicrographs by B. Ligouis; copyright, University of Tübingen.

With this discovery, the widespread notion that three-dimensional female depictions developed in the Gravettian can be rejected¹⁷. Interpretations suggesting that strong, aggressive animals or shamanic depictions dominate the Aurignacian art of Swabia, or even of Europe as a whole, must be reconsidered^{15,19}. Although there is a long history of debate over the meaning of Palaeolithic Venuses, their clearly depicted sexual attributes suggest that they are a direct or indirect expression of fertility²⁰.

The stratigraphic position of the Venus of Hohle Fels indicates that it is the oldest of all of the figurines recovered from the Swabian caves and perhaps the earliest example of figurative art worldwide. The most noteworthy figurative representations of roughly comparable age outside Swabia are limited to the schematic, monochrome, red paintings on rock fragments from Fumane Cave in northern Italy^{2,21}, the standing figurine from Stratzing in the Wachau of Lower Austria^{2,22} and the impressive paintings from Grotte Chauvet in the Ardèche in southern France^{2,23}. Female imagery is rare in the early Upper Palaeolithic and includes a schematic example of parietal art from Chauvet, the figurine from Stratzing and engraved vulvas from several rock shelters in southwestern France^{2,17,20,24}. The oldest evidence for figurative depictions outside Europe are seven paintings on mobile stone blocks from Apollo 11 Cave in southwestern Namibia, which date from between 25.5 and 27.5 kyr BP²⁵.

The Venus of Hohle Fels provides an entirely new view of the art from the early Upper Palaeolithic and reinforces the arguments that have been made for innovative cultural manifestations accompanying the rise of the Aurignacian in the upper Danube region^{7,26}. Although the radiocarbon dates are ambiguous, as they often are in this period, the stratigraphic position of the figurine at the base of the thick Aurignacian deposits, which lack micro- and macroscopic signs of reworking, corroborate the abundant evidence for ivory working from the lower Aurignacian of Geißenklösterle and Hohle Fels. The archaeological context of the Venus of Hohle Fels indicates that innovations including the production of ivory figurines were present from the start of the Swabian Upper Palaeolithic²⁶. Comparable

depictions are entirely unknown at this early date, suggesting a local origin for this kind of female iconography.

No diagnostic human remains have been found in these strata^{27,28}. Although I, as well as many other researchers, assume that the Aurignacian artworks were made by early modern humans shortly after their migration into Europe, this assumption can neither be confirmed nor refuted on the basis of the available skeletal data from the Swabian caves.

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