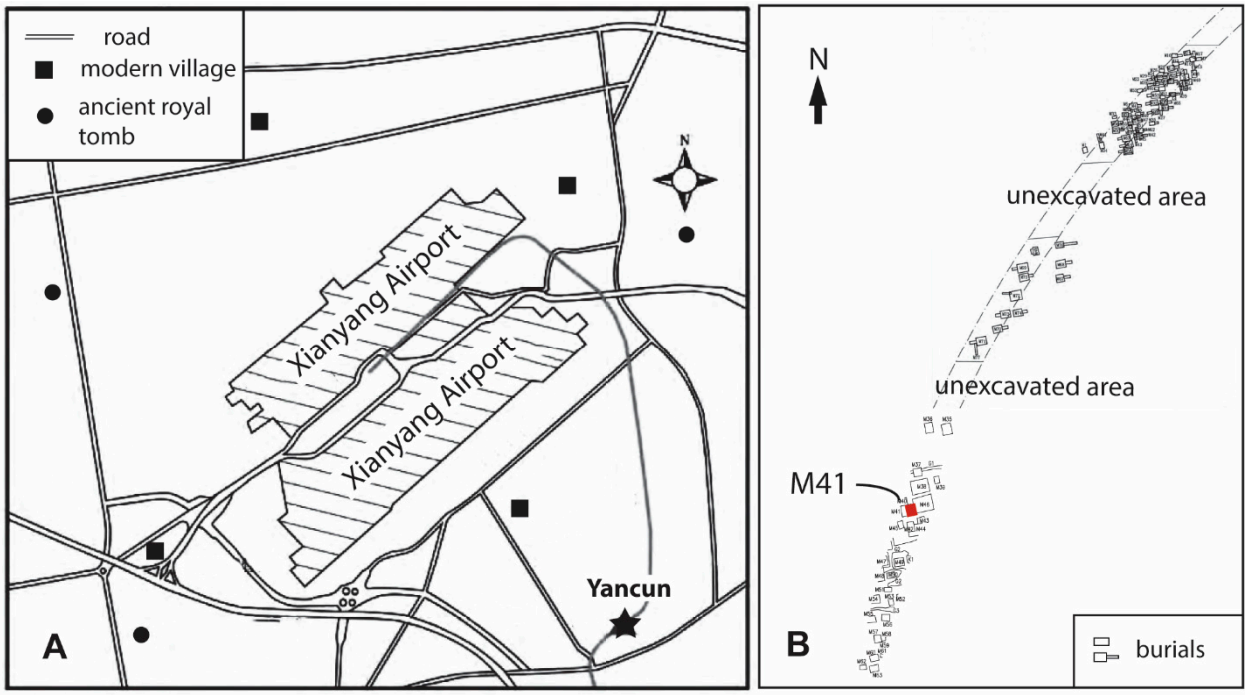

Figure S1. Location of Yancun cemetery site. **A**. The Yancun site location in Xianyang. **B**. Location of Tomb M41 in the Yancun cemetery.

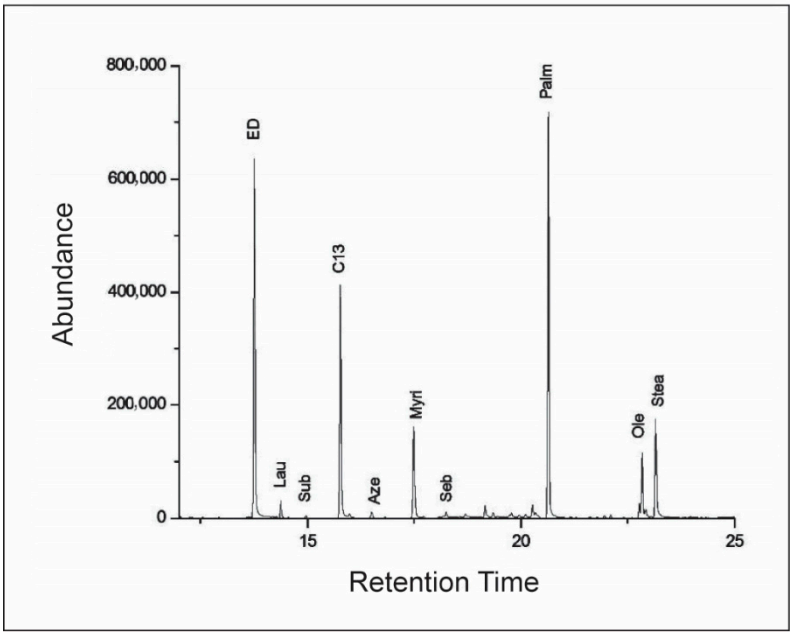

Figure S2. Selected ion chromatogram of fatty acids from liquid residues.

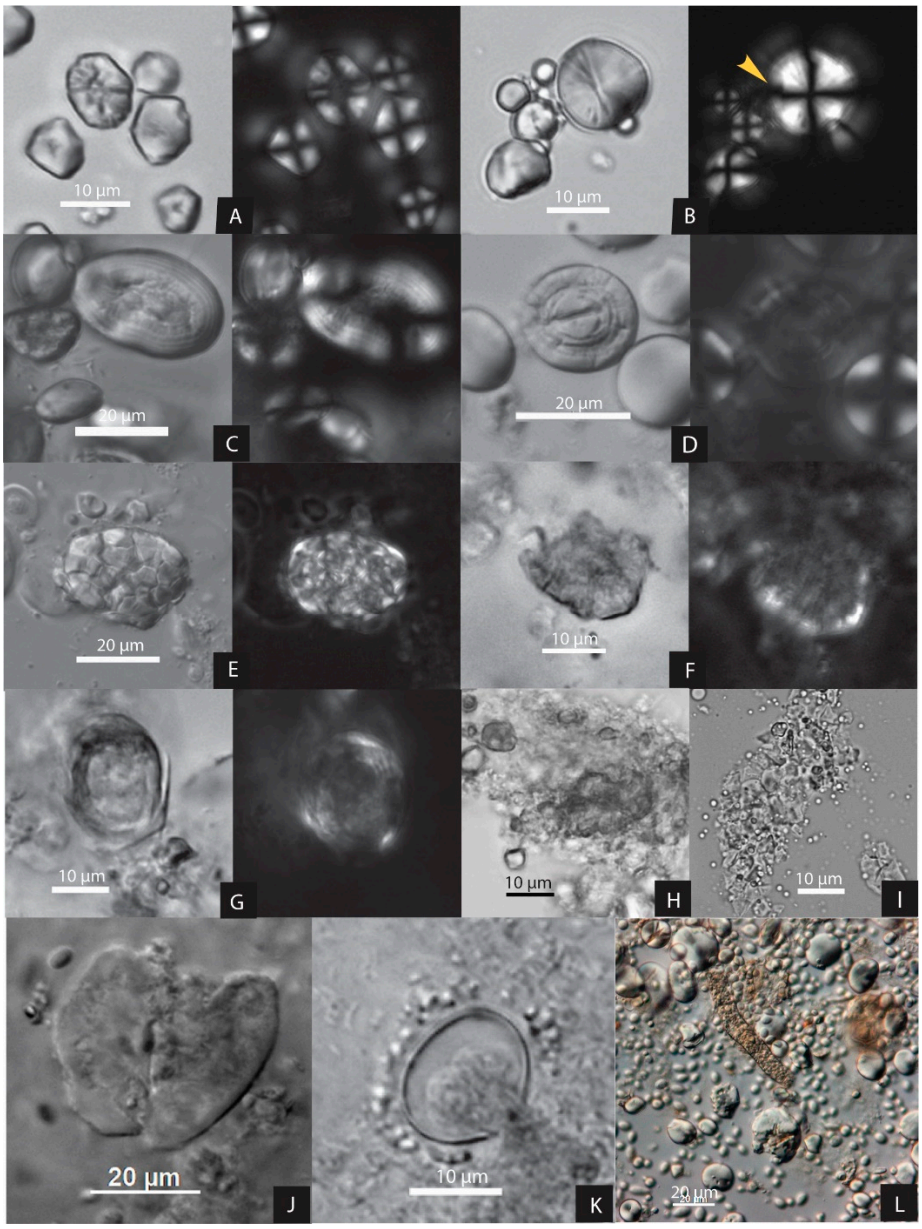

Figure S3. Starch granules showing damages induced by fermentation in modern reference. (**A**) Broomcorn millet, pitting and deep fissures; (**B**) Job's tears, the arrow pointing to the zig-zag arm on the cross; (**C**) pea, depression in the center; (**D**) wheat, pitting and deep channels in concentric circles; (**E**) rice, mildly damaged; (F) rice, more damaged with disappeared extinction cross; (**G**) mildly gelatinized wheat, central depression with birefringence on the peripheries; (**H**) rice, gelatinized mass in fermented beverage; (**I**) rice, gelatinized mass in boiled porridge; (J) gelatinized starch in fermented millet beer, Shimao; (**K**) gelatinized barley starch in fermentation experiment; (**L**) wheat starch granules (large and medium round-shaped) with numerous yeasts (small oval cells) in millet beer, fermented for 12 days (all fermented except (B) Job's tears).

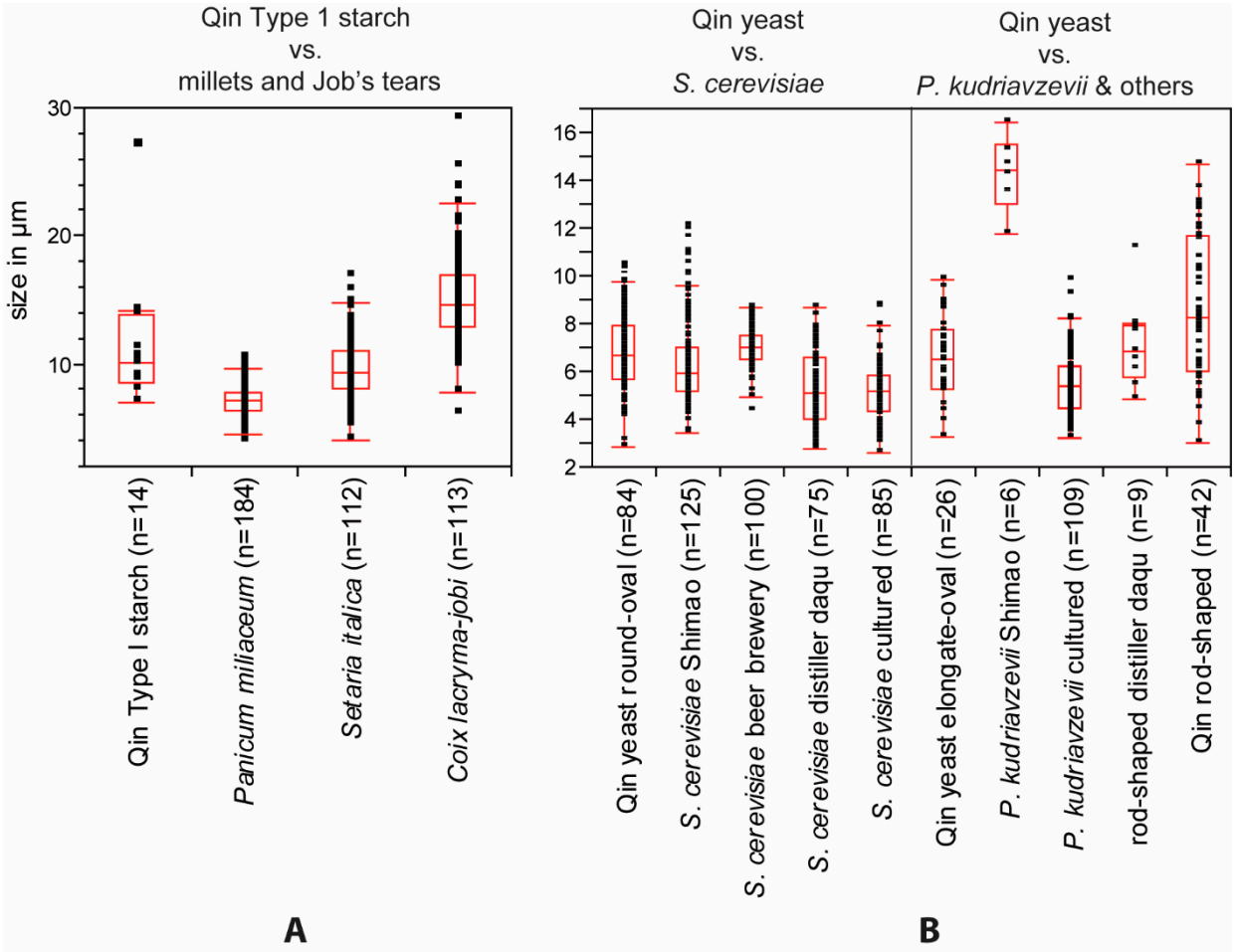

Figure S4. Comparison of Qin Type I starch and yeasts with modern references. (**A**) Starch sizes; (**B**) yeast sizes.

Table S1. Bronze vessels containing liquid unearthed in North China (ca. 1100-300 BC; *n*=13).

Site name	Location	Vessel with liquid content	Dates	Analytical method	Results	References
Liujiazhuang	Anyang, Henan	M1:11 *you* M1046:10 *you* M1046:2 *he* (analyzed)	Yinxu Phase IV 1100-1046 BC	GC-MS; HPLC; FT-IR, stable isotope	Millet and herbs	[1–3]
Dasikong	Anyang, Henan	M303:59 *lei*	late Yinxu Phase IV 1100-1046 BC		Not analyzed	[4]
Qianzhangda	Tengxian, Shandong	M11:99 *lei* M11:111 or 112 *you*	late Shang-early W. Zhou; early W. Zhou; ca. 1000 BC		Not analyzed	[5]
Changzikou	Luyi, Henan	M1:224 *You*(analyzed) M1:218 *hu*	Early W. Zhou c. 1000 BC	GC-MS; HPLC; FT-IR, stable isotope	Rice and herbs	[3,6]
Tianhu	Luoshan, Henan	M8:6 *you* (analyzed) M28:1 *you* M28:2 *you*	Yinxu Phase II 3265±145 cal BP	Wet chemical methods	Ethyl formatted content	[7,8]
Beibai'e	Yuanqu, Shanxi	M1:45 *hu* (analyzed)	Transition from W Zhou to E Zhou, 8th century BC	1. GC-MS and HPLC-MS/MS	1. Fruit wine;	[9]

				2. microfossil, HPLC–MS and FTIR	2. Cereal-based beer (millet and Triticeae)	[10]
Yancun	Xianyang, Shaanxi	M41, *hu*	Late warring States 300 BC	Fatty acids and amino acids tests	Similar to *huangjiu* Yellow beer	[11]

Table S2. Counts and sizes of starch grains recovered from the bronze bottle.

Starch type	**I**	**II**	**III**	**IV**				
	Panicoideae	Pulses	Triticeae	Rice compound	UNID	Starch total	Rice granule measured	Gelatinized starch mass
N	19	10	242	28	23	322	51	5
%	5.9%	3.1%	75.2%	8.7%	7.1%	100%		
Size Min (μm)	7.06	13.19	4.36				2.54	
Size Max (μm)	27.04	24.85	33.33				6.56	
Size Mean (μm)	11.52	16.45	10.44				3.98	

Table S3. Counts and sizes (in μm) of fungi and bacteria recovered from the bronze bottle.

	Yeast oval/ round	**Yeast elongate**	**Yeast rod-shape**	**Bacteria cf. *Bacillus***	**Hypha**	**Mycelium**	**Germinating fungal spore**	***Aspergillus* Conidial cluster**	***Monascus* Cleisto-thecium**	**Total**
N	616	31	42	5	20	9	3	472	2	1200
%	51.3%	2.6%	3.5%	0.4%	1.7%	0.8%	0.3%	39.3%	0.2%	100.0%
Size Min	2.9	3.32	3.06	4.59						
Size Max	10.83	9.88	14.71	8.79						
Size Mean	6.76	6.66	9.47	6.44						

Table S4. Measurements of Yeasts and conidia from Qin alcohol and modern reference data.

	N	**Min (μm)**	**Max (μm)**	**Mean (μm)**	**Data source**
S. cerevisiae					
Qin yeast round-oval	84	2.9	10.83	6.76	Qin liquid (this study)
S. cerevisiae Shimao millet beer	125	3.47	12.16	6.43	Shimao, Shaanxi
S. cerevisiae Jing-A Brewery	100	4.39	8.71	7.00	Jing-A Brewer, Beijing
cf. *S. cerevisiae* Yangshao Distiller *daqu*	75	2.81	8.71	5.32	Yangshao Distiller, Mianchi, Henan
S. cerevisiae cultured	85	2.64	8.83	5.20	Stanford database
P. kudriavzevii					
Qin yeast elongate-oval	67	3.06	14.71	7.53	Qin liquid (this study)
P. kudriavzevii Shimao millet beer	6	11.78	16.47	14.33	Shimao, Shaanxi
P. kudriavzevii cultured	109	3.25	9.81	5.47	Yangshao Distiller, Mianchi, Henan
Unidentified elongate yeast, Yangshao Distiller *daqu*	9	4.91	11.21	7.21	Yangshao Distiller, Mianchi, Henan
Fungal conidia					
Qin small dark conidia in conidia cluster	52	0.96	2.79	1.77	Qin liquid (this study)
Aspergillus niger	54	1.3	3.47	2.23	Yangshao Distiller, Mianchi, Henan
Qin large conidia in gemination	2	6.14	6.74	6.44	Qin liquid (this study)
Aspergillus oryzae	177	2.87	6.92	4.36	Yangshao Distiller, Mianchi, Henan

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