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An Initial Upper Palaeolithic attribution is not empirically supported at Shiyu, northern China

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 Check for updatesLeonardo Carmignani^{1,5}, Igor Djakovic^{1,5}, Peiqi Zhang²,
Nicolas Teyssandier³, Nicolas Zwyns^{2,4} & Marie Soressi¹✉ARISING FROM: S.-X. Yang et al. *Nature Ecology & Evolution* <https://doi.org/10.1038/s41559-023-02294-4> (2024)

Initial Upper Palaeolithic (IUP) assemblages are increasingly thought to be linked to the first widespread dispersal of *Homo sapiens* across Eurasia between 55 and 40 thousand years ago (kya cal BP). As a result, today the identification of IUP assemblages plays a key role in archaeological research focused on this key period, which is also characterized by the eventual disappearance of Neandertals and Denisovans from the fossil record. In a recent paper, Yang et al.¹ claim to have identified the oldest and easternmost IUP at Shiyu, northern China, dated to ~45 kya cal BP and with this to transform knowledge of the routes and timing of the migration of *H. sapiens* in Asia. We argue, however, that this attribution is based on a biased sample of artefacts, the misuse of technological definitions and the misreading of stone artefacts central to their argument. Furthermore, it relies on the questionable assumption that the studied material (750 lithic artefacts from an original number of ~15,000) is a representative sample of a single assemblage. Although we recognize the value of technological re-evaluations of previously excavated assemblages, we believe that an IUP attribution is not empirically supported. In fact, it detracts attention from more pressing issues concerning the character of this technology, the association between lithics and personal ornaments and the overall integrity of the assemblage. Below, we highlight the key problems in the conclusions reached by Yang et al.¹

Sampling of material

Yang et al.¹ attribute the Shiyu assemblage as IUP technology based on the presence of typical Levallois and volumetric blade products. The assemblage in question is a set of 750 lithic artefacts selected from a larger pool of over 15,000 artefacts, representing approximately 5% of the original assemblage. These 15,000 artefacts were collected in 1963 according to unknown selection criteria in a deposit known as Layer 2. It remains unclear whether the sample is representative of one, or perhaps several, distinct assemblages, as Layer 2 was ~1 m thick. Hence, neither

the association between Levallois and volumetric blade products nor the association of these with personal ornaments are guaranteed.

Blade production

Central and East Asian IUP assemblages are characterized by bidirectional blade production, with ~20–40% of blanks and tools displaying bidirectional removals from two opposed platforms in excavated assemblages^{2,3}. Of the 750 total artefacts sampled, nine blade or blade fragments were identified. If we include technical pieces (crested blades and core tablets), the entire blade component consists of 18 pieces (0.12% of the total assemblage and 2.4% of the reported sample). Assuming that this sample is representative of the original assemblage, this proportion is notably low compared with what has been documented in other IUP assemblages in Central Asia, particularly in nearby Mongolia^{2–5}. Also, it falls below what has been observed in some Middle Palaeolithic assemblages directly associated with Neandertal remains⁶. In Supplementary Fig. 27 of ref. 1, where a metrical distribution is displayed, flakes and bipolar flakes partially overlap with the length-to-width ratio of blades. Among the two blade cores reported at Shiyu, the only illustrated example does not show the unidirectional or bidirectional exploitation characteristic of blade production (Fig. 1a(3)). Overall, the nine elongated elements classified as blades could have resulted from the simple flake or bipolar production that constitutes ~83% of the sampled products. Therefore, in our view, the published evidence from Shiyu does not demonstrate an intentional blade production, which is a fundamental trait of IUP assemblages across their distribution.

Point production

Only 12 points were recognized and no cores related to their production were identified. This constitutes 1.6% of the reported sample and appears to be on par with what is known for the IUP in China⁷. However,

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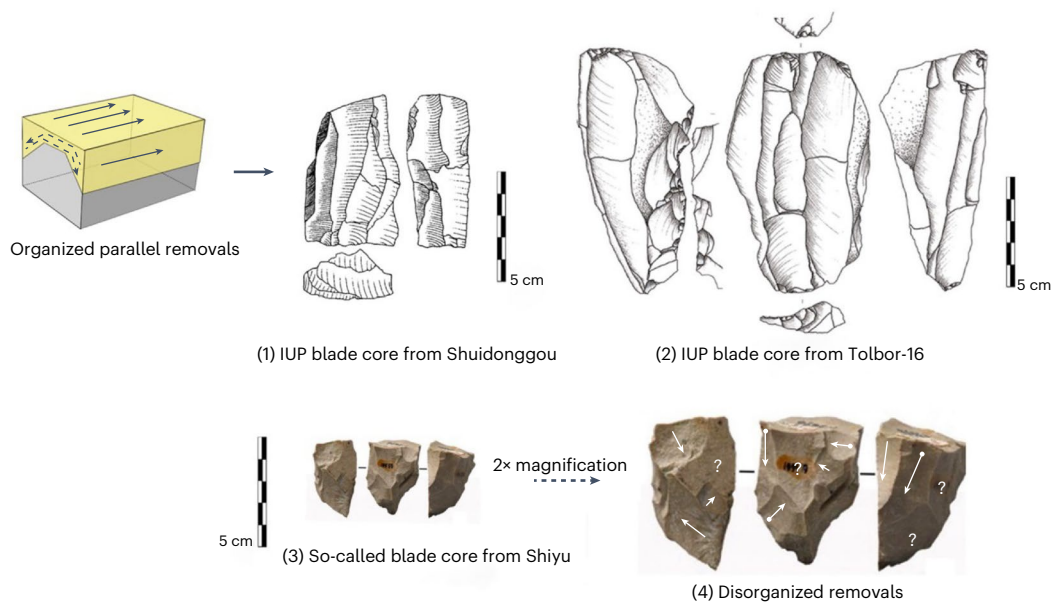
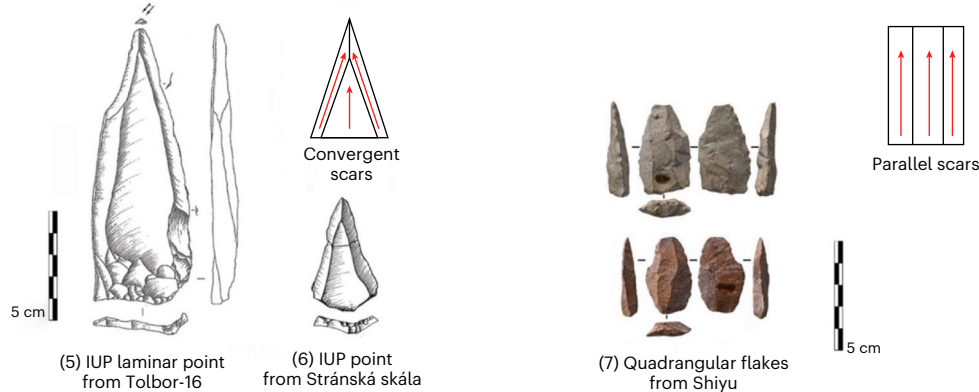
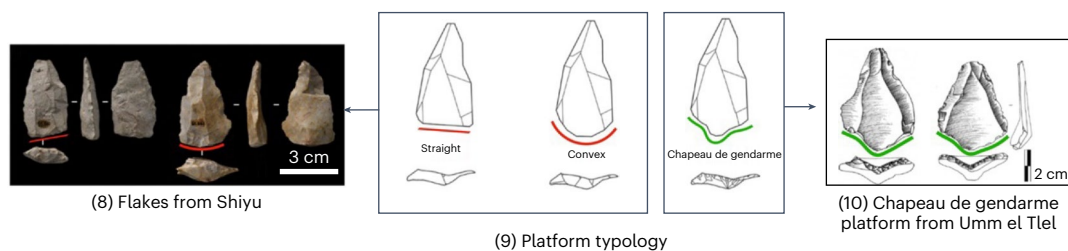
a Blade cores comparison**b** Point comparison**c** Platform comparison

Fig. 1 | Comparison of blade cores, points and platforms in Shiyu and IUP assemblages. **a–c,** Blade core (**a**), point (**b**) and platform (**c**) comparisons between Shiyu and IUP and other assemblages. Panel **a** shows two IUP blade cores with evidence of organized parallel removals (from Shuidonggou (1) and Tolbor-16 (2)). Blade core from Shiyu illustrated by Yang et al.¹ is shown below (3). The magnified image to the right (4) highlights the disorganization of the removals seen on (3). Panel **b** shows two IUP points (left) with evidence of convergent scars (from Tolbor-16 (5) and Stránská skála (6)). Quadrangular flakes from Shiyu (7) exhibiting parallel scars are shown to the right. Panel **c** shows images of the platforms of flakes from Shiyu (8; left), with drawings of references for straight, convex and chapeau de gendarme striking platform on Levallois

blanks (9; middle) to show that one has a straight platform and the other has a convex platform, in contrast to the chapeau de gendarme shape seen on Levallois points from Umm el Tlel (10; right). All of the images are to the same scale except when indicated otherwise. Panel **a**(1) adapted with permission from ref. 13, Univ. Chicago Press; panel **a**(2) reproduced from ref. 3, Springer; panels **a**(3) and (4) reproduced with modifications from ref. 1, Springer Nature Limited; panel **b**(5) adapted from ref. 3, Springer; panel **b**(6) reproduced with permission from ref. 14, Elsevier; panels **b**(7) and **c**(8) reproduced from ref. 1, Springer Nature Limited; panel **c**(9) adapted with permission from ref. 15, Elsevier; panel **c**(10) adapted with permission from ref. 16, Stéphanie Bonilauri.

based on the figures, some blanks identified as points are not points. The Levallois points in Supplementary Fig. 25b,d in ref. 1 show quadrangular (d) and sub-quadrangular (b) morphologies instead of the typical triangular outline. Unlike IUP points that are usually predetermined during debitage, scars on their dorsal surface are parallel (Fig. 1b(6) and not convergent (Fig. 1b(4),(5)). The triangular shape of some Levallois points at Shiyu has been attained through retouching (Fig. 4(2),(3) in ref. 1). Taking this into account, points should not be considered as a defining character of the Shiyu assemblage.

Concerning the presence of Levallois production

The characterization of Levallois production hinges on six explicit criteria⁸. Several non-Levallois production methods can yield Levallois-like artefacts⁹. At Shiyu, the presence of Levallois products cannot be confirmed because: (1) no cores related to this system were found and the two flakes illustrated in Supplementary Fig. 25e,f in ref. 1 could equally have been produced by a variety of different free-hand percussion methods (the same applies to the few points classified by the authors as Levallois points); and (2) Yang et al.¹ specify that: “All of the Levallois points have retouched platforms, ‘en chapeau de gendarme,’ the retouches covering the complete platforms”; however, on the illustrated examples (Fig. 5(1),(2),(4) in ref. 1), the delineation is straight or convex and not “en chapeau de gendarme” (Fig. 1c).

Retouched tools

Burin cores co-existing with bidirectional blade technology are a characteristic element of the IUP of Mongolia and Siberia³. At Shiyu, there are no burin cores and there is no clear evidence of systematic blade production. Yang et al.¹ report 412 retouched pieces (55% of the entire assemblage), an unusually high proportion that is likely the result of a sampling strategy (750 studied pieces from ~15,000 in the total assemblage). The majority are tool types such as scrapers, notches and denticulates (231 pieces; 65% of determinable tool types) that are known in various non-IUP contexts¹⁰. The single end scraper depicted (from a total of six) is ambiguous as the retouch is on the longest edge of the blank (rather than the shortest).

Conclusion

Between ~55 and 40 kya, features such as the use of stone-tipped weaponry, bone tools, personal ornaments and colouring minerals are not specific to IUP industries^{11,12}. Accordingly, IUP assemblages in Asia are defined on a strict technological foundation (that is, the production of points and blades from sub-volumetric, non-Levallois reduction system(s) and burin cores). We believe that such a definition provides an objective archaeological meaning to the concept, which is essential during a critical period for the expansion of *H. sapiens* across Eurasia¹⁰. We therefore argue that this attribution must remain based on lithic technological criteria and applied with discretion. Although Yang et al.¹ have added valuable new data concerning cultural diversification in northern China, the technological features necessary to support an IUP attribution are absent. In the case of Shiyu, such an attribution enhances neither our understanding of this assemblage nor our understanding of the IUP. As it stands, an IUP attribution simply detracts from more pressing issues concerning the integrity of the assemblage, the character of the technology and the potential association with personal ornaments.

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Author contributions

L.C. and I.D. wrote the original draft, with editorial and content support from M.S. N.Z. and P.Z. provided extra references. N.Z., P.Z. and N.T. contributed to the writing of the manuscript.

Competing interests

The authors declare no competing interests.

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