

Southern Bracket or Artist's Conk?

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Until recently I hadn't given much attention to the large *Ganoderma* brackets that adorn some of the trees of my local site, Hampstead Heath. I had assumed that they were all most likely to be *Ganoderma australe*, the Southern Bracket.

At the beginning of 2016 I was asked by David Humphries, Trees Management Officer of Hampstead Heath, whether I would take a look at a collection he and a colleague had made from *Quercus ilex*, Holm Oak, in nearby Totteridge. He believed that it might have been *G. applanatum*, commonly known as Artist's Conk or Artist's Bracket.

However, this and subsequent collections, once the spores had been measured, all turned out to be *G. australe*. This exercise spurred my curiosity about *G. applanatum*; how common was it in Southern England, did it occur on Hampstead Heath? I certainly hadn't recorded it in 20 years of recording on the Heath. How could others, and I, tell it apart from *G. australe* in the field?

I was able to investigate the spore size, when looking at *G. australe* specimens, by using my available literature but I didn't have actual

G. applanatum spores to compare my *G. australe* spores against; with a case like this it is always preferable if possible. I was subsequently able to compare spores from a confirmed collection of *G. applanatum* from elsewhere.

In addition to recent works on the polypores of Europe by authors such as Ryvarden & Melo (2014) and Bernicchia (2005), an article by Ann Leonard (1998), specifically compares the two species, both morphologically and microscopically.

Morphology and Habitat

In the field *G. applanatum* and *G. australe* can and often do look identical, with brown, knobbly upper surfaces, white obtuse to narrowed margins, and a white pore surface with very small pores that bruise dark brown (Figs 1 & 2). Both species occur on a variety of broadleaved deciduous trees, including oak, beech, birch, willow, poplar, plane and lime, occurring in woodland, parkland, gardens and cemeteries (Ryvarden & Melo, 2014).

Ryvarden & Melo state that *G. applanatum* is primarily a saprotroph, rarely parasitic and then growing at the base of numerous genera of



Fig. 1. *Ganoderma australe* with the upper crust showing the annual growth ridges and the white pore surface which bruises brown. Photograph © Andy Overall.

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Fig. 2. *Ganoderma applanatum* with one upturned bracket showing the brown staining of the bruised pore surface. Photograph © Andy Overall.

hardwoods, whilst *G. australe* can be found on both dead and living trees, which might suggest that it can be both parasitic and saprophytic which would concur with my observations of *G. australe*. Both cause a mottled white root and butt rot of living and dead hardwoods. Interestingly the comment regarding *G. applanatum* being primarily saprotrophic is not included in Ryvar den & Gilbertson's 1993 Vol. 1 publication *European Polypores* and the source for these statements is not mentioned. This information, if correct, would be important when assessing the management of infected trees. If the ecologies of each *Ganoderma* species really do differ, this would need to be taken into account deciding on treatment of a particular tree.

David Humphries states that, "no one really talks specifically about how to manage trees with separate colonisations of *Ganoderma australe* and *Ganoderma applanatum* but there are some articles and written experiments worth taking

note of, that discuss the different ways in which these two species affect the wood of living trees".

The following are a few statements from some articles and written up experiments:

- Guy Watson, Ted Green and Dr David Lonsdale (2011), remark in the Arboricultural Association's *Fungi on Trees* guide that *G. australe* has the ability to penetrate otherwise sound sapwood, whereas *G. applanatum* is mainly confined to already damaged wood.
- *G. australe* is a weak parasite, whilst *G. applanatum* is principally a true saprotroph on old, already dead stumps, Heinz Butin (2002).
- Under controlled conditions, Schwarze & Ferner (2003), assessed the relative abilities of *G. australe*, *G. applanatum* and *G. resinaceum* to overcome the reaction zone* (R-Zone) within *Platanus x acerifolia*, London Plane. They found that *G. australe* was able to breach the R-Zone

* A reaction zone is a region of active response of living bark and sapwood forming boundaries between sound sapwood and decaying wood to effectively seal off the living tissues.

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Fig. 3. *Ganoderma applanatum* showing a thick flesh layer (arrowed) between two tube layers. Photograph © Geoffrey Kibby.



Fig. 4. *Ganoderma australe* showing the tube layers with just a thin separating zone (arrowed). Photograph © Andy Overall.



Fig. 5. *Ganoderma applanatum* spores from specimen collected on fallen birch, Hampstead Heath. Most spores have the exospore broken off. Scale bar = 10 μ m. Photograph © Andy Overall.



Fig. 6. *Ganoderma australe* spores showing the transparent outer sheath or exospore. Scale bar = 10 μ m. Photograph © Andy Overall.

and colonize new sapwood, whilst *G. applanatum* was unable to do so unless the R-Zone had already been breached via prior drilling.

So, there seems to be some consensus among those working with trees that *G. australe* is the more aggressive and 'parasitic' of the two species and *G. applanatum* the more saprotrophic.

The Consistent Differences

Even though these two species look very similar there are distinguishing features one can look for when examining them in the field.

One is the thickness of the cuticle or crust of the upper surface. In *G. applanatum* the thickest part of the crust is less than 0.75mm thick, whilst

in *G. australe* the thickest part is more than 0.75mm. As a result, the upper surface of *G. applanatum* is softer and depressable with a thumb or finger whilst *G. australe* is much harder and has no give. This should be tried on fruitbodies appearing to be at least two years old and upward but not applied to old fruitbodies with crumbling cuticles.

This age threshold should also be applied when observing and comparing the context of the two species, i.e. the thickness of flesh layer between each season's tube growth. In *G. applanatum* a distinct band of flesh occurs between the tubes, which can be up to 13.5mm thick but varies with age (Fig. 3), whilst in *G.*



Fig. 7. Galls on the pore surface of *Ganoderma applanatum* caused by the Yellow Flat-footed fly *Agathomyia wankowiczii*. Photograph © Mario Tortelli.

australe there is merely a thin stratification between the tube growths, without any substantial contextual layers (Fig. 4).

Once the above criteria have been assessed, the spores need to be measured. When collecting spores for measurement, either scrape them from the upper surface or collect a leaf or twig from around or beneath where the brackets are growing. I find this the most efficient source for obtaining plenty of mature spores.

Ganoderma spores have an outer transparent layer known as the exospore, which often breaks off (see Figs 5 & 6). For a consistent, reliable measurement it is best to measure only the darker boundary of the inner spore. From personal study the following are my spore measurements of both species. The measurements in brackets are the minimum and maximum sizes found by Ann Leonard in her examination of the spores of 65 specimens from Britain and Denmark. (Leonard, 1998). Some of the difference between our measurements is explained by Leonard also including part of the exospore wall in her measurements.

- *Ganoderma applanatum* spores were 5.8–7.0 (9.0) x 4.5–5.2(6.0) μm .
- *Ganoderma australe* spores were (8.0) 9.0–10.0 (13.0) x (5.0) 6.2–7.1 (8.5) μm .

This shows a consistent and substantial difference in length and width between the spores of the two species. However, it has to be noted that



Fig. 8. *Agathomyia wankowiczii*, the Yellow flat-footed Fly commonly causes galls to form on the pores of *Ganoderma applanatum*. Photograph © Pristurus, Wikimedia.

where *G. applanatum* spores reach their maximum size and *G. australe* spores their minimum size, there is an overlap. But even so, when enough spores are measured, a size pattern emerges and one can be sure of an identification

Inconsistent Differences

- The fruitbody margin of both species can be obtuse to narrowed but is more often narrower in *G. applanatum*.
- *G. applanatum* can be infected by *Agathomyia wankowiczii*, a yellow-orange fly that causes distinct, nipple-like galls to form on the pore surface, but they are not always present (Figs 7 & 8).
- The flesh colour can also differ between the two species, often having golden tints just below the

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cap cuticle in *G. applanatum* but as they both have a range of shades they pass through as they age it is not such a reliable feature.

Results and Conclusion

Following the discussions with David Humphries, we both set about seeing whether *G. applanatum* actually occurred on Hampstead Heath. As expected *G. australe* was quite abundant; in one morning we collected small samples and spores from 12 specimens, from across the heath, off different trees. Applying the criteria given here, each collection was confirmed as *G. australe*.

NOTE: For identification purposes, there is no need to collect the whole fruitbody; a small sliver from the fruitbody and/or spores collected from debris or from the upper crust will suffice for identification.

And then one afternoon, during a routine dog walk across the Heath, I decided I would press the tops of each *Ganoderma* I saw during the walk. All were rock hard, apart from one large fruiting of rather small brackets, mixed with some older, larger specimens, on a fallen, dead birch tree (back cover). To my surprise and excitement, each and every one had a soft top, giving way when I pressed down with my thumb.

I felt the underside of one of the larger specimens and felt some hard, cone-like lumps, and on closer inspection I could see that these were galls caused by *Agathomyia wankowiczii*.

Next I measured the spores and they all turned out to be consistently smaller than the minimum size of *G. australe*; I had found my first bona-fide *Ganoderma applanatum*! It seems clear that this is by far the least common of the two species in Middlesex and quite likely most of Southern England.

So I would suggest that when assessing finds of *Ganoderma* in the field you first apply the thumb test for a soft top, then look for fly galls on the pore surface, before collecting a spore deposit and measuring the spores. It is also worth taking note of the habitat and substrate: living or dead trees, fallen or standing and the tree species.

G. applanatum is also known to occur on conifer trees and of the 2776 records (inc. duplicates) on the FRDBI there are a number from conifers, including Yew. Of the 5380 (twice as many as *G. applanatum*) records (inc. duplicates) of *G. australe* on the FRDBI, at a quick glance

there appear to be none from conifers.

Of the 25 records of *G. applanatum* for Middlesex, including duplicates and misidentifications, there are none from Hampstead Heath, making this the first record for the site.

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