Translocation of *Pyrenula nitida*, *Bacidia incompta* and *Thelopsis rubella* at Burnham Beeches 2019

Dave Lamacraft[1] & Neil A. Sanderson[2]

July 2019

BACK FROM THE BRINK

[1] Plantlife, Brewery House, 36 Milford Street, Salisbury, SP1 2AP
[2] Botanical Survey and Assessment, 3 Green Close, Woodlands, Hampshire SO40 7HU

1. Background

Until a scoping visit in September 2018 *Pyrenula nitida* was known in recent years from only one tree at Burnham Beeches (see Figs 1, 2, 3), at least as a naturally occurring population (some material had been transplanted to two beach trees in 2001). This is an ancient beech pollard to the northeast of Mendelssohns Slope above the intersection of Halse Drive and Burnham Walk. This tree has been dead for some time and the likelihood of the tree falling is increasing. The bark is also starting to separate and fall from the lignum. It was for these reasons that a translocation project was planned as part of the Back from the Brink Ancients of the Future project funded by National Lottery Heritage Fund.

Neil Sanderson was contracted by Plantlife to undertake a scoping visit with Dave Lamacraft in September 2018 during which additional specimens of *Pyrenula nitida* were found in an apparently unexplored part of the site that harboured rich lichen interest on ancient beech pollards including some very rare and specialist species (Sanderson 2018). These were in a healthy condition and some were colonising juvenile thalli. Furthermore, during the course of the translocation work on 2-3 April 2019 more *Pyrenula nitida* was found, along with colonising *Pyrenula* thalli that are likely to be *P. nitida*, encouragingly on relatively young beech trees. More significant finds were made on a wider reconnaissance (Sanderson 2019, and this document).

The Section 41 red-listed (Vulnerable) *Bacidia incompta* was also found on the original *P. nitida* pollard in 2018, previously overlooked. The opportunity was therefore taken to remove and transplant some of this material. Some *Thelopsis rubella*, a rare species in the vice-county, was also removed and transplanted.

Translocation of *Pyrenula nitida* had taken place in 2001 (Purvis 2016). These transplants were searched for in the visit in September 2018 (Sanderson 2018).

Figure 1. The original beech pollard with a large colony of *Pyrenula nitida*.

Figure 2. The lower section of trunk where *Pyrenula nitida* and *Bacidia incompta* were collected. Neil Sanderson can be seen collecting *P. nitida* from the bulge on the left.

Figure 3. *Pyrenula nitida*, on the bulge referenced in Fig. 2.

2. Method

a. Donor material

Donor material was taken from the original tree by cutting and prising with a knife. Only apparently healthy material on sound bark was collected.

b. Selection of receptor trees and locations

Pyrenula nitida

The selection of receptor trees was informed by Neil Sanderson's experience of *Pyrenula nitida* in the New Forest (Sanderson 2018); rain tracks on trees, principally beech, with base-rich bark. The following were the key features looked for in selection:

- Tree species; beech trees were selected based on this being the known host species at Burnham Beeches and the key host species elsewhere in its UK range
- Tree age; mature trees, preferably with post-mature features were selected. Post mature / veteran trees were not selected to avoid the risk of tree death or bark loss becoming an issue in the near future.
- Bark characteristics; base-rich bark was selected, key indicators for this were the bryophytes *Metzgera furcata* or *Orthotricum* species.
- Presence of rain tracks; these were easily identified by looking at the architecture and features of the tree e.g areas of flushing down the trunk and below knotholes. Indicator species were also looked for e.g. *Porina borreri* and *Enterographa crassa*. Rain tracks that were colonised by *Porina* species but not yet by the more 'aggressive' *Enterographa crassa* were selected as transplant sites.

In addition, trees were checked for presence/absence of the species being transplanted, with transplants only taking place where the transplant species was absent.

Bacidia incompta

The criteria above were followed here also, but bare rain tracks i.e. ones not colonised by lichens were selected for the actual transplant location.

Thelopsis rubella

The criteria above were followed for this species also.

c. Attachment method

Various methods were investigated prior to undertaking the translocation work, and the hope was to be able to graft the cambium from the transplant bark fragment with that of the receptor tree with the use of grafting wax and stainless steel panel pins. In practice it was evident that the cambium on the ancient pollard was largely if not entirely dead so this plan went out the window and araldite was used to simply glue fragments in place. The main difference to the previous transplants in terms of attachment method was that sections were cut from the bark of the recipient tree with a knife and/or chisel to match the transplant fragment in size and shape as closely as possible. The aim of this was for the transplant fragments to sit as flush as possible with the bark surface rather than sitting proud on top of the bark a. in the hope that some knitting of the cambium may take place and b. so that rain water will flush over the transplanted lichen taking spores with it.

d. Recording

The following details were recorded:

- Tree number; trees were assigned a number simply working from 1 upwards.
- Tag number; trees were tagged if they hadn't already been tagged.
- Tree species and any notes regarding character e.g. age class.
- Grid reference; 10 figure with accuracy (+/- xm) and altitude also recorded.
- Transplants; number of which species and approx. where on the tree e.g. 2 on each of 3 stems.
- A species list was compiled for some receptor trees, but not all (due to time constraints).

Photos were taken of the location of the tree, of the transplant sites and of the transplants themselves. These photos were annotated.

3. Results

The detailed recording and photographs are presented in Appendix 1.

In summary, 33 transplants were made of 3 species on 8 trees, all beech, as detailed below.

- *Pyrenula nitida*; 24 transplants on 7 beech trees.
- *Bacidia incompta*; 5 transplants on 1 beech tree.
- *Thelopsis rubella*; 4 transplants on 1 beech tree.

Additional records were made on a wider reconnaissance of the site; these records are presented in Appendix 2. The most significant new discoveries were *Coenogonium tavaresianum* (5th British record) on the buttress of an oak tree near the intersection of Dukes Drive and Halse Drive, and another tree with B*acidia incompta* on Mendelssohns Slope.

4. Discussion and recommendations for future translocation work.

It proved relatively straightforward to physically collect and transplant bark fragments with *Pyrenula nitida*, *Bacidia incompta* and *Thelopsis rubella*. The method of sitting the transplants into the bark of the receptor tree seems logical, however the practice of trying to cut the right size and shape (including depth) recess within which to sit the transplant fragment was difficult, and perhaps not always as successful as intended. For future translocation of crustose species, it would be worth considering a technique that could take a regular sized and shaped fragment of donor material and create a matching recess or hole at the receptor site. The use of a coring attachment on a handheld electric drill was considered for this work but was not used for various reasons such as the state of the bark of the old beech pollard, anticipated difficulties of extracting the bark core and weight/bulk of the equipment. Use of a short increment corer should be considered.

The use of araldite – seemingly the adhesive of choice for lichen translocation – also proved problematic. Mixing small amounts of the 2-part adhesive in the field was messy and time-consuming and applying the adhesive to the bark fragment and/or the recess not always very accurate or easy using the 'applicator' provided with the adhesive. Despite trying to avoid adhesive squidging out the sides of the transplanted fragmented this was difficult to achieve in practice and in some cases adhesive on fingers ended up on the

lichen thallus. The use of beeswax based grafting wax in place of glue (+/- a stainless steel tack through the bark fragment) was considered, but was not used due to concerns that the grafting wax may prove attractive food for squirrels. For future translocations where an adhesive is required, a more controllable method of applying an inert adhesive should be investigated. Following discussions with Alan Orange, an aquarium adhesive may prove to be suitable, and this is available in tubes that fit a sealant gun which may prove to be much more controllable and much less messy if a very small hole is cut into the nose of the tube.

If a method that can take and insert cores can be found this may not require the use of any adhesive, and would have the added advantage of maximising the chances of the cambium of both transplant and recipient tree grafting. This may require, or benefit from, the use of grafting wax to seal any apparent join. With this in mind, the attractiveness of grafting was to squirrels should be investigated.

With consideration of the 2001 transplants and those done during this work the identification of the correct niche to transplant into is clearly key. This was easily done in this instance thanks to Neil Sanderson's familiarity with *Pyrenula nitida* and its ecology from the New Forest which allowed us to identify suitable transplant locations using physical characters of the tree e.g. rain tracks along with some key indicator species e.g. the liverwort *Metzgera furcata* and the lichen *Porina borreri* (Sanderson 2018); it would have been much harder without this. With this in mind, and although it is early days with regards the success or otherwise of this work, it would seem sensible to take a similar approach if transplants are attempted with other crustose lichen species.

5. Future monitoring

Future monitoring should revisit each transplant on each tree. Any changes to the tree/location information should be recorded e.g. a multi-stemmed tree may have lost a stem.

Photographs should be repeated of each tree and each transplant, ensuring a measuring tape is used for scale in the transplant photographs. The use of a measuring tape for scale will enable image analysis to be undertaken at a later date.

The following should be recorded:

- Any change in condition of the tree e.g. whether showing signs of disease, or any obvious changes in e.g. ivy or bryophyte cover.
- Is the tag still present?
- Are the transplants still present? Which ones?
- Have the transplants moved off the original transplant bark flake onto adjacent bark?
- Approx. size of the transplants i.e. across and down.
- Do the transplants appear healthy or unhealthy e.g. with necrosis?
- Are there signs of mollusc or other damage?
- Are there any other signs of anything else affecting the transplant e.g. ivy growth?
- Has the species established elsewhere on the tree?
- If so, where? Especially noting location relative to the transplants e.g. in rain track below transplant.

6. Measuring success

Success should be measured as follows:

1. Survival of the transplanted bark fragment.
2. Survival of the lichen on the transplanted bark fragment.
3. Spread of the lichen off the transplanted bark fragment onto the adjacent bark of the tree.
4. Colonisation of the lichen (by spore rain) to elsewhere on the same tree as transplant.
5. Colonisation of the lichen (by spore rain) to other trees.

7. References

Purvis, O. W. (2016) Burnham Beeches Lichen Inventory 2016. Unpublished report for City of London.

Sanderson, N. A. (2018) Reconnaissance survey of epiphytic lichens Burnham Beeches NNR, Buckinghamshire, 2018. Unpublished report to Plantlife.

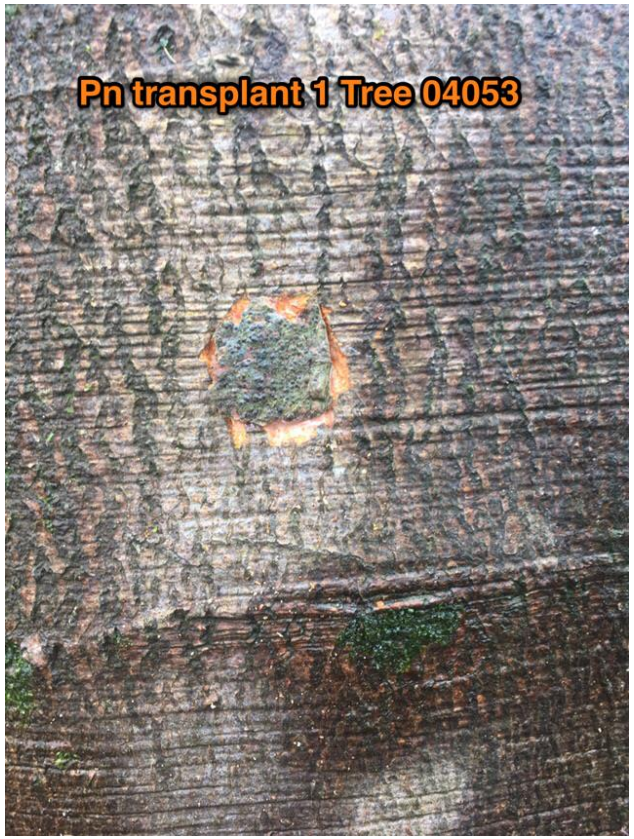
Sanderson, N.A. (2019). Notes on *Pyrenula nitida* translocation April 2019. Unpubished report to Plantlife.

Appendix 1; detailed recording of the transplants

Tree 1
Tag 04053
Species: beech, mature with post-mature features developing
GR: SU8903185100 +/-3m 49m
Transplants:
3x *Pyrenula nitida* transplants into well flushed bark on nw facing side
Also recorded on tree:
Cliostomum griffithii
Graphis scripta
Lepraria finkii
Porina aenea
Porina byssophila
Porina leptalea
Psoroglaena stigonemoides

Tree 1/04053; location, taken from the north


Tree tag 04053
Locations for Pn transplants on
flushed bark


Pn transplant 1 Tree 04053


Pn transplant 3 Tree 04053

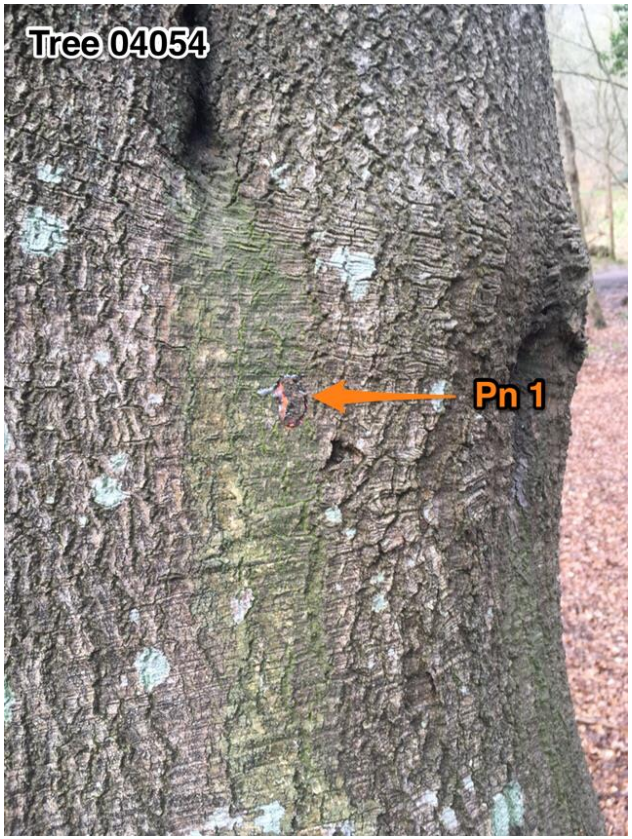

Pn transplant 2 Tree 04053

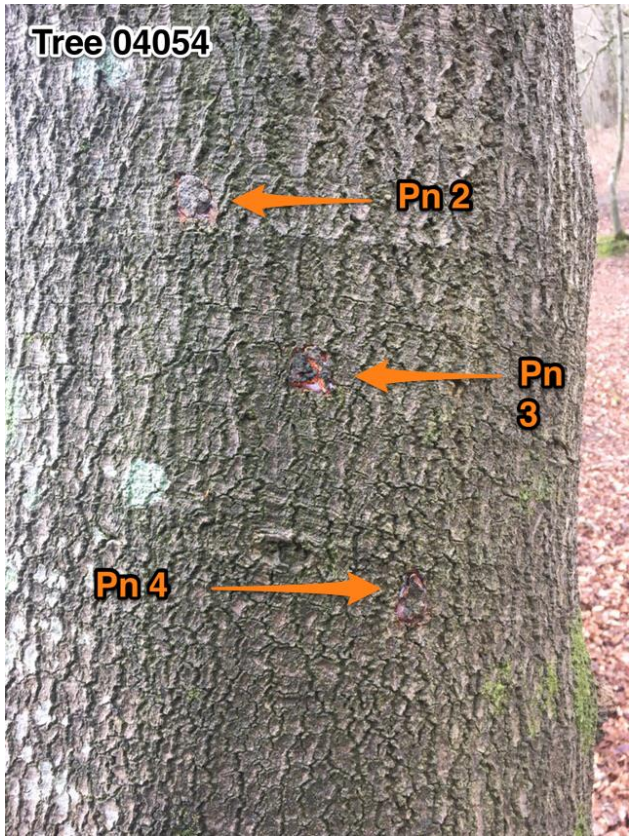
Tree 2
Tag 04054
GR: SU9505285097 +/-6m 54m
Species: beech, mature
Transplants:
4x *Pyrenula nitida* into flushed areas on ne-e side with *Porina borreri*
1-3 (top-bottom) in ne flush and 1 in e flush
5x *Bacidia incompta* into bare wound track on n and w side 1-2 (top-bottom) in n track and 3-4 (top-bottom) in w track
Also recorded on tree:
Anisomeridium polypori
Enterographa crassa
Graphis scripta
Pertusaria hymenea
Porina borreri
Porina byssophila

Tree 2/04054; location, taken from the north

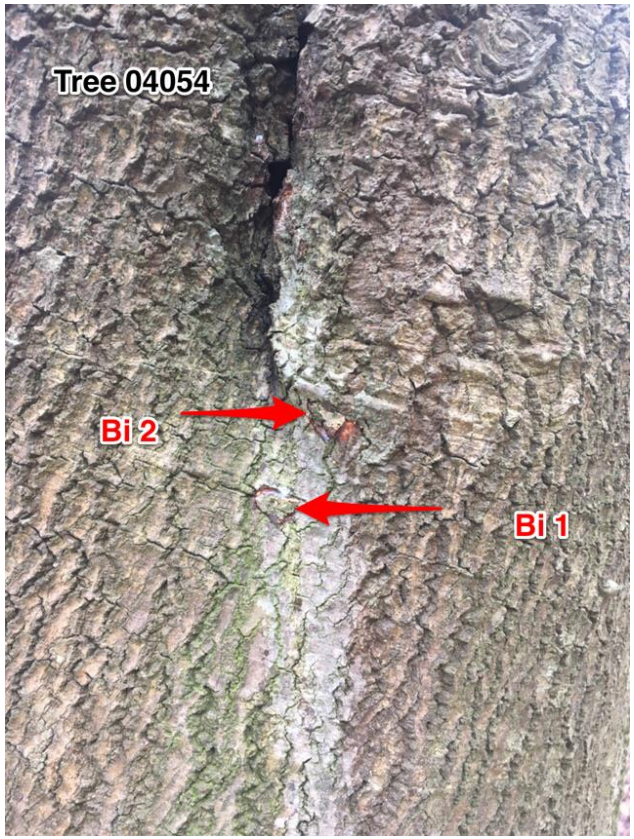

Tree tag 04054
Locations for 3 Pn transplants
on flushed bark

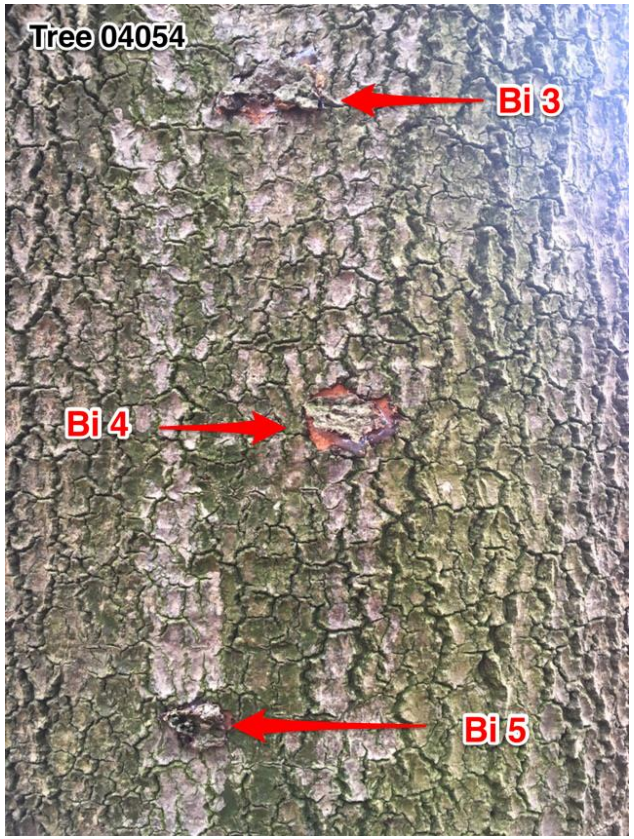

Tree 04054
Locations for Pn
transplant in flushed bark e side


Tree 04054
Pn 1


Tree 04054
Pn 2
Pn 3
Pn 4

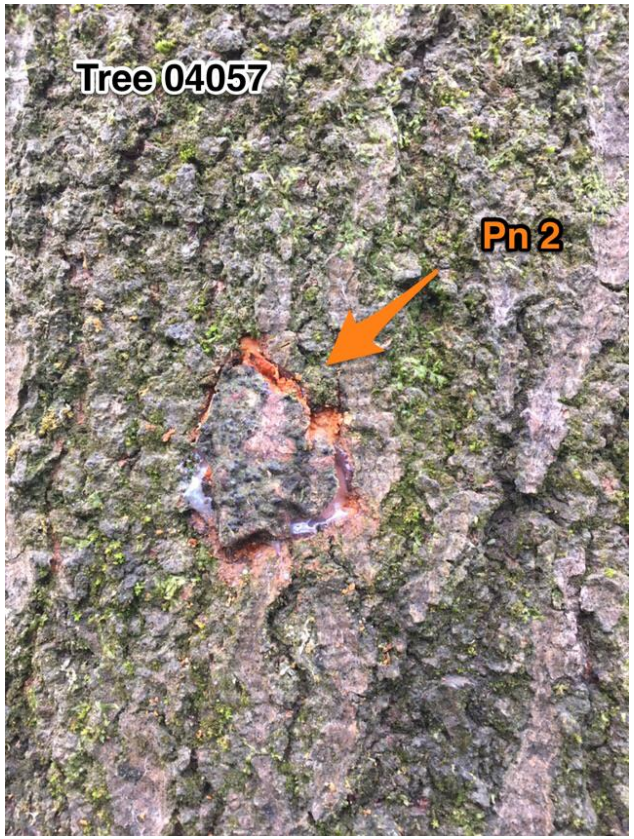
Note: 3 Bi transplants were placed in this rain track

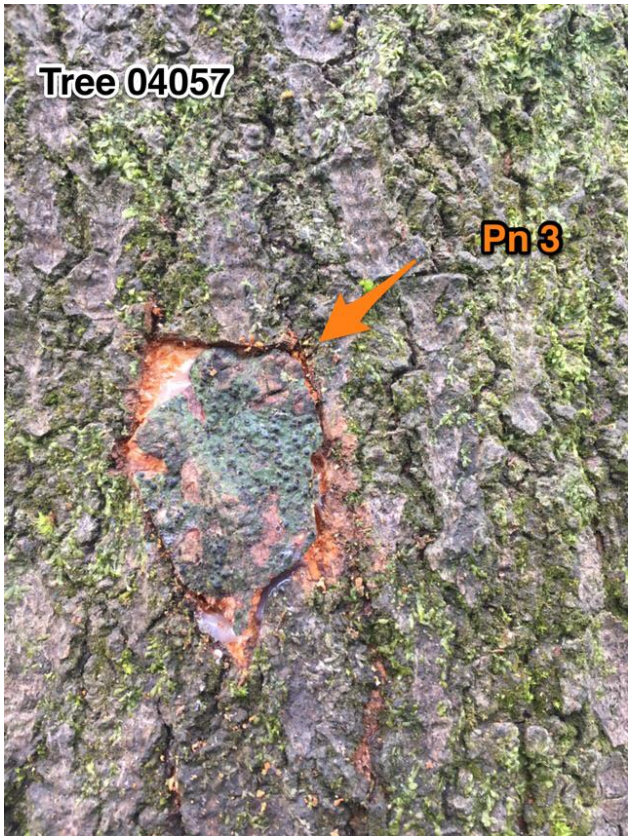

Tree 04054
Bi 2
Bi 1


Tree 04054
Bi 3
Bi 4
Bi 5

Tree 3
Tag 4057
GR: SU9504885105 4m 63m
Species: beech, mature
Transplants:
3x *Pyrenula nitida* into flushed area on ne side
1-3 top-bottom
Also recorded on tree (by N Sanderson):
Arthonia spadicea
Enterographa crassa
Graphis scripta
Pertusaria hymenea
Porina aenea
Porina borreri
Porina byssophila

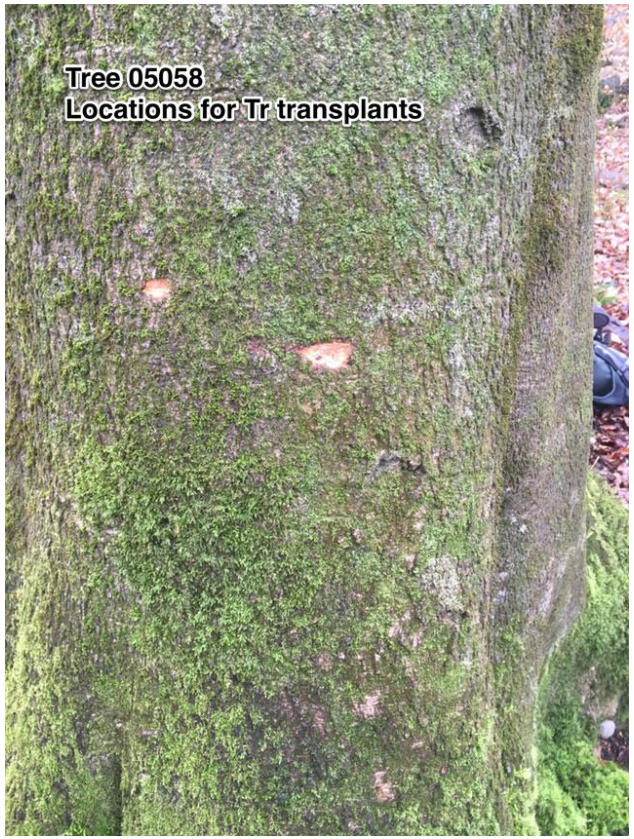

Tree 04057
Pn 1


Tree 04057
Pn 2


Tree 04057
Pn 3

Tree 4
Tag 4058
GR: SU9506685089 +/-5m 67m
Species: beech, mature
Transplants:
4x *Thelopsis rubella* 1-4 from left-right


Tree 04058
Locations for Tr transplants


Tree 05058
Locations for Tr transplants


Tree 04058
Tr 1


Tree 04058
Tr 2

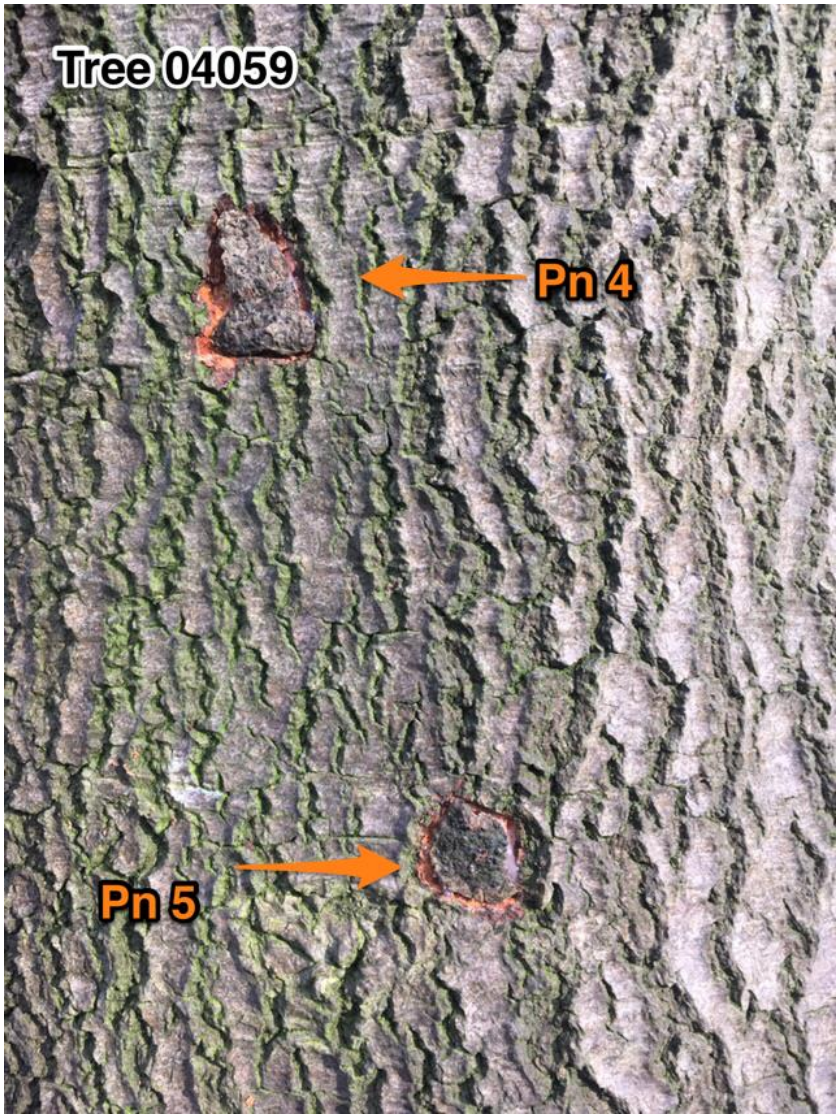

Tree 04058
Tr 3

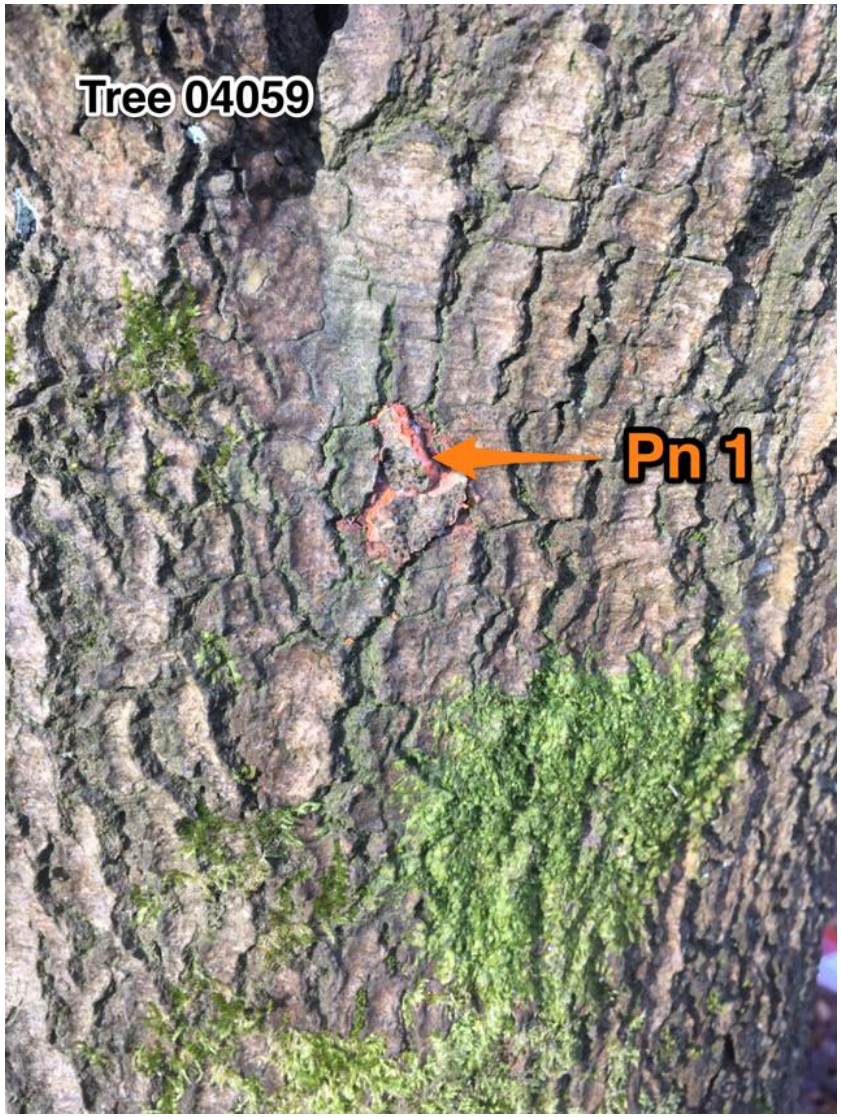

Tree 04058
Tr 4

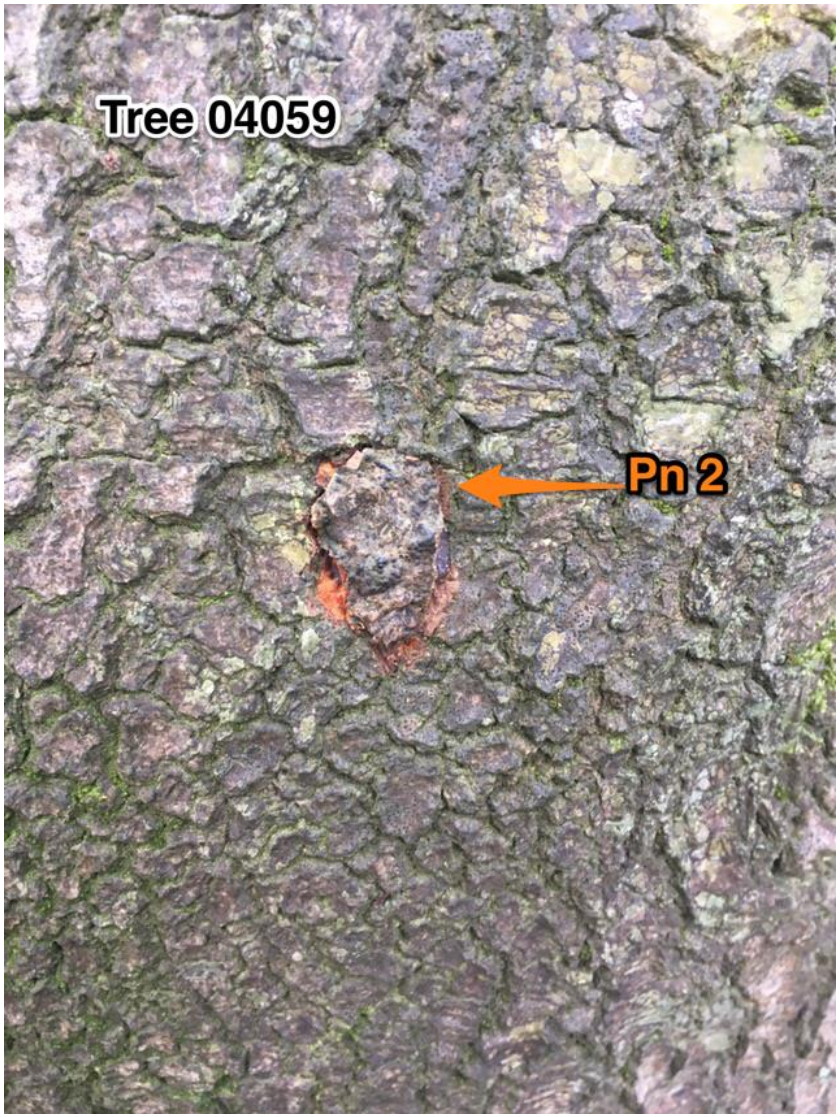
Tree 5
Tag 04059
GR: SU9500385041 +/-3m 67m
Species: beech, mature
Transplants:
5x *Pyrenula nitida* in small rain tracks below knotholes on ne (1), e (2) and s (2) sides.


Tree 04059
Locations for Pn transplants on flushed bark


Tree 04059
Locations for Pn transplants on s side


Tree 04059
Pn 4
Pn 5


Tree 04059
Pn 1

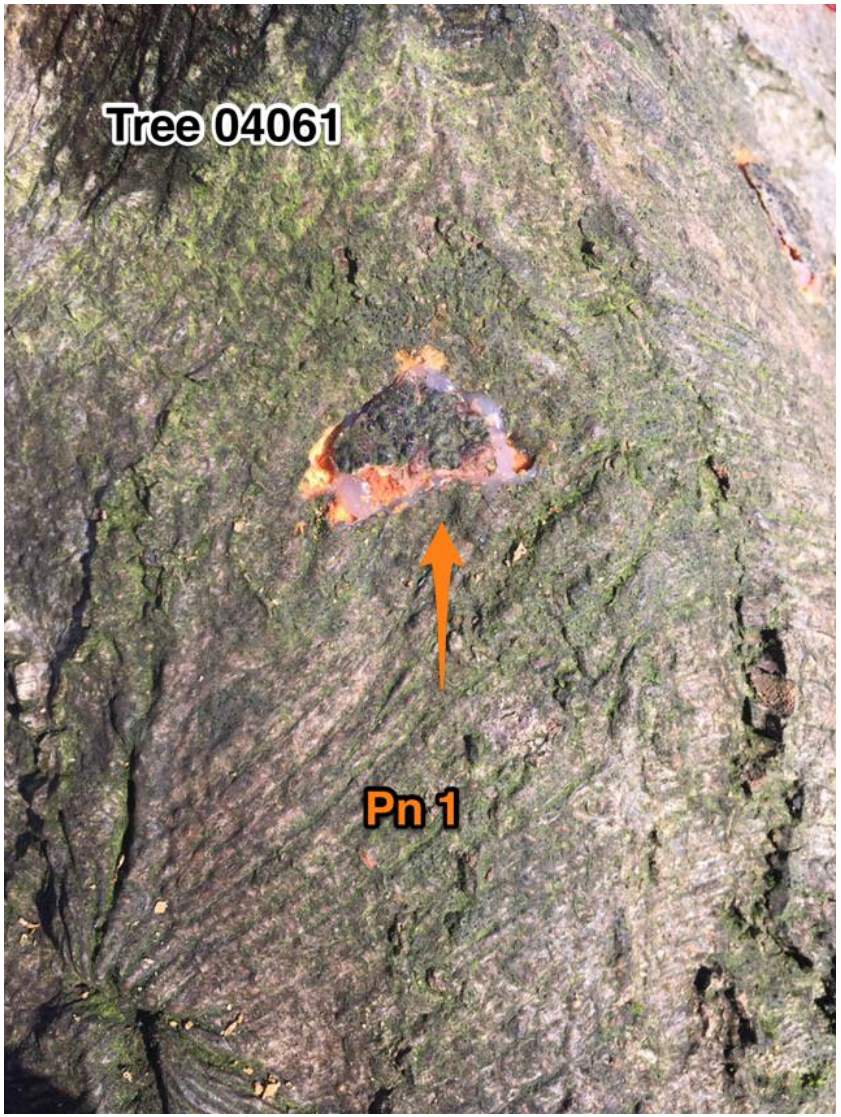

Tree 04059
Pn 2

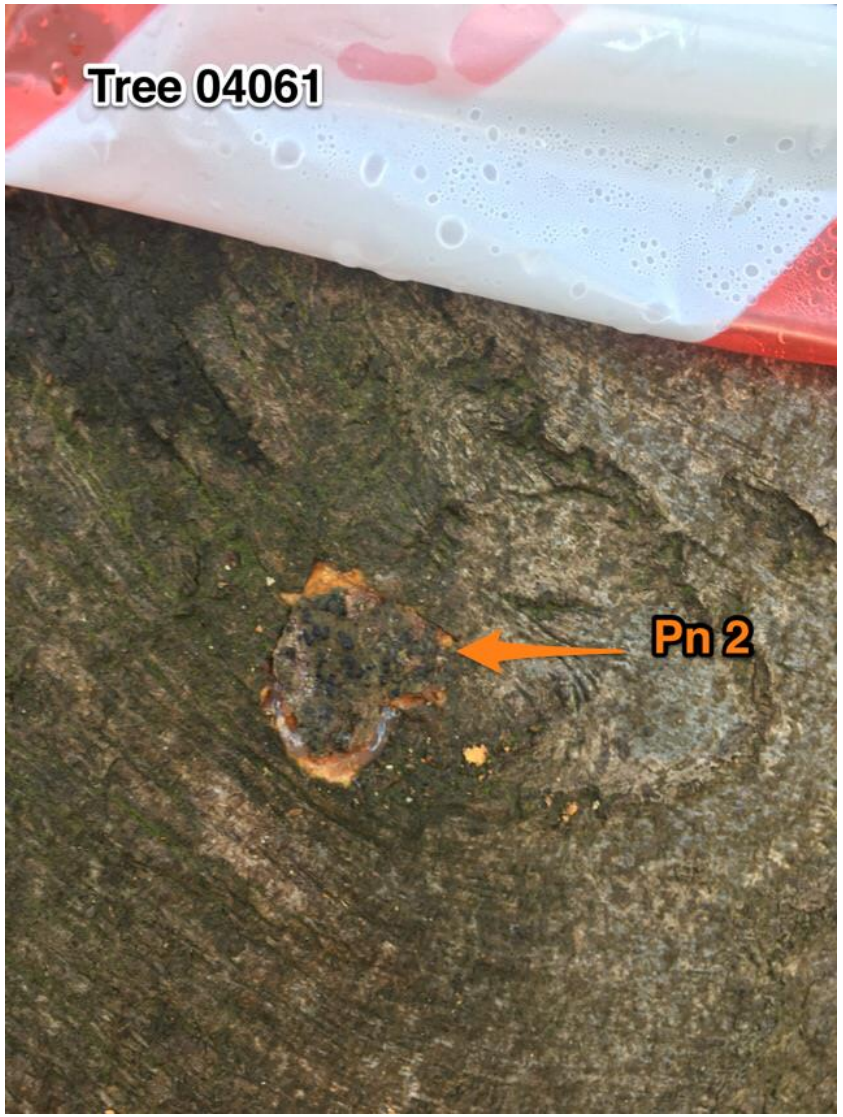

Tree 04059
Pn 3

Tree 6
Tag 04060
GR: SU9500085053 +/-3m 64m
Species: beech, mature
Transplants:
1x *Pyrenula nitida* on flushed bark on n side of leaning tree, quite bryophyte dominated in general, visible in photo (*Orthotricum* sp - *straminea*?)

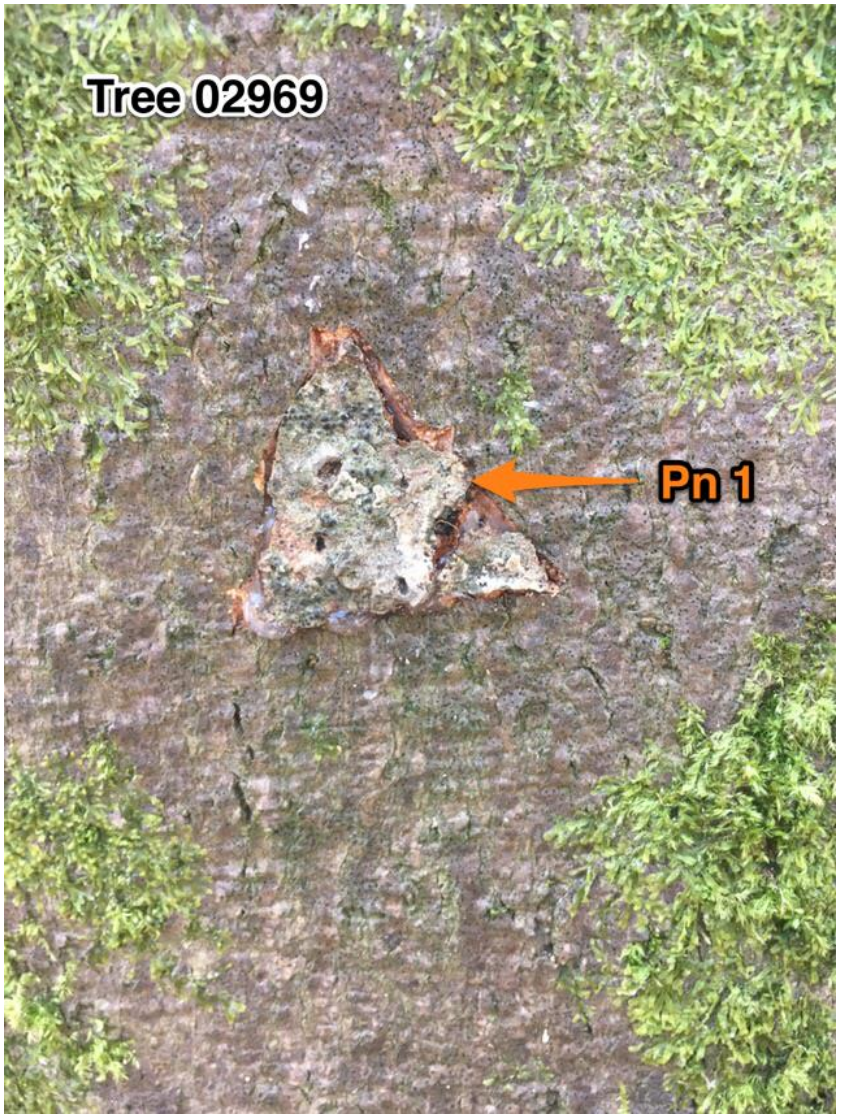

Tree 04060
Pn 1

Tree 7
Tag 04061
GR: SU9499285046 +/-3m 71m
Species & age: beech, mature
Transplants:
2x *Pyrenula nitida* in rain track from knot hole on se side of leaning tree


Tree 04061
Pn 1


Tree 04061
Pn 2

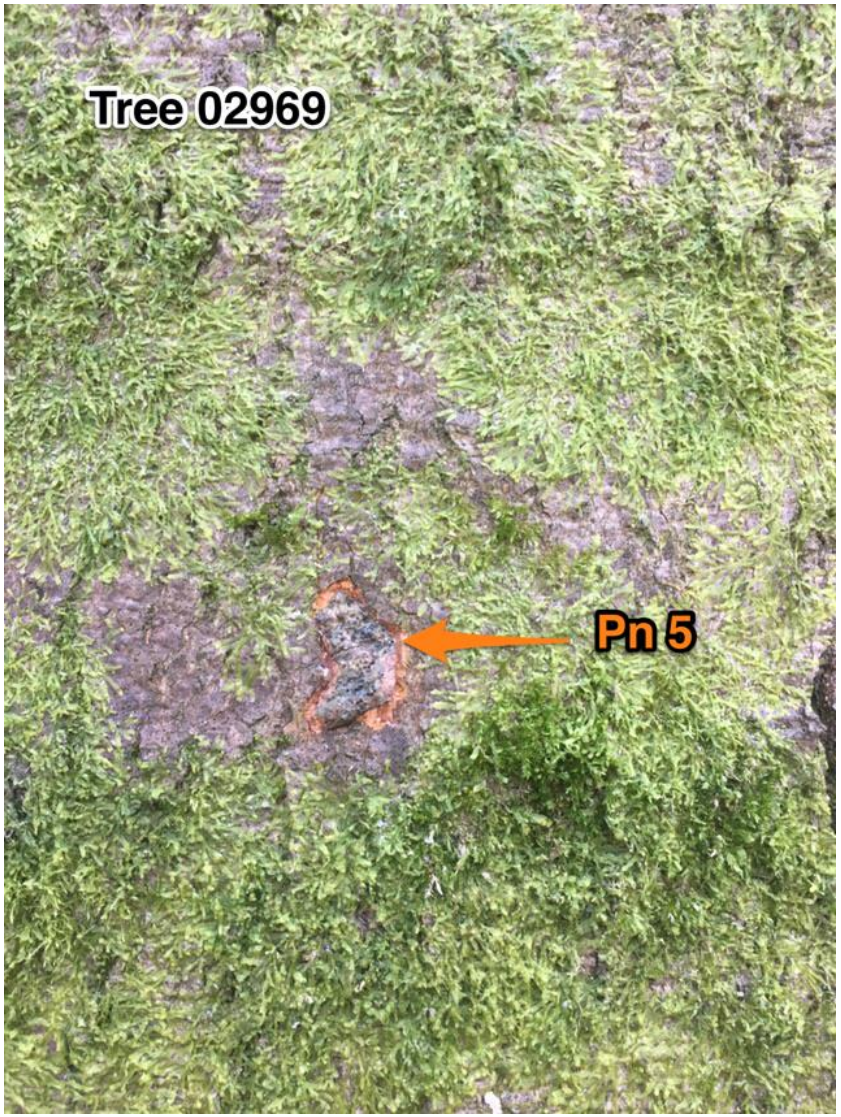
Tree 8
Tag: already tagged 02969
Species & age: beech, mature
Transplants:
6x *Pyrenula nitida* on flushed area on n side, although quite bryophyte-dominated with *Isothecium myosuroides*, *Metzgera furcata*. Transplants made into areas with *Porina borreri*.


Tree 02969
Pn 1


Tree 02969
Pn 2


Tree 02969
Pn 3

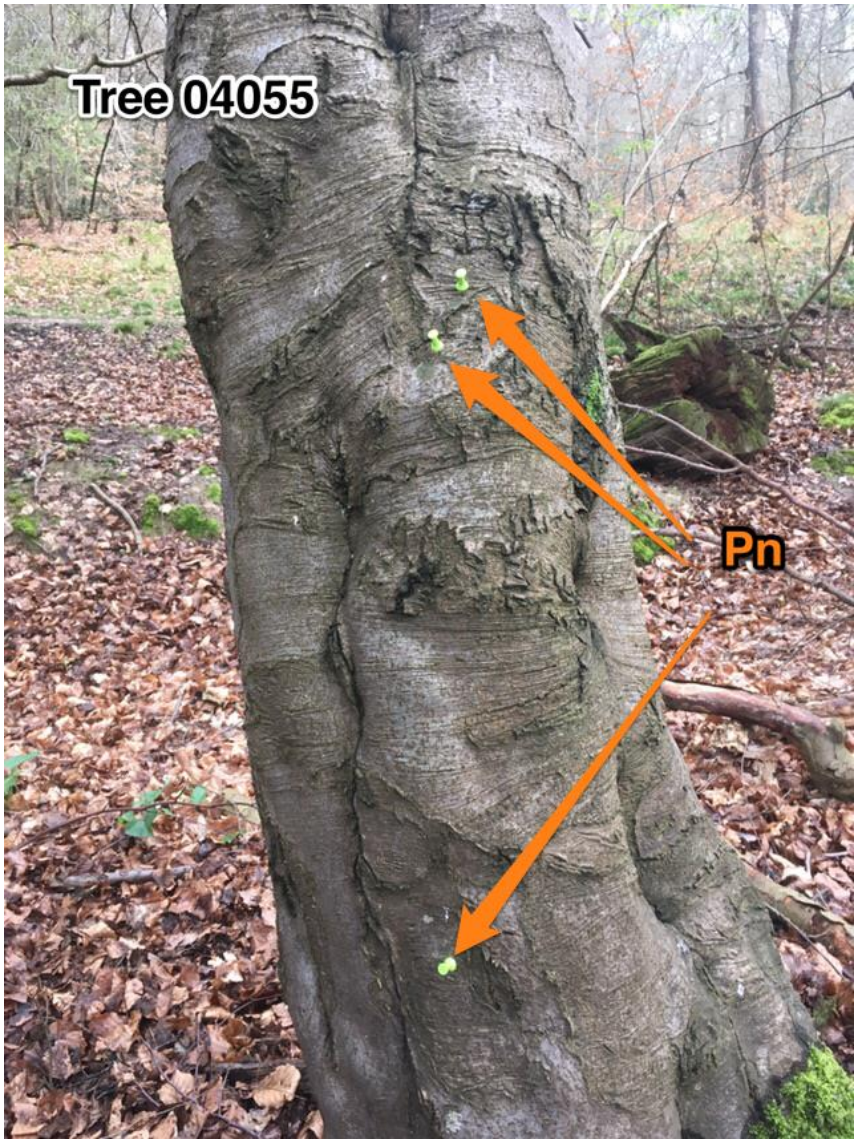

Tree 02969
Pn 4


Tree 02969
Pn 5

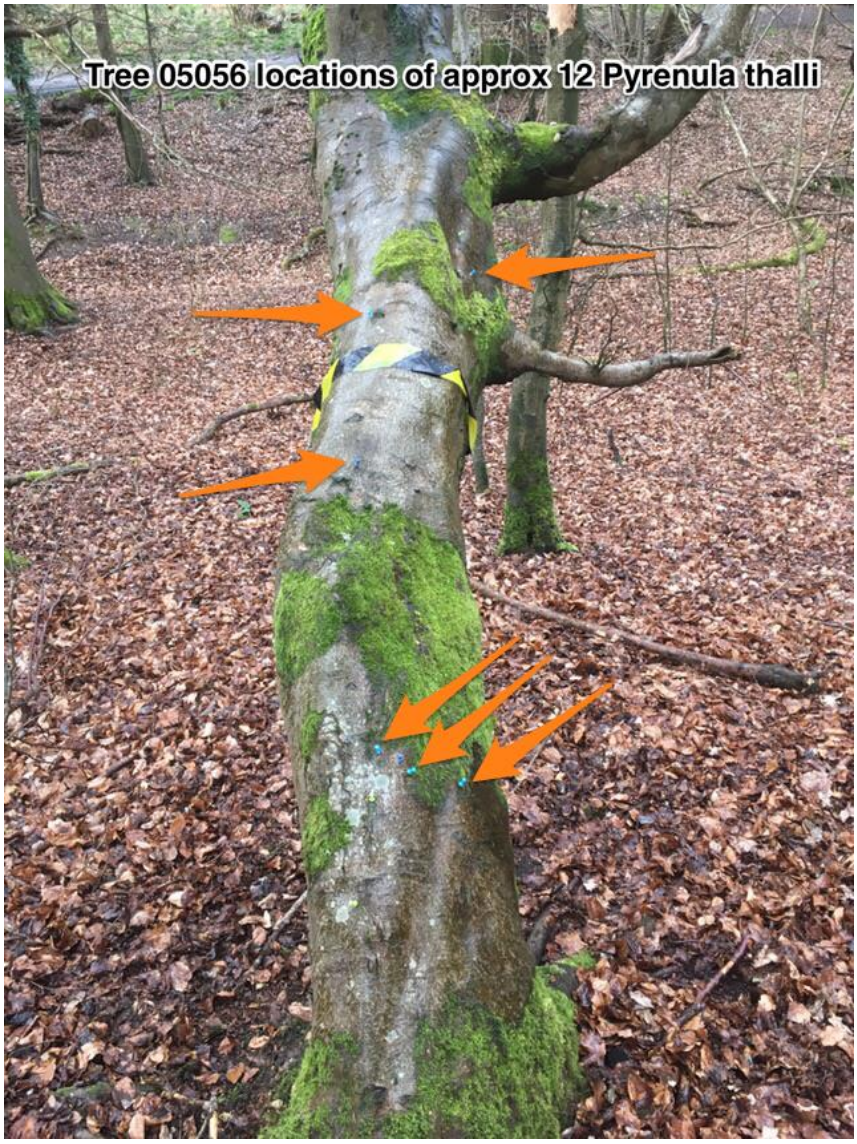

Tree 02969
Pn 6

Appendix 2; Additional records made during the course of the translocation work

Tag 04055
GR: SU9504285113 +/-6m 42m
Tree species & age: beech, young and suppressed
Date: 03/04/2019
Identified for translocation but colonising *Pyrenula*, quite probably *P. ntitida* was located.
Photographed with green pins.


Tree 04055
Pn

Tag 4056
GR: SU9506885096 4m 52m
Tree species & age: beech, mature (leaning)
Leaning mature beech with c12 Pyrenula thalli, newly discovered colonists


Tree 05056 locations of approx 12 Pyrenula thalli

Tree 01351 SU9499684991 4m 63m
Beech pollard with hole in middle
Bacidia incompta o in rain/wound track on e side
Amandinea punctata r scattered over cracked bark on boss on s side, small thalli
Opegrapha vermicillefera
Opegrapha varia
Porina borreri
Enterographa crassa
Porina leptalea
Caloplaca obscurella

Oak 1348 just upslope
Cresponea premnea

Beech post-mature 01137
SU9493785248 4m 60m
Rain track on se side with
Strigula taylorii
Enterographa crassa on edges
Graphis scripta
Dendrographa decolorans

Oak nearby
Arthonia spadicea
Anisomeridium polypori

Graphis elegans Fg
Lecanactis abietina Q

Beech
Old tag 1132
SU9491385276 4m 59m
Dactylospora parastica

Old stub of beech pollard
SU9488285440 7m 72m
Good *Enterographa crassa* mosaic
Caloplaca ulcerosa

Big old oak pollard
Tag01054
SU9486185523 3m 73m
Rich buttress left of tag - all low down
Coenogonium tavaresianum r, low down in crevices of buttress
Amadinea punctata
Pertusaria flavida
Cresponea premnea - a on n side
Schismatomma decolorans

Ancient beech pollard no tag
SU9493685563 4m 72m

Appendix 3; notes on translocation from Sanderson 2018

Pyrenula nitida Translocation

3.1.1 Existing Translocations

It was impressive that some of the flakes of bark translocated in 2001 were still attached, had not rotted and had healthy *Pyrenula nitida* thalli on them. While there may or not be better ways of attaching transplanted bark than araldite, the basic technique would appears to be proven. On the other hand no colonisation had occurred onto the bark of the new trees. *Pyrenula nitida* was observed as currently colonising bare bark on one of the new trees found in 2018 and it was colonising new bark on the last original tree, so the lichen is capable of colonising currently. Of the two translocation trees looked at, on one the bark was far to acid support *Pyrenula nitida*, although the surviving material is still healthy on the translocated bark (itself an interesting observation). The other looked to be actually quite suitable but was deeply shaded by the dense Beech regeneration. This alone could be inhibiting new colonisation. Also the translocations are somewhat proud of the bark, which may reduce spore flow off the bark flake. The third tree, which was not visited, was also likely to be too shaded and acidic.

3.1.2 Surviving Original Tree

This still had plenty of *Pyrenula nitida* VU (NR/S41) and there is no shortage of material to translocate. Recording the tree, however, found considerable over looked interest including *Bacidia incompta* VU (NS/IR) and *Thelopsis rubella*. The need to translocate these as well is not clear without a full survey.

3.1.3 Potential Translocation Trees

In Britain *Pyrenula nitida* is a species of drier rain tracks on veteran Beech trees. It grows on non-acidic flushed bark where it is not too wet for bryophyte dominance. The commonest associate is *Enterographa crassa*, a common southern oceanic species with a wider range of habitats. Colonisation is likely to occur when the habitat is developing, the species can easily overgrow pioneer thin thallus species such as *Porina* species and *Opegrapha* species but not its late succession competitors. Once the thick thallus late succession species have fully colonised the communities remain very stable with no opportunities for new colonisation. In many cases, this means that the rapid colonising *Enterographa crassa* dominates rain tracks (Sanderson, 2009).

The need is to identify suitable trees, which are likely to be capable of supporting *Pyrenula nitida*. There are suitable Beech pollards, which could be used, but the ideal are Beeches just moving out of maturity into a post mature condition. There actually are a fair few of these in the vicinity of the original tree some are acidic but several were spotted which had developing non-acidic flushed bark. The potential pollards trees are mostly well lit due to the active management by haloing but most of the younger post mature trees are in the valley bottom in unmanaged former pasture woodland with large scale invasion by dense young Beech. This means most are currently too deeply shaded. Full grazing restoration and patchy thinning of the beech saplings to let in more light will be required. Slow growing suppressed trees are also a potential colonisation habitat, but these are probably not worth translocating on to.

Suitable trees have flushed bark habitat with the liverwort *Metzgeria furcata* present (indicating high enough pH) but not dominant (so not too wet) with colonising pioneer

lichens including *Porina* species and *Opegrapha* species and especially the beginnings of colonisation by the late succession species *Enterographa crassa*.

4.1 *Pyrenula nitida* Translocation

The follow was concluded:

- Survival of some of the translocations since 2001 suggests that translocation on bits of bark is worthwhile.
- Further investigation of potential better translocation techniques should be investigated.
- Suitable trees can be identified by the bryophyte and colonising lichen assemblage.
- Creating better habitat conditions around translocation trees is required for success, i.e. colonising off the translocated bark.
- The best potential trees for translocation of (or natural colonisation by) *Pyrenula nitida*, the younger post mature Beech in the valley bottom near the original *Pyrenula nitida* tree are deeply shaded.
- Restoration of a more open grazed high forest type gladed pasture woodland habitat is recommended for the area with younger post mature Beech. This is vital for natural colonisation by old growth dependant lichens as well as the ensuring the success of any translocations.
- There are other important lichen species on the original Beech pollard, which may also merit translocation.