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1 An Initial Upper Palaeolithic attribution is not empirically supported at 2 Shiyu, northern China

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18 Initial Upper Palaeolithic (IUP) assemblages are increasingly thought to be linked to the first
19 widespread dispersal of *Homo sapiens* across Eurasia between 55 and 40 thousand years ago (kya cal
20 BP). As a result, today the identification of Initial Upper Palaeolithic assemblages plays a key role in
21 archaeological research focused on this key period – which is also characterized by the eventual
22 disappearance of Neandertals and Denisovans from the fossil record. In a recent paper, Yang *et al.*¹
23 claim to have identified the oldest and easternmost IUP at Shiyu, northern China, dated to ~45 kya cal
24 BP and with this to transform knowledge of the routes and timing of the migration of *Homo sapiens* in
25 Asia. We argue, however that this attribution is based on a biased sample of artefacts, the misuse of
26 technological definitions, and the misreading of stone artefacts central to their argument. Furthermore,
27 it relies on the questionable assumption that the studied material (750 lithic artefacts from an original
28 ~15,000) is a representative sample of a single assemblage. While we recognize the value of
29 technological re-evaluations of previously excavated assemblages, we believe that an ‘Initial Upper
30 Palaeolithic’ attribution is not empirically supported. In fact, it detracts attention from more pressing
31 issues concerning the character of this technology, the association between lithics and personal
32 ornaments, and the overall integrity of the assemblage. Below, we highlight the key problems in the
33 conclusions reached by Yang *et al.*¹

34

35 **Sampling of material:** Yang *et al.* attribute the Shiyu assemblage as IUP technology based on the
36 presence of typical Levallois and volumetric blade products. The assemblage in question is a set of 750
37 lithic artifacts selected from a larger pool of over 15,000 artefacts, representing approximately 5% of

38 the original assemblage. The latter were collected in 1963 according to unknown selection criteria in a
39 deposit known as ‘Layer 2’. It remains unclear whether the sample is representative of one, or perhaps
40 several, distinct assemblages as Layer 2 was circa 1 meter thick. Hence, the association of Levallois
41 and volumetric blade nor the association of these with personal ornaments are guaranteed.

42

43 **Blade production:** Central and East Asian IUP assemblages are characterized by bidirectional blade
44 production with circa 20-40% of blanks and tools displaying bidirectional removals from two opposed
45 platforms in excavated assemblages^{4,5}. Of the 750 total artefacts sampled: nine blade or blade fragments
46 are identified. If we include technical pieces (crested blades and core tablets), the entire blade
47 component consists of 18 pieces (0.12% of total assemblage, 2.4% of reported sample). Assuming this
48 sample is representative of the original assemblage, this proportion is notably low compared to what is
49 documented in other IUP assemblages in Central Asia, particularly in nearby Mongolia²⁻⁵. Also, it falls
50 below what is observed in some Middle Palaeolithic assemblages directly associated with Neanderthal
51 remains⁶. In Supplementary Fig. 27, where a metrical distribution is displayed, flakes and bipolar flakes
52 partially overlap with the length-width ratio of blades. Among the two blade cores reported at Shiyu,
53 the only illustrated example does not show unidirectional or bidirectional exploitation characteristic of
54 blade production (see our Fig. 1A). Overall, the nine elongated elements classified as blades could
55 result from the simple flake or bipolar production that constitute ~83% of the sampled products.
56 Therefore, in our view, the published evidence from Shiyu does not demonstrate an intentional blade
57 production – which is a fundamental trait of IUP assemblages across their distribution.

58

59 **Point production:** Only 12 points were recognized – and no cores related to their production were
60 identified. This constitutes 1.6% of the reported sample and appears to be in par with what is known for
61 the IUP in China⁷. However, based on the figures, some blanks identified as points are not points. The
62 ‘Levallois points’ in Supplementary Fig. 25 (b and d) show quadrangular (d) and sub-quadrangular (b)
63 morphologies instead of the typical triangular outline. Unlike IUP points that are usually predetermined
64 during debitage, scars on their dorsal surface are parallel and not convergent (see our Fig. 1B n. 4,5).
65 The triangular shape of some ‘Levallois points’ at Shiyu has been given through retouch (Fig. 4 n. 2,
66 3). Taking this into account, points should not be considered as a defining character of the Shiyu
67 assemblage.

68

69 *Figure 1. Blade core (A) and point (B) comparison between Shiyu and IUP assemblages (all the same scale except when*
70 *indicated otherwise) (ref. n.1⁸, n.2 and 4⁵ n.5⁹); Platform comparison (ref. n. 7¹², n.8¹, n.9¹³)*

71

72 **Concerning the presence of Levallois production:** The characterization of Levallois hinges upon six
73 explicit criteria¹⁰. Several non-Levallois production methods can yield Levallois-like artifacts¹¹. At
74 Shiyu, the presence of Levallois cannot be confirmed because:

- 75 - No cores related to this system were found and the two flakes illustrated in Fig 25 (e-f) could
76 equally have been produced by a variety of different free-hand percussion methods. The same
77 applies to the few points classified by the authors as ‘Levallois points’.
- 78 - Yang *et al*¹ specify: ‘*All of the Levallois points have retouched platforms, ‘en chapeau de*
79 *gendarme, the retouches covering the complete platforms*’. However, on the illustrated
80 examples (Fig. 5: 1, 2, 4), the delineation is straight or convex and not ‘en chapeau de
81 gendarme’ (see our Fig. 1C).

82

83 **Retouched tools:** Burin-cores co-existing with bidirectional blade technology are a characteristic
84 element of the IUP of Mongolia and Siberia¹⁴. At Shiyu, there are no burin-cores and no clear evidence
85 of systematic blade production. Yang *et al.*¹ report 412 retouched pieces (55% of the entire assemblage),
86 an unusually high proportion which is likely the result of a sampling strategy (750 studied pieces of
87 ~15000 in total assemblage). The majority are tool types such as scrapers, notches, and denticulates
88 (231 pieces, 65% of determinable tool types) known in various non-IUP contexts¹⁵. The single end-
89 scraper depicted (no total=6) is ambiguous as the retouch is on the longest edge of the blank (rather
90 than the shortest).

91

92 **Conclusion**

93

94 Between ~55 and 40 kya, features such as the use of stone-tipped weaponry, bone tools, personal
95 ornaments, and coloring minerals are not specific to IUP industries^{16,17}. Accordingly, Initial Upper
96 Palaeolithic assemblages in Asia are defined on a strict technological foundation – i.e., production of
97 points and blades from a sub-volumetric, non-Levallois reduction system(s), burin-cores. We believe
98 that such definition provides an objective archaeological meaning to the concept, which is essential
99 during a critical period for the expansion of *Homo sapiens* across Eurasia¹⁵. We, therefore, argue that
100 this attribution must remain based on lithic technological criteria and applied with discretion. Although
101 Yang *et al.* have added valuable new data concerning cultural diversification in northern China, the
102 technological features necessary to support an IUP attribution are absent. In the case of Shiyu, such an
103 attribution neither enhances our understanding of this assemblage nor of the Initial Upper Palaeolithic.
104 As it stands, an ‘Initial Upper Palaeolithic’ attribution simply detracts from more pressing issues
105 concerning the integrity of the assemblage, the character of the technology, and the potential association
106 with personal ornaments.

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112 **Author contribution:**

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

115

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118

119 **Ethics declarations:**

120 The authors declare no competing interests.

121

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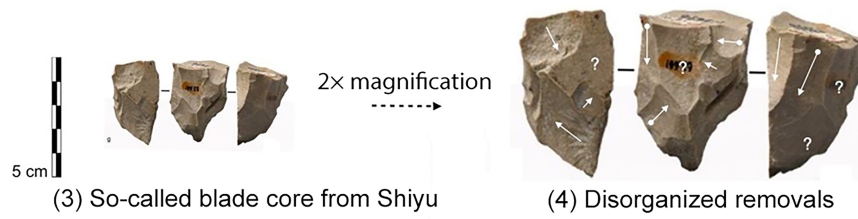
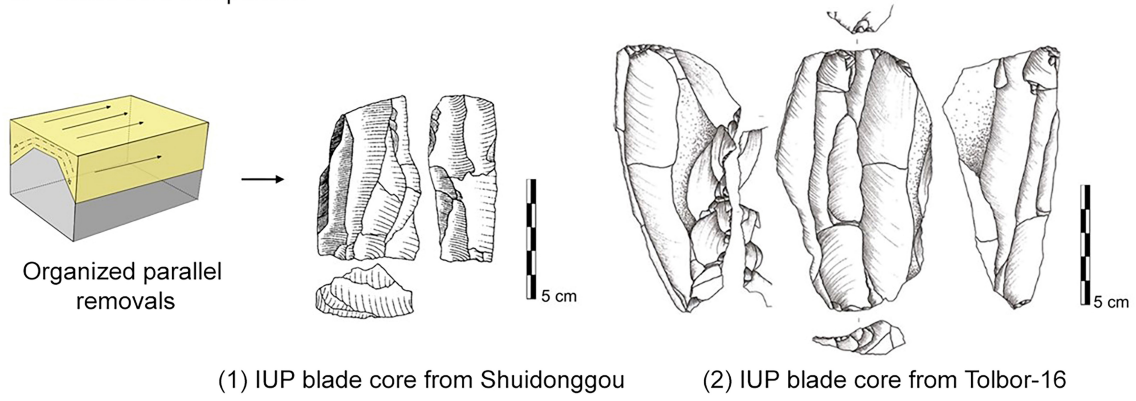
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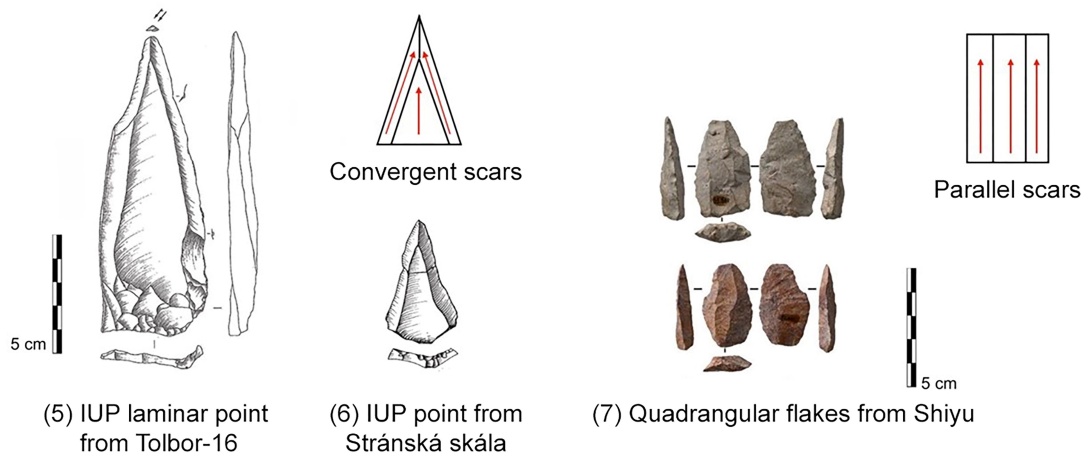
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a Blade core comparison



b Point comparison



c Platform comparison

