

## Mycological Notes 11: *Boletus edulis* in Canterbury

Jerry Cooper, July 2012

Probably most mycologically minded New Zealanders know about *Boletus edulis* in Christchurch. Wang et al (1995) reported its occurrence with a number of host trees across the City and a single collection from Lake Pukaki with Birch. A well-known stronghold is with *Quercus robur* (Oak) in Hagley Park where it occurs with a range of other fungi. Wang et al speculate that *B. edulis* arrived with early European settlers into Christchurch and spread, perhaps with nursery plants in some cases. Research by Stringer et al (2002 & pers.comm), indicates that the old oak trees in Hagley Park arrived as living plants in half-barrels on-board ship. Thus the soil+fungus+roots+tree were shipped together. Even the possible source of the nursery near Bagshot in the UK has been traced. Similar shipments were apparently made to Nelson and planted in parks there. Recently there are reports of the fungus from various plantations in North Canterbury. In New Zealand the bolete is relatively immune to attack by fungous gnats, unlike its home range where most specimens rapidly become a maggot nursery. In recent years I have noticed more damage, so either the associated fungus gnat has arrived, or local species have developed a taste for it. The fungus has also been introduced/arrived with *Pinus* plantations in South Africa, Zimbabwe, and Chile.

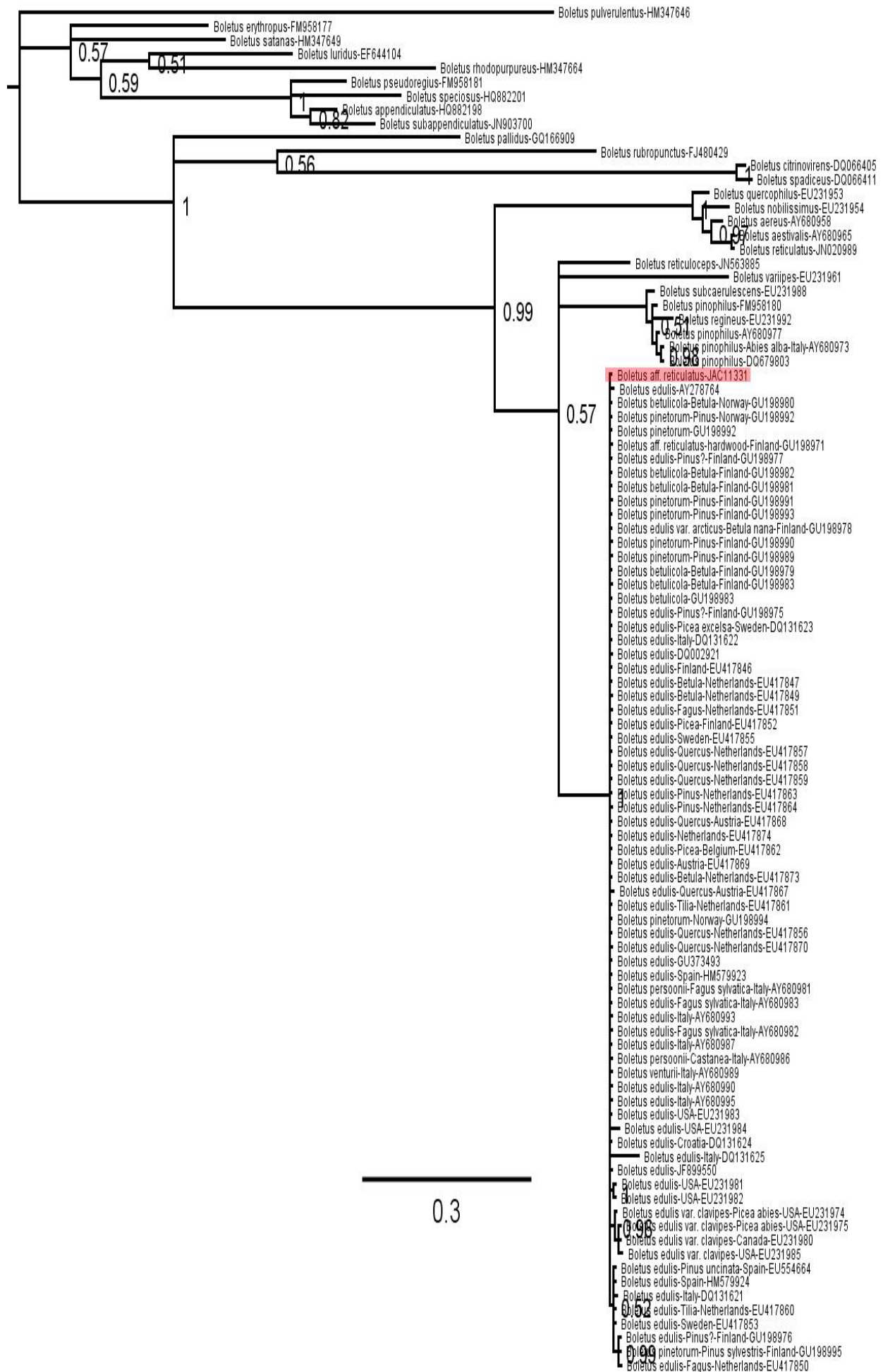
Wang et al also recognised that the name '*Boletus edulis*' has been used in a broad sense by some, with morphological/host differences recognised as separate species by others. So, do we have just one species? Stringer et al investigated sequences of New Zealand *Boletus edulis* and concluded it was the same as UK material. However, as she also points out, there wasn't much sequence data available at that time, but more on that later.

Hagley Park is quite rich in fungi; so far I have recorded 66 species including a recent surprising find of the paddy straw mushroom, *Volvariella volvacea*, growing from a steaming hot pile of composting leaves and sawdust. It is a very fast growing tropical fungus and very unlikely to persist in our climate. I wonder where it came from? The oaks in the Park are associated with a number of other distinctive fungi. By far the most common is *Amanita excels* var. *spissa*. That is not especially common in its home range and you would expect the common *Amanita rubescens* to have arrived with *Quercus*, but we don't appear to have that. Also in Hagley Park with the oaks is *Xerocomus 'chrysenteron'* which was noted by McNabb in 1968. It remains a puzzle why McNabb did not also spot the *Boletus edulis*. New Zealand has a number of introduced and similar looking *Xerocomus* species with poorly resolved taxonomy so the exact application of names remains vague. In Hagley Park it is often parasitized by another fungus, *Apiocrea chrysosperma* which turns the fruitbodies powdery bright yellow. There is also a white *Clavulina c.f. rugosa*. Other ectomycorrhizal associates include *Dermocybe*, *Hebeloma*, *Inocybe geophila*, *Laccaria*, *Russula amoenolens* and *Scleroderma verrucosum*.

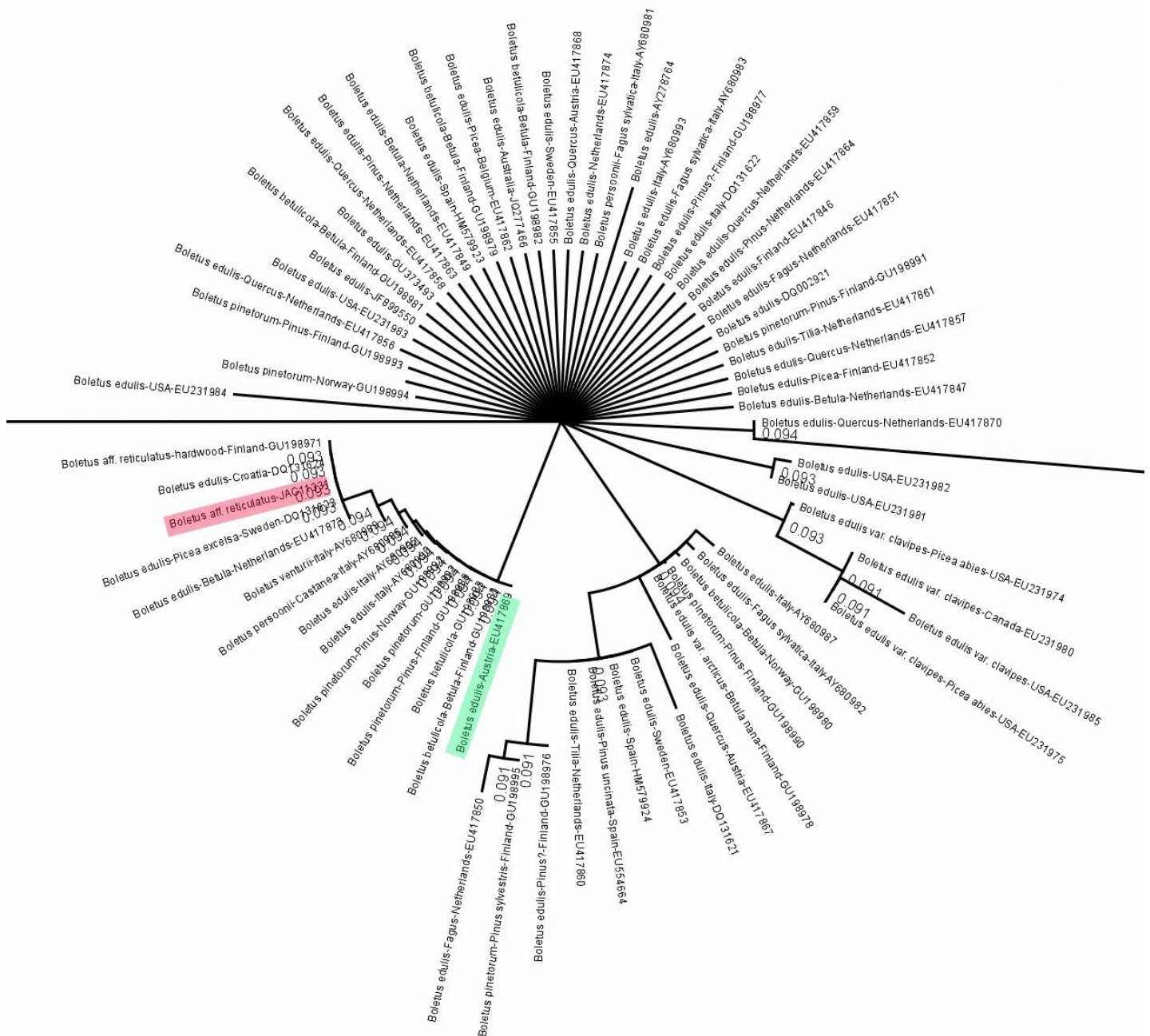
A while ago I found a number of fruitbodies of *Boletus edulis* growing with *Quercus ilex* and with *Cedrus atlantica* at Lincoln. They looked different to me, and did not taste as good as the *Boletus edulis* from Hagley Park (one of the very few fungi I eat). I was suspicious they were something different, as were collections I have seen from plantations outside Christchurch, and from some areas within Christchurch (e.g. Riccarton). I had material sequenced in order to investigate. Since

Stringer's investigation in 2002 the amount of sequence data for this group has expanded considerably. My sequence proved to be 100% identical to collections called *Boletus* aff. *reticulatus* (Korhonen et al) which is still within the core *Boletus edulis* group. As usual things aren't quite that straightforward.

Here is the ITS1-5.8-ITS2 phylogram for *B. edulis* and close allies in genbank with my collection in pink ...



So it looks pretty clear cut there is a single *Boletus edulis* taxon, certainly across Europe and the US which seems to include sequences (presumably from morphologically different specimens) called *B. pinetorum*, *B. aff. reticulatus*, *B. persoonii* & *B. betulicola*. Certainly material labelled *B. pinophilus* and *B. aestivalis* is separate. But if we take a closer look then maybe a signal begins to emerge



Now we start to see some differentiation within *Boletus edulis* sensu lato. In fact my material (in pink) is 100% identical to a group called *Boletus aff. reticulatus*. Despite not having a proper name, this appears to be a morphologically recognised taxon known in Finland and UK with *Quercus*, *Tilia*, and *Corylus*. So are these differences worthy of recognition at species level? On the basis of ITS alone I would say not. All the sequences in the above circular tree are separated by just 10 base pairs across 685 bases of the alignment. There may well be consistent differences, but the signal is getting too close to getting lost in noise. And of course, just because ITS looks the same doesn't mean to say

they are the same species, or have the same morphology. It really just depends on your definition of species. There is no definitive objective answer to that question, especially for fungi. A species is simply what a biologist says it is! To unravel the question of whether we have significantly different populations of *Boletus edulis* in New Zealand (and I think we do) requires more sophisticated analysis of population genetics.

### **Update – Sept 2012**

Pam & David Catchside have recently published records of *Boletus edulis* from the Adelaide Hills associated with *Quercus robur*, *Castanea sativa* and *Pinus radiata*. A sequence of that material was deposited in Genbank and I have now included in the circular tree above with green shade. It is at the other extreme of the same group, which Dentinger et al consider to be variation within *B. edulis* sensu stricto.

### **References**

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Stringer, A., Wang, Y., Bulman, S., Hall, I.R. and Orlovich, D. (2001). *Boletus edulis* sensu lato down under. In: Edible mycorrhizal mushrooms and their cultivation (eds. I.R. Hall, Y. Wang, A. Zambonelli and E. Danell). Proceedings of the second international conference on edible mycorrhizal mushrooms, 3-6 July, Christchurch, New Zealand: 1-5.

Wang, Y.; Sinclair, L.; Hall, I.R.; Cole, A.L.J.; *Boletus edulis* sensu lato: a new record for New Zealand; New Zealand Journal of Crop and Horticultural Science; v23; 1995; pp227-231

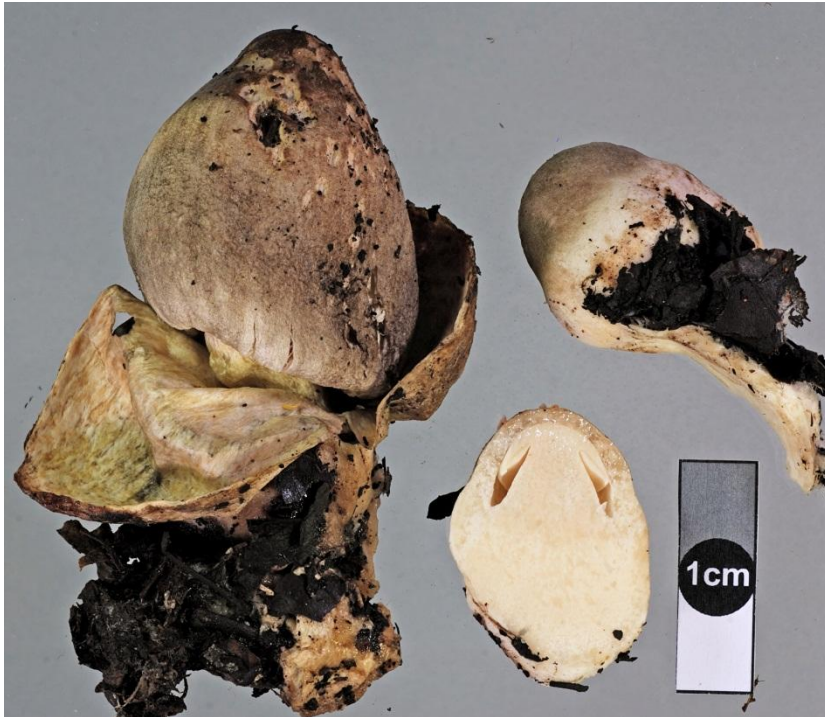




*Boletus edulis* (perhaps) with *Quercus robur* in Hagley Park



*Boletus aff. reticulatus*, with *Cedrus atlantica*, Lincoln



*Volvariella volvacea*, the paddy straw mushroom, from a compost heap in Hagley Park



*Amanita excels* var. *spissa*, with *Quercus robur* in Hagley Park





*Clavulina c.f. rugosa*