Chinese Calligraphy and Pattern Recognition:
Styles and Scripts in Excavated Ancient Chinese Documents

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玄　天　玄　天　而　大
地　地　地　地　地　墜
玄　玄　玄　玄　玄　玄
黄　黄　黄　黄　黄　黄

- Warring States (475-221 BCE) period forms of *xiang* 相
- The modern or *liding* 隸定 form of the following *xiang* is 相.

- Qi 齊
- Chu 楚
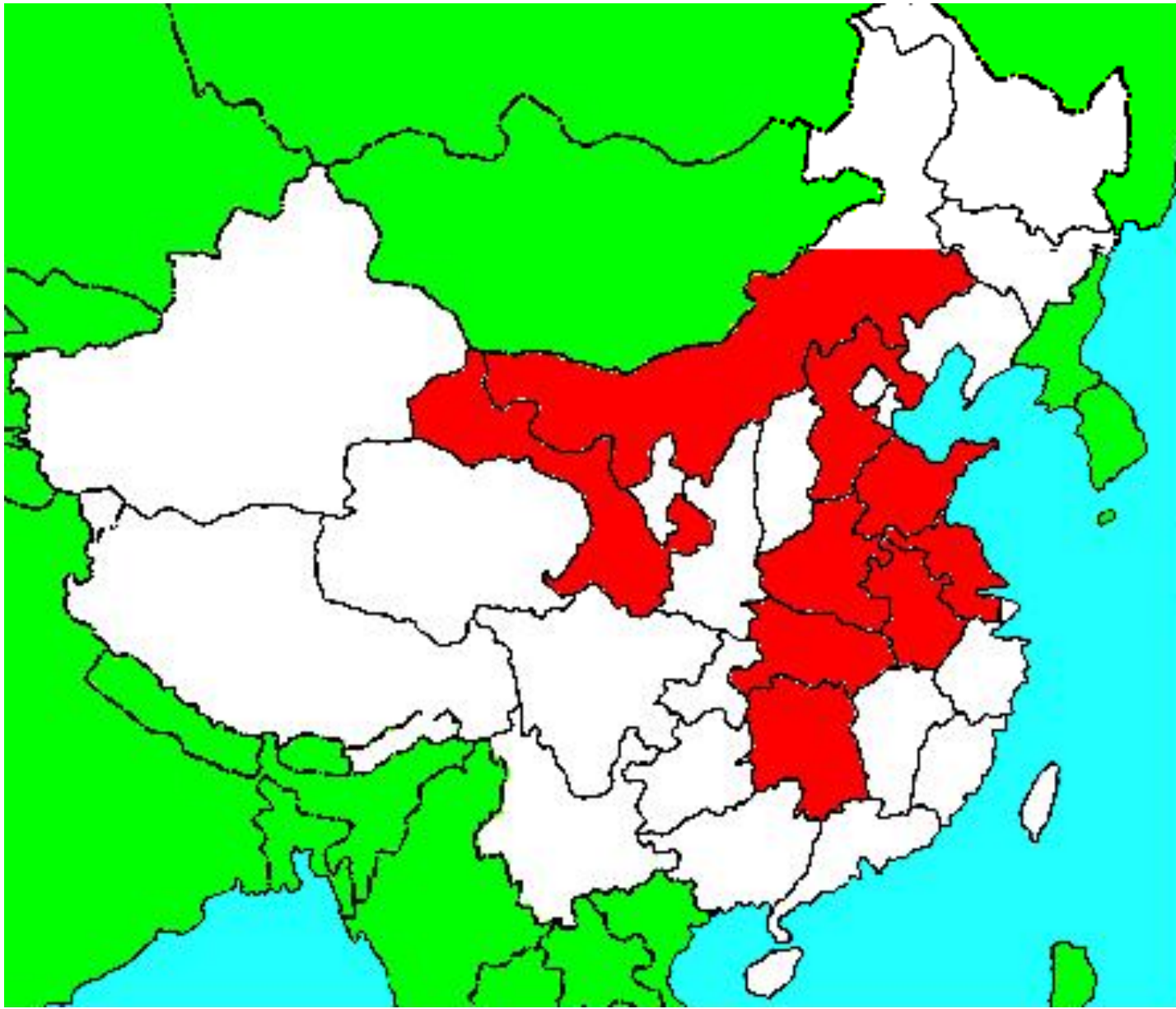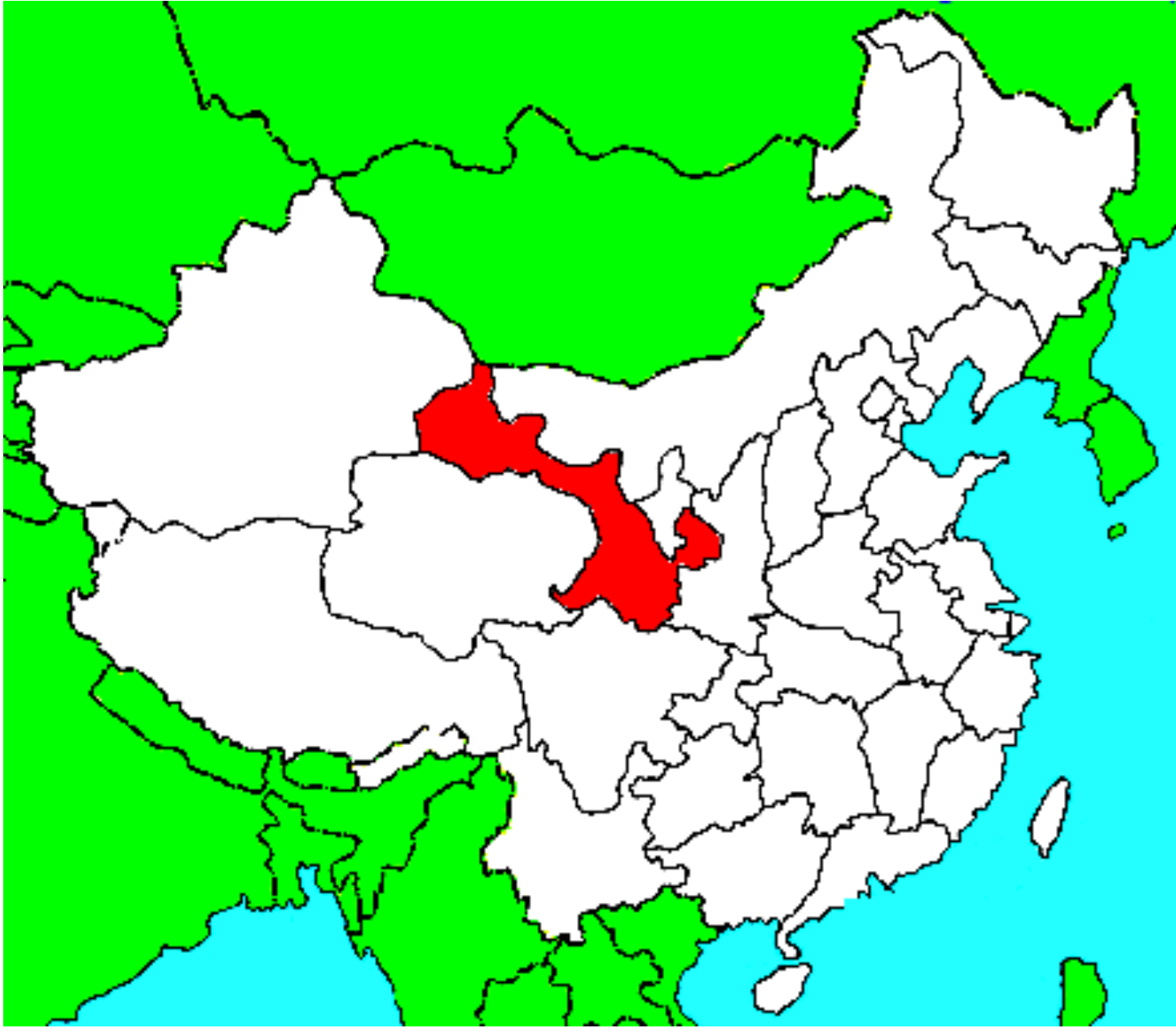- Yan 燕
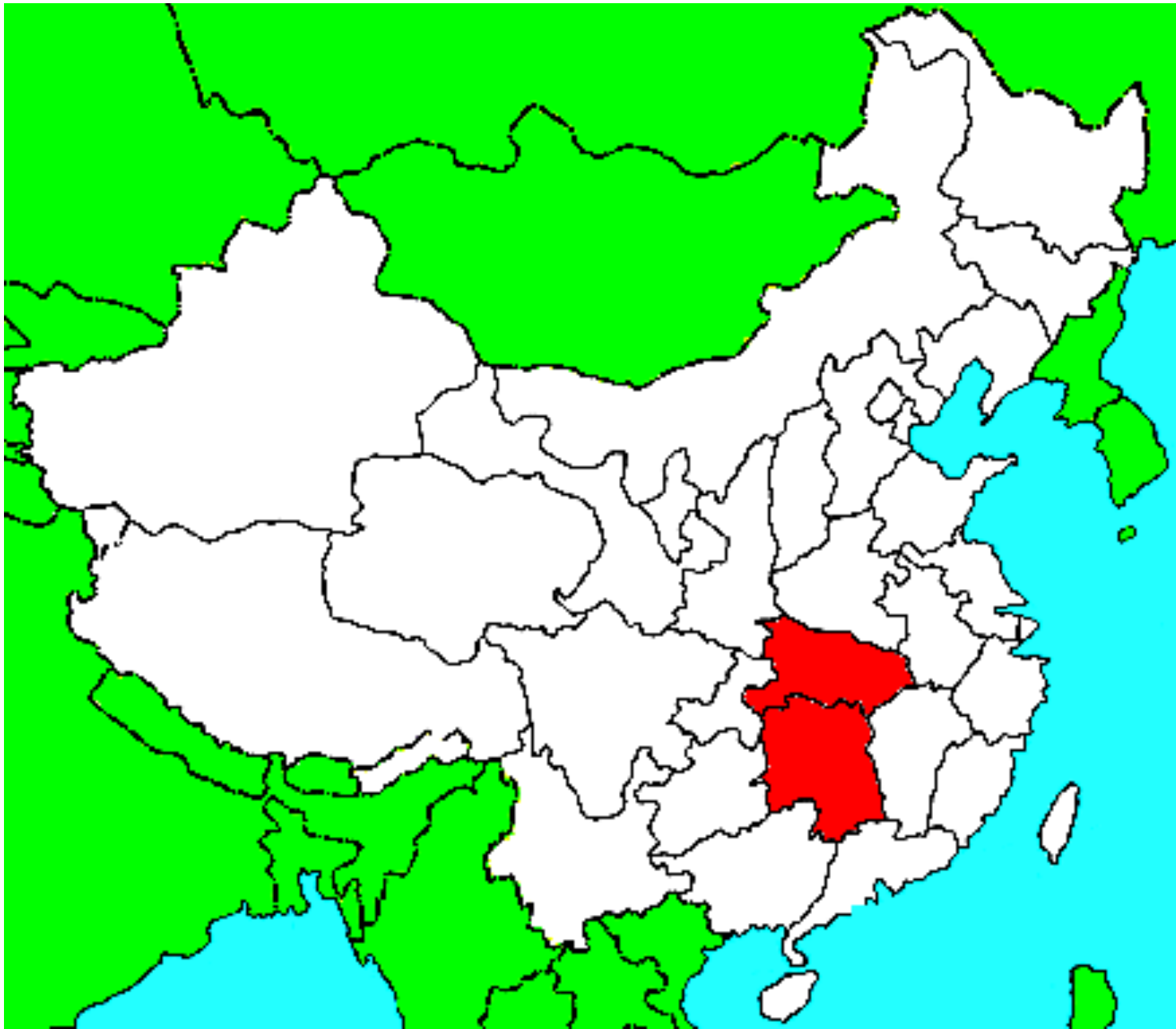- Jin 晉
- Qin 秦

Excavated Ancient Chinese Documents

Seal Script

篆書/篆书

五　丁

三　書　泉

Clerical Script

隸書/隶书

北面請射于以
如初反舊待迺
次命三偶皆但
又述執弓徐出
取夫司射先反
位三偶押取泰

Cursive Script

草書/草书

Standard Script

楷書/楷书

涅槃大旨於福林寺岾鑒法師復夢梵凡僧

汲黯字長孺濮陽人也其先有寵於古之
衛君至黯七世　為卿大夫黯以父任孝景時
為太子洗馬以莊見憚孝景帝崩太子即
位黯為謁者東越相攻上使黯往視之不至
吳而還報曰越人相攻固其俗然不足以辱天子

Running Script

行書/行书

盛一觴一詠亦足以暢叙幽情
是日也天朗氣清惠風和暢仰
觀宇宙之大俯察品類之盛
所以遊目騁懷足以極視聽之
娛信可樂也夫人之相與俯仰

- Warring States period forms of *xiang* 相

- Qi 齊
- Chu 楚
- Yan 燕
- Jin 晉
- Qin 秦

- slip 1 of the Warring States period bamboo-slip text *Hengxian* 恒先

zhi 質, *quan* 全, *pu* 樸, and *su* 素

- Early Warring States period tomb of Marquis Yi 乙 of Zeng 曾 (dated 433 BCE or later)
- The middle Warring States Geling 葛陵 tomb no.1 (dated 377 BCE or so)
- Baoshan 包山 tomb no.2 (316 BCE)
- Guodian 郭店 tomb no. 1 (around 300 BCE)
- The late Warring States Jiudian 九店 tomb no.56 (around but before 278 BCE)

- The Qin 秦 Dynasty Shuihudi 睡虎地 tomb no.11 (around 240s-210s BCE)
- Qin Liye 里耶 site (between 208 to 206 BCE)

- Han 漢 Mawangdui 馬王堆 tombs (around 168 BCE)
- Han Yinqueshan 銀雀山 tombs (between 134-118 BCE)
- Han Bajiaolang 八角廊 tomb no. 40 (no earlier than 56 BCE)

- slip 1 of the Warring States period bamboo-slip text *Hengxian* 恒先

zhi 質, *quan* 全, *pu* 樸, and *su* 素

- *Pu* 業, in (*pu* 樸 on Guodian *Laozi* A slip 13) , (*pu* 業 on Baoshan slip 145) , etc.
- *Ye* 業, in (*ye* 業 on Shanghai *Kongzi shilun* slip 3) , (*ye* 業 on *Hengxian* slip 4) , etc.

- Observation 1: The top portions of components *pu* and *ye* are the same as that of component

- The bottom of 業 is either *da* 大 , an abbreviation of *gong* 廾 , or abbreviated as the half, *you* 又 .

- Observation 2: The bottom portions of components *pu* and *ye* are the variations of the same component *gong* 廾

- Discussion and conclusion: The transcription of component 業 can be either *pu* 菐 or *ye* 業. Any other decipherments are not supported by the matching results of pattern recognition. Since *ye* 業 does not make sense but *pu* 樸 (*pu* 菐) makes perfect sense in the original text, the interpretation of the character in question should be *pu* 樸.

Stylistic Variations

No.	1	2	3	4	5	6	7
Filled-in Component:							
Modern Equivalent:	一	廿	口	日	凵	厶	己

No.	1	2	3	4	5	6	7
Filled-in Component:							
Modern Equivalent:	一	廿	口	日	凵	厶	己
Archaic Graph:							
Transcription:	正	共	風	昆	屯	瓜	車已

Structural Complexity

保

- *zhong* 中 (central)：

- *wen* 文 (cultural)：

Aesthetic Principles

- *ren* 人 (human) on slip 1 of *Huangmen* 皇門 of the Warring States period bamboo slips in the Tsinghua University collection vividly depicts a profile of a person with a upward straight back, downward arm and supporting hip

- *bing* 并 (parallel), , on slip 3 of *Chengwu* 程寤 in the same catch of the bamboo slips depicts two parallel people with open arms walking or standing hands in hands in parallel

- A falling rock from a peak of a mountain
- 高峰之坠石

- a crescent in the night sky
- 长空之新月

- **TOWARDS A HOLISTIC CHINESE PALEOGRAPHY**

- The style and script particularities of Chinese calligraphy and paleography found in the excavated ancient Chinese documents require a contextual development of the pattern recognition system.

- Geographically, different states have different local writing systems before 221 BCE.

- Chronologically, different historical period has different stylistic scripts in pre-modern China.

- Stylistic variations and structural complexity could easily confuse one character with another. Improper applications of aesthetic principles of Chinese calligraphy could further complicate component structure and pattern recognition. (see p. 955-56)

- A comprehensive understanding of geographical, historical, aesthetic, stylistic, and structural characteristics of the Chinese writing system and the script styles is critical for developing the pattern recognition system, including its necessary database, of Chinese paleography. An interdisciplinary study of Chinese paleography, calligraphy, and pattern recognition that incorporates the considerations of stylistic variation, structural complexity, and cosmological implications of Chinese calligraphy is an effective and innovative approach to the study of Chinese paleography.