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SUPPLEMENTARY ONLINE MATERIAL FOR

***Xenoxylon* synecology and palaeoclimatic implications for the  
Mesozoic of Eurasia**

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**SOM. The data set**

- 1. Data for the Late Triassic.**
- 2. Data for the Early to Middle Jurassic.**
- 3. Data for the Late Jurassic to Early Cretaceous.**
- 4. Data for the Late Cretaceous**

**References**

The following format is used for data:

- Author (date); locality, country; geological formation, group, series etc (if available); age; generic or species name of *Xenoxylon* ↔ associated generic or species name of other fossil woods (If the fossil woods were reported from the same formation but by other authors, we also referenced the authors and dates. In case of emending to another taxon at a later date, we showed this with an arrow: original species → emended species.).

## 1. Data for the Late Triassic.

### 1.1. Asia

- Felix (1887); Pyeongyang, North Korea; Songnimsan Ser.; Late Triassic; *X. latiporosum* ↔ *Cedroxylon regulare*.
- Shimakura (1936); Pyeongyang, North Korea; Songnimsan Ser.; Late Triassic; *X. latiporosum*, *X. phyllocladoides* ↔ *Phyllocladoxylon heizyoense* (→*Sciadopityoxylon heizyoense* by Zhang et al. 2000a)
- Yamazaki et al. (1980); Nariwa, Okayama Prefecture, Japan; Hinabata Fm., Nariwa Gr.; Late Triassic (Carnian to Norian); *X. nariwaense*, *X. cf. japonicum* ↔ *Protocedroxylon triassicum*, *Araucariopitys japonica*.
- Yamazaki and Tsunada (1981); Miné area, Ominé-machi, Miné-shi, Yamaguchi Prefecture, Japan; Ominé Coal-bearing Member, Momonoki Fm., Miné Gr.; Late Triassic (Carnian to Norian); *X. sp. A*, *X. sp. B* ↔ *Protocedroxylon triassicum*.
- Wang (1991b); North Guandong, China; Hongweikeng Fm., Gengkou Gr.; Late Triassic; *X. ellipticum* ↔ *Protophyllocladoxylon szei* (from Wang 1991a).

### 1.2. Europe

- Shilkina (1967); Heiss Island of Franz Josef Land, Arctic; Late Triassic; *X. latiporosum*, *X. cf. latiporosum* ↔ *Araucariopitys gregussii*.

## 2. Data of the Early to Middle Jurassic.

### 2.1. Asia

- Boureau (1950); Nong-Son, Tho Lam area, Quangnam Province, Central Vietnam; Khe Ren Fm., Tho Lam Ser., Nong Son Basin; Early Jurassic (Hettangian to Toarcian); *X. latiporosum* ↔ *Protophyllocladoxylon thylloides*, *Ginkgoxylon quangnamense*.
- Delle (1960); Tkvarcheli, Georgia (Black Sea); Middle Jurassic (Bathonian); *Xenoxylon latiporosum* ↔ *Agathoxylon* (→*Protopodocarpoxyylon svanidzei* by Philippe, M.)
- Junusov (1975); Angren, Uzbekistan; Middle Jurassic; *X. barberi*, *X. sp.* ↔ *Protopodocarpoxyylon blevilense*, *P. jurassicum*, *Circoporoxylon voburnense*, *Protocedroxylon gregussii*, *P. holdenas*, *P. polyporosum*.
- Nadjafi (1982); Tazareh, Northeastern Iran; Shemshak Fm.; Middle Jurassic (Bajocian); *X. latiporosum* ↔ *Protelicoxylon*, *Protaxodioxyylon*, *Protosciadopityoxylon*, *Protocedroxylon*.
- Suzuki et al. (1982); Asahi-machi, Simoniikawa-gun, Toyama Prefecture, Southwest Japan; Negoya Fm. or Shinatani Fm., Kuruma Gr.; Early Jurassic; *X. latiporosum* ↔ *Taxodioxyylon sp.*
- Yamazaki and Tsunada (1982); Asahi-machi, Toyama Prefecture, Southwest Japan; Negoya Fm., Kuruma Gr.; Early Jurassic; *X. sp. A*, *X. sp. B* ↔ *Protocallitrixylon liassicum*, *P. sp. A*, *P. sp. B*, *Protocupressinoxylon sp.*

- Miao et al. (1989); south of Yanchi County, Henan Province, China; Yima Fm.; Middle Jurassic; *X. cf. phyllocladoides* ↔ *Cupressinoxylon cf. fujeni*; *Protocupressinoxylon* sp. (from Zhou and Zhang 1989); *Perisemoxylon bispirale* (from He and Zhang 1993).

- Ding et al. (2000a); Beipiao, Western Liaoning, China; Lanqi Fm. (=Tiaojishan Fm.); *X. latiporosum*, *X. hopeiense* ↔ *Haplomyeloxylon tiaojishanense* (from Zheng et al. 2008).

- Zhang et al. (2000a); Longfenggou of Lingyuan, Xinglonggou of Chaoyang, Taiji of Beipiao, and Yangshugou of Kazuo in Western Liaoning, China; Beipiao Fm.; Early Jurassic; *X. latiporosum* ↔ *Protosciadopityoxylon liaoxiense*, *P. jeholense*, *Sciadopityoxylon heizyoense*, *Protophyllocladoxylon chaoyangense*, *P. franconicum*, *Protocedroxylon dibneri*.

- Kim et al. (2005); Cheongyang-gun, Chungcheongnam-do, South Korea; Jogyeri Fm., Nampo Gr.; Upper Triassic (→Middle Jurassic by Egawa and Lee 2011); *X. phyllocladoides* ↔ *Agathoxylon* sp.

- Poole and Ataabadi (2005); North of Kerman, Central Iran; Hojedk Fm., Kerman Basin; Middle Jurassic; *X. cf. latiporosum* ↔ *Agathoxylon* sp.

- Wang et al. (2006); Beipiao City, Western Liaoning, China; Tiaojishan Fm.; Middle Jurassic; *X. latiporosum*, *X. hopeiense* ↔ *Taxodioxylon* sp., *Protopodocarpoxyton* sp., *Phyllocladoxylon* sp., *Protosciadopityoxylon liaoningense*, *Sciadopityoxylon heizyoense*, *Podocarpxylon* sp., *Lioxylon liaoningense*.

- Jiang et al. (2008); Shebudaigou, Changgao Town, Beipiao County, Liaoning, China; Lanqi Fm. (=Tiaojishan Fm.); late Middle Jurassic; *X. phyllocladoides* ↔ *Pinoxylon dacotense*, *Araucariopitys* sp.; *Sahnioxylon rajmahalense* (from Zheng et al. 2005); *Lioxylon liaoningense* (from Zhang et al. 2006).

## 2.2. Europe

- Conwentz (1882); Gallberg, Salzgitter, Germany; Early Jurassic (Toarcian); *X. phyllocladoides* ↔ *Simplicioxylon hungaricum* (unpublished no. 1991/43 in Berlin from Philippe 1995).

- Gothan (1906); Southern Poland; Middle Jurassic (Bajocian and/or Bathonian); *X. phyllocladoides* ↔ *Dadoxylon*, *Podocarpoxyton* (→*Protopodocarpoxyton* by Philippe, M.).

- Holden (1913); Robin Hood's Bay, Yorkshire, UK; Early Jurassic (Liassic); *X. latiporosum* ↔ *Metacedroxylon araucarioides*.

- Holden (1913); Scarborough, Yorkshire, UK; Middle Jurassic; *X. phyllocladoides* ↔ *Paraphyllocladoxylon eboracense*, *Metacedroxylon araucarioides*, *Araucarioxylon* sp., *Protobrachyoxyton eboracense*.

- Matyjasik and Gierliński (1988); Łuków, Poland; Middle Jurassic (Callovian); *X. jurassicum* ↔ *Agathoxylon*.

- Morgans (1999); North Yorkshire, England; Cleveland Ironstone Fm. to Scalby Fm., Cleveland Basin; Early to Middle Jurassic (late Pliensbachian to late Bathonian); *X. phyllocladoides* ↔ *Cupressinoxylon* spp., *Taxodioxylon* spp., *Cedroxylon* spp., *Araucarioxylon lindlei*.

- Marynowski et al. (2008); Lapiguz near Łuków, Eastern Poland, Gnaszyn Dolny and Gnaszyn Gómy in Southern Poland; Middle Jurassic (Bajocian to Callovian); *X. phyllocladoides* ↔ *Agathoxylon*, *Protopodocarpoxyton*.

- BMNH, London (unpublished); Whitby, Yorkshire, UK; Early Jurassic (Toarcian); *X. latiporosum*, *X. hutonianum?* ↔ *Protocedroxylon araucarioides*.

- BMNH, London (unpublished); Kilsby, Northamptonshire, UK; Early Jurassic (Pliensbachian); *Xexnoxylon* ↔ *Protocedroxylon araucarioides*.
- MP1569 (unpublished data by Philippe, M.); Anna, Częstochowa, Southern Poland; Middle Jurassic (Bajocian, Anna, level 1); *X. phyllocladoides* ↔ *Agathoxylon*.
- MP1588 (unpublished data by Philippe, M.); Anna, Częstochowa, Southern Poland; Middle Jurassic (Bathonian, Anna, level 4); *X. phyllocladoides* ↔ *Podocarpoxyylon*.
- MP1798 and co (unpublished data by Philippe, M.); Lithuania; Middle Jurassic (Callovian); *X. phyllocladoides* ↔ *Protocedroxylon*, *Protopodocarpoxyylon*.
- MP (unpublished data by Philippe, M.); Jameson Land, Eastern Greenland; Early Jurassic (early Pliensbachian); *X. phyllocladoides*, *X. latiporosum* ↔ *Brachyoxyylon*.
- MP (unpublished data by Philippe, M.); Jameson Land, Eastern Greenland; Early Jurassic (late Toarcian); *X. phyllocladoides* ↔ *Brachyoxyylon*, *Protaxodioxylon*, cf. *Agathoxylon*.
- MP (unpublished data by Philippe, M.); Jameson Land, Eastern Greenland; Middle Jurassic (Aalenian); *X. phyllocladoides* ↔ *Brachyoxyylon*, *Protocircoporoxylon*.
- MP (unpublished data by Philippe, M.); Jameson Land, Eastern Greenland; Vardekløft Fm.; Middle Jurassic (Callovian); *X. latiporosum* ↔ *Agathoxylon*.
- Sev. Spec. (unpublished data by Philippe, M.); Częstochowa, Southern Poland; Middle Jurassic (Bajocian, Parkinsonii zone); *X. phyllocladoides* ↔ *Cupressinoxylon* sp.
- Sev. Spec. (unpublished data by Philippe, M.); Częstochowa, Southern Poland; Middle Jurassic (Bathonian, Retrocostatum zone); *X. phyllocladoides* ↔ *Agathoxylon*, *Protopodocarpoxyylon*.
- Sev. Spec. (unpublished data by Philippe, M.); Częstochowa, Southern Poland; Middle Jurassic (Bathonian, Subcontractus zone); *X. phyllocladoides* ↔ *Prototaxodioxylon*.

### 3. Data of the Late Jurassic to Early Cretaceous.

#### 3.1. Asia

- Du (1982); Jiaying of Heilongjiang, China; Ningyuancun Fm.; Late Jurassic; *X. latiporosum* ↔ *Protopiceoxyylon amurense*.
- Zheng and Zhang (1982); Eastern Heilongjiang, China; Yunshan Fm., Longzhaogou Gr.; Early Cretaceous (Hauterivian? to Aptian); *X. latiporosum* ↔ *Protopodocarpoxyylon jinshaense*, *Cupressinoxylon baomiqiaoense*.
- Duan (1986); Xiadelongwan village, Yanqing district, Beijing, China; Houcheng Fm.; Late Jurassic; *X. latiporosum*, *X. sp.* ↔ *Scotoxyylon yanqingense* (from Zhang et al. 2000b → *Protojuniperoxyylon*); *Protopiceoxyylon extinctum*, *Cupressinoxylon fujeni* (from Sze et al. 1963 in Zheng et al. 2008).
- Duan et al. (1995); Yizhou (=Yixian) district, Western Liaoning, China; Shahai Fm.; Early Cretaceous; *X. latiporosum*, *X. liaoningense* ↔ *Protopiceoxyylon yizhouense*.
- He (1995); Huolinhe mine, Jarud Banner, Inner Mongolia, China; Huolinhe Fm.; Early Cretaceous; *X. peidense* ↔ *Phyllocladoxylon eboracense*, *Protocedroxylon orientale*, *Cedroxylon jinshaense*.
- Zhang and Shang (1996); Baitazigou, Yixian County, Western Liaoning, China; Shahai Fm.; early Early Cretaceous; *X. yixianense* ↔ *Protosciadopityoxyylon liaoningense* (from Zhang et al. 1999); *Ginkgoxyylon chinense* (from Zhang et al. 2000c).

- Ding (2000); Yixian County, Western Liaoning, China; Yixian Fm.; Early Cretaceous; *X. latiporosum*, *X. hopeiense* ↔ *Piceoxylon zaocishanense*, *Protopodocarpoxydon jingangshanense*, *Protophylocladoxydon franconicum*.
- Ding et al. (2000a); Haizhou Coal Mine, Fuxin City, Liaoning, China; Fuxin Fm.; Early Cretaceous; *X. fuxinense*, *X. hopeiense* ↔ *Phyllocladoxydon xinqiuensis* (from Cui and Liu 1992); *Protophylocladoxydon haizhouense*, *Sciadopityoxylon liaoningense* (from Ding et al. 2000b).
- Ding et al. (2000a); Huolinhe Coal Mine, Inner Mongolia, China; Huolinhe Fm.; Early Cretaceous; *X. huolinhense*, *X. peidense* ↔ *Podocarpoxydon dacrydioides*, *Podocarpoxydon* sp., *Phyllocladoxydon* sp. 1, *Phyllocladoxydon* sp. 2 (from Cui 1995).
- Wang et al. (2000), Wang et al. (2002); Northern Qitai County, Eastern Junggar Basin, Xinjiang, China; Junggar Basin; Late Jurassic; *X. latiporosum*, *X. liaoningense?* ↔ *Protopiceoxylon xinjiangense*; *Cupressinoxylon* (from Stratigraphic Group of Xinjiang 1981); *Araucarioxylon* (from McKnight et al. 1990).
- Zheng et al. (2001); Liujiagou near Sanbaoying of Beipiao, Western Liaoning, China; Tuchengzi Fm.; Late Jurassic; *X. ellipticum* ↔ *Protophylocladoxydon franconicum*.
- Zheng (2004); Western Liaoning, China; Tuchengzi Fm.; Late Jurassic; *X. latiporosum* ↔ *Protopodocarpoxydon batuyingziense*, *Protaxodioxydon romanense*.
- Li and Oh (2007), Philippe et al. (2009); Pinggang, Baiquan, and Liaoyuan of Jilin Province, China; Changan Fm., Liaoyuan Basin; Late Jurassic to Early Cretaceous; *X. latiporosum*, *X. sp.* ↔ *Phyllocladoxydon* sp., *Taxodioxydon* sp., *Protocedroxylon* sp.
- Li and Oh (2007), Philippe et al. (2009); Songxiaping, Chuangye, Jilin Province, China; Chancai Fm., Yanji Basin; Early Cretaceous; *X. latiporosum* ↔ *Protopiceoxylon* sp.
- Li and Oh (2007), Philippe et al. (2009); Yangcaogou, Jilin Province, China; Yingcheng Fm., Songliao Basin; Early Cretaceous; *X. latiporosum* ↔ *Phyllocladoxydon* sp., *Protocedroxylon* sp., *Taxodioxydon pseudoalbertense*, *T. albertense*, *T. sp.*
- Philippe et al. (2009), Oh (2010), Oh et al. (2011); Eastern Heilongjiang, China; Muling Fm., Jixi Gr.; Early Cretaceous; *X. latiporosum* ↔ *Araucariopitys* sp., *Taxodioxydon cryptomerioides*, *T. albertense*, *T. pseudoalbertense*; *Glyptostroboxydon xidapoense* (from Zheng and Zhang 1982); *Taxodioxydon szei* (from Yang and Zheng 2003).
- Philippe et al. (2009), Oh (2010), Oh et al. (2011); Eastern Heilongjiang, China; Muling Fm. and/or Chengzihe Fm., Jixi Gr.; Early Cretaceous; *X. latiporosum*, *X. phyllocladoides* ↔ *Taxodioxydon cryptomerioides*, *T. albertense*, *T. pseudoalbertense*; *Phoroxylon qiezihense*, *Protocupressinoxylon mishanense* (from Chengzihe Fm. in Zheng and Zhang 1982); *Phoroxylon scalariforme* (from Chengzihe Fm. in Sze 1951).
- Philippe et al. (2009), Oh (2010), Oh et al. (2011); Huolinguole City, Inner Mongolia, China; Damoguaihe Fm. (=Huolinhe Fm.), Huolinguole Basin; Early Cretaceous; *X. latiporosum*, *X. japonicum*, *X. watarianum*, *X. phyllocladoides*, *X. liaoningense*, *X. sp.* ↔ *Araucariopitys shimakurae*, *Planoxylon* sp.
- Ding et al. (2010); Southeastern Mongolia; Sharilin Fm. to Tsagan Tsav Fm.; Late Jurassic to Early Cretaceous; *X. latiporosum* ↔ *Protaxodioxydon mongolense*, *Circoporoxylon mongolense*, *Protocircoporoxylon mongolense*, *Protocupressinoxylon coromandelinum*, *P. mishanense*, *Protophylocladoxydon franconicum*, *Protocedroxylon lindicianum*.

- Terada and Yabe (2011); Sugiyama River area of Katsuyama City, Fukui Prefecture, Japan; Kitadani Fm. of Akaiwa Subgroup of Tetori Gr.; Early Cretaceous (late Barremian); *X. latiporosum* ↔ *Podocarpoxylon* sp., *Cupressinoxylon* sp.

- Afonin (2008); Muravyov-Amursky Peninsula, southern Primorye, Russian Far East; upper Lipovtsy Fm.; Early Cretaceous (Late Aptian-beginning of the Early Albian); *X. latiporosum*, *X. hopeiense* ↔ *Protocedroxylon primoryense* (from Afonin, 2012).

### 3.2. Europe

- Gothan (1907); King Charles Land, Svalbard, Arctic; Helvetiafjellet Fm.; Early Cretaceous (Barremian); *X. phyllocladoides* ↔ *Phyllocladoxylon* sp., *Cupressinoxylon* cf. *Mc.Geei*, *Cedroxylon dedroides*, *Cedroxylon transiens*, *Protopiceoxylon exstinctum*.

- Gothan (1910); Green Harbour, Svalbard, Arctic; Late Jurassic; *X. latiporosum* ↔ *Anomaloxylon magnoradiatum*, *Protopiceoxylon exstinctum*, *Piceoxylon antiquius*.

- Gothan (1910); Wimansberg, Svalbard, Arctic; Late Jurassic; *X. phyllocladoides* ↔ *Cedroxylon transiens*.

- Shilkina (1967); Alexandra land, McClintock Island, Hooker Island, Cape Cedova, Nortbruk Island, Cape Lager, Alger Island, Ziegler Island, Cape Washington, Franz Josef Land, Arctic; Early Cretaceous; *X. barberi*, *X. latiporosum*, *X. cf. latiporosum*, *X. sp.* ↔ *Araucariopitys gregussii*, *Cedroxylon arcticum*, *Cupressinoxylon discoense*, *Keteleerioxylon arcticum*, *Palaeopiceoxylon arcticum*, *Pinoxylon* sp., *Podocarpoxylon sciadopityoides*.

- Harland et al. (2007); Spitsbergen, Svalbard, Arctic; Carolinefjellet Fm.; Early Cretaceous (Aptian to Albian); *X. sp.* ↔ *Piceoxylon* sp., *Laricioxylon* sp., *Protocedroxylon* sp., *Protopiceoxylon* sp., *Taxodioxylon* sp., *Juniperoxylon* sp., *Cupressinoxylon* sp., *Araucariopitys* sp., *Taxaceoxylon* sp.

- MP (unpublished data by Philippe, M.); Jameson Land, Eastern Greenland; Hartzfjellet Fm.; Late Jurassic (Portlandian or Kimmeridgian); *X. cf. phyllocladoides* ↔ cf. *Brachyoxylon*.

### 3.3. North America

- Gordon (1932); Bituminous Sands at Fort McMurray, Alberta, Canada; McMurray Fm.; Early Cretaceous; *X. phyllocladoides* type ↔ *Protocedroxylon* type, *Cupressinoxylon* type.

- Arnold (1953); Big Bend of Colville River, Central North Slope, Alaska; Chandler Fm., Nanushuk Gr.; Early Cretaceous; *X. latiporosum* ↔ *Cedrus alaskensis*.

- Parrish and Spicer (1988); Central North Slope, Alaska; Nanushuk Gr.; Middle Cretaceous (→ Albian in this paper); *X. latiporosum* ↔ taxon B (→ *Protocedroxylon* group).

- Selmeier and Grosser (2011); Sverdrup Basin, Canadian Arctic Archipelago; Deer Bay Formation; Early Cretaceous (Valanginian); *Dacrydioxylon* sp. (→ *Xenoxylon* in this paper) ↔ *Protopiceoxylon* sp.

## 4. Data of the Late Cretaceous

### 4.1. Asia

- Nishida and Nishida (1986); Saghalien; Miho Gr.; Late Cretaceous (Turonian to Santonian?); *X. watarianum* ↔ *Araucarioxylon kiiense*, *Taxodioxylon albertense*, *Cupressinoxylon cryptomerioides*, *Cedroxylon shimakurae*.

### 4.2. North America

- Spicer and Parrish (1990); Central North Slope, Alaska ; Prince Creek Fm., Colville Gr.; Late Cretaceous (Campanian to Maastrichtian); *X. latiporosum* ↔ taxa B, C, D, and E (→ *Protocedroxylon* group).

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