Cannabis in Asia: its center of origin and early cultivation, based on a synthesis of subfossil pollen and archaeobotanical studies

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Online Resource

This file contains three tables:

Table S1: Part A: Pollen (or macroevidence) interpreted as *Cannabis, Humulus,* or indeterminant *C/H* from the Miocene, Pliocene, or Pleistocene
Table S1: Part B: Pollen (or macroevidence) interpreted as *Cannabis, Humulus,* or indeterminant *C/H* during the Holocene
Table S2: Studies excluded from analysis

Table S1: Pollen interpreted as *Cannabis* from the Miocene, Pliocene, or Pleistocene; and interpreted as *Cannabis, Humulus,* or indeterminant *C/H* during the Holocene (millions of years ago, mya; thousands of years ago, kya)

Study #	Citation of study that includes *C-H* pollen (annotated as *Cannabis, Humulus, Cannabis/Humulus, Humulus/Cannabis,* or *Cannabaceae*). Other technical notes and comments appear in red-colored font.	study location lat., long.	identified in publication as C, H, C/H, or H/C	algorithm identification, with notes regarding AP/NAP, *ASP* (*Alnus,Salix, Populus*) and *PAC* (*Poaceae,Artemisia,Chenopodiacea*) pollen, and dates of relevant strata

Part A: The following studies date to the Miocene (23.03-5.3 mya), Pliocene (5.3-2.58 mya), or Pleistocene (2.58 mya-11.7 thousand years ago, kya). They are listed in chronological order from oldest (millions of years ago, mya) to youngest (thousands of years ago, kya)

1.	Jiang HC, Ding ZL. 2008. A 20 Ma pollen record of East-Asian summer monsoon evolution from Guyuan, Ningxia, China. *Palaeogeography, Palaeoclimatology, Palaeoecology* 265: 30–38.	**China**, Ningzia, Guyuan, +36.3, +106.1	H	core begins 20.13 mya. peaks of "H" w/NAP 90%+*PAC* 19.6 mya, 18.6, 17.3, then short curves 16.5-14.5, 14.0-11.6, 11.0-present
2.	Li XL, Hao QZ, Wei MJ, Andreev AA, Wang JP, Tian YY, Li XL, Cai MT, Hu JM, Shi W. 2017. Phased uplift of the northeastern Tibetan Plateau inferred from a pollen record from Yinchuan Basin, northwestern China. *Scientific Reports* 7: 18023.	**China,** Ningzia, near Shízuĭshān, PL02 core, 1103 m +38.920 +106.600	H	core begins 2.6 mya; H throughout core to present, w/NAP 70-90%+*PAC*
3.	Li XL, Pei SW, Jia ZX, Guan Y, Niu DW, Ao H. 2015. Paleoenvironmental conditions at Madigou (MDG), a newly discovered Early Paleolithic site in the Nihewan Basin, North China. *Quaternary International* 400: 100-110.	**China**, Hebei, Nihewan Basin, Feiliang site, +40.219 +114.669	H	core begins 1.2 mya; H throughout core, zones 1-2 w/AP 14%+*PAC* (*Art.* predominant); zone 3 *ca.* 1.0 mya with more AP 12.6%—call it all *C*
4.	Bolikhovskaya NS, Derevyanko AP, Shun'kov MV. 2006. The fossil palynoflora, geological age, and climatostratigraphy of the earliest deposits of the Karama site (Early Paleolithic, Altai Mountains). *Paleontological Journal* 40: S558-S566.	**Russia**, Altai, Karama site +51.466 +84.565	C, H	core begins 787 kya; C: 787 to 610 kya w/*PAC,* call it *C*; H: begins 712 w/*Alnus*. call it *H*

5.	Cai MT, Wei MJ, Xu DN, Miao YF, Wu FL, Pan BL. 2013. Vegetation and climate changes during three interglacial periods represented in the Luochuan loess-paleosol section, on the Chinese Loess Plateau. *Quaternary International* 296: 131-140.	**China,** Shaanxi, Louchuan, 1060 m +35.700 +109.416	H	core begins 342 kya BP "H" w/AP 0-22%+*PAC* 342-318 (OIS9), 238-227 (OIS7), 129-96 (OIS5)
6.	Wang L, Xin W, Cheng J. 2014. Sporepollen assemblages and climate changes since the Late Quaternary at Qingtu Lake in northwestern margin of Tengger Desert (腾格里沙漠西北缘青土湖晚第四纪 孢粉组合特征与环境变迁). *Journal of Palaeogeography* 16(2): 239-248. rare trees include *Picea, Pinus, Betula*	**China,** Gansu, Minqin, Qingtu Lake +39.067, +103.600	H	core begins 145 ka BP; H throughout core to present, w/NAP and PAC throughout, call C (recent peaks not double earlier peaks, therefore not *CC*)
7.	Pickarski N, Kwiecien O, Langgut D, Litt T. 2015. Abrupt climate and vegetation variability of eastern Anatolia during the last glacial. Climate of the Past 11: 1491-1505.	**Turkey**, Ahlat Ridge +38.667 +42.669	Canna-baceae	core begins 111 kya C 104,000 BP w/NAP 80-90%+ *PAC* 111,000, call it *C*; then 104,000 to 87,000 w/ ↓ to NAP30-60% (no *ASP* in diagram but ↑in *Pinus*) call it *H*; then 87,000 to 10,000 w/ ↑ NAP 80-95% w/*PAC* call it *C*
8.	Yang Q, Li X, Zhou X. 2016. Vegetation succession in response to climate changes since the LGM in the desert-loess transition zone, North China (末次盛冰期以来沙漠-黄土过渡带植被演替及其对气候变化的响应). Acta Anthropologica Sinica 35(3): 469-480. difficult dating in this study; rare trees are *Pinus, Picea, Betula, Juglans, Ulmus*	**China,** Shanxi, Fugu, Hanjialiang +39.5, +111.1	H	core begins 59 ka. H pollen from 50 to 10 ka w/NAP 80-95%+ *PAC*: call it *C*
9.	Tian F, Wang Y, Chi ZQ, Liu J, Yang HJ, Jiang N, Tang WK. 2017. Late Quaternary vegetation and climate reconstruction based on pollen data from southeastern Inner Mongolia, China. *Review of Palaeobotany and Palynology* 242: 33–42.	**China,** Inner Mongolia, Liujiadian +42.982+ 117.444	H	core begins 35 ka; H 35-32 ka w/AP 5-30%+*PAC*, call it *C*; then 24-18 ka w/AP 5-35%+*PAC*, still call it *C*
10.	Park JJ, Lim HS, Lim JS, Yu KB, Coi JM. 2014. Orbital- and millennial-scale climate and vegetation changes between 32.5 and 6.9k cal a BP from Hanon Maar paleolake on Jeju Island, South Korea. *Journal of Quaternary Science* 29: 570-580.	**Korea,** Hanon Maar +33.233 +126.533	H-t	core begins 32.5 ka; H 32,000-8000 w/NAP 70-80%+*PA* (overwhelming)
11.	Verma P, Rao MR. 2011a. "Quaternary vegetation and climate change in Central Narmada Valley: palynological records from Hominin bearing sedimentary successions," pp. 71-84 in Singh DS, Chahabra NL, *eds. Geological Process and Climate Change.* Macmillian Publishers India, New Delhi. no *Celtis* in diagram	**India**, Madhya Pradesh, Narmada Valley, Baneta +22.883 +77.876	C	core begins 32600 BP; C 32600-12300 w/NAP 80-90%+*PAC*
12.	Yang Q, Li X, Zhou X. 2016. Vegetation succession in response to climate changes since the LGM in the desert-loess transition zone, North China (末次盛冰期以来沙漠-黄土过渡带植被演替及其对气候变化的响应). *Acta Anthropologica Sinica* 35(3): 469-480. difficult dating in this study; rare trees are *Pinus, Picea, Betula, Juglans*	**China,** Shaanxi, Yulin, Caijiagou +38.1, +109.8	H	core begins 25 ka. H pollen from 25 to recent w/NAP 80-95% + *PAC*: call it *C*
13.	Li MH, Kang SC, Ge J, Yi CL, Fang XM. 2010. Saline rhythm and climatic change since 20.6 kyr BP from the Qiulinanmu Playa Lake in Tibet. *Carbonates Evaporites* 25: 5–14.	**China**, Tibet, Lake Qiūlǐnánmù 4420 m +31.516 +84.066	H	core begins 20000 BP; H 20000-17,700 w/NAP 90% + *PAC;* then 7000-5200 w/NAP 75% and *PAC*
14.	Premathilake R. 2006. Relationship of environmental changes in central Sri Lanka to possible prehistoric land-use and climate changes. *Palaeogeography, Palaeoclimatology, Palaeoecology* 240: 468–496. no *Celtis* in diagram	**Sri Lanka**, Horton Plains, +6.8 +80.8	H	core begins 24000 BP; H 18000-10000 w/ NAP 55-75% + *P-C*
15.	Blyakharchuk TA, Wright HE, Borodavko PS, van der Knaap WO, Ammann B. 2004.	**Russia**, Altai,	C-t	core begins 16000 BP; C intermittent

	Late Glacial and Holocene vegetational changes on the Ulagan high-mountain plateau, Altai Mountains, southern Siberia. *Palaeogeography, Palaeoclimatology, Palaeoecology* 209: 259–279.	Uzunkol, 1985 m +50.483 +87.108		16000-10000 w/NAP 60-80% + *PAC;* then 9000-300 w/AP 60-80% + *AP*; then small surge 300 BP, call it *CC*
16.	Li P, Xu Y, Li P. 2014. Evolution of paleoenvironment since late Pleistocene 24 ka of LH01 core in the northern Liaodong Bay (辽东湾北部 LH01 孔晚更新世 24ka 以来古环境演变). *Advances in Marine Science* 32(1): 59-67. no pollen diagram; authors described the pollen zones in text; dating problematic; trees *Pinus, Betula, Juglans, Quercus*	**China,** Liaoning, +40.900, +121.833	H	core begins 24 ka; H ca. 16-6 ka w/NAP 65-76%+PA, call it *C*; then 5.9-4 .5 ka w/AP:NAP~1:1, call it *C/H*; then 4 .5 -4 .1 ka w/NAP 82%, call it *C*
17.	Blyakharchuk TA, Wright HE, Borodavko PS, van der Knaap WO, Ammann B. 2004. Late Glacial and Holocene vegetational changes on the Ulagan high-mountain plateau, Altai Mountains, southern Siberia. *Palaeogeography, Palaeoclimatology, Palaeoecology* 209: 259–279.	**Russia**, Altai, Kendegelukol, 2050 m +50.505 +87.608	C-t	core begins 15250 w/*PCA:* intermittent 15250-10000 BP; then w/*Alnus* and AP: intermittent 9000-present
18.	Blyakharchuk TA, Wright HE, Borodavko PS, van der Knaap WO, Ammann B. 2004. Late Glacial and Holocene vegetational changes on the Ulagan high-mountain plateau, Altai Mountains, southern Siberia. *Palaeogeography, Palaeoclimatology, Palaeoecology* 209: 259–279.	**Russia**, Altai, Tashkol, 2150 +50.450 +87.670	C-t	core begins 16000 BP; C intermittent 1500-9000 w/*PCA*; then 9000-present w/AP+ *Alnus*
19.	Xu QH, Chen FH, Zhang SG, Cao XY, Li JY et al. (5 additional authors). 2017. Vegetation succession and East Asian summer monsoon changes since the last deglaciation inferred from high-resolution pollen record in Gonghai Lake, Shanxi Province, China. *The Holocene* 27: 835-846.	**China,** Shanxi, Ningwu County, Gonghai Lake, +38.90 +112.233	H	core begins 15,000; H 15,000-11,000 w/AP 10-25%+*PAC*; then surge w/ AP↓+*PAC*↑ and *Cerealia*: 2800-present, call it *CC*
20.	Li XQ, Zhao KL, Dodson J, Zhou XY. 2011. Moisture dynamics in central Asia for the last 15 kyr: new evidence from Yili Valley, Xinjiang, NW China. *Quaternary Science Reviews* 30: 3457-3466.	**China**, Xinjiang, Yili +43.857 +81.965	Canna-baceae	core begins 15000; C 14500-12500 w/*PAC*; 11500-present ditto, surge at 3750
21.	Chauhan MS, Pokharia AK, Srivastava RK. 2015. Late Quaternary vegetation history, climatic variability and human activity in the Central Ganga Plain, deduced by pollen proxy records from Karela Jheel, India. *Quaternary International* 371: 144-156. no *Celtis* in diagram, but photo of *Cannabis* pollen looks like *Cannabis*	**India**, Uttar Pradesh, Karela Jheel +26.681 +81.027	C.s.	core begins 14,000 BP; C 14,000-12,5000 BP w/NAP+*PAC*, and single grain 3400 BP
22.	Blyakharchuk TA, Wright HE, Borodavko PS, van der Knaap WO, Ammann B. 2007. Late glacial and Holocene vegetation history of the Altai Mountains (southwestern Tuva Republic, Siberia). *Palaeogeography, Palaeoclimatology, Palaeoecology* 245: 518-534.	**Russia**, Altai, Grusha 2413 m +50.383 +89.416	C	core begins 15000 BP; C 14000-1300 w/*PCA;* then reappears 6000-5000 BP, and 100 BP
23.	Leroy SAG, Tudryn A, Chalié F, López-Merino L, Gasse G. 2014. From the Allerød to the mid-Holocene: palynological evidence from the south basin of the Caspian Sea. *Quaternary Science Reviews* 101: 77-97.	**Caspian Sea,** north of Iran, GS05 core +38.760 +51.537	Canna-baceae	C: one peak at Allerød, 14000 BP w NAP >> AP + ↑*Poaceae* (near peak) yet ↓*Art/Cheno;* also peak *Alnus* but relatively low, call it *C*
24.	Yu C, Luo Y, Sun X. 2008. A high-resolution pollen records from Ha'ni Lake, Jilin, Northeast China showing climate change between 13.1 cal. ka B.P. and 4.5 cal. ka B.P. (吉林柳河哈尼湖 13.1~4.5 cal. ka B.P.古气候演化的高分辨率孢粉记录). *Quaternary Sciences* 28(5): 929-938. *Humulus* not displayed in diagram but described in text; trees dominated by *Pinus, Picea, Betula, Juglans, Ulmus*	**China,** Jilin, Liuhe, +42.20, +126.05	H	core begins 59 ka; H in band I_2, ca. 13-12.2 ka, w/NAP55-70% and peak *PAC* in core: call it *C*
25.	Quamar MF, Bera SK. 2017. Pollen records related to vegetation and climate change from northern Chhattisgarh, central India during the late Quaternary. *Palynology* 41: 17-30. *Cerealia* throughout core (back to 12,8000 BP!) but no surge in *C* (highest levels ca. 12,800-9100 BP, rare after that), so call it *C* not *CC*	**India,** Chhattisgarh, Lakadandh Swamp, +23.25 +82.549	C	core begins 12,800 BP; C present 12,800-9100, 5000, 1000 BP, w/NAP 70-80%, call it *C*

26.	Quamar MF, Chauhan MS. 2012. Late Quaternary vegetation, climate as well as lake-level changes and human occupation from Nitaya area in Hoshangabad District, southwestern Madhya Pradesh (India), based on pollen evidence. *Quaternary International* 263: 104-113. no *Celtis* in diagram	**India**, Madhya Pradesh, Lake Nitaya +22.666 +77.700	C.s.	core begins 12750 BP; C 12750-9000 w/NAP 65-80% + *PAC*; decrease, then equal-sized curve (no surge) 2800-1125
27.	Dixit S, Bera SK. 2013. Pollen-inferred vegetation vis-á-vis climate dynamics since Late Quaternary from western Assam, Northeast India: Signal of global climatic events. *Quaternary International* 286: 56-68. no *Celtis* in diagram	**India**, Assam, Chayagon +26.036 +91.422	C	no *Cannabis* in pollen diagram but text says *Cannabis* w/*PAC* 12400-10810 and 10810-7680 w/surge 500-100 BP
28.	An CB, Feng ZD, Tang LY. 2003. Evidence of a humid mid-Holocene in the western part of Chinese Loess Plateau. *Chinese Science Bulletin* 48: 2274-2479. Repeated in: An CB, Feng ZD, Tang LY. 2004. Environmental and cultural response between 8000 and 4000 cal. yr BP in the western Loess Plateau, northwest China. *Journal of Quaternary Science* 19: 529-535. Zou SB, Cheng GD, Xiao HL, Xu BR, Feng ZD. 2009. Holocene natural rhythms of vegetation and present potential ecology in the Western Chinese Loess Plateau. *Quaternary International* 194: 55-67. Xia ZK, Zhang JN, Liu J, Zhao CH, Wu XH. 2012. Analysis of the ecological environment around 10000 a BP in Zhaitang area, Beijing: A case study of the Donghulin site. *China Science Bulletin* 57: 360-369.	**China,** Gansu, west Loess plateau, Dadiwan, +35.016 +105.916	H	core begins ca. 12000 BP; "H" 12000-11500 w/NAP 60-80% + mostly *Art*. less so *Poa* and *Cheno*.; then 8300-2000 w/AP 40-90% + *Pinus, Ulmus, Betula, Alnus, Celtis*—call it *H;* then 2000-present w/AP 10-30% and slight surge, call it *CC*
29.	Verma P, Rao MR. 2011a. "Quaternary vegetation and climate change in Central Narmada Valley: palynological records from Hominin bearing sedimentary successions," pp. 71-84 in Singh DS, Chahabra NL, *eds. Geological Process and Climate Change.* Macmillian Publishers India, New Delhi. no *Celtis* in diagram; data from Kusumeli repeated in: Verma P, Rao MR. 2011b. Late Holocene vegetation and climate of Kusumelli Swamp in Sehore District, Madhya Pradesh, India. *Geophytology* 44: 127-132.	**India**, Madhya Pradesh, Kusumeli, +22.902 +77.814	C	core begins 11900; C 11900 BP w/ NAP 60-90% +*PAC*, then low but continuous curve until small surge 800 BP to present, call it *CC*
30.	Bottema S, van Zeist W. 1981. "Palynological evidence for the climatic history of the near East: 50,000-6000 BP," pp. 111-132 in *Préhistoire du Levant.* Editions du CNRS, Paris.	**Syria,** Aleppo, Ghab-3 +35.683 +36.3	H/C	H/C 11920-11307 w/peak *PAC and* peak *Alnus* but much less of latter; then w/*PAC* and ↓ *Alnus* 9500-8063, 5813
31.	Dorofeev PI. 1982. "Cannabaceae," pp. 43-48 in Takhtajan AL, Ископаемые цветковые растения России и сопредельных государств, T. 2 [*Fossil flowering plants of Russia and neighboring states, Vol. 2*], Izd-vo Nauka, Leningrad.	**Russia**, Tomsk Oblast, Dunaevsky Yar village, near Tymsk +59.4 +80.29	H	Seed, extinct species *H. strumulosus* and *H. minimus,* both from same location and Oligocene, 34-23 mya
32.	Dorofeev PI. 1982. "Cannabaceae," pp. 43-48 in Takhtajan AL, Ископаемые цветковые растения России и сопредельных государств, T. 2 [*Fossil flowering plants of Russia and neighboring states, Vol. 2*], Izd-vo Nauka, Leningrad. *Humulus irtyshensis*, formerly misidentified as "*Cannabis* sp." (Dorofeev 1969).	**Russia**, Omsk region, Chernoluchye, near Irtysh River +55.247 +73.027	H	Seed, extinct species *H. irtyshensis*, Miocene, 23.03-5.3 mya
33.	Dorofeev PI. 1963. Третичные флоры Западной Сибири (*Tertiary flora of Western Siberia*). Izd-vo Akademia nauk SSSR, Leningrad.	**Russia**, Omsk region, Isakova village +55.747 +74.41	H	Seed, extinct species *H. rotundatus*, Miocene, 23.03-5.3 mya
34.	Kou XY, Ferguson DK, Xu JX, Wang YF, Li CS. 2006. The reconstruction of paleovegetation and paleoclimate in the late Pliocene of West Yunnan, China. *Climatic Change* 77: 431–448. *data repeated in:* Xu JX, Ferguson DK, Li CS, Wange YF. 2008. Late Miocene vegetation and climate of the Lühe region in Yunnan, southwestern China. *Review of Palaeobotany and Palynology* 148: 36-59. Photomicrograph of *Humulus* has diameter of 19 um. Authors conclude, "most	**China**, Yunnan, Liantie coal mine, 2280 m +26.003 +99.817	H	"Late Pliocene" *ca.* 3.0-2.6 mya Two "H" peaks. Older peak w/NAP 65% + *Art*. but little *Poa*. or *Cheno*., plus *Alnus*. Younger peak where NAP transitions from 65% to 2% + *Art*. but little *Poa*. or *Cheno*., plus *Alnus* and

	elements of the Eryuan palynoflora would appear to have been derived from the semi-moist evergreen coniferous and broadleaved mixed forest belt at 1600–2500 m."			*Quercus; call it H.*
35.	Zhang ZQ, Sun JM. 2011. Palynological evidence for Neogene environmental change in the foreland basin of the southern Tianshan range, northwestern China. *Global and Planetary Change* 75: 56–66.	**China,** Tian Shan rim of Tarim Basin, Kuchetawu +41.918 +83.054	H	core begins 14 ma; H 13-7 mya w/AP 60-80% + *Betula, Quercus* and peaks in *Alnus*; call it *H*
36.	Li B, Wen X, Zhao B, Qiu H, Wang X, Pei Z. 2015. Sporo-pollen assemblages and paleoclimate analysis since the Late Pleistocene sediments of Nanyang Basin (南阳盆地更新世以来的孢粉分析及其古气候记录). *Geological Science and Technology Information* 34(1): 49-56. NYbz2 core has H, and NYbz1 does NOT. NYbz2 core begins ca. 900 ka (extrapolating past 100 cm stratum to 130 cm stratum); trees dominated by *Pinus, Quercus, Betula, Juglans*	**China,** Henan, Nanyang, +32.933, +112.400	H	core begins ca. 900 ka; short curve 900-800 ka w/NAP 40-45: call it *C/H*; short curve 750-700 ka w/NAP 45-60%: call it *C/H*; curve 600-278; w/NAP 45-60%: call it *C/H*; note that tallest NAP peak in diagram shows no H pollen
37.	Bolikhovskaya NS, Derevyanko AP, Shun'kov MV. 2006. The fossil palynoflora, geological age, and climatostratigraphy of the earliest deposits of the Karama site (Early Paleolithic, Altai Mountains). *Paleontological Journal* 40: S558-S566.	**Russia**, Altai, Karama site +51.466 +84.565	C, H	core begins 787 kya; C: 787 to 610 kya w/*PAC,* call it *C*; H: begins 712 w/*Alnus*. call it *H*
38.	Granoszewsi W, Demske D Nita M, Heumann G, Andreev AA. 2005. Vegetation and climate variability during the Last interglacial evidenced in the pollen records from Lake Baikal. *Global and Planetary Change* 46: 187-198. *data repeated in:* Tarasov PE, Granoszewski W, Bezukova E, Brew S, Nita M, Abzaeva A, Oberhänsli. 2005. Quantitative reconstruction of the last interglacial vegetation and climate based on the pollen record from Lake Baikal, Russia. *Climate Dynamics* 25: 625-637.	**Russia**, Lake Baikal, CON01-603-2 +53.950 +108.900	H/C	core begins 131 kya; H/C present 130-114 kya (OIS5e) w/AP 40-80% +*Alnus-Salix,* call it *H*
39.	Li SP, Li JF, Ferguson DK, Wang NW, He XX, Yao JX. 2014. Palynological analysis of the late Early Pleistocene sediments from Queque Cave in Guangxi, South China. *Palaeogeography, Palaeoclimatology, Palaeoecology* 354: 24-34. Pollen could be misidentified *Pteroceltis tatarinowii,* given that *P. tatarinowii,* dominates the current vegetation, and it was not included in the pollen diagram	**China,** Guangxi, Queque Cave +22.272 +107.506	H/C	"late Early Pleistocene," 126 kya, assemblage indicates a warm to subtropical deciduous forest, call it *H*
40.	Zheng Z, Lei ZQ. 1999. A 400,000 year record of vegetational and climatic changes from a volcanic basin, Leizhou Peninsula, southern China. *Palaeogeography, Palaeoclimatology, Palaeoecology* 145: 339–362. NOTE: during LGM the site was a Poaceae grassland, yet no H pollen at all!	**China,** Guǎngdōng Province, Lake Tianyang +20.59 +110.1	H	core begins 200 kya; H appears 70 kya to present w/AP 80-90%+Quercus, Alnus, Salix, call it *H*
41.	Meng YT, Wang WM, Hu JF, Zhang JX, Lai YJ. 2017. Vegetation and climate changes over the last 30 000 years on the Leizhou Peninsula, southern China, inferred from the pollen record of Huguangyan Maar Lake. *Boreas* 46: 525-540.	**China,** Leizhou, Huguangyan Maar +21.150 +110.283	H	core begins 30 ka; H present throughout core w/AP 50-80% + *Cyclobalanopsis, Quercus, Pinus, Betula, Alnus, Salix*, call it *H*
42.	Schlütz F, Zech W. 2004. Palynological investigations on vegetation and climate change in the Late Quaternary of Lake Rukche area, Gorkha Himal, Central Nepal. *Vegetation History and Archaeobotany* 13: 81-90. no *Celtis* in diagram	**Nepal**, Gorkha Himal, Lake Rukche +28.295 +84.741	C-t	core begins 15000 BP; C 15000-13000 w/AP 60-70%+*Quercus* (call it C/*H*); then five peaks 7800-800 w/AP40-60%+*PAC* 7800-800 (call it *C/H*)
43.	Yao FL, Ma CM, Zhu C, Li JY, Chen G, Tang LY, Huang M, Jia TJ, Xu JJ. 2018. Holocene climate change in the western part of Taihu Lake region, East China. *Palaeogeography, Palaeoclimatology, Palaeoecology* Epub prior to print.	**China,** Jiangsu, Taihu Lake, Gaochun site +31.306 +119.092	H	core begins 13,500 BP; H throughout w/AP 40-60%+*Aln/Bet+PAC*, call it *C/H*

Table S1, Part B: The following studies are limited to the Holocene (11.6 kya to recent), except for the final four studies, which were added at the conclusion of data collection. They include evidence interpreted as *Cannabis, Humulus,* or indeterminant *C/H* pollen. They are listed geographically, by country of origin

44.	Kaniewski D, de Laet V, Paulissen E, Waelkens M. 2007. Long-term effects of human impact on mountainous ecosystems, western Taurus Mountains, Turkey. *Journal of Biogeography* 34: 1975–1997.	**Turkey,** Bereket +37.545 +30.295	H/C	core begins 3520 BP, H/C with two adjacent peaks *ca.* 2350, w/AP 40-50% +lots of *PAC* but not aligning with *Fagopyrum* (only ag plant). Call it *C*.
45.	Miebach A, Niestrath P, Roeser P, Litt T. 2015. Impacts of climate and humans on the vegetation in NW Turkey: palynological insights from Lake Iznik since the Last Glacial. *Climate of the Past Discussions* 11: 5157–5201.	**Turkey,** Lake Iznik +40.433 +29.533	H/C	H/C 8300, 7500, 6800, 4400 w/80%AP (call it *H*), then 3200-1000 w/*Cerealia* + triple count H/C (call it *CC*)
46.	Pickarski N, Kwiecien O, Langgut D, Litt T. 2015. Abrupt climate and vegetation variability of eastern Anatolia during the last glacial. *Climate of the Past* 11: 1491-1505. Pre-18.5 kya data entered into Table 2.	**Turkey**, Ahlat Ridge +38.667 +42.669	Canna-baceae	80-95%NAP w/*PAC* 87,000 to 10,000, continuous but intermittent without surge. Call it C.
47.	Knipping M, Müllenhoff M, Brückner H. 2008. Human induced landscape changes around Bafa Gölü (western Turkey). *Vegetation History & Archeobotany* 17: 365-380. Authors state that human disturbance was pastoral (goats) instead of arable farming	**Turkey**, Bafa Gölü, Core Baf S1 +37.5 +27.416	H-type	core begins 6000 BP "*H*" 4000-3200 BP w/50-60%AP+low *PAC* (total<25%) but even lower *Alnus*; reappears 3000-2710 same scenario; decreases 2710-recent. Call it undetermined *C/H*
48.	Knipping M, Müllenhoff M, Brückner H. 2008. Human induced landscape changes around Bafa Gölü (western Turkey). *Vegetation History & Archeobotany* 17: 365-380. Authors state that some *H/C* pollen grains during Roman period could be determined as *Cannabis* (presumably based on grain diameter).	**Turkey**, Bafa Gölü, Core Baf S6 +37.5 +27.490	H/C	core begins ca. 2400 BP "*H*" intermittent throughout core with same scenario as Baf S1 core; small peaks at 436 and 400 cm ("Roman period" 2100-1600 BP), 360 cm ("Goths"), 236 cm (1300-1200 BP), and 162 cm (800-700 BP) Call it undetermined *C/H* until Roman times, then cultivated *C*
49.	Leroy SAG, López-Merino L, Tudryn A, Chalié F, Gasse G. 2014. Late Pleistocene and Holocene palaeoenvironments in and around the middle Caspian basin as reconstructed from a deep-sea core. *Quaternary Science Reviews* 101: 91-110.	**Caspian Sea,** between Azerbaijan and Turkmenistan GS18 core +41.550 +51.100	Canna-baceae	core begin 12000; C w/*PAC* dominant but no Cannabaceae until one peak at 2800 BP
50.	Ramezani E, Mohadjer HRM, Knapp HD, Ahmadi H, Joosten H. 2008. The late-Holocene vegetation history of the Central Caspian (Hyrcanian) forests of northern Iran. *The Holocene* 18: 307-321.	**Iran**, northern Hyrcanian forests EIG mire +36.550 +51.483	H	recent study only back to 1000 BP, but no *H* until recently, 200 BP
51.	Bottema S. 1986. A late Quaternary pollen diagram from Lake Urmia (northwestern Iran). *Review of Paleobotany and Palynology* 47: 241-261.	**Iran**, Lake Urmia +37.583 +45.467	H/C	core begin 11000; intermittent H/C 8262-2893 w/NAP 70-95% + PAC; then surge 723 BP w/*Cerealia*

52.	Bottema S. 1986. A late Quaternary pollen diagram from Lake Urmia (northwestern Iran). *Review of Paleobotany and Palynology* 47: 241-261. Data from this study retracted—it is identical to the above study.	**Iran**, Lake Urmia +37.583 +45.467	H/C	single grains: w/*PAC* +NAP dominant 8262, 6185, 4666, 2893, then surge with four grains 723 BP, call it *CC*
53.	Tripathi S, Basumatary SK, Singh VK, Bera SK, Nautiyal CM, Thakur B. 2014. Palaeovegetation and climate oscillation of western Odisha, India: A pollen data-based synthesis for the Mid-Late Holocene. *Quaternary International* 325: 83-92. Authors interpret habitat as tropical mixed deciduous forest, yet low AP%; interpret Zone M5 (1300-present) as evidence of *C* cultivation (*Cerealia* increases, but present through whole core), no *C* surge 1300-present. No *Celtis* in pollen diagram.	**India**, Odisha, Bargarh, +21.748 +83.566	C	core begins 5800 BP; C begins 5800 and consistent levels throughout core C w/AP 29-33% + *PAC* , call it *C*
54.	Chauhan MS, Sharma A, Phartiyal B, Kumar K. 2013. Holocene vegetation and climatic variations in Central India: A study based on multiproxy evidences. *Journal of Asian Earth Sciences* 77: 45–58. no *Celtis* in diagram	**India**, Madhya Pradesh, Padauna +22.683 +81.766	C.s.	core begins 8400 BP; C begins 7055 and sporadic (5700, 1000 BP) w/NAP 75% + *PAC*, call it *C*
55.	Quamar MF, Chauhan MS. 2014. Signals of Medieval Warm Period and Little Ice Age from southwestern Madhya Pradesh (India): A pollen-inferred Late-Holocene vegetation and climate change. *Quaternary International* 325: 74-82. no *Celtis* in diagram, *Cannabis* pollen grain 16 μm according to bar scale Authors interpreted *C* as cultivated crop	**India**, Madhya Pradesh, Lake Khedla Quila, +21.666 +77.500	C.s.	core begins 1275 BP, no *C* in pollen diagram, text says *C* rare throughout core, w/AP 20% and *PAC* (*Cerealia* also throughout), no surge, call it *C*
56.	Pandey S, Scharf BW, Mohanti M. 2014. Palynological studies on mangrove ecosystem of the Chilka Lagoon, east coast of India during the last 4165 yrs BP. *Quaternary International* 325:126-135. Authors interpret habitat as mangrove ecosystem, but *PAC* percentage always higher than mangrove percentage No *Celtis*, and photo of *C* pollen grain 23.5 μm diameter according to scale bar	**India**, Odisha, Chilka Lagoon +19.583 +85.250	C.s.	core begins 4165 BP, C begins 4000 BP and intermittent throughout core. Zone III (2246-present) C count doubles earlier counts (reaching 11.8%), but remains intermittent, and no crop pollens recorded; call it *C*
57.	Bali R, Chauhan MS, Mishra AK, Ali SN, Tomar A, Khan I, Sing DS, Srivastava P. 2017. Vegetation and climate change in the temperate-subalpine belt of Himachal Pradesh since 6300 cal. yrs. BP, inferred from pollen evidence of Triloknath palaeolake. *Quaternary International* 444: 11-23. Authors interpret *C* pollen as cultivated hemp. We think long distance transport from Manali. No *Celtis*, and photo of *C* pollen grain is 70 μm diameter, according to scale bar	**India**, Lahaul, Triloknath Glacier Valley +32.633 +76.616	C	core begins 6300 BP; five C grains 5000-200 BP w/AP 45-53%, but high count (two grains in Zone-VI) correspond to lowest AP and highest PAC in study, call it *C/H*
58.	Chauhan MS, Quamar MF. 2012. Pollen records of vegetation and inferred climate change in south-western Madhya Pradesh during the last ca. 3800 years. *Journal of the Geological Society of India* 80: 470-480. No *Celtis* in diagram; Photo of C pollen shows oblong grain, 150 x 125 μm, according to bar scale	**India**, Madhya Pradesh, Sapna Lake +21.666 +77.500	C.s.	core begins 3800 BP, no *C* in pollen diagram, text says *C* rare throughout core, w/AP 10-20% and *PAC* (*Cerealia* also throughout, and correlates with *Poa* curve) call it *C*
59.	Trivedi A, Kotlia BS, Joshi LM. 2011. Mid-Holocene vegetation shifts and climate change in the temperate belt of Garhwal Himalya. *Palaeobotanist* 60: 291-298. Photo of C pollen shows grain 180 μm, according to bar scale	**India**, Garhwal, Lake Nachiketa +30.500 +78.500	C	core begins 5350 BP; no *Cannabis* in pollen diagram but text says *Cannabis* ca. 3120 BP when AP~60% + declining *PAC*, call it *C/H*
60.	Saxena A, Trivedi A, Chauhan MS, Sharma A. 2015. Holocene vegetation and climate change in Central Ganga Plain: A study based on multiproxy records from Chaudhary-Ka-Tal, Raebareli District, Uttar Pradesh, India. *Quaternary International* 371: 164-174. Authors ascribe *Cerealia* (throughout core) to crops—back to 6470 BP. No *Celtis* in diagram. Photo of *C* pollen grain looks oblong grain, 30 x 26 μm (oblique view, mostly polar), pore annulus *not* protruding, 5.4-6.8 μm diameter, exine surface appears	**India**, Uttar Pradesh, Chaudhary-Ka-Tal +26.476 +81.287 Bajpai *et al.* 2015. Tree species of the Himalayan Terai	C	core begins 8470 BP, C appears as five short curves throughout core, 8550-7775, 7053-5404, 4804-3734, 3200-2482, 2100-present, w/30-40% AP and up to 43% *Poa*., no surge. Sattarian A. 2006. *Contribution to the*

	verrucate. This is consistent with *Celtis australis* (Sattarian 2006), and *C. australis* grows in the hills of Uttar Pradesh (Bajpai *et al.* 2015). The authors identify other pollen as "Himalayan elements" (*Pinus, Betula, Alnus*), but their percentage of *C* (up to 5.3%) is five- to ten-fold greater than *Pinus, Betula*, and *Alnus*.	region of Uttar Pradesh, India. *Check List* 11(4): 1718.		*biosystematics of Celtis L. (Celtidaceae) with special emphasis on the African species.* Doctoral thesis, Wageningen University.
61.	Quamar MF. Nautiyal CM. 2017. Mid-Holocene pollen records from southwestern Madhya Pradesh, central India, and their palaeoclimatic significance. *Palynology* 41: 401-411. Authors interpreted *C* as cultural pollen taxon. No *Celtis*.	**India,** Madhya Pradesh, Sehore, Manjarkui Lake, +22.856 +77.00	C	core begins 5679 BP; C throughout core but intermittent, w/largest curve 5300-4900, none in youngest strata, w/AP 10-20% + *PAC* (*Cerealia* also throughout), no surge, call it *C*
62.	Saraswat KS, Pokharia AK. 2003. Palaeoethnobotanical investigations at Early Harappan Kunal. *Pragdhara* 13:105–139.	**India**, Haryana, Kunal, +29.50 +75.683	C	one seed, 4600-3500 BP photo provided; 5.00 mm long, oblong, with basal constriction, unusual crustaceous seedcoat
63.	Pokharia AK, Sharma S, Tripathi D, Mishra N, Pal JN,Vinay R, Srivastava A. 2017. Neolithic—early historic (2500-200 BC) plant use: the archaeobotany of Ganga Plain, India. *Quaternary International* 443: 223-237.	**India,** Uttar Pradesh, Allahabad, Hetapatti site +25.483 +81.925	C	one seed, 4500-3500 BP photo provided; 3.58 mm long, nearly spherical, no basal constriction or abscission zone
64.	Saraswat KS. 2004a. "Plant economy of early farming communities at Senuwar, Bihar," pp. 416-535 in: Singh BP, ed. *Early Farming Communities of the Kaimur, Vol. 2.* Publication Scheme, Jaipur.	**India**, Bihar, Senuwar, +24.933 +83.939	C.s.	carbonized plant stems *ca.* 3950-3300, *Cannabis* seeds *ca.* 3300-2600 BP
65.	Tewari R, Srivastava RK, Singh KK, Saraswat KS, Singh IB, Chauhan MS, Pokharia AK, Saxena A, Prasad V, Sharma M. 2004. *Second preliminary report of the excavations at Lahuradewa District Sant Kabir Nagar, Uttar Pradesh: 2002-2003-2004 & 2005-06*. Available at: http://www.uparchaeology.org/archae.pdf	**India**, Uttar Pradesh, Lahuradewa, +26.766 +82.950		carbonized plant stems *ca.* 4000-3200 BP
66.	Sharma C, Singh G. 1972. Studies in the Late-Quaternary vegetational history in Himachal Pradesh—I. Khajiar Lake. *The Palaeobotanist* 21: 144-162. *Celtis* present in diagram. *Cannabis* no surge, so not *CC* despite *Cerealia* throughout core.	**India,** Himachal Pradesh, Chamba, Khajiar Lake, 1920 m +32.545 +76.058	C	core begins ca. 2300 BP; C intermittently present 2300 to present, largest peaks align with w/lowest AP 40-50%, call it *C/H*
67.	Trivedi A, Saxena A. 2017. Pollen based vegetation and climate change records deduced from the lacustrine sediments of Kikar Tal (Lake), Central Ganga Plain, India. The *Palaeobotanist* 66: 37-46. *Cerealia* throughout most of core (beginning 7200 BP) but no surge in C, so call it *C* not *CC*. No *Celtis* in diagram.	**India,** Uttar Pradesh, Lucknow, Kikar Tal, +26.479 +81.110	C	core begins ca. 8100 BP; C intermittently present 8100 to present, w/NAP averaging 60% +*PAC*, call it *C/H*
68.	Chauhan MS, Pokharia AK, Singh IB. 2005. Preliminary results on the palaeovegetation during Holocene from Lahuradewa Lake, district Sant Kabir Nara, Uttar Pradesh. *Prāgdharā (Journal of the Uttar Pradesh State Department of Archaeology)* 15: 33-40. *pollen data repeated in* Tewari R, Srivastava RK, Singh KK, Saraswat KS, Singh IB, Chauhan MS, Pokharia AK, Saxena A, Prasad V, Sharma M. 2004. *Second preliminary report of the excavations at Lahuradewa District Sant Kabir Nagar, Uttar Pradesh: 2002-2003-2004 & 2005-06.*	**India**, same site as above		core begins 9200 BP *Cannabis* pollen w/NAP "dominance" and *PC* + *Cerealia* 7000-recent BP (Tewari *et al.* 2005 state 5000-4000 BP)
69.	Shaw J, Sutcliffe J, Lloyd-Smith L, Schwenninger JL, Chahuan M, Misra O, Harvey E. 2007. Ancient irrigation and Buddhist history in Central India: Optically stimulated luminescence dates and pollen sequences from Sanchi dams. *Asian Perspectives* 46: 166-201. No *Celtis*	**India**, Madhya Pradesh, Sanchi, +23.479 +77.739	C	Pond sediment from 2200 BP irrigation dams, pollen of *Cannabis*, rice, cereals, etc. call it *CC* (archaeological site)

70.	Trivedi A, Chauhan MS, Sharma A, Nautiyal CM, Tiwari DP. 2013. Record of vegetation and climate during Late Pleistocene-Holocene in Central Ganga Plain, based on multiproxy data from Jalesar Lake, Uttar Pradesh, India. *Quaternary International* 306: 97-106. No *Celtis* in diagram	**India**, Uttar Pradesh, Lake Jalesar, +26.979 +80.319	C.s.	core begins 42,000 BP, no *Cannabis* in pollen diagram but text says *Cannabis* 1.5% 1200 BP-present w/ AP 30% + *PAC*
71.	Demske D, Tarasov PE, Leipe C, Kotlia BS, Joshi LM, Long TW. 2016. Record of vegetation, climate change, human impact and retting of hemp in Garhwal Himalaya (India) during the past 4600 years. *The Holocene* 26: 1661-1675. No *Celtis* in diagram; authors assign pollen >27.5 *μ*m to *C*, and pollen <27.5 *μ*m + crumpled grains to *H*, taking into consideration pore protrusion; 5 photomicrographs supplied and compared to Moraceae pollen grains	**India**, Garhwal, Badanital, 2083 m +30.497 +78.923	C, H/C	core begins 2562 BC (~ 4580 BP); *H/C* curve begins 4580 BP and present throughout, w/surge 1000 BC-1150 AD (~3020-870 BP); *C* curve begins 500 BC (2520 BP) w/ surge 490 BC-1075 AD (~2500-940 BP); during surge *C*+ *H/C* up to 28% TLP, during H/C surge AP 30-60%
72.	Singh G, Joshi RD, Chopra SK, Singh AB. 1974. Late Quaternary history of vegetation and climate of the Rajasthan Desert, India. *Philosophical Transactions of the Royal Society B (Biological sciences)* 267: 467-501. No *Celtis* in diagram	**India**, Rājasthān, Lunkaransar +28.43 +73.75	C	core begins 10000 BP *Cannabis* w/NAP 70%+*PAC* begins 200 BP
73.	Demske D, Tarasov PE, Wünnemann B, Riedel F. 2009. Late glacial and Holocene vegetation, Indian monsoon and westerly circulation in the Trans-Himalaya recorded in the lacustrine pollen sequence from Tso Kar, Ladakh, NW India. *Palaeogeography, Palaeoclimatology, Palaeoecology* 279: 172–185. *Celtis* present in diagram	**India**, Ladakh, Tso Kar +33.31 +78.00	C	core begins 15000 BP; no *Cannabis* in pollen diagram but text says *Cannabis ca.* 2400 BP, when AP 25% + *PAC* and *Triticum.* No evidence of surge, so call it *C*
74.	Leipe C, Dieter Demske D, Tarasov PE, HIMPAC Project Members. 2013. A Holocene pollen record from the northwestern Himalayan lake Tso Moriri: Implications for palaeoclimatic and archaeological research. *Quaternary International* 348: 113-129. No *Celtis* in diagram	**India**, Ladakh, Tso Moriri, 4515 m +32.900 +78.316	C-t	core begins 12000 BP *Cannabis* w/NAP+*PAC*, peaks 10,000, 3550, 3040, 2950, 1900, 1500 w/*PAC*, then more frequently after 800 BP
75.	Beug HG, Miehe G. 1999. *Vegetation history and human impact in the eastern central Himalaya (Langtang and Helambu, Nepal).* J. Cramer, Berlin. *Celtis* present in diagram	**Nepal**, Langtang +28.05 +85.583	C	core begins 800 BP; C begins 800 BP w/NAP+*PAC*, call it *C*
76.	Knörzer KH. 2000. 3000 years of agriculture in a valley of the high Himalayas. *Vegetation History and Archaeobotany* 9: 219-222.	**Nepal**, Mustang, Kagbeni, +28.837 +83.783		*Cannabis* seed 2400-1900 BP
77.	Miehe G, Miehe S, Schlütz. 2009a. Early human impact in the forest ecotone of southern High Asia (Hindu Kush, Himalaya). *Quaternary Research* 71: 255-265. Add to canna History, surge starts 1650	**Nepal**, Mustang, Jharkot, +28.816 +83.850	C	core begins ca. 7000 BP; C appears ca. 700 BP w/AP 30% + PAC, then 350-50 BP marked surge w/*Cerealia* and onset of *Faygopyrum*, call it *CC*
78.	Miehe G, Miehe S, Schlütz. 2009a. Early human impact in the forest ecotone of southern High Asia (Hindu Kush, Himalaya). *Quaternary Research* 71: 255-265.	**Pakistan**, Gilgit-Baltistan, Shukan, 3360 m +36.383 +73.116	C-t	core begins 5800 BP; C appears 2850, 2500, 1300, and 1000-0 w/AP 30-40% + PAC, call it *C*
79.	Sergusheva EA, Moreva OL. 2017. Agriculture in southern Primorye in the 1st millennium BC according to archaeobotanical data from the settlement of Cherepakha-13. Вестник археологии, антропологии и этнографии. № 4 (39): 195-204.	**Russia**, Primorye Province, Ussuri Bay +43.280 +132.300		hemp seeds, Kronovskaya culture, 2500-1900 BP

80.	Blyakharchuk T, Alla Eirikh A, Mitrofanova E, Li HC, Kang SC. 2017. High resolution palaeoecological records for climatic and environmental changes during the last 1350 years from Manzherok Lake, western foothills of the Altai Mountains, Russia. *Quaternary International* 447: 59-74.	**Russia**, Altai, Manzherok Lake +51.820 +85.809	C	core begins 1350 BP; C intermittent throughout core w/AP 40-60% + yet low *ASP* compared to *Art.* (less *Poa* + *Cheno.*); call it *C/H*
81.	Blyakharchuk TA, Chernova NA. 2013. Vegetation and climate in the Western Sayan Mts according to pollen data from Lugovoe Mire as a background for prehistoric cultural change in southern Middle Siberia. *Quaternary Science Reviews* 75: 22-42. data slightly different in: Blyakharchuk TA. 2011. Vegetation and climate change in the Western Sayan and their relationship with the development of archaeological cultures of the region in the second of the Holocene according to palynological studies of marsh deposits. *Tomsk State University Herald* 351: 145-151.	**Russia**, Western Sayan, Lugovoe Mire, 1299 m +52.862 +93.355	C	hard to read, no *ASP* or NAP/AP ratio. C-pollen rises and falls. authors say surges during Afanasievo culture, (5300-4500 BP), absent Andronovo, Karasuk, slight Tagar, not Tashtyk, more Yenisei Kirgiz (2300-1000 BP)
82.	Blyakharchuk TA, Wright HE, Borodavko PS, van der Knaap WO, Ammann B. 2007. Late glacial and Holocene vegetation history of the Altai Mountains (southwestern Tuva Republic, Siberia). *Palaeogeography, Palaeoclimatology, Palaeoecology* 245: 518-534.	**Russia**, Altai, Akkol, 2204 m +50.250 +89.625	C	core begins 10000 BP w/*PAC:* 9700-9500, 8000-4000 BP
83.	Blyakharchuk TA, Wright HE, Borodavko PS, van der Knaap WO, Ammann B. 2008. The role of pingos in the development of the Dzhangyskol lake–pingo complex, central Altai Mountains, southern Siberia. *Palaeogeography, Palaeoclimatology, Palaeoecology* 257: 404–420.	**Russia**, central Altai, Dzhangyskol Lake, 1800 m +50.183 +87.733	C-t	core begins 13000 uncal. BP w/*PAC:* 6100-5000 BP, again 2300-2000, 1000-800 BP
84.	Dirksen VG, van Geel B, 2004. "Mid to late Holocene climate change and its influence on cultural development in south central Siberia," pp. 291-307 in Scott EM, *et al., eds. Impact of the Environment on Human Migration in Eurasia.* Kluwer Academic Publishers, Netherlands. data repeated in: Van Geel B, Bokovenko NA, Burova ND, Chugunov KV, Dergachev VA, Dirksen VG, Kulkova M, Nagler A, Parzinger H, van der Plicht J, Vasiliev SS, Zaitseva GI. 2004. Climate change and the expansion of the Scythian culture after 850 BC: a hypothesis. *Journal of Archaeological Science* 31: 1735-1742.	**Russia**, Altai, Kutuzhekovo Lake +53.600 +91.933	C	core begins ca. 6000 BP w/*PAC:* 6000-2800 BP, again 1000 BP-present
85.	Kiriushin YF, Kiriushin K., Gol'eva AA, Semibratov VP. 2012. Почвенные и микробиоморфные исследования в Тавдинском гроте [Soil and microbioformic research at Tavdinsky grotto]. *Science Bulletin of the Altai* 2012 (1): 123-127.	**Russia**, Altai, Tavdinsky +51.777 +85.731	C	phytoliths found in "later Scythian" tomb, ca. 2000 BP
86.	Krivonogov SK, Takahara H, Yamamuro M, Preis YI, Khazina IV, Khazin LB, Kuzmin YV, Safonova IY, Ignatova NV. 2012. Regional to local environmental changes in southern Western Siberia: evidence from biotic records of mid to late Holocene sediments of Lake Beloye. *Palaeogeography, Palaeoclimatology, Palaeoecology* 331-332: 177-193.	**Russia**, Western Siberia, Lake Beloye, 107 m +55.650 +82.950	C	core begins 6000 BP w/*PCA:* 6000-5500 BP, then with *Salix, Betula, Alnus* until surge ca. 300 BP, call it CC
87.	Blyakharchuk TA. 2003. Four new pollen sections tracing the Holocene vegetational development of the southern part of the West Siberian Lowland. *The Holocene* 13: 715-731.	**Russia**, Western Siberia, Kirek Lake +56.100 +84.216	C	core begins 10,000 BP as steppe, "C" w/*Alnus+Betula* after *PAC* declines*:* 6500-3000 BP, reappears 2000-1000 again with *Betula, Alnus*
88.	Blyakharchuk TA. 2003. Four new pollen sections tracing the Holocene vegetational development of the southern part of the West Siberian Lowland. *The Holocene* 13: 715-731.	**Russia**, Western Siberia, Kirek Lake +56.450 +84.900	C	core begins 8000 BP as forest-steppe w/BOTH 8000-7000 (*C/H*), then with *Betula-Alnus* 7000-present intermittently (*H*)

89.	Blyakharchuk T, Alla Eirikh A, Mitrofanova E, Li HC, Kang SC. 2017. High resolution palaeoecological records for climatic and environmental changes during the last 1350 years from Manzherok Lake, western foothills of the Altai Mountains, Russia. *Quaternary International* 447: 59-74.	**Russia**, Altai Mountains, Manzherokskoye, +51.821 +85.809	C	core begins 1350 BP, C intermittent throughout w/AP 40-60% but tallest peaks of C align with *Triticum*, call it *CC*
90.	Leshchinskiy SV, Blyakharchuk TA, Vvedenskaya IA, Orlova LA. 2011. The first terrace above the Ob' floodplain near Kolpashevo: the age and formation conditions. *Russian Geology and Geophysics* 52 (2011) 641–649.	**Russia**, Siberia, Kolpashevo +58.208 +83.033	C	core begins 10200 BP w/72%AP and low *PAC:* 10200 one peak
91.	Tsembalyuk SI, Ilyushin VV, Ryabogina NE, Ivanov SN. 2011. Комплексное исследование баитовского городища Боровушка 2 (лесостепное Притоболье) [Comprehensive study of Baitovo settlement Borovushka 2 (forest-steppe Tobol)]. *Journal of Archaeology, Anthropology and Ethnography* 2011(2): 98-107.	**Russia,** Tyumen Oblast, Borovushka +56.406 +65.937	C	"C" w/80-90%AP (mostly *Betula*, some *Alnus+Salix*) 1320-950 BCE
92.	Shu J, Jiang L, Cheng Y. 2017. Palynological evidence for the formation of the culture interval layers at the Loujiaqiao archaeological site in Zhuji, Zhejiang Province, East China (浙江诸暨楼家桥遗址文化间歇层成因的孢粉学证据). *Acta Micropalaeontologica Sinica* 34(4): 406-417. "*Urtica*" in pollen diagram called "*Humulus*" in text; trees dominated by *Pinus, Quercus,* but mentioned in text: *Alnus, Ulmus, Celtis*	**China,** Zhejiang, Zhuji, +29.942, +120.227	U(H)	core begins 6500 BP; "*Urtica*" 6500-6300 BP w/AP 40-60% but peak *Poa*, call it *C/H*; then 6300-6000 w/AP 60-75%+↓ *Poa*, call it *H*; then 6000-2700 w/AP 40-65%+↑ *Poa*, call it *C/H*
93.	Cui A, Ma C, Zhu C, Bai J, Zhang W. 2015. Pollen records of the Yuxi Culture site in the Three Gorges reservoir area, Yangtze River (长江三峡库区玉溪遗址的环境与人类活动的孢粉记录). *Acta Micropalaeontologica Sinica* 32(2): 161-174. trees dominated by *Pinus, Quercus, Juglans,* but mentioned in text: *Alnus, Betula*	**China,** Chongqing, Fengdu, +30.333, +107.850	H	core begins 7600 BP; peak at 7200 w/AP 60%: call *C/H*; two peaks and short curve between 6550 and 6450 w/AP 40-70% call *C/H*; tallest peak at 6200 w/AP 30% call *C* (not double earlier peaks, therefore not *CC*)
94.	Ma C, Tian M. 2010. Sporo-pollen record of the Shendun site in Liyang, Jiangsu Province (江苏溧阳神墩遗址地层的孢粉记录研究). *Acta Micropalaeontologica Sinica* 27(1): 67-76. trees dominated by *Pinus, Betula, Juglans, Liquidambar, Ulmus, Alnus*	**China,** Jiangsu, Liyang, +31.314, +119.229	H	core begins 7 ka; H 7-3 ka w/NAP ca. 50%: call it C/H; surge during "Spring & Summer Period" (ca. 2700-2300) call it *CC*
95.	Li L, Zhu C, Zhou R, et al. 2015. Holocene environmental change recorded in Dongshancun archaeological site, Zhangjiagang, Jiangsu Province (江苏张家港东山村遗址地层揭示的全新世环境变迁). *Archaeology and Cultural Relics* (6): 88-94. trees dominated by *Pinus, Betula, Juglans, Liquidambar, Ulmus,*	**China,** Jiangsu, Zhangjiagang, +120.416, +31.928	H	core begins 9 ka; short curve 9-7.4 w/AP 50-80% + peak *Quercus*: call it *H*; short curve 7.2-5.5 w/AP 20-30% + peak *Poa* and ↑*Art:* call it *C*; surge 560-400 BP: w/↓AP (no crop plants in diagram) call it *CC*
96.	Li Z, Wu G, Zheng J, et al. 2016. Diversification of rainfed agriculture in the upper Ying River during the late Neolithic Age (新石器晚期颍河上游旱作农业的多元化特征). *Marine Geology & Quaternary Geology* 36(4): 145-152. *Humulus* not displayed in diagram but described in text; time-depth of soil profile poorly described	**China,** Henan, Dengfeng, +34.533, +113.167	H	core begins ca. 4.2 ka; late Longshan 4200-3900 w/AP 55%+peak *Art*., call it *C/H*; then Erlitou 3900-3600 w/↓AP 47%+↑*Poa,* still call it *C/H;* then Erlitou 3600-3300 w/↓AP 42%+peak *Poa*+high *Art*., call it *C*
97.	Jin G, Wang W, Wagner M, Tarasov PE. 2006. Pollen-based reconstruction of human activities in Fengtai archaeological site, Huzhu, Qinghai Province, dating to Kayue archaeological culture (青海互助丰台卡约文化遗址抱粉分析与人类活动研究：化石和现代表土花粉分析结果). *Huaxia Archaeology* (3): 24-32. no trees in pollen diagram, but text metions Abies, Picea, Betula, Populus, Salix, Juglans, Ulmus, dating based on archaeological findings consistent with 卡约, Kǎyuē culture period	**China,** Qinghai, Huzhu, +36.859, +101.938	C/H	Kǎyuē culture strata, ca. 3000 BP, C/H with PAC, peak appears with Cerealia-type pollen, call it *CC*

98.	Xu Q, Xiao J, Nakamura T, et al. 2004. Climate changes of Daihai Basin during the past 1500 from a pollen record (孢粉记录的岱海盆地 1500 年以来气候变化). *Quaternary Sciences* 24(3): 341-347. rare trees *Ulmus, Salix, Pinus, Picea, Quercus, Betula*	**China,** Inner Mongolia, Liangcheng, +40.578, +112.700	H	core begins 1500 BP, H 1400-present with NAP 70%+*PAC*, no crop plants in diagram, no surge, call it *C*
99.	Zhao L, Ma C, Zhang G, et al. 2013. Sporo-pollen record of the Yuhuicun site in Bengbu, Anhui Province (安徽蚌埠禹会村遗址地层的孢粉记录研究). *Acta Micropalaeontologica Sinica* 30(4): 405-414. trees dominated by *Pinus, Quercus, Ulmus*	**China,** Anhui, Bangbu, ABYT2008 core +32.9, +117.3	H	core begins pre-Longshan (undated), and no H; lower Longshan strata ca. 4500-4100 BP shows H with shows surge in H w/NAP 50-86%, no crop plants, so call it C
100.	An CB, Feng ZD, Tang LY. 2003. Evidence of a humid mid-Holocene in the western part of Chinese Loess Plateau. *Chinese Science Bulletin* 48: 2274-2479. Repeated in: Zou SB, Cheng GD, Xiao HL, Xu BR, Feng ZD. 2009. Holocene natural rhythms of vegetation and present potential ecology in the Western Chinese Loess Plateau. *Quaternary International* 194: 55-67.	**China,** west Loess plateau, Sujiawan, +35.53 +104.52	H	core begins ca. 9000 BP "H" with *Artemisia* and low trees ca. 9000, then likely switches to *Humulus* with trees 8300-ca. 200, with a surge around 200 BP, call it *CC*
101.	Miehe G, Miehe S, Schlütz F, Kaiser K, Duo L. 2006. Palaeoecological and experimental evidence of former forests and woodlands in the treeless desert pastures of southern Tibet (Lhasa, China). *Palaeogeography, Palaeoclimatology, Palaeoecology* 242: 54 – 67.	**China**, Tibet, Lhasa +29.65, +91.1	C-t	core begins 4200 BP *Cannabis* begins 200 BP w/*PAC*
102.	Miehe G, Sabine Miehe S, Knut Kaiser K, Reudenbach C, Behrendes L, Duo L, Schlütz F. 2009b. How old is pastoralism in Tibet? An ecological approach to the making of a Tibetan landscape. *Palaeogeography, Palaeoclimatology, Palaeoecology* 276: 130-147.	**China**, Tibet, Damxung +30.366 +90.90	C-t	core begins 13000 BP *Cannabis* begins 400 BP w/*PAC*
103.	Ma QF, Zhu LP, Lü XM, Guo Y, Ju JT, Want JB, Wang Y, Tang LY. 2014. Pollen-inferred Holocene vegetation and climate histories in Taro Co, southwestern Tibetan Plateau. *China Science Bulletin* 59: 4101-4414.	**China**, Tibet, Taro Co, TRL11-2 site +31.133 +84.200	H	core begins 10200 BP; H intermittent throughout core to present w/NAP 80-90 + *Art*. less so *Poa., Cheno.*
104.	Yin J. 2003. A regional investigation into prehistoric cultures on the Liyang Plain, Hunan Province. Archaeology 3:56–68. (cited in Long et al. 2016). oldest *Cannabis* seeds in China	**China**, Húnán, Chéngtóushān +29.692 +111.655		hemp seeds 6400-5300 BP
105.	Zhao KL, Li XQ, Dodson J, Atahan P, Zhou XY, Bertuch F. 2012. Climatic variations over the last 4000 cal yr BP in the western margin of the Tarim Basin, Xinjiang, reconstructed from pollen data. *Palaeogeography, Palaeoclimatology, Palaeoecology* 321-322: 16-23. outskirts of Kashgar.	**China**, Wupaer, +39.281 +75.595	Canna-baceae	core begins 4000 BP *Cannabis* w/*PAC* 4000-2620, then declines to small intermittent peaks, with smallish surge 680-550 BP (end of core), call it *CC*
106.	An CB, Lu YB, Zhao JJ, Tao SC, Dong WM, Li H, Jin M, Wang ZL. 2012. A high-resolution record of Holocene environmental and climatic changes from Lake Balikun (Xinjiang, China): implications for central Asia. *The Holocene* 22: 43-52.	**China**, Lake Balikun, 1575 m +43.666 +92.833	C	core begins 9000 BP w/*PAC:* 8600, 7900, 3800-present
107.	Herzschuh U, Tarsov P, Wünnermann B, Hartmann K. 2004. Holocene vegetation and climate of the Alashan Plateau, NW China, reconstructed from pollen data. *Palaeogeography, Palaeoclimatology, Palaeoecology* 211: 1-17.	**China**, Inner Mongolia, Alashan plateau, Juyan, 892 m, +41.89 +101.85	C-t	core begins 10700 BP w/*PAC:* 10700-10000, 9000-7700, 6000-5500, 4500-2000 BP
108.	Teacher's College of Northwest China, Institute for Plant Research and the Gansu Provincial Museum. 1984. Gansu Dongxiang Linjia Majiayao Wenhua Yizhi Chutu de Ji yu Dama [Hemp and millet from the Majiayao Culture site of Linjia at Dongxiang, Gansu]. *Kaogu* 7: 654-655, 663. (*cited by Long et al. 2016 as* Institute of Botany in	**China,** Gānsù, Dōngxiāng County, Línjiā site +35.6 +103.2	C.s.	carbonized hemp seed, 5000-4700 BP

	Northwest Normal University, Gansu Provincial Museum (1984) Millets and cannabis recovered from Linjia Site (Majiayao Culture), Gansu. *Archaeology* 7: 654–655)			
109.	Zhou XY, Li XQ, Zhao KL, Dodson J, Sun N, Yang Q. 2011. Early agricultural development and environmental effects in the Neolithic Longdong basin (central Gansu). *Chinese Science Bulletin* 56: 762-771.	**China,** western Gansu, Yanggua, +35.65 +107.90	C	single seed, 5000 BP
110.	Jia X, Dong GH, Li H, Brunson K, Chen FH, Ma MM, Wang H, An CB, Zhang KR. 2012. The development of agriculture and its impact on cultural expansion during the late Neolithic in the Western Loess Plateau, China. *Holocene* 23:85–92.	**China,** Gānsù Province, Dìngxī City, Buziping +35.450 +104.466	C.s.	charred hemp seeds, 4890-4710 cal. BP
111.	Zhou XY, Li XQ, Zhao KL, Dodson J, Sun N, Yang Q. 2011. Early agricultural development and environmental effects in the Neolithic Longdong basin (central Gansu). *Chinese Science Bulletin* 56: 762-771.	**China,** western Gansu, Honguanzhai, +35.683 +107.583	H	core begins 4800 "H" w/*PAC* 4800-4600, 3300-present
112.	Zhou XY, Li XQ, Zhao KL, Dodson J, Sun N, Yang Q. 2011. Early agricultural development and environmental effects in the Neolithic Longdong basin (central Gansu). *Chinese Science Bulletin* 56: 762-771.	**China,** western Gansu, Qiacun, +38.650 +100.583	H	core begins 4200 BP "H" w/*PAC* 4200-present
113.	Jarvis DI. 1993. Pollen evidence of changing Holocene monsoon climate in Sichuan Province, China. *Quaternary Research* 39: 325-337.	**China**, Sichuan, Lake Shayema, +28.083 +101.583	C.s.	core begins 10,000 BP *C* begins 1000 BP and surges 500 BP with *Fagopyrum*—call it *CC*
114.	Kramer A, Hurzschuh U, Mischke S, Zhang CJ. 2010. Holocene treeline shifts and monsoon variability in the Hengduan Mountains (southeastern Tibetan Plteau), implications from palynological investigations. *Palaeogeography, Palaeoclimatology, Paleoecology* 286: 23-41.	**China**, Sichuan, Lake Naleng +31.10 +99.75	C-t	core begins 11000 BP *"C-t"* with BOTH trees and *PA*, 11000-3450 at low levels then stops
115.	Yang Y. 2014. *The analysis of charred plant seeds at Jinchankou site and Lijiaping site during Qijia Culture period in the Hehuang region, China*. Master thesis, Dept. Physical Geography, Lanzhou University.	**China**, Qīnghǎi Province, Hehuang Héhuáng region, Jinchankou +36.4 +102.5	C.s.	one charred hemp seed, 4200-3750 BP
116.	Zhang C. 2013. *Archaeobotanical remains from Lajia Site, Minhe, Qinghai*. Master thesis, Northwest University.	**China**, Qīnghǎi Province, Mínhé, Lǎjiā site +35.873 +102.812	C.s.	charred hemp seed, 4200-3500 BP
117.	Xiao JL, Qinghai Xu QH, Nakamura T, Yang XL, Wendong Liang WD, Inouchi Y. 2004. Holocene vegetation variation in the Daihai Lake region of north-central China: a direct indication of the Asian monsoon climatic history. *Quaternary Science Reviews* 23 (2004) 1669–1679.	**China**, Inner Mongolia, Lake Daihai +40.550 +112.666	H	core begins 10250 "H" w/*PAC* 10250-8000, then w/AP pollen 7500-5200, call it *H*; then surge 1000 BP to present, call it *CC*
118.	Xia ZK, Zhang JN, Liu J, Zhao CH, Wu XH. 2012. Analysis of the ecological environment around 10000 a BP in Zhaitang area, Beijing: A case study of the Donghulin site. *China Science Bulletin* 57: 360-369.	**China**, Beijing, Donghulin site +39.98 +115.83	H	core 11090-9560 H w/*PAC* and NAP 4 peaks 10200-10120, 9700
119.	Xia ZK, Wang ZH, Zhao QC. 2004. Extreme flood events and climate change around 3500 aBP in the Central Plains of China. *Science in China Ser. D Earth Sciences* 47: 599-606.	**China**, Henan, Xinzhai, +34.44 +113.541	H	core begins Longshan Period (5000-4000 BP) w/AP 60-70%+*PAC* 5000-4000, and 2200-1600

120.	Tarasov P, Jin GY, Wagner M. 2006. Mid-Holocene environmental and human dynamics in northeastern China reconstructed from pollen and archaeological data. *Palaeogeography, Palaeoclimatology, Palaeoecology* 241: 284-300.	**China,** near Beijing, Taishizhuang +40.358 +115.825	C-H	core begins 5500 BP, two peaks: 5300 w/AP in flux 40-80% and low *PAC*—call it *H*, then 4000 w/AP in flux 30-50% and rises in *Poa, Art.,* call it *C*
121.	Wei Chen Wei-Ming Wang Xue-Rong Dai . 2009. Holocene vegetation history with implications of human impact in the Lake Chaohu area, Anhui Province, East China.*Vegetation History and Archaeobotany* 18: 137-146.	**China**, Anhui, Lake Chaohu, lower Yangtze +31.529 +117.374	H	core begins 10500. H w/AP 50-90%+*Alnus* 10500-3500 call it H, then w/AP 20-30%+PAC, Cerealia, double-count 1000 BP, call it *CC*
122.	Huang F, Zhang M. 2000. Pollen and phytolith evidence for rice cultivation during the Neolithic at Longqiuzhuang, eastern Jianghuai, China. *Vegetation History and Archaeobotany* 9: 161-168.	**China,** Jianghuai, Longqiuzhuang +32.66 +119.50	H	core begins 7000 BP "H" w/*PAC* peak at 6600, early Neolithic
123.	Chen W, Wang WM. 2012. Middle-Late Holocene vegetation history and environment changes revealed by pollen analysis of a core at Qingdao of Shandong Province, East China. *Quaternary International* 254: 68-72. add to CannaHistory	**China,** Shandong, Qingdao, +36.166 +120.250	H	core begins 7250 BP "H" w/AP 40-60%+*Alnus* but also *PAC* 5900-5400, call it *C/H*; then w/AP 10-35%, no *Alnus*, but *PAC* (no surge) 4800-3900, call it *C*
124.	Chen XX. 2007. 海岱地区新石器时代晚期至青铜时代农业稳定性考察 [*Hǎidài late Neolithic to the early Bronze Age stability of agriculture*]. Doctoral thesis, Shāndōng University, Jǐnán. *cited by Long et al. (2016)* as Chen XX. 2007. Paleoethnobotany and agriculture across the transition from the Late Neolithic to the Bronze Age in Northeastern China: A case study. Ph.D. Thesis, Shandong University	**China,** Shandong, near Jǐnán, Dàxīnzhuāng site +36.666 +116.98	C.s.	charred hemp seed, 3600-3000 BP
125.	Zhu C, Zheng CG, Ma CM, Yang XX, Gao XZ, Wang HM, Shao JH. 2003. On the Holocene sea-level highstand along the Yangtze Delta and Ningshao Plain, East China. *Chinese Science Bulletin* 48: 2672-2683.	**China,** Yangtze delta, Hemudu +29.96, +121.34	H	core begins 6955 BP "H" begins 6955 w/*Alnus*, decreases alongside AP (likely *Humulus*), then surge at 5330-4700 along with rice pollen—call *CC*
126.	Li CH, Wu YH, Hou XH. 2011. Holocene vegetation and climate in northeast China revealed from Jinbo Lake sediment. *Quaternary International* 229: 67-73.	**China,** Heilongjiang, Jinbo Lake +43.916 +128.833	H	core begins 9600 BP H w/AP 65-75%+*Quercus,Betula* 9000-6000; then H rare 6000-present w/AP still 50-75%, call it all *H*
127.	Makohonienko M, Kitagawa H, Fujiki T, Liu X, Yasuda Y, Yin HN. 2008. Late Holocene vegetation changes and human impact in the Changbai Mountains area, Northeast China. *Quaternary International* 184: 94-108.	**China,** Jilin, Changchun +43.900 +125.216	H-t	core begins 5050 BP H w/AP 80-90%+*Quercus* 5050-310, call it *H*; then w/↓AP 75%+↑*PAC*+ *Fagopyrum* + surge, 200-present, call it *CC*
128.	Makohonienko M, Kitagawa H, Naruse T, Nasu H, Momohara A, Okuno M, *et. al.* 2004. Late-Holocene natural and anthropogenic vegetation changes in the Dongbei Pingyuan (Manchurian Plain), northeastern China. *Quaternary International* 123-125: 71-88.	**China,** Inner Mongolia, Muchang +43.150 +123.450	H-C	core begins 4930 BP. H-C w/AP 35-55% 4930-1040 BP + *H. scandens* fruits found: call it *H*, then w/↓AP 10-15%+*Fagopyrum* and surge 1040-680 BP call it *CC*
129.	Huang XZ, Chen CZ, Jia WN, An CB, Zhou AF, Zhang JW, Jin M, Xia DS, Chen FH Grimm EC. 2015. Vegetation and climate history reconstructed from an alpine lake in central Tienshan Mountains since 8.5 ka BP. *Palaeogeography, Palaeoclimatology, Palaeoecology* 432: 36-48.	**China**, Tienshan, Swan Lake +43.046 +84.381	H	w/*PAC* 8500 BP, then surge begins 2600 BP

130.	Innes JB, Zong YQ, Wang ZH, Chen ZY. 2014. Climatic and palaeoecological changes during the mid- to late Holocene transition in eastern China. *Quaternary Science Reviews* 99: 164-175. The authors report a "strange" surge in Moraceae pollen not following other tree pollens; Demske et al. (2016) interpret the surge as misidentified *Cannabis*, indicative of a retting site.	**China,** Yangtze delta, Pingwang, +30.96 +120.7	Moraceae	w/75%AP, increasing *Poaceae*, surge 15% of total pollen 5000-4300, 4400-2800 (end of core), call it *CC* retting site
131.	Zhou KS. 1963. 西安半坡新石器时代遗址的孢粉分析 [*Sporopollen analysis of Neolithic sites in Bànpō, Xī'ān*], pp. 270-272 in 西安半坡: 原始氏族公社聚落遗址, Cultural Relics Press, Beijing.	**China,** Bànpō site near Xī'ān +34.273 +109.051	H	four pollen grains as *Humulus*, but in an assemblage with *Poaceae, Artemisia* and *Chenopodiaceae*—suggestive of wild-type *Cannabis*. ca. 3000 BCE (5000 BP)
132.	Bestel S, Bao YJ, Zhong H, Chen XC, Liu L. 2018. Wild plant use and multi-cropping at the early Neolithic Zhuzhai site in the middle Yellow River region, China. *The Holocene* 28: 195-207.	**China,** Henan, Zhèngzhōu, Zhūzhài +34.76 +113.65		one carbonized seed, 7853 ± 58 cal. BP, photo provided; 3.6 mm long by 3.0 mm wide, ovoid, no basal constriction or abscission zone
133.	Jia X, Sun YG, Wang L, Sun WF, Zhao ZJ, Lee HF, Huang WB, Wu SG, Lu HY. 2016. The transition of human subsistence strategies in relation to climate change during the Bronze Age in the West Liao River Basin, Northeast China. *The Holocene* 26: 781-789.	**China,** Inner Mongolia, West Liao River Basin, Shangtaizi site +42.25 +118.883		one carbonized hemp seed, 3900–3400 cal. yr BP
134.	Sun YG. 2014. 西辽河上游地区新石器时代至早期青铜时代植物遗存研究 (*Research on plant remains from Neolithic to Early Bronze Age in Upper West Liao River region*). Doctoral Thesis, Inner Mongolia Normal University.	**China,** Inner Mongolia, Chìfēng City, Èrdàojǐngzi +42.25 +118.882	C.s.	carbonized hemp seeds, 5000 BP
135.	Jiang HG, Zhang YB, Lü EG, Wang CS. 2015. Archaeobotanical evidence of plant utilization in the ancient Turpan of Xinjiang, China: a case study at the Shengjindian cemetery. *Vegetation History and Archaeobotany* 24: 165-177.	**China,** Xinjiang, Shengjindian +42.93 +89.626		seeds and phytoliths, 2800-2520 BC, BP
136.	Jiang HE, Li X, Zhao YX, Ferguson DK, Hueber F, Bera S, Wang YF, Zhao LC, Liu CJ, Li CS. 2006. A new insight into *Cannabis sativa* (Cannabaceae) utilization from 2500-year-old Yanghai Tombs, Xinjiang, China. *J Ethnopharmacology* 108: 414-422. *data elaborated in:* Russo EB, Jiang HE, Li X, Sutton A, Carboni A, del Bianco F, Mandolino G, Potter DJ, Zhao YX, Bera S, Zhang YB, Lü EG, Ferguson DK, Hueber F, Zhao LC, Liu CJ, Wang YF, Li CS. 2008. Phytochemical and genetic analyses of ancient cannabis from Central Asia. *Journal of Experimental Botany* 59: 4171-4182.	**China,** Xinjiang, Turpan, Yánghǎi +42.807 +89.65	C.s.	seeds and phytoliths, 2700-2500 cal. BP
137.	Brugger SO. Gobeta E, Siglb M, Osmont D, Papina T, Rudaya N, Schwikowski M, Tinner W. 2018. Ice records provide new insights into climatic vulnerability of Central Asian T forest and steppe communities. *Global and Planetary Change* 169: 188–201.	**Mongolia,** Altai, Tsambagarav, +48.655 +90.847	C	core begins 5400; C intermittent peaks 3000-1600 w/AP 10-30%+*PAC*; then small surge w/AP↓+*PAC*↑ and *Cerealia*: 1000-present, call it *CC*
138.	Crawford GW, Lee GA. 2003. Agricultural origins in the Korean peninsula. *Antiquity* 77: 87-95. *also reported in:* Shin S-C, Rhee S-N, Aikens CM (2012) Chulmun Neolithic intensification, complexity, and emerging agriculture in Korea. *Asian Perspectives* 51:68–109.	**Korea,** central, Daecheonri +36.67, +129.11		carbonized phytoliths, 4590-4240 BP (Crawford and Lee 2003) or 5200 BP (Shin *et al.* 2012).

139.	Park J, Kim M, Lim HS, Choi J. 2013. Pollen and sediment evidence for late-Holocene human impact at the Seonam-dong archeological site, Gwangju, Korea. *Review of Palaeobotany and Palynology* 193: 110–118	**Korea,** Seonam-dong, +35.166 +126.916	H/C	core begins 3150 BP. H/C in 3150 at high levels, 25% TLP, w/*Cerealia*, a retting site. H/C and *Cerealia* decrease 2340 BP due to a "flooding event." H/C returns to high percentage 1860-1000 BP, peaking at 55%. It decreases again, returning to 20% 500 BP.
140.	Park J, Yu KB, Lim HS, Shin YH. 2012. Multi-proxy evidence for late Holocene anthropogenic environmental changes at Bongpo marsh on the east coast of Korea. *Quaternary Research* 78 (2012) 209–216.	**Korea,** Gangwon-do, Bongpo +38.247 +128.563	H/C	core begins 2650 BP 2300 BP peak w/AS and AP pollen (*Humulus*), then surge 150 BP (call it *CC*)
141.	Evstigneeva TA, Naryshkina NN. 2010. The Holocene climatic optimum at the southern coast of the Sea of Japan. *Paleontological Journal* 44: 1262–1269.	**Korea,** off the coast of Gyeongju +35.883 +130.233	Canna-baceae	core begins 10100 BP two peaks w/*Alnus* and AP: 6000, 1800
142.	Kobayashi M, Momohara A, Okitsu S, Yanagisawa S, Okamoto T. 2008. Fossil hemp fruits in the earliest Jomon period from the Okinoshima site, Chiba Prefecture. *Shokuseishi kenkyū (Japanese Journal of Historical Botany)* 16(1): 11-18. Kudo Y, Kobayashi M, Momohara A, Noshiro S, Nakamura T, Okitsu S, Yanagisawa S, Okamoto T. 2009. Radiocarbon dating of fossil hemp fruits in the earliest Jomon period. *Shokuseishi kenkyū (Japanese Journal of Historical Botany)* 17(1): 27-32.	**Japan,** Chiba Prefecture, Okinoshima +34.983 +134.816	C	seeds, calibrated date 10000 BP
143.	Takahara H, Sugita S, Harrison SP, Miyoshi N, Morita Y, Uchiyama T. 2000. Pollen-Based Reconstructions of Japanese Biomes at 0, 6000 and 18,000 14C yr BP. *Journal of Biogeography* 27: 665-683.	**Japan,** Honshu island, +36.0 +138.0		*Humulus* named as temperate forb: 6000 BP
144.	Crawford GW. 1992. "Prehistoric plant domestication in east Asia," pp. 7-38 in Cowan CW, Watson PJ, *eds. The Origins of Agriculture: An International Perspective.* Smithsonian Institution, Washington, DC. *also mentioned in:* Matsui A, Kanehara M. 2006. The question of prehistoric plant husbandry during the Jomon Period in Japan. World Archaeology 38:259–273	**Japan,** Fukui Prefecture, Torihama, +35.550 +135.900		hemp seeds, 7200 BP
145.	Kasahara Y. 1987. "鳥浜貝塚(第 7 次発掘)における種子集中層から出土種実の同定— アサ,クマヤナギ,ヒルムシロ 類,その他—,' pp. 1-6 in 鳥浜貝塚 1985 年度調査概報・研究の成果—縄文前期を主とする低湿地遺跡の調 査 6—. Wakasa Historical Folk Museum, Fukui Prefecture.	**Japan,** Fukui Prefecture, Torihama, +35.550 +135.901		hemp seeds, 5000 BP
146.	Habu J, Kim M, Katayama M, Komiya H. 2001. Jomon substistence-settlement systems at the Sannai Maruyama site. *Bulletin of the Indo-Pacific Prehistory Association* 21: 9-21.	**Japan,** Aomori Prefecture, Sannai Maruyama +40.81, +140.70		hemp seeds, 5900-4300 BP
147.	D'Andrea AC. 1995. Later Jomon subsistence in Northeastern Japan: new evidence from palaeoethnobotanical studies. *Asian Perspectives* 34:195–227	**Japan,** Aomori Prefecture, Kazahari +40.512 +141.489		one hemp seed, 3500-3000 BP
148.	Crawford GW (2011) Advances in understanding early agriculture in Japan. *Current Anthropology* 52(S4): S331–S345	**Japan,** Tokyo Shimoyakebe +35.768 +139.455		hemp seed, 3400 BP

149.	Herzschuh U, Kürscher H, Battarbee R, Holmes J. 2005. Desert plant pollen production and a 160-year record of vegetation and climate change on the Alashan Plateau, NW China. *Vegetation History and Archaeobotany* 15: 181-190.	**China,** Alashan Plateau, Lake Baoritalegai +39.6 +102.0		Core begins 160 BP (1860 AD), *Artemisia* dominates, between 50-80%. Last 30 years w/ surge in *Cannabis* + *Cerealia*, call it *CC*
150.	Makohonienko M, Kitagawa H, Naruse T, Nasu H, Momohara A, Okuno M, *et. al.* 2004. Late-Holocene natural and anthropogenic vegetation changes in the Dongbei Pingyuan (Manchurian Plain), northeastern China. *Quaternary International* 123-125: 71-88.	**China,** Liaoning, Dahuofang +42.666 +122.616	H-type, cf. Canna	Core begins 3860 BP **H-t:** w/AP 30-60%+ *Quercus, Salix, Betula*, 3860-710 BP call it *H*; then w/AP 10%+*PAC*+ *Fagopyrum* and surge 710-present, call it *CC* **cf. Cannabis**: w/AP 10%+*PAC*+ *Fagopyrum* and surge 710-present, call it *CC*
151.	Mingram J, Allen JRM, Brüchmann C, Liu J, Luo X,. Negendank JFW, Nowaczyk N, Schettler G. 2004) Maar- and crater lakes of the Long Gang volcanic field (N.E. China): overview, laminated sediments, and vegetation history of the 900 years. *Quaternary International* 123-125: 135-147.	**China,** Jilin Province, Lake Sihailongwan, +42.283 +126.60	Canna-baceae	Core began 1060 BP H w/AP 80-90%+*Quercus,Betula, Alnus, Salix* 1000-150, call it *H*, then w/↓AP 60%, ↑ *PAC* + *Cerealia* and surge, call it *CC*
152.	Yahimovich VL, Nemcova VK, Dorofeev PI, Popov-Lviv, F, Suleymanov F, Khabibullina GA, Alimbekova LI, Latypova EK. 1986. Плейстоцен нижнего течения р. Урал [*Pleistocene lower reaches of the Ural River*]. Bashkir Branch of the USSR Academy of Sciences, Ufa.	**Kazakhstan**, Chapaev +50.2 +51.0	*C. ruderalis*	Mikulino (Eemian) interglacial (OIS 5), 130-115 kya. Seed identified by Dorofeev
153.	Shumilovskikh LS, Tarasov P, Arz HE, Fleitmann D, Marret F, Nowaczyk N, Plessen B, Schlütz F, Behling H. 2012. Vegetation and environmental dynamics in the southern Black Sea region since 18 kyr BP derived from the marine core 22-GC3. *Palaeogeography, Palaeoclimatology, Palaeoecology* 337-338: 177–193.	**Turkey,** Black Sea core 22- GC3 +42.225 +36.492	Canna-baceae	w/*PCA*: 17000, 14500, 13,500, then w/*Alnus*: 8500-7000, 5500-3500, then surge w/*PCA*: 2300-present
154.	Shatilova I, Mchedlishvili N, Rukhadze L, Kvavadze E. 2011. The history of the flora and vegetation of Georgia (South Cacasus). Georgian National Museum Institute of Paleobiology, Tbilisi.	**Georgia**, Barmysh +43.216 +40.49	H	Sarmatian stage (13.0-9.5 mya) and Meotian stage (9.5-7.1 mya) w/90-95% AP—likely *Humulus*
155.	Prikhod'ko VE, Ivanov IV, Mankhov DV, Gerasimenko NP, Inubushi K, Kawahigashi M, Nagano K, Sugihara S. 2013. Soils, vegetation, and climate of the southern Transural region in the middle Bronze Age (by the example of the Arkaim fortress). *Eurasian Soil Science* 46: 925-934.	**Russia,** Arkaim +52.644 +59.563	C/H	w/*PCA*; NAP pollen 68%, *Cerealia* reported—call it either *CC* or archaeological (Arkaim site, 3700 BP)
156.	Danukalova GA. 2010. The refined Quaternary stratigraphic scale of the Fore-Urals and main events in southern Urals Region. *Stratigraphy and Geological Correlation* 18: 331–348.	**Russia,** several Cis-Ural sites +54.39 +56.17 (centrum of sites)	H	Eopleistocene, 1.8–1.2 mya, use mean date of 1.5 mya "H" pollen occurring in "forest-free herbaceous–steppe landscape" w/*PCA*, rare *ASP* — likely *C*

Table S2: Studies excluded from analysis (reason why in red-colored font)

1.	Nair PKK. 1968. Affinities of some Indian Tertiary and Quaternary pollen and spores.	**India**, two sites	C	Nair reinterprets as *Cannabis* the

	Journal of the Palaeontological Society of India 11: 18-23. The single pollen grains that Nair reinterprets as *Cannabis* greatly exceed the grain diameter of modern *Cannabis* pollen	listed below		pollen identified by Vimal (1953) and Sahni et al. (1947) see below
2.	Vimal KP. 1953. Tertiary spores and pollen from Warkalli lignites, Travancore. *Proceedings of the Indian Academy of Sciences, Section* B 38: 195-210.	**India,** Travancore, Kerla, soft coal mine		Miocene (23.0-5.3 mya) *Triorites spp. 4* —oblate-spheroidal, with three equatorial pores, surface granular, 45.3 µm diameter
3.	Sahni B, Sitholey RV, Puri GS. 1947. Correlation of the Tertiary succession in Assam by means of microfossils, Palaeobotany in India No. 6. *Journal of the Indian Botanical Society* 26: 262-263.	**India,** Assam		Tertiary Period (66-2.58 mya). unnamed pollen illustrated in Sahni's Plate XVI Fig. 35 —spheroidal, with three equatorial pores, a granular surface, 58 µm diameter.
4.	Danukalova GA. 2010. The refined Quaternary stratigraphic scale of the Fore-Urals and main events in southern Urals Region. *Stratigraphy and Geological Correlation* 18: 331–348.	**Russia,** southern Urals/upper Volga River basin	H	This study is technically located in Europe. Eopleistocene, 1.8–1.2 mya pollen occurring in "forest-free herbaceous–steppe landscape" w/*PAC*, rare *ASP* — likely *Cannabis*
5.	Matveev AV, Larina NS, Kostomarovo JV, Kiktenko EV. 2010. Результаты изучения пригаров и почв из сосудов алакульской культуры Хрипуновского могильника [The result of soot and soil study from the vessels of Alakul Culture of Khripunovskiy necropolis]. *Вестник Тюменского государственного университета* 2010(1): 12-20.	**Russia,** Alakul culture, Khripunovskiy	C.s.	Debris in buried vessels was high in P_2O_5, which authors interpret as evidence of *Cannabis* seed—a dubious methodology.
6.	Baruch U. 1986. History of Lake Kinneret (Sea of Galilee), Israel. *Paléorient* 12(2): 37-48.	**Israel**, Sea of Galilee, Lake Kinneret +32.833 +35.583	H/C	only two pollen grains, probably long distance transport
7.	Hajar L, Haïdar-Boustani M, Khater C, Cheddadi R. 2010. Environmental changes in Lebanon during the Holocene: man vs. climate impacts. *Journal of Arid Environments* 74: 746-755. Authors report "Cultivated species were not recorded in the pollen records"	**Lebanon**, Bekaa Valley, Chamisine +33.733 +35.950	H/C	only two pollen grains, probably long distance transport