

# Phototropism of Petrified Wood and Its Relation with the Rotation of Different Blocks in China and the Possibility of Application in the World

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## Abstract

Normally, trees on the side directly exposed to sunlight will grow faster than the opposing side. This phenomenon is termed plant phototropism. Moreover, palaeomagnetists have revealed that the Junnar Block has never rotated since the Mesozoic. The petrified woods in the Jiangjunmiao area of Qitai County show the positive phototropism direction of SSW220. By compared with the modern normal growth stumps in plain area, which have positive phototropism direction of SSW 219 ± 5, this observation supports the conclusion of palaeomagnetic researchers: the Junggar basin has never rotated since the Late Jurassic.

## Keywords

Jurassic Petrified Wood, Phototropism, Plate Rotation, Palaeogeography

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## 1. Introduction

It is common knowledge that phototropism refers to the direction of plant growth in relation to a light source. Positive phototropism relates to plant

growth towards a light source and includes most plant parts, such as leaves and stems. In general, phototropism is easy to observe in crown and the trunk near roots. The definition intensity of plant phototropism varies regularly along with latitudinal change as “strong to weak to disappeared” ranges from high to low. This phototropism phenomenon exists also in the well-protected *in situ* petrified wood formed in geological ages. Therefore, we can obtain important first-hand information of important geological significance through the investigation into the shape and rings of the *in situ* fossil tree trunks [1].

## 2. Relationship between Tree Ring Eccentricity and the Latitude

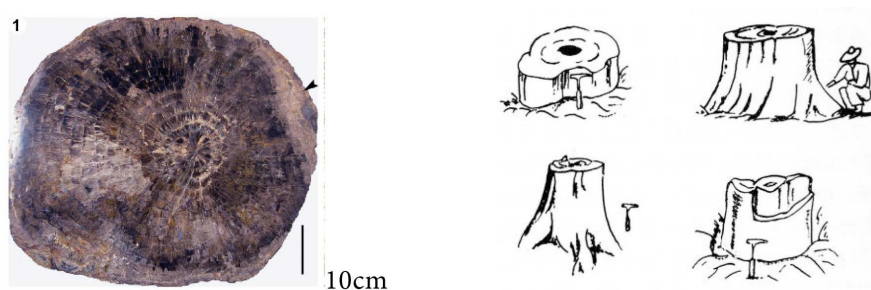
The link between the tree ring eccentricity and the latitude can be proved in the arbors in the Northern Hemisphere. It seems that the lowest latitude of identifiable phototropism phenomenon of trees is possibly at least to the Tropic of Cancer (N23°26'), but the further south line still needs more data of the extant trees to further confirmation.

What should be pointed out is that according to the practical experience of some present-day foresters, gravitropism plays a more important role during the growth of trees [2]. In contrast, other foresters believe that the comprehensive factors of sunshine, gravity, wind direction and other disturbing elements influence the growth of trees [3]. However, the *in situ* silicified wood was usually preserved in relatively open and flat environments, and sunshine should be the major element influencing the growth of trees.

The shape of rings of silicified wood preserved in strata can also reflect the ancient latitudes. The Middle Jurassic silicified wood from the Chaoyang District, western Liaoning Province, had an obvious phototropism feature; but the Early Cretaceous silicified wood from the Huolinhe basin, eastern Inner Mongolia, showed a little eccentricity according to the sketches by Deng [4] (Figure 1). If there were more definite materials to confirm the above comparison, it possibly implicated that the ancient latitude of the North China Plate and the east part of Inner Mongolia moved slightly toward the direction of south from the Jurassic to Cretaceous, and therefore the previous conclusion that the North China Plate largely moved northwards is incorrect.

## 3. Orientation of the *in Situ* Preserved Silicified Trunk and Rotation of the Junggar Block

The Upper Jurassic Shishugou Group of the Jiangjunmiao area, Qitai County, North Xinjiang (Junggar basin) is rich in petrified wood [5]. The first author of this paper found that the tree rings of the *in situ* preserved silicified trunks are clear and characterized by the obvious asymmetry in the SW 220 sides. Compared with the living trees phototropism [6], the result is almost the same. This means that the positive phototropism the trees are in accordance with the present ones, and possibly indicating that the Junggar basin has never rotated since the Late Jurassic.



**Figure 1.** Comparison between the Middle Jurassic silicified wood in Chaoyang, western Liaoning Province and the Early Cretaceous silicified wood from the Huolinhe Basin, eastern Inner Mongolia.

#### 4. Significances of Palaeogeography

How to release the relationship and interaction among the different spheres of the Earth system during the Jurassic to Cretaceous transition in a reasonable way on the base of new results of comprehensive and multidisciplinary studies has become a new challenge to scientists all over the world.

Hence, a deep and multiple-dimension investigation of the silicified wood in terms of systematic earth science has a priority and is promising in the world.

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#### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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