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The trees of Tianmushan

ALISTAIR WATT has travelled twice to this species rich mountain which is located close to both Shanghai and Hangzhou. He writes about the diversity of conifers and broadleaves that he saw there.

Two notes drew my initial attention to the Tianmushan. The first was a short comment made by Robert Fortune in 1857 in his third book, *Residence among the Chinese:* 'A mountain called Tein-muh-shan celebrated for its height and for its temples'. This was followed by a helpful comment from Prof. David Mabberley which brought my attention to the celebrated trees of Tianmushan in a chapter in Peter Crane's fascinating monograph, *Ginkgo*. Crane discussed the evidence that suggests that the fabulous ginkgos growing there in a very old, primary forest could well represent the last remaining wild origin home of this most ancient of the world's surviving gymnosperms.

For someone wishing to get a taste of the true richness of the forests of Eastern China, within easy striking distance of Shanghai and Hangzhou, there is no better place to visit than Tianmu Mountain, which reaches 1,500 m (almost 5,000 ft) and is densely clothed with vegetation ranging from sub-tropical evergreen 'jungle' to the temperate deciduous open forest of West Peak. I had already glimpsed the peak on earlier visits to this part of China, and some homework indicated that the Tianmushan, with the beautiful translation, 'The Eyes of Heaven', reserve was quite accessible, so a visit there

Opposite, the view down to Chanyuan temple with *Cunninghamia lanceolata* on the right and *Cyclobalanopsis mysinifolia* to the left.
Right, one of the huge specimens of *Cryptomeria japonica*. The plaque below this individual gives it an age of 1,000 years.
Bottom, left, a young seeding of *Liriodendron chinense*. The 30 year old specimen in my own garden now shows a brilliant white bark.
Bottom, right, *Sambucus williamsii*.

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became a must to plan for at the end of a 'Fortune' photographic tour in 2015. The experience of the visit was as exciting a botanical treat as could possibly be expected and demanded a return in 2016.

Tianmushan is located about 250 km south west of Shanghai and some 95 km west of Hangzhou. The main peak attains a height of just over 1,500 m taking its summit well above the surrounding sub-tropical environment. The historical evidence suggests that the mountain has been revered by visiting monks for almost 1,500 years, with the existing Buddhist Kaishan temple located at some 1,000 m, going back to the thirteenth century. As well as Kaishan, other temples exist including the large Chanyuan Temple, finished around 1665 AD and located at the base of the mountain near to the Park entrance. As in other parts of China, it was these religious institutions which gave long-term protection to the forest flora and fauna, before an initial 650 hectare natural reserve was officially declared in 1960. The

present protected area is now around 4,280 hectares.

With its long history of protection, an altitude range from 250 to 1,500 m, an annual rainfall of around 1.8 m, an equable average temperature of 17.3 °C and a topography dissected by humid gullies, we can expect and do find an extremely rich flora and range of species.

Ginkgos

It was the American botanical collector, Frank Meyer, who in 1915 specifically reported the existence of the extensive presence of spontaneously growing ginkgos in this forested area of Zhejiang Province in the mountains to the west of Hangzhou. This was reinforced by Chinese botanists as long ago as 1933. Much DNA work has been put in to determining whether the ancient ginkgos of Tianmushan are of a natural and continuous origin, although the Daloushan in Guizhou Province also could stake a similar claim. With the jury still out on the definitive conclusion, the evidence to date suggests that they are. The answer revolves around the fact of whether the gene pool of the ginkgos demonstrates a variability enough to represent a natural population, or whether they are from a limited and cultivated stock. It would be interesting to compare the Tianmushan situation with that of *Wollemia nobilis* (Wollemi pine) discovered only in 1994. The small relic population of the latter species is reported to have almost zero genetic variability and yet is acknowledged to be of a fully natural occurrence. On the other hand, as *Ginkgo biloba* has clearly survived the millennia of human occupation in China, the actual status of the Tianmushan specimens is not altogether relevant. Ginkgo may well have been planted around the old temples but it had to survive many thousands of years 'somewhere' before that tradition was commonplace. It is self-evident that even if old ginkgos were *planted* by monks in early times then the seeds or seedlings had to have been sourced from somewhere and why not locally? I would imagine that this could be readily established if local pollen records could be established from suitable stratified peat deposits.

Some 10% of the Tianmu ginkgo population is believed to be over 1,000 years old and clearly 'fit in' to their natural forest environment with no appearance of having been planted ie, found growing only along paths for example. Nevertheless, the ginkgo is decidedly represented by both multi-stemmed and large single-trunked individuals. The Tianmu ranges were of such difficult access that as late as World War 2 the area was a haven for Chinese partisans and even the Chanyuan Temple was bombed by Japanese aircraft in 1941. The largest single trunk specimens are up to 40 m high and 1.1 m dbh. Perhaps the most striking specimen is the 'Family of Five Generations' tree believed to be the remnant of an original ancient ginkgo where the original trunk has long rotted away to leave a ring of an additional four successive generations, occupying over 12 m², which have reproduced from suckers. It should be added that one of the difficulties of accounting for

the reproduction of ginkgos in the wild is in determining what the natural vectors are for distributing the large fruits through the forest, though here it could be squirrels or native civets.

Other conifers

Declaring myself as a conifer enthusiast, there are certainly other exciting trees which are easily found on Tianmushan. The stars to me would have to be the magnificent specimen trees of Robert Fortune's 'Golden Pine', *Pseudolarix amabilis,* reaching up to over 60 m in height and diameters of 75 cm. Having a chance to see very old individuals of the latter conifer revealed something new to me. The distinctly tessellated form of the bark is not seen in the specimens encountered in cultivation. Fortune first discovered this beautiful conifer in the Tiantai Mountains to the south of Ningbo in the 1850s and it really was exciting to encounter such huge examples still growing in its natural environment. Kew's Aljos Farjon wrote in an article published in the journal of the American Conifer Society that; 'This mountain, Tianmu Shan, is the undisputed site of a truly wild population' ….'in good health, and including seedlings and saplings under the giant tree'.

Having only previously seen the golden pine as a large specimen in the temple garden at Tiantong near Ningbo it came as an immense thrill so see such a magnificent tree species growing so obviously in the wild state.

Perhaps the most enigmatic of the giant conifers of Tianmu is *Cryptomeria japonica.* Despite their ancient appearance, the same procedures of DNA analysis suggests that these conifers were in fact were all planted as an *introduced* species. Individuals of *Cryptomeria japonica* are up to a height of 45 m. The largest girth specimen was reputedly named the 'Giant Tree King' by the famed Emperor, Qianlong. At only 26 m in height, having lost its top, it is a very impressive 2.3 m in diameter. Alive until recent decades this magnificent tree sadly is now a lifeless hulk apparently having died a slow death as a result of visitors removing pieces of bark believing it possessed high medicinal properties. Special plaques beside some of the other treasured living *Cryptomeria* claim that some individuals are 1,000 years old. It is very difficult to comprehend that such a gigantic tree could be planted by a human hand so many centuries ago. As well as the above species, the conifers readily found include large specimens of *Cunninghamia lanceolata, Cephalotaxus fortunei* and *Pinus huangshanensis* (syn. *P. taiwanensis).*

Broadleaves and shrubs

However, given the climatic conditions and topography, it is the richness of the broadleaf tree and shrub populations which is the outstanding feature of the park. In two visits to Tianmushan, one of which was in atrocious weather, a whole smorgasbord of the plants of eastern China was readily found, including very large trees of *Emmenopterys henryi* (30 m in height), *Liquidambar formosana,*

Above left, *Aesculus chinensis* is often planted in Buddhist temple grounds as the Chinese substitute for the sacred Sal or Shala Tree (Shorea robusta) of India. The Buddha reputedly died under a Sal tree. This one is at Chanyuan Temple. **Right**, *Daphniphyllum macropodum* can easily be confused with a rhododendron. *Rhododendron fortunei* is found on Tianmushan but is not at all common.

Below, left, a superb specimen of *Pseudolarix amabilis*. The stone plaque states that it is 45 m high and 77 cm in diameter. Note the 'tiled' bark. **Right**, a huge wild ginkgo in Tianmushan forest.

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Above, These stele on the site of the ancient Zhongfeng Temple are flanked by a pair of large *Emmenopterys henryi*.

Right, *Sinocalycanthus chinensis*, the Chinese allspice tree, growing next to the Huanzhu teahouse. This lovely deciduous small tree is not yet prominent in Western gardens.

Below, left, *Rhododendron anhweiense* only grows from about 1,300 m in the more open-aspect forest under *Pinus huangshanensis*.

Below, right, *Sorbus amabilis* grows in the open situations above 1,200 m.

Quercus glauca, Litsea auriculata and *Castanopsis sclerophylla*. There can be no doubt that the three vegetation zones of Tianmu; the principally evergreen sub-Tropical forest up to 800 m, the warm temperate zone with conifers as the dominant canopy with a very rich understorey up to 1,200 m, succeeded by a mainly deciduous dwarf forest extending to the summit at over 1,500 m, make an astoundingly rich flora. It is estimated that there is at least 2,100 species of higher plants growing in the reserve.

In both visits, I have only had the opportunity to explore the area around the Chanyuan Temple at 300 m altitude, and also the area of the reserve at 1,000 to 1,200 m and easily accessible from the Longfengjian parking lot where the park buses terminate. Even in a couple of days, we found a range of plant finds which was truly exciting. In addition to those already mentioned, a large number of species was encountered. The range of broadleaf trees and shrubs made the mouth water; *Acanthopanax evodiaefolius*, *Acer henryi*, *Acer ginnala, Acer anhweiense, Acer mono*, *Alangium platanifolium*, *Neolitsea aurata*, *Litsea coreana* var. *sinensis*, *Carpinus viminea*, *Sinocalycanthus chinensis*, *Daphniphyllum macropodum*, *Lindera obtusiloba*, *Liquidambar acalycina*, *Liriodendron chinense* (to 40 m high), *Stewartia sinensis*, *Deutzia ningpoensis*, *Sassafras tsumu*, *Tilia henryana*, *Sambucus williamsii*, *Illicium lanceolatum, Hovenia trichocarpa, Cornus macrophylla, Cornus japonica, Quercus myrsinifolia*, *Rhododendron fortunei*, *Nyssa sinensis and Castanea henryi* etc. etc. As well as the rich woody plant flora, we could see that the herbaceous species stratum was equally rich. Immediately visible were *Astilbe chinensis*, *Gabeola henryi*, *Hylomecon japonicum*, *Hemiboeia henryi*, *Saxifraga stolonifera*, *Lysimachia clethroides*, *Ligularia japonica* and *Chloranthus spicatus.*

Exploration of the upper zone of vegetation was very limited due to lack of time but noted were *Sorbus amabilis*, *Quercus dentata* subsp. *stewardii*, a *Carpinus* (probably *C. viminea*) and a *Rhododendron* which was almost certainly *R. anwheiense*.

The plants listed above are taken from my own notes from the two brief visits to Tianmu and are but a fraction of what is there to be seen. The basic line drawing illustrated guide *Woody plants of Tianmushan* which provides descriptions of around 800 species, not including fern and herbaceous plants, gives a good idea of what is there to be discovered. There is also a four volume flora of Tianmu but it is very expensive to buy.

It should be noted that we spent most of the time exploring the paths at around 1,100 m. Nevertheless, the couple of hours exploring the forest area at the base of the mountain around the park entrance and accommodation village proved to be most interesting. Species included: *Taxus chinensis*, *Fokenia hodginsii*, *Pseudotsuga gaussenii*, *Cephalotaxus fortunei*, *Quercus variabilis*, *Buddleja lindleyana*, *Q. acutissima*, *Juglans cathayensis*, *Briggsia chienii*, *Cocculus orbiculata* and, of course, *Trachycarpus fortunei*. Apart from the natural forest which is clearly the big draw-card, in the upper Kaishan Temple a large

example of *Citrus trifoliata* was seen. The Chanyuan Temple grounds were well worth a visit, with several ancient single-stem ginkgos, a 350 year old *Podocarpus macrophylla*, *Aesculus chinensis* and *Boehmeria nivea* were seen among others. The beautiful large bamboo *Phyllostachys pubescens*, Moso bamboo, was very common and while we were there in 2015 extremely large stems of another species was being harvested for construction work in local cities.

Getting there

Given the riches that Tianmushan offers the visiting plantsperson, one could easily assume that the reserve is inaccessible to the present day traveller. In fact, nothing could be further from the truth. Thanks to the magnificent freeway road infrastructure, I would venture to suggest that it would be possible (but not at all recommended) to do a botanising trip there in one full day out of Shanghai, especially if accommodation was made at Honggiao Airport on the western outskirts of the city. We departed the city centre of Shanghai at 6.15 a.m., mainly to avoid the diabolical traffic, and had arrived at the entry to the park less than four hours later. For a more comfortable visit though, good guest house and hotel accommodations are available at the tourist area adjacent to the Chanyuan Temple, just inside the park entrance. The mandatory procedure for visitors is to take a parks administration shuttle bus from the foot of the mountain up to the Longfengjian carpark at 1,150 m. Here, well-paved trails run approximately along the contour lines. There is also a well-defined path of around seven kilometres which provides a most interesting walking descent directly back to Chanyuan Temple. From the Kaishan Temple at 1,100 m, a made trail continues up through open slopes to the mountain summit at just over 1,500 m, although we did not have time to complete the ascent. These stone-paved walks are not a strenuous undertaking, but they are decidedly slippery in wet weather. Two or three tea rooms are available near the top entrance for refreshments, so everything is very easy for the traveller visiting Tianmushan!

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