Origins & Spread of Agriculture in India. Dorian Q Fuller 2008.4.18
印度的农业起源和传播

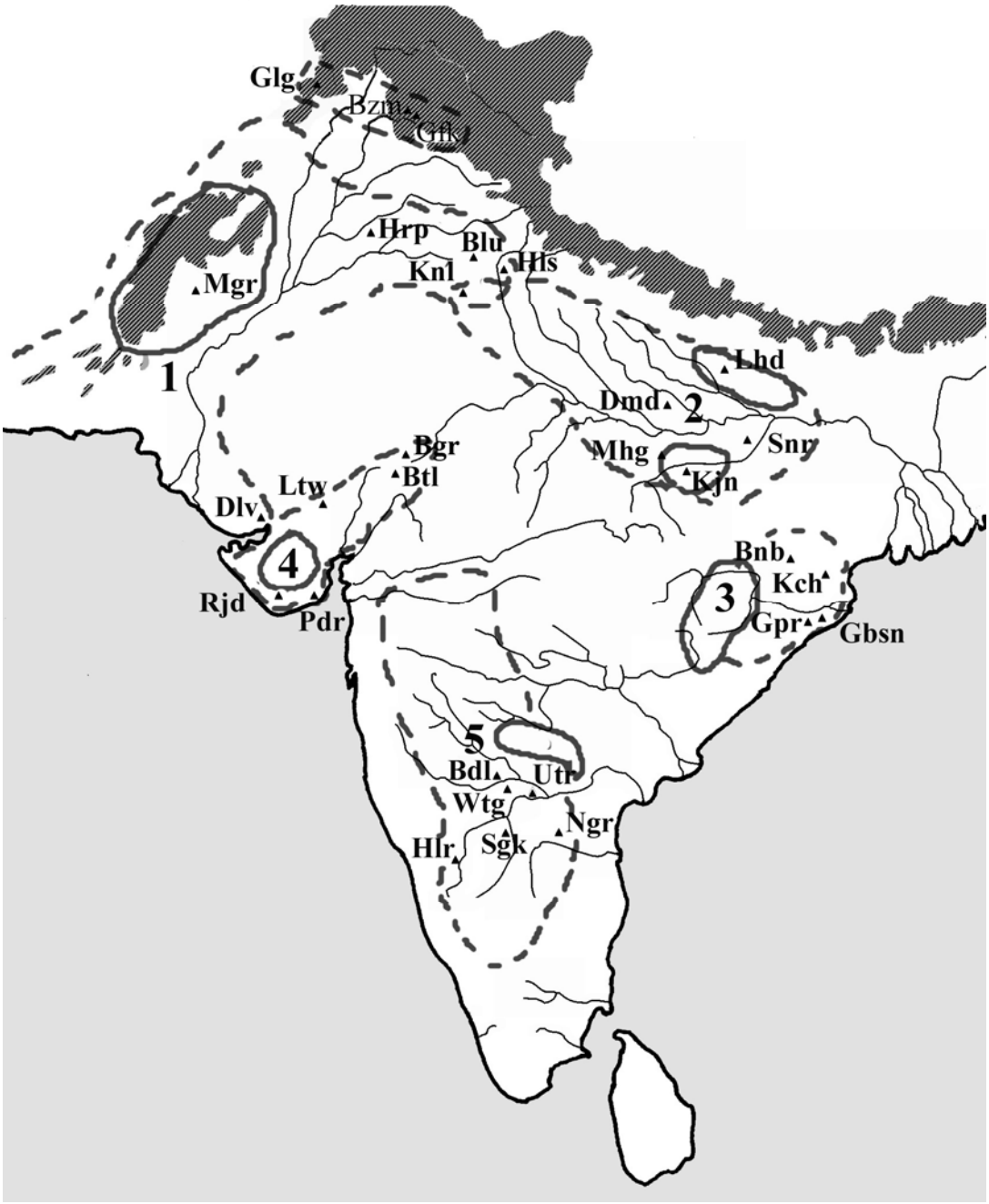
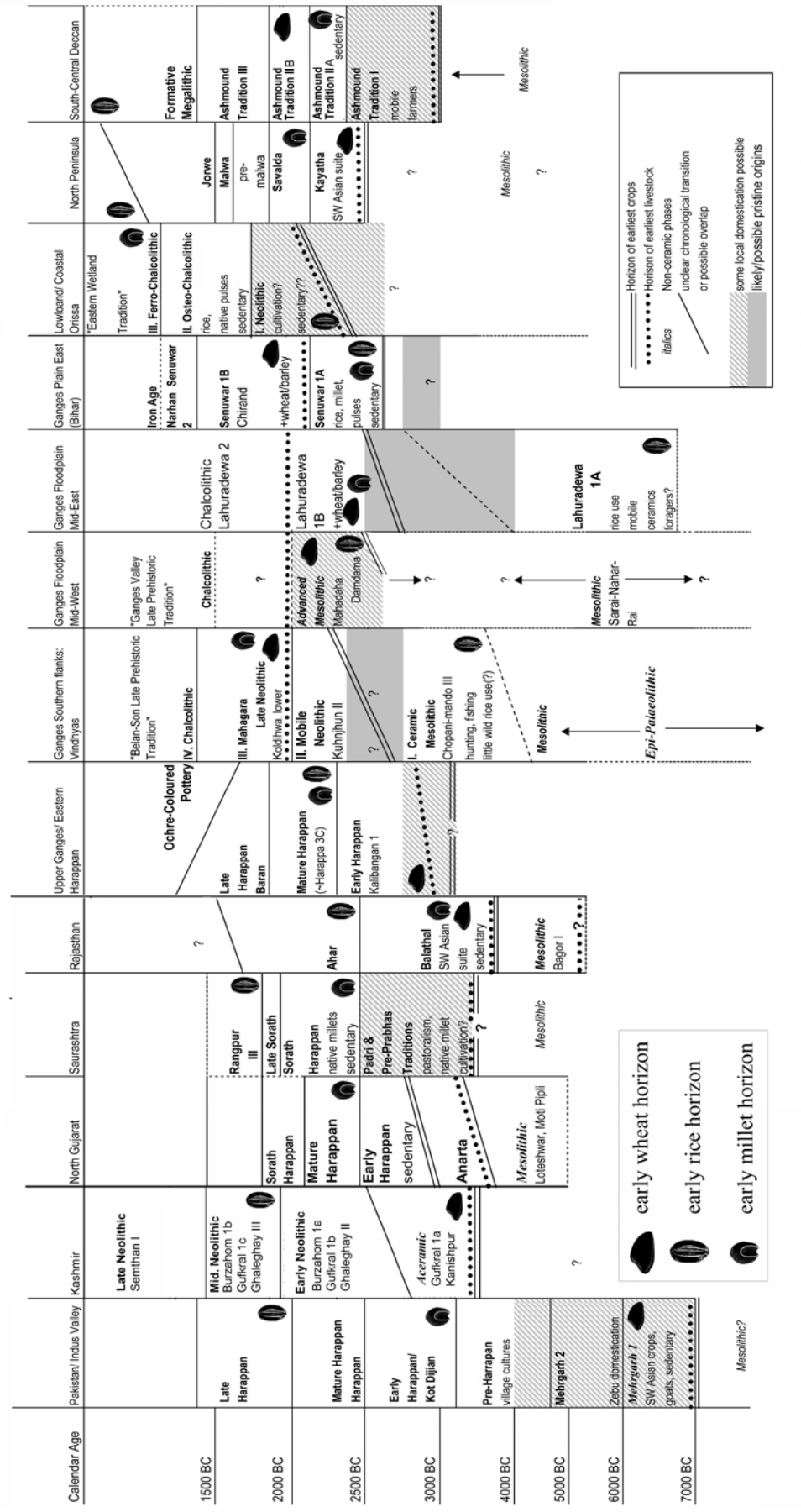


Figure 1. The major independent Neolithic zones of South Asia, with selected archaeological sites. For each zones the solid grey outline indicates best guess region(s) for indigenous domestication processes and/or earliest adoption of agriculture. The dashed lines indicates the expanded region of related/derivative traditions of agriculture; selected sites plotted.
图一，南亚各新石器区分布，含主要遗址位置。实线范围为本地驯化的最可能区域或最早接受农业的区域；虚线为这一传统的传播扩大区域

1. The northwestern zone, with the disjunct area of the Northern Neolithic shown: Mgr. Mehrgarh, Glg. Ghaleghay, Bzm. Burzahom, Gfk. Gufkral. 2. The middle Ganges zone with two possible rice domestication areas: Dmd. Damadama, Lhd. Lahuradewa, Mhg. Mahagara, Kjn. Kunjhun, Snr. Senuwar. 3. Eastern India/Orissan zone: Bnb. Banabasa, Kch. Kuchai, Gpr, Gopalpur, Gbsn. Golabai Sassan. 4. Gujarat and southern Aravalli zone: Ltw. Loteshwar, Rjd. Rojdi, Pdr. Padri, Btl. Balathal, Bgr. Bagor. 5. Southern Indian zone: Bdl. Budihal, Wtg. Watgal, Utr. Utnur, Sgk. Sanganakallu and Hiregudda, Hlr. Hallur, Ngr. Nagarajupalle.



Chronological Framework (based on Fuller 2006 *Journal of World Prehistory* 20: 1-86)印度新石器一铜石并用时代编年

Table 1. Important domesticates in South Asia originating in the Near East
表一，近东起源传入南亚的驯化物种

Species	**Region and period of origin**	**Earliest occurrence in South Asia 最早出现于南亚的地区年代**	**Comments 备注**
Wheat(s) *Triticum* spp.小麦	Near Eastern fertile crescent, 9700-8000 BC	Mehrgarh, ca. 7000 BC	Mehrgarh finds include primitive glume wheats (*Triticum monococcum*, *T. diococcum*) as well as derived free-threshing breadwheats (*T. aestivum*)
Barley 大麦 *Hordeum vulgare*	Near Eastern fertile crescent, 9700-8000 BC. Additional domestication further east is possible.	Mehrgarh, ca. 7000 BC	Wild barley also reported at Mehrgarh, probably as a field weed.
Pea 豌豆 *Pisum sativum*	Near Eastern fertile crescent (Southern Levant), 9700-8000 BC.	Indus valley sites, Kashmir, 3rd M. BC	Earlier sites lack adequate sampling
Lentil 兵豆 *Lens culinaris*	Near Eastern fertile crescent, 9700-8000 BC.	Indus valley sites, Kashmir, 3rd M. BC; 4th M. BC Makran	Earlier sites lack adequate sampling
Chickpea 鷹嘴豆 *Cicer arietinum*	Near Eastern fertile (Northern Levant) crescent, 9700-8000 BC.	Indus valley sites, 3rd M. BC	Earlier sites lack adequate sampling
Grasspea 家山黧豆 *Lathyrus sativus*	Greece(?), Anatolia(?), 8000-7000 BC(?)	Indus valley sites, 3rd M. BC	Earlier sites lack adequate sampling
Flax 亚麻 *Linum usitatissimum*	Near Eastern fertile (Northern Levant) crescent, 9700-8000 BC.	Indus valley sites, 3rd M. BC	Earlier sites lack adequate sampling
Safflower 红花 *Carthamus tinctorius*	Near East	Balathal, Rajasthan, ca. 3000 BC	
Goat 山羊 *Capra hircus*	Near East, 8500-8000 BC	Mehrgarh, ca. 7000 BC	May have more than one domestication in Near East
Sheep 绵羊 *Ovis aries*	Near East, 8500-8000 BC; and Baluchistan?	Mehrgarh: domestication process, 7000-5000 BC(?)	More than one origin in West/Central Asia
Cattle 牛 *Bos taurus*	Near East, 8500-8000 BC	Indus valley sites, 3rd M. BC	Separate origins of zebu (*Bos indicus*), which has domestication process at Mehrgarh, 7000-5000 BC

Table 2. Selected domesticates of South Asian Neolithic origin
表二，部分南亚新石器起源的驯化物种

Species	Region and period of origin	Comments
Zebu cattle 瘤牛 *Bos indicus*	Baluchistan, e.g. Mehrgarh donmestication process, 7000-5000 BC	A second domestication in India is possible.
Water buffalo 水牛 *Bubalus bubalis*	Lower Indus region (Sindh, Kutch), by Harappan period 2500 BC	A second domestication in India is possible.
Chicken 鸡 *Gallus gallus*	Northern India and/or Kashmire: present on Indus valley and Gujarat sites by Harappan period.	Probably a separate origin from Chinese Chickens
Tree Cotton 木棉 *Gossypium arboreum*	Pakistan: present at Mehrgarh by 5000 BC; cultivated by Harappans in Indus valley (3rd M. BC)	Wild ancestor extinct(?)
Sesame 芝麻 *Sesamum indicum*	Indus valley(?);cultivated by Harappans in Indus valley, by 2500 BC	
Long-grained rice 籼稻 *Oryza sativa* ssp. *Indica*	Ganges valley. In use by 7000 BC (Lahuradewa), domesticated by 3rd M. BC	Domestication process poorly understood
Little millet 细柄黍 *Panicum sumatrense*	Saurasthra Peninsula, Gujarat; staple grain by 3rd Millennium BC; also upper Punjab(?) present at Harappa by 3000 BC	Domestication process poorly understood. Two domestications(?).
Browntop millet 多枝臂形草 *Brachiaria ramosa*	South India; staple grain of South Indian Neolithic by 3rd Millennium BC	May also be present as a crop in Gujarat and Ganges during the Neolithic.
Urd bean, black gram 黑绿豆（黑吉豆） *Vigna mungo*	Gujarat or northwest Peninsula; present in Saurashtra by 2500 BC	
Mungbean, green gram 绿豆 *Vigan radiata*	South India; important pulse by 3rd M. BC; Also upper Punjab, present by 3rd M. BC on Harappan sites	
Horsegram 硬皮豆 *Macrotyloma uniflorum*	South India; important pulse by 3rd M. BC	Additional domestication in Western India possible
Pigeonpea 木豆 *Cajanus cajan*	Eastern India: Orissa Neolithic sites by 1500 BC; spread to South India by 1500 BC	
Ivy gourd 红瓜 *Coccinia grandis*	North India, Himalayan foothills; on Late Neolithic sites in Ganges by 1800 BC	

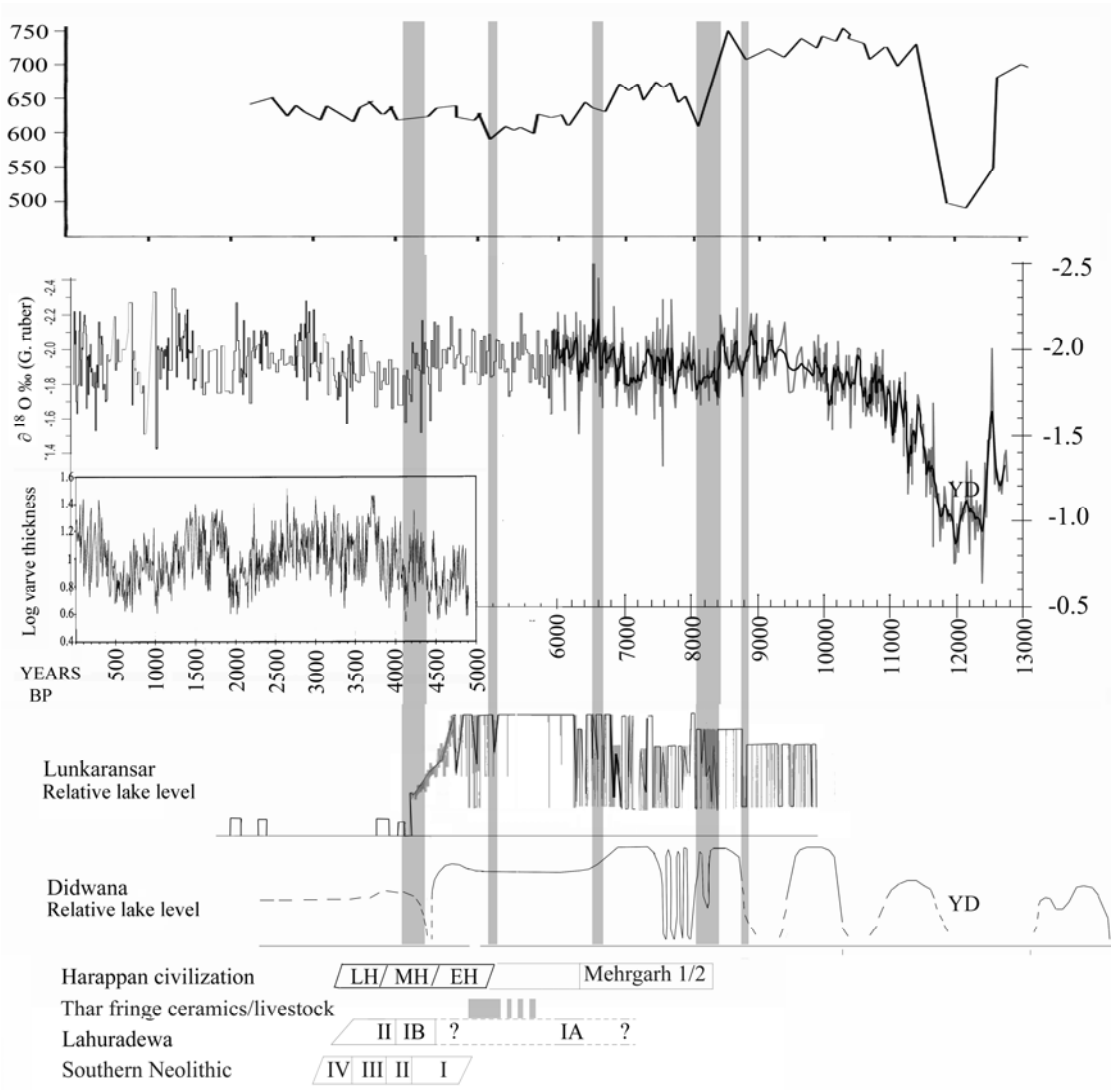


Figure 3. Correlation between various paleoclimatic proxies from northwestern south Asia, and selected archaeological phases. From top to bottom: global atmospheric methane as measured in the Greenland GISP core, O-18 isotopic variation from Pakistan continental margin; 5000 years of Indus discharge inferred from Karachi delta varve thickness, lake level data from Lunkaransar, lake levels from the Didwana lake, selected archaeological phases. (From Madella and Fuller 2006, *Quaternary Science Reviews*)

图三，南亚西北部古气候变化与考古学阶段的对应。上到下：格陵兰冰芯；巴基斯坦 O18 同位素变化；卡拉奇五千年纹泥厚度变化；印度 Lunkaransar 湖和 Didwana 湖水面升降资料；几个主要考古学阶段的对应关系。

Figure 4. Plan of the Gangetic Neolithic settlement of Mahagara, ca. 1700 BC, indicating the distribution of huts in relation to a small animal pen.恒河新石器聚落 Mahagara 平面图。灰色为房址；中间虚线为动物围栏。

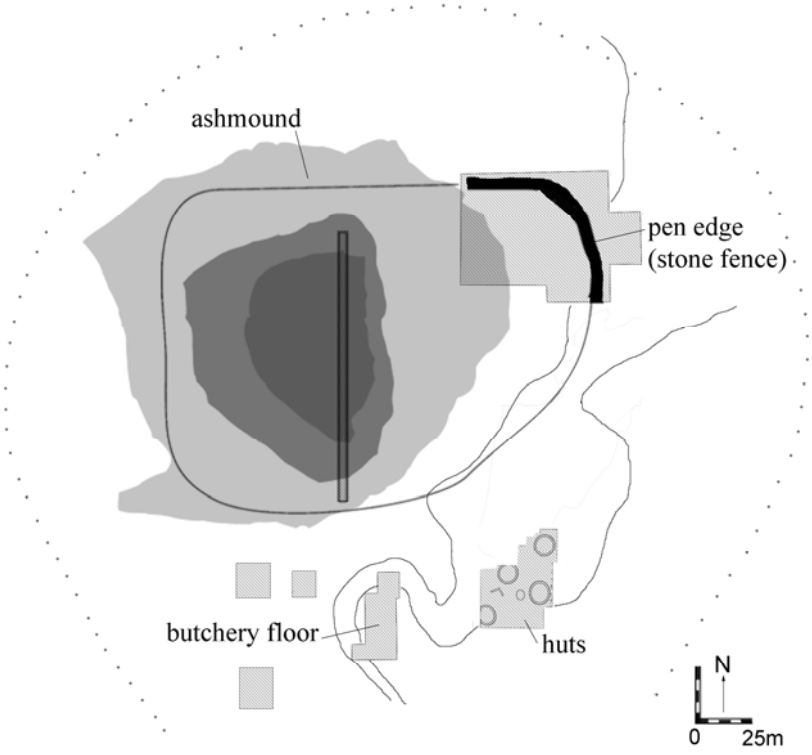
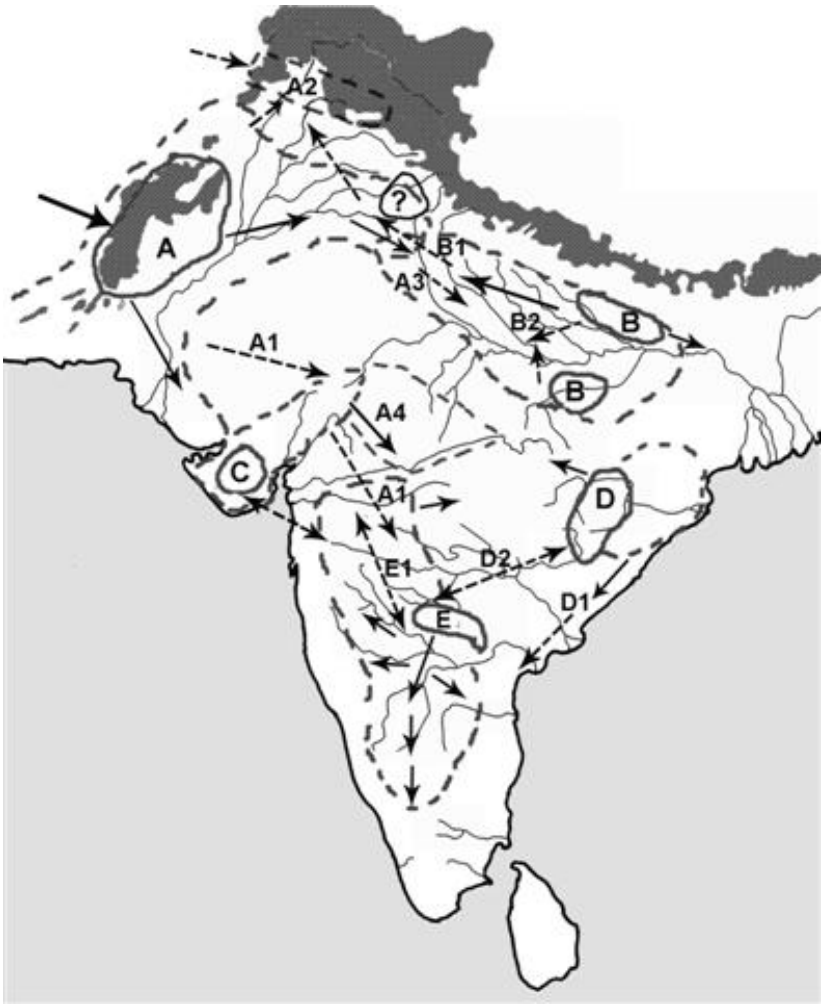


Figure 5. Plan of the Southern Neolithic sire of Budihal, indicating the substantial Ashmound developed atop a large penning area, ca. 2200 BC, and a small area of huts, 2200-1700 BC. 图五，南部新石器遗址 Budihal 平面。灰堆遗址建于大型的围栏范围之上。



Synthesis of Early agricultural dispersals in South Asia (from Fuller 2006, *Journal of World Prehistory* 20: 1-86). Regions of probable local domestications outlined in solid lines, adjacent early spread areas of the same agricultural package indicated by dashed lines. Agricultural package dispersals (probable moving frontiers) indicated by arrows, diffusion across likely static frontiers indicated by dashed arrows. 南亚早期农业传播图示。实线为起源区，虚线为同区域农业组合的早期扩张传播，箭头方向表示农业组合传播方向，跨区域传播为虚线箭头。

Selected "events" labelled: A. Early zone of agro-pastoralism of Southwest Asian origin, with some local domestications (zebu cattle, cotton, sheep?)A 农业－畜牧经济在西南起源（瘤牛，棉花，绵羊？）. A1. possible dispersal of pastoralism without Southwest Asian cultivars, across the Thar and down the peninsula; A2. Diffusion of agricultural package into aceramic Kashmir/Swat; A3. Diffusion of crops and livestock into Gangetic agricultural zone. A4. Expansion of Ahar (and Kayatha?) winter agriculture; B. Middle Ganges centre(s) of domestication, with dispersal through the Gangetic plain B 恒河中游驯化中心及沿恒河平原的传播. B1. Diffusion of rice into the Indus agricultural zone and beyond to Swat, B2. Diffusion of rice and millets into the aceramic Mesolithic of the central plains. C. Saurashtra zone of probable plant domestication. C，Saurashtra 区可能存在的植物驯化 D. Probable zone of Eastern "Munda" domestication 东"蒙达"区可能的驯化, D1. Dispersal and later diffusion rice along the coastal plain, D2. Two-way diffusion of pulses, and millets(?), between the Peninsular and Eastern zones, E. Southern domestication centre of small millets and pulses, with phased southward dispersal indicated 南部驯化中心（小黄米，豆类），往南传播, E1. Diffusion between Chalcolithic North Deccan and the Southern Neolithic. The likely zone of millet and pulse domestication in the upper Sutlej basin is indicated with a question mark, although these could represent secondary domestications by Near Eastern crop farmers.