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The Abies of Bedgebury

A report on my time spent verifying the pinetum's silver firs

Abies is a genus of evergreen conifers found in northern latitudes, mostly in montane environments (Eckenwalder, 2009) . It is characterised by regular whorled branching, stiff needles with a round base, and cones which disintegrate at maturity. Thirty nine species are represented at Bedgebury, with three quarters of specimens being collected from trees growing in the wild. For three months of summer 2020 I was tasked with verifying these trees, and below discuss the challenges, lessons and importance of the process.

Correctly naming a tree involves analysing its morphology, which may include leaves, cones, or bark, at the macroscopic and sometimes microscopic level. I then use my notes, observations of the various taxa within and beyond Bedgebury, and relevant literature to assign the specimen to the correct species. The key to being able to verify is not only to know what each species looks like, but to also have an awareness of the range of variation inherent in each taxon, which often has a geographical component. A profound problem is the circularity of learning about species from the same specimens one is tasked to verify. Visits to various collections helped in both these respects, and in getting to know which traits prove particularly plastic in different sites and which were reliable diagnostic features.

As well as detailed examination, verification also involves the examination of the provenance of the specimens relative to known distributions of the species. It was fascinating to learn about the geographic range and variation of species from real wild collected examples in the collection. The species *Abies pinsapo* is very interesting in this respect. Whilst populations in Spain have narrow, radially arranged needles, those in Morocco (*var. marocana*) have flatter upward angled leaves with discontinuous stomatal lines above, and the population on Mt. Tazaot (sometimes referred to as *var. tazaotana* or subsumed within *var. marocana*) is even more extreme in these respects. The sheer numbers of specimens of A. pinsapo in the pinetum (eighty five so far) not only allows such phenotypic variation to become apparent, but is vital to conserving as much genetic variation of this endangered conifer as possible.





The distinctive radially arranged leaves of Abies pinsapo var. pinsapo

The description above makes verification sound as if it is an exact science, but the Silver Firs, for all their symmetrical beauty, are an immensely confusing group. The genus stretches the biological species concept to the limit, with species often readily hybridising where they are sympatric or grown together in cultivation, and often showing a cline of characteristics across their range. An excellent example is *A. grandis* and *A. concolor. A. concolor* begins to merge into *A. grandis* where their ranges approach each other (*A. concolor var. lowiana*), and are also thought to hybridise, forming the so-called *"Abies grandicolor* (Laacke). An excellent example of this taxon can be seen in Churchill's wood. I also found a number of putative hybrids within the collection, mainly amongst the European firs. The rare hybrid *A. × umbellata* was a particular surprise, verified by a visiting expert. This is a hybrid between *A. homolepis* and *A. firma*, with distinctive bark. Our specimen is probably an original introduction of the tree. Whilst the possible hybrids were fascinating and immensely challenging to identify, the Asian firs of the section *Pseudopicea* were just as difficult. With their striking blue cones and bright white undersides of the leaves, this is one of the most aesthetically appealing groups, yet also one of the most frustrating. Many will have to wait for expert verification.





The striking cone of an Abies forrestii relative growing at Bedgebury. Image: Tom Christian

In addition to verifying specimens at Bedgebury, I was lucky enough to visit the sister site, Westonbirt Arboretum in Gloucestershire. There, I was able to assist their dendrologist with verification of their Abies specimens, and learned a great deal more about the genus.

Overall, during the two and a half months spent verifying I changed the names (including verification to the subspecies level) of a fifth of all accessions, and uploaded over 900 photos to the database.

But why expend such time and energy on correctly identifying a rather esoteric group of plants? The answer is because the importance of such a task extends beyond the collection at Bedgebury. First and foremost, it ensures the integrity of the collection as a resource for scientific research. Indeed, a request from China for Abies material was made earlier during my time here. To provide unverified material is to potentially mislead any conclusions which are made. There is also scientific investigation which occurs closer to home. For two weeks in spring I assisted in a survey of all Abies specimens across the site, testing for the susceptibility to Neonectria neomacrospora . This fungus causes cankers in the bark and consequent dieback of foliage, and could be a threat to the cultivation of the genus for timber and ornament. (Pérez-Sierra, Gorton, & Webber, 2016). Neonectria fungus in just one of a number of pathogens which have the potential to affect wild and cultivated conifers. The economic importance of species such as Abies will ensure that Bedgebury remains an important sentinel site for such diseases. Furthermore, the conservation value of specimens also necessitates their accurate identification. For instance, I found that a group of four wild collected specimens labelled under various A. nordmanniana subspecies, were in fact the somewhat similar A. cilicica. Whilst both originate from Turkey, it is clearly essential that the correct species is used, for instance, as a seed source for reintroduction.





Abies cilicica ssp. cilicica, showing (clockwise from left) its densely columnar form, pinkish cones, and nonresinous buds

The months spent at Bedgebury this year have not only given me an insight into the need for such collections and their multifaceted value, but also bestowed a deep interest in conifers, and the genus *Abies* which I spent so much time examining. The diversity of the genus, if not discretely defined, is fascinating. It has motivated me to study further to begin to gain some understanding of the complex processes by which such diversity comes to be.

I am immensely grateful for having had the opportunity to work within such a collection, and thank the staff for their tolerance of my many questions, and their good humour.



References

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