

Three *Trichophorum* taxa ~ ID & ecology

Jeremy Roberts, April 2018

Links to:

**a lot more [more information](#) on the genus,
the downloadable [field-guide](#):**

or

google for

'roberts deergrass'

... some history

... traditionally, a single species, *Scirpus cespitosus* L.; '*Trichophorum cespitosum*'



'CTW' Ed. 2
(1962)

Two deergrass
taxa, LONG
known! - here
recognised as
SUBspecies

Eduard Palla
(d. 1922) →
... *T. germanicum*

2. *T. cespitosum* (L.) Hartman

Deer-grass.

Scirpus caespitosus L.

A densely tufted perennial 5–35 cm. Stems slender, terete, smooth. Lower sheaths lfless, light brown, shiny. Spikelet 3–6 mm., 3–6-fl. Glumes subacute, the two lower larger than the rest. Bristles somewhat longer than fr. but shorter than glumes, brownish. Nut c. 2 mm., ovoid, trigonous. Fl. 5–6. Fr. 7–8. Hs. or Hel.

Ssp. *cespitosum*

Basal sheaths shining; uppermost sheath (Fig. 70 A) fitting tightly round the stem (at least in fresh material), the opening c. 1 mm., hyaline margin narrow. Glumes brown with a yellowish-brown midrib, the lowest ending in a short, stout green point. $2n=104$.

Ssp. *germanicum* (Palla) Hegi

T. germanicum Palla; *Scirpus germanicus* (Palla) Lindm.

Basal sheaths scarcely shining; uppermost sheath (Fig. 70 B) fitting loosely round the stem, the opening 2–3 mm., with broad hyaline margin. Glumes brown with a green midrib, the lowest ending in a stout, green, often almost lf-like, point which usually equals or exceeds the spikelet.

Native. In damp acid peaty places, particularly blanket bogs and heaths, locally dominant. 104, H40. The distribution of the ssp. is not known in detail, but ssp. *germanicum* is much the commoner; ssp. *cespitosum* is rare and its distribution is imperfectly known. The sp. is scattered throughout much of the British Is., but absent from base-rich soils. W. and N. Europe, local in C. Europe and rare in the south; Himalaya; N. America; Greenland.

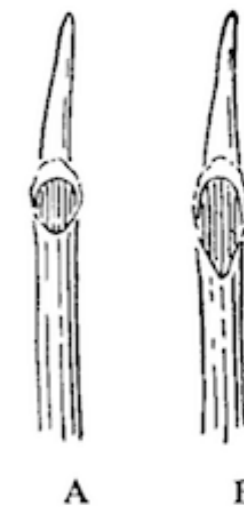


Fig. 70. Uppermost sheaths of *Trichophorum cespitosum*. A, ssp. *cespitosum*; B, ssp. *germanicum*. $\times 2.5$.

1999: two SUBspecies - and recognition of a frequent hybrid
[with a not-very-memorable name!]:

Watsonia 22: 209–233 (1999)

209

**Identification, distribution and a new nothosubspecies of
Trichophorum cespitosum (L.) Hartman (Cyperaceae) in the
British Isles and N. W. Europe**

G. A. SWAN

81 Wansdyke, Morpeth, Northumberland, NE61 3QY

ABSTRACT

The common form of *Trichophorum cespitosum* (L.) Hartman (Cyperaceae) in Britain and Ireland, growing in acidic peat, is subsp. *germanicum*, while subsp. *cespitosum* is rare in South Northumberland (v.c. 67) in marginal areas of *Sphagnum* mires, with base-enrichment, although specimens exist from elsewhere in Britain and Ireland. The characteristic *Trichophorum* of raised mires in v.c. 67 is a sterile hybrid between subsp. *cespitosum* and subsp. *germanicum*, corresponding to a plant found by E. Foerster in 1970 in the Harz Mountains and elsewhere in N. W. Germany, and for which the name ***Trichophorum cespitosum* (L.) Hartman nothosubsp. foersteri** G. A. Swan, **nothosubsp. nov.** is now proposed. The identification and distributions of these taxa are discussed. Possibly, in earlier times, subsp. *cespitosum* was the plant of raised mires in Britain, as in Norway today, but was displaced by the hybrid except in base-enriched, marginal areas. In Britain, proliferous forms of the hybrid and subsp. *germanicum* also occur.

KEYWORDS: Deergrass, raised mires, Harz Mountains, nothosubsp. *foersteri*, floral proliferation.

2007: two SPECIES - and the hybrid gets a nice binomial!:
the common species is now “*germanicum*”; the rare species is “*cespitosum*”

6 *Trichophorum cespitosum* (L.) Hartm.

Northern Deergrass

Map 6

Rhizomes short, forming small ± open tufts. **Stems** 5–25 cm × 0.5–0.8 mm, ± terete, smooth, but with distinct ridges; substomatal pits conspicuous in transverse section of stem, 20–26 µm deep; aerenchyma tissue between vascular bundles absent. **Leaves** as in 5 *T. germanicum*, but upper leaf-sheath fitting tightly round stem, with a ± transverse and circular opening typically c. 1 mm in diameter. **Inflorescence** smaller and more compact than in *T. germanicum*, with fewer (3–5) flowers; sometimes up to 20% of the population proliferating (in Northumberland: see Swan 1999); involucre bracts 2, 4–5(–7) mm long, glume-like, brown to orange-brown, with midrib pale yellow-green with an obtuse, green apical projection. **Glumes** similar in size and texture to those of *T. germanicum* but sometimes paler brown with the central nerve dominant and the marginal ones indistinct; apex subobtuse, attenuated into a subulate tip. **Flowers** and **nuts** as in *T. germanicum*.

Fr. 5–7.

The ecology of *Trichophorum cespitosum* is difficult to define owing to the small number of populations found. In Northumberland it appears to be confined to the margins of raised or valley mires where there is some water movement and base enrichment, whilst 5 *T. germanicum* tolerates a wider range of habitats (see Swan 1999). In Perthshire (v.c. 88) it can be found on limestones in open, often stony, calcareous mires with *Carex panicea*, *C. pulicaris*, *C. viridula* subsp. *oedocarpa* and occasionally *C. viridula* subsp. *brachyrrhyncha* with *Schoenus ferrugineus* and *Saxifraga aizoides* (M11).

The general morphology of *Trichophorum cespitosum* is similar to that described for 5 *T. germanicum*, with which it can grow. The micro-characters seen in stem section are the best way to confirm it. The species should be looked for in often open and stony, base-rich mires (as described above), which often show a mosaic with residual peat islands where *T. germanicum* will be more common; also in apparently base-poor communities, where it can be dominant (see Swan 1999). In the field it appears as a more slender-stemmed and more open tuft with a distinctive ‘jizz’.

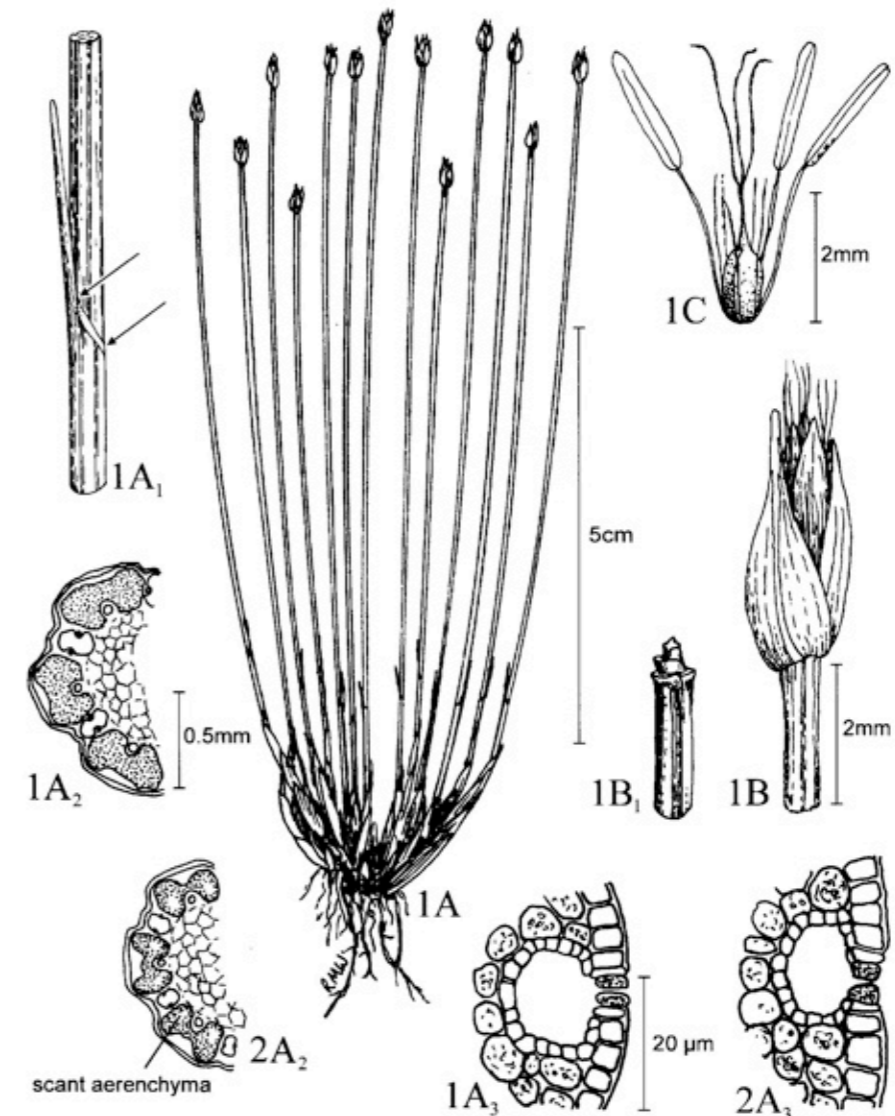
The name *Trichophorum cespitosum* has in the past generally been used for *T. germanicum*, which is treated as a subspecies of *T. cespitosum* even by Stace (1997) and Sell & Murrell (1996).

Trichophorum cespitosum

T. × foersteri (*T. cespitosum* × *T. germanicum*)

6

6 × 5



1 *Trichophorum cespitosum* 2 *T. × foersteri*
A Plant habit and flowering stems; A₁ Upper sheath with leaf (arrows indicating length of opening); A₂ Partial transverse section of stem (with no or little aerenchyma); A₃ Enlarged portion of stem, showing substomatal pit; B Spikelet; B₁ Spikelet rachis, showing glume bases; C Floret.

... so now we have three taxa...

Deergrass
T. germanicum

hopefully,
to be called
“Common”
Deergrass
in Stage 4!

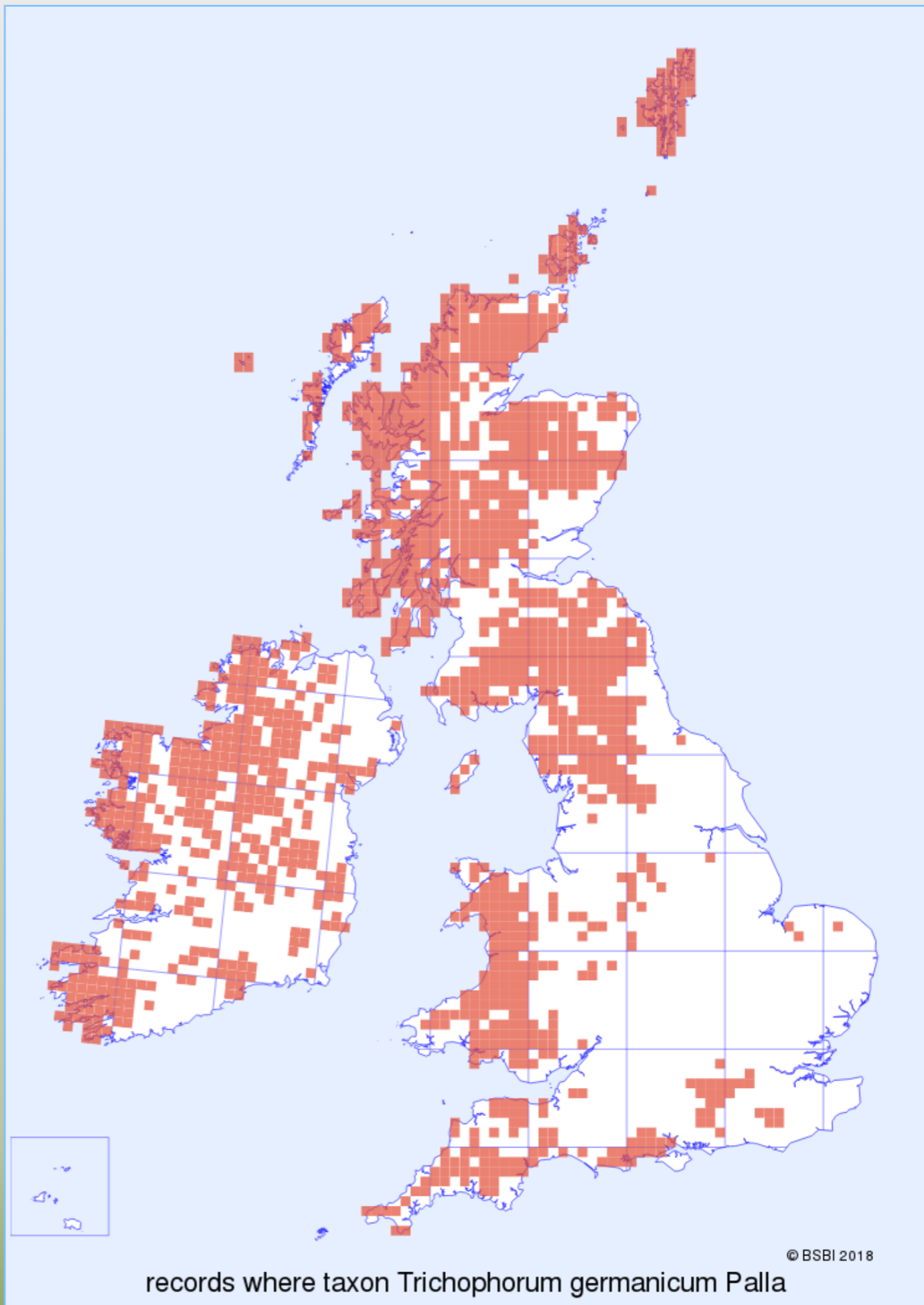


‘Common’ Deergrass
T. germanicum

a local ‘Atlantic-subtropical’ species

*[shallow] peaty soils:
blanket bog and wet
heath*

**British Isles, ‘lower
regions’ of Sweden,
Denmark, France and
Germany**



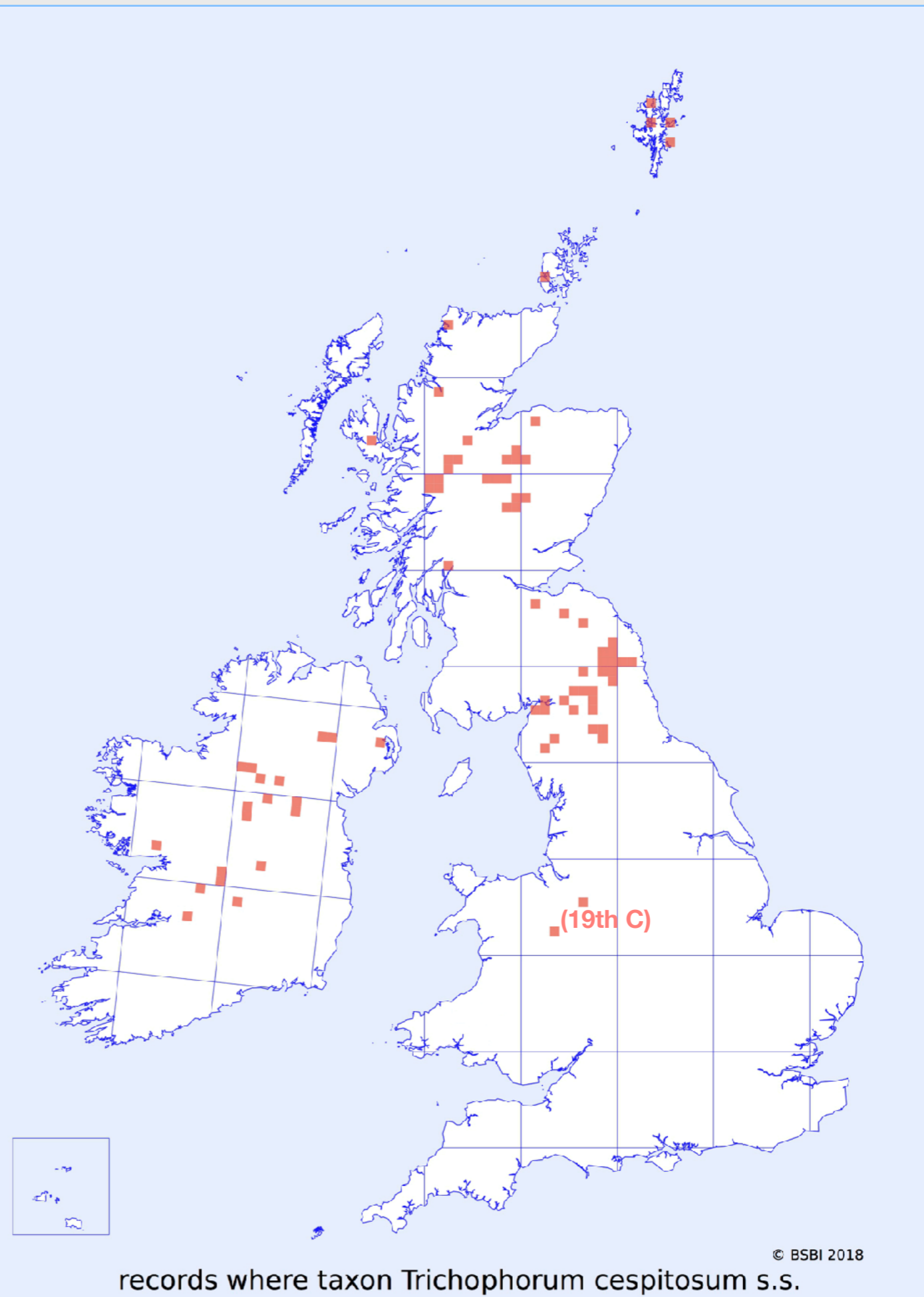
‘Northern’ Deergrass
T. cespitosum s.s.

arctic-alpine; circumpolar

*base-rich habitats and
deep peat mires*

**Widespread in northern
and central Europe**

[grateful thanks to Andy
Amphlett for ‘sorting’ the DDb
data for this map!]

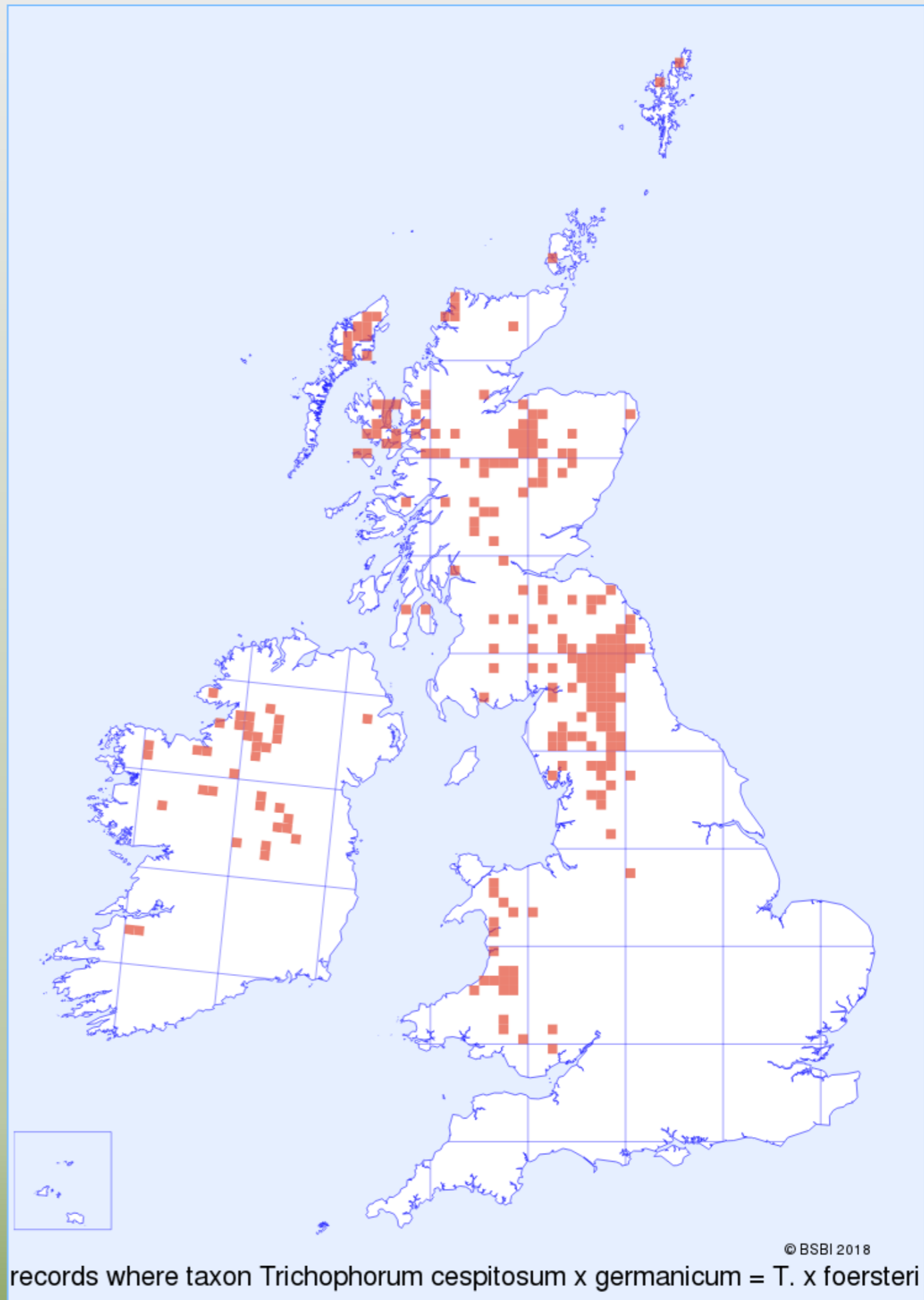


‘Hybrid’ Deergrass
T. × foersteri

*in overlap zone of parent
species:*
‘Atlantic-subatlantic’

*base-rich habitats and
deep peat mires*

**NB: widespread in Wales,
where *cespitosum* parent
not yet found**



Where to seek Northern Deergass,
Trichophorum cespitosum s.s.

Occurs in two very different habitats

1: BASIC

- range of habitats (see Swan 1999). In Perthshire (v.c. 88) it can be found on limestones in open, often stony, calcareous mires with *Carex panicea*, *C. pulicaris*, *C. viridula* subsp. *oedocarpa* and occasionally *C. viridula* subsp. *brachyrrhyncha* with *Schoenus ferrugineus* and *Saxifraga aizoides* (M11).
-

... calcareous habitats flagged in
Sedges of the British Isles
(BSBI, 2007)

calcareous seepages,
Widdybank Pasture, Teesdale ~ 395 metres a.s.l.



calcareous seepages:

Widdybank Pasture, Teesdale 395 metres a.s.l.



... here with Alpine Rush *Juncus alpinoarticulatus*



Glen Fender Meadows/Monzie - remarkably similar habitat to Widdybank Pasture ...



[... but occurs with (the yummy) Brown Bog-rush *Schoenus ferrugineus*]



Trichophorum cespitosum

Glen Fender Meadows, with *Triglochin*, *Sax. aizoides*, etc.



+++ *Trichophorum cespitosum*

calcareous seepages in blanket bog, Pennine Way at Chesters Burn Northumberland



Trichophorum cespitosum

Allt Glean Chaorachain, An Teallach ~ 260 metres a.s.l.



Trichophorum cespitosum

Allt Glean Chaorachain, An Teallach, with *Pinguicula*



Where to seek Northern Deergrass,
Trichophorum cespitosum s.s.

Occurs in two very different habitats

2: ACIDIC

lagg zone inflows (slightly mineral-enriched) BUT also far out on quaking bog
Muckle Moss, Roman Wall, with abundant hybrid



basin- and raised-mires
Cumbria/Northumberland

T. × foersteri dominating on peat-surface ...



basin- and raised-mires
Cumbria/Northumberland

T. × foersteri dominating on peat-surface...



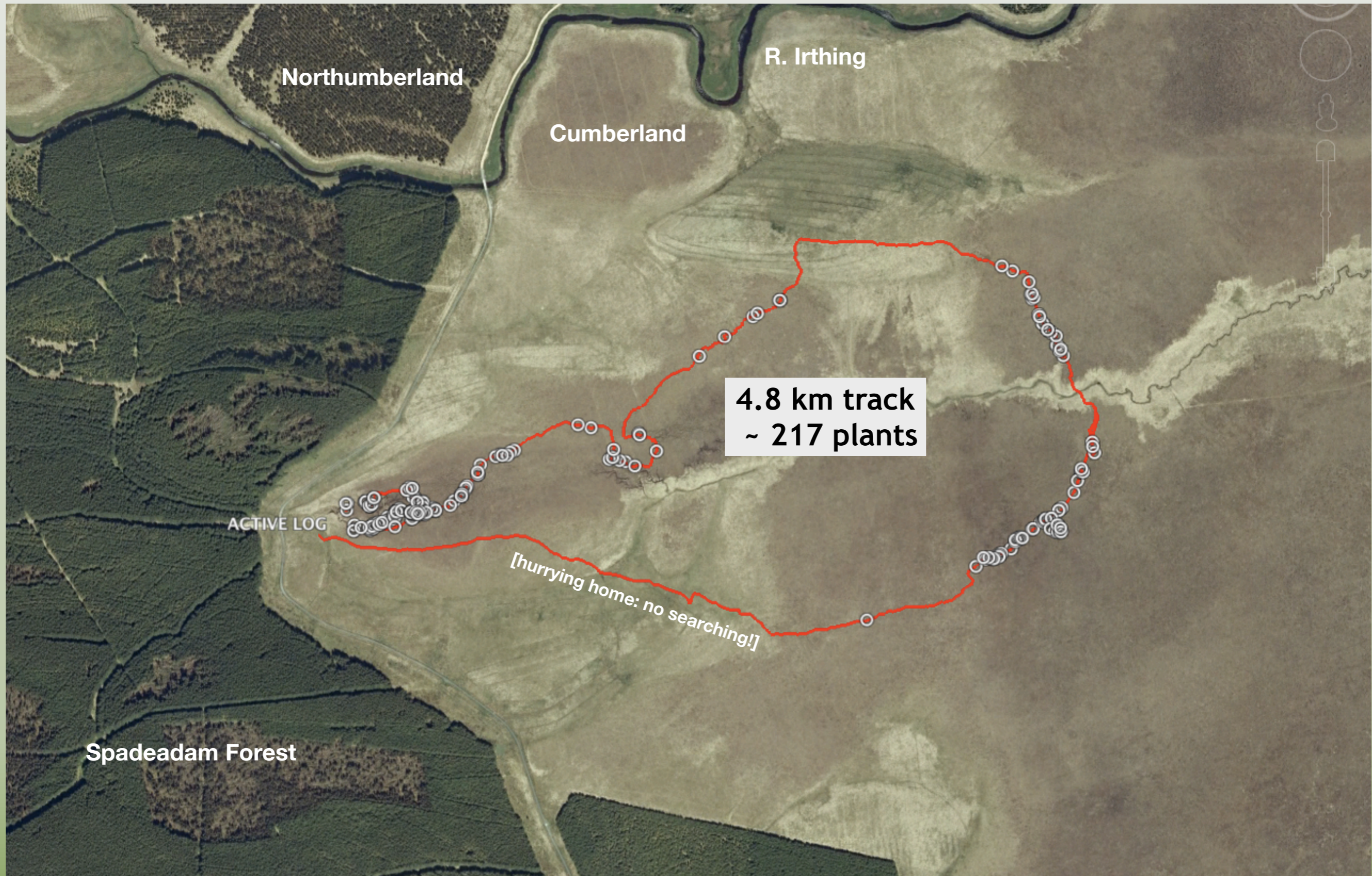
basin- and raised-mires
Cumbria/Northumberland

... *T. cespitosum* typically down in runnels/seepages, taller hybrid above



T. cespitosum logged along a route over Butterburn Flow, most frequent on the deepest peat lobes

[estimated population over whole 410 hectare site: 100,000 plants!]



T. cespitosum

~ eventually found on all South Solway Mosses raised mires ~ 10-15 metres a.s.l.



T. cespitosum

High Rigg, Thirlmere, central Lake District

~ 170 metres a.s.l.



**High Rigg, above Thirlmere, Lake District ~ 170 metres a.s.l.
emergent from bog-pools and seepages**



Tulloch Moor, Spey ~ 220 metres a.s.l. (Andy Amphlett site)

T. × foersteri dominant, with *T. cespitosum* occurring in runnels and sphagnum lawns



acid and basic habitats

(NB: see [website](#) version, with keys)

shows remarkable divergence of associates in basic and acidic sites

Site name	pH*	Widdybank Pasture					Muckle Moss		BE	Butterburn Flow			LM**	DM**	Glen Fender		Frequency (/15)
		Site 1	Site 2	Site 3	Site 4	Site 5	Site 1	Site 2		Site 1	Site 2	Site 3			Site 1	Site 2	
Andromeda polifolia	1										y						1
Carex magellanica	2										y						1
Eriophorum vaginatum	2							y				y					2
Narthecium ossifragum	2			y		y	y				y	y	y	y	y		8
Drosera rotundifolia	2		y	y					y			y			y		5
Empetrum nigrum	2														y		1
Erica tetralix	2						y	y			y	y		y		y	6
Calluna vulgaris	2						y	y			y	y		y			6
Vaccinium oxycoccus	2						y		y	y				y			4
Trichophorum xfoersteri	2	y		y			y	y	y	y	y			y			8
Potentilla erecta	3	y	y	y	y	y	y									y	7
Luzula multiflora	3	y															1
Myrica gale	3															y	1
Molinia caerulea	3	y	y	y	y	y	y										6
Carex echinata	3						y										1
Juncus acutiflorus	4	y	y	y		y	y										5
Carex panicea	4	y	y	y			y		y								5
Eriophorum angustifolium	4	y			y	y		y									4
Festuca ovina	4		y			y											2
Menyanthes trifoliata	4								y								1
Carex rostrata	4								y								1
Carex pulicaris	5	y	y	y		y	y		y								6
Euphrasia scottica	5								y								1
Salix phylicifolia	5												y				1
Pedicularis palustris	5	y														y	2
Succisa pratensis	5	y		y	y	y							y		y		6
Valeriana dioica	6	y															1
Triglochin palustris	6		y	y											y		3
Saxifraga aizoides	6														y		1
Salix repens	6						y										1
Selaginella selaginoides	6		y			y									y		3
Pinguicula vulgaris	6	y	y	y					y							y	5
Cynosurus cristatus	6	y															1
Equisetum palustre	6								y						y		2
Carex flacca	6	y	y														2
Dactylorhiza incarnata	6	y													y		2
Carex hostiana	6	y	y	y	y	y			y								6
Tofieldia pusilla	7	y	y												y		3
Briza media	7	y		y		y											3
Bartsia alpina	7	y	y														2
Carex xfulva	7		y														1
Schoenus ferrugineus	7														y		1
Eriophorum latifolium	7	y	y						y							y	4
Gymnadenia borealis	7	y															1
Juncus alpinoarticulatus	7	y													y	y	3
Eleocharis quinqueflora	7	y	y	y					y						y		5
Linum catharticum	7	y		y													2
Kobresia simpliciuscula	8	y	y		y												3
Carex viridula brachyrrhyncha	8	y		y	y	y			y						y		6
Carex capillaris	8	y															1
Primula farinosa	9	y	y			y											3

huge number of associates in basic sites, but very few in acidic sites!

Trichophorum cespitosum s.s.

the same divergent habitat preferences can be seen on the continent ...

BASIC:

Niederhorn, Switzerland
seepages in damp heath
over limestone ~ 2000 m

T. cespitosum with *Homogyne* and
Eriophorum scheuchzeri





also lower, in forest clearings,
1635 m



with *Primula* and *Gentiana*

T. cespitosum



Trichophorum cespitosum s.s.

the same divergent habitat preferences can be seen on the continent ...

ACIDIC:

raised mire
NC Finland

T. cespitosum



T. cespitosum





**Separation &
Identification:
1**

Fertile or sterile?

First question: EITHER, 1) Has it got RIPE fruit?



If RIPE, then it's one or other SPECIES, and NOT the sterile hybrid!



but nuts often very inconspicuous in *T. cespitosum* ...



... without a pale background...

in *T. cespitosum*, 'like 1 or 2 black fleas!'



OR:

2) has it got 'BARE TOPS'
from mid-July?

Then it's EITHER the
hybrid, OR perhaps
aborted species

T. × foersteri



[If it is *germanicum* with aborted fruits, the spikelets *MAY* retain the glumes for much longer than the hybrid, as here...]



When fully ripe:



germanicum
(several bloomed fruits)



× **foersteri**
(no fruits)



cespitosum
(1-4 glossy fruits)

germanicum

tight cluster of bloomed fruits



NOTE:

germanicum and
× *foersteri* can be
PROLIFEROUS

(proliferity NOT seen
in *cespitosum*)

... note this
germanicum also has
some ripening fruits
(arrowed)



cespitosum

**small heads with just a few shiny fruits
(rarely seen in such good fruit!)**



cespitosum





cespitosum



germanicum

**Separation &
Identification:
2**

**Upper sheath-opening
& stem-width**

ANGLE of sheath-opening

[In these particular examples]

ca.
12°

ca.
33°

ca.
45°

germanicum
(STRONGLY oblique)

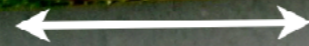
× foersteri
(oblique; variable)

cespitosum
(can be +/- transverse, *i.e.* 90°)

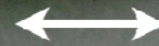
LENGTH of sheath-opening

Snap stem an inch below the opening, and (try to) pull out stem to leave sheath-opening

germanicum 2–4 mm



x foersteri ~1.5 mm



cespitosum ~1.0 mm



a crucial
character!

Stem WIDTHS

cespitosum
(0.45-)0.5-0.6(-0.7)
mm

× foersteri
0.7-0.85 mm

germanicum
typically = 1mm
(can be 0.6mm!)

Spikelet size & no. of flowers

always short

never expands, and
glumes soon dropped

large and swells,
if ripening

[length of basal glumes might be
worth exploring as a character]

BUT beware 'tiny' stunted *germanicum*!!



**Separation &
Identification:
3**

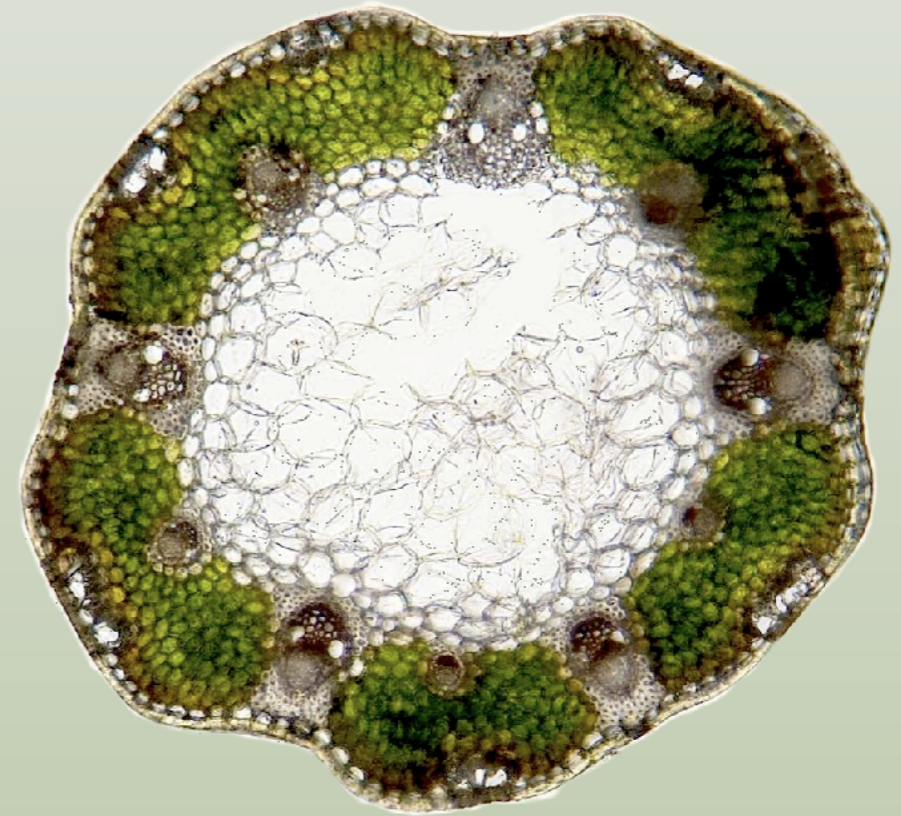
Stem cross-section

[needs compound microscope]

Stem cross-sections



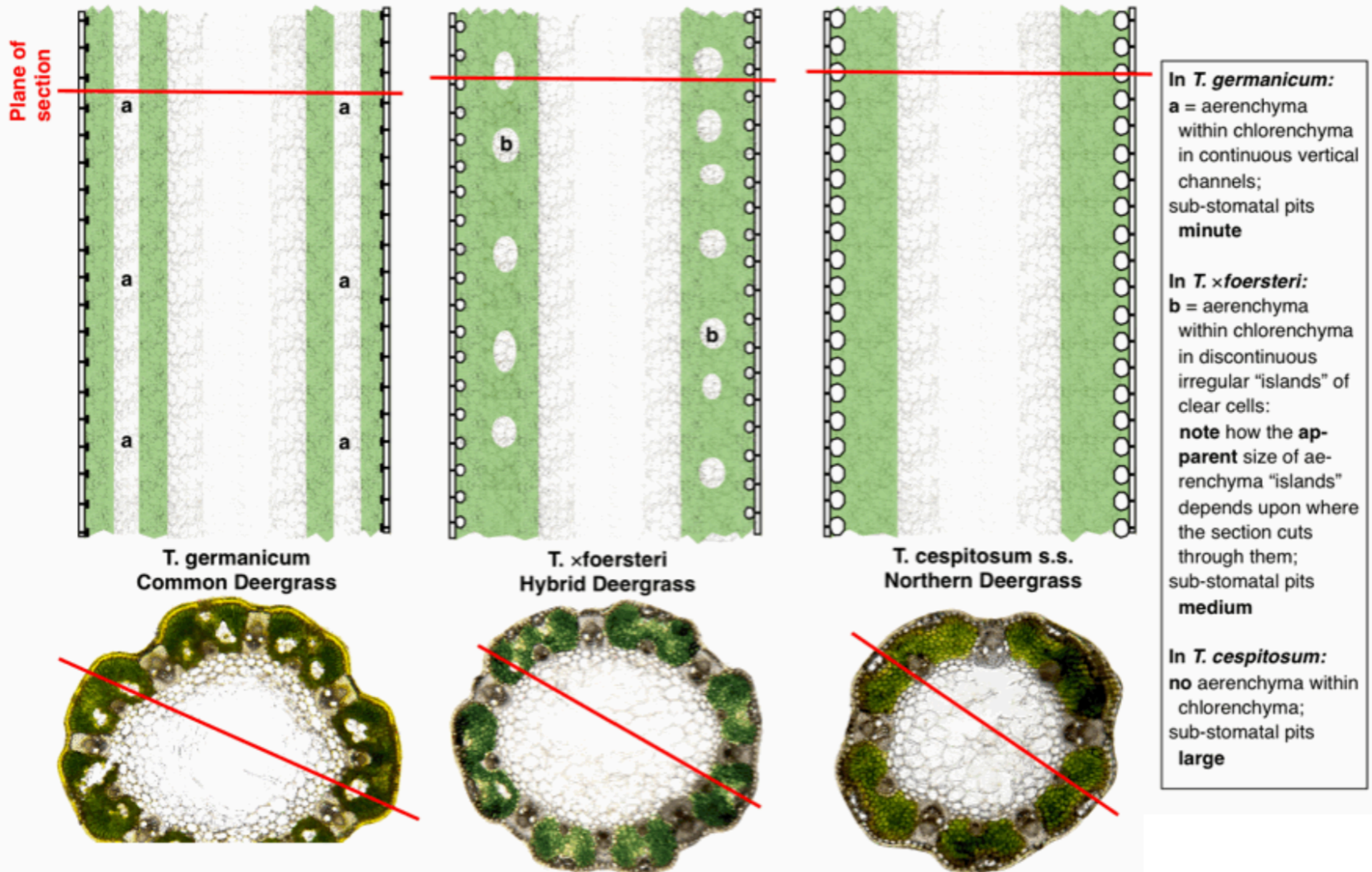
Common Deergrass
Trichophorum germanicum



Northern Deergrass
Trichophorum cespitosum

Putative internal structure of longitudinal stem-section [view on [website](#) with explanation]

Vertical sections (diagrammatic) through stems of *Trichophorum germanicum* (left); *T. ×foersteri* (centre); *T. cespitosum* (right)



***T. germanicum* stem-section**

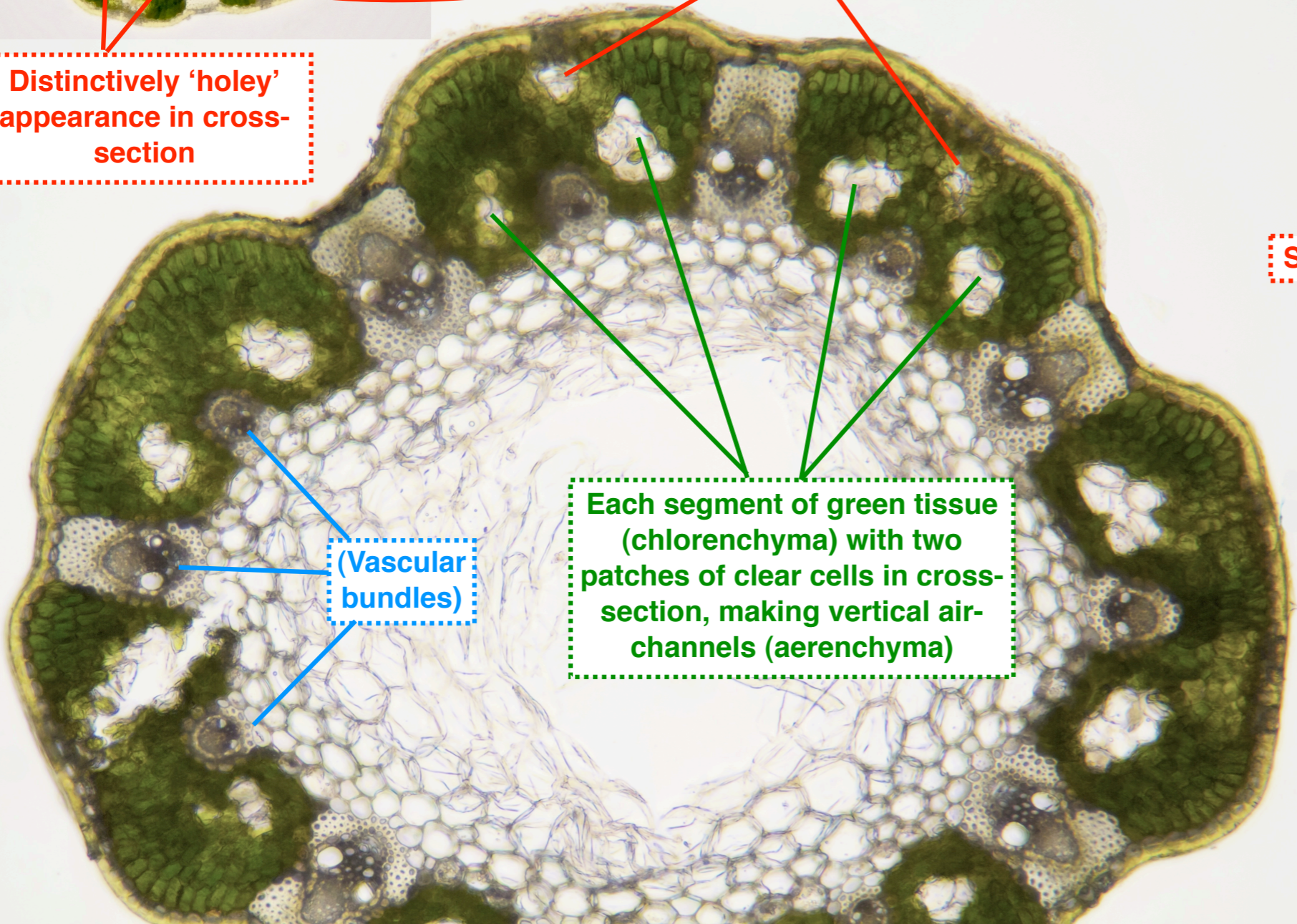
Also on [website](#) ...

Common Deergrass *Trichophorum germanicum*



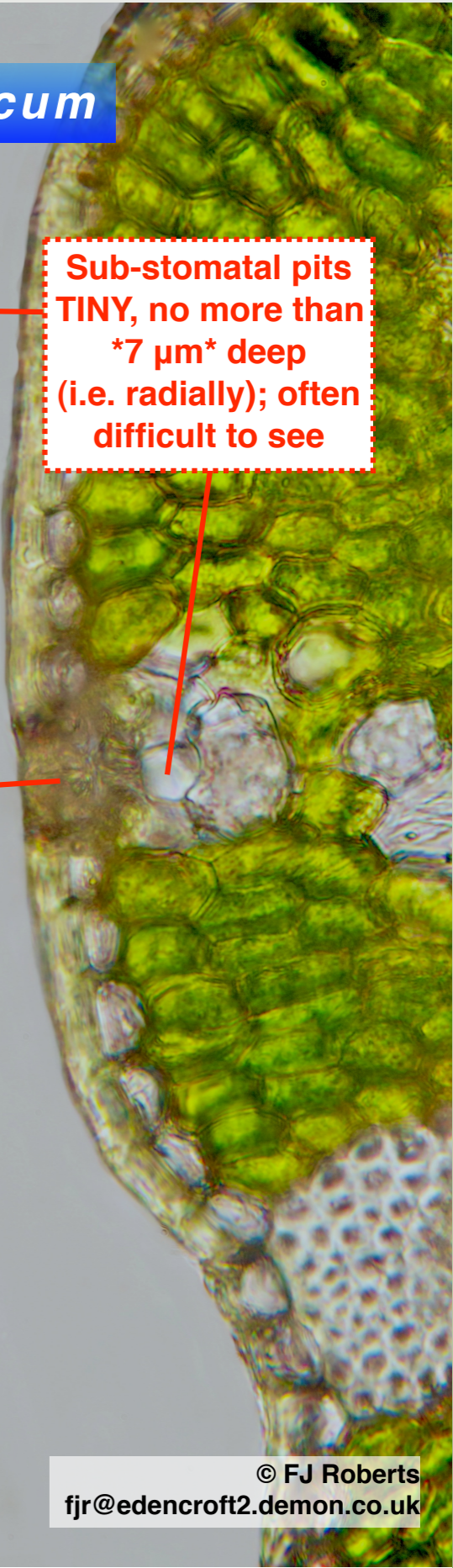
Distinctively 'holey' appearance in cross-section

True sub-stomatal pits very SMALL - see right. (However, these often linked to small regions of aerenchyma, as shown, which have large clear cells, but no lining of smaller cells.)



(Vascular bundles)

Each segment of green tissue (chlorenchyma) with two patches of clear cells in cross-section, making vertical air-channels (aerenchyma)



Sub-stomatal pits TINY, no more than *7 µm* deep (i.e. radially); often difficult to see

Stoma

germanicum

aerenchyma patches
below stomata

beware: these are
NOT substomatal
cavities!

substomatal cavity



germanicum, variation



germanicum

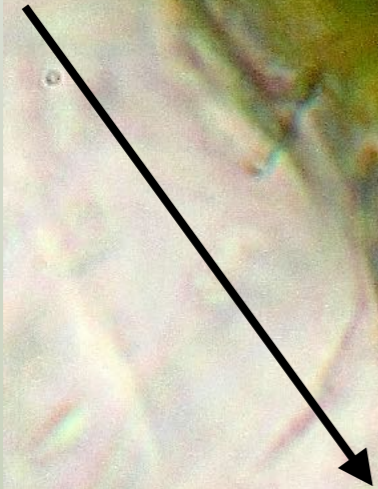


substomatal pit ~
tiny!

stoma
guard-
cells

germanicum

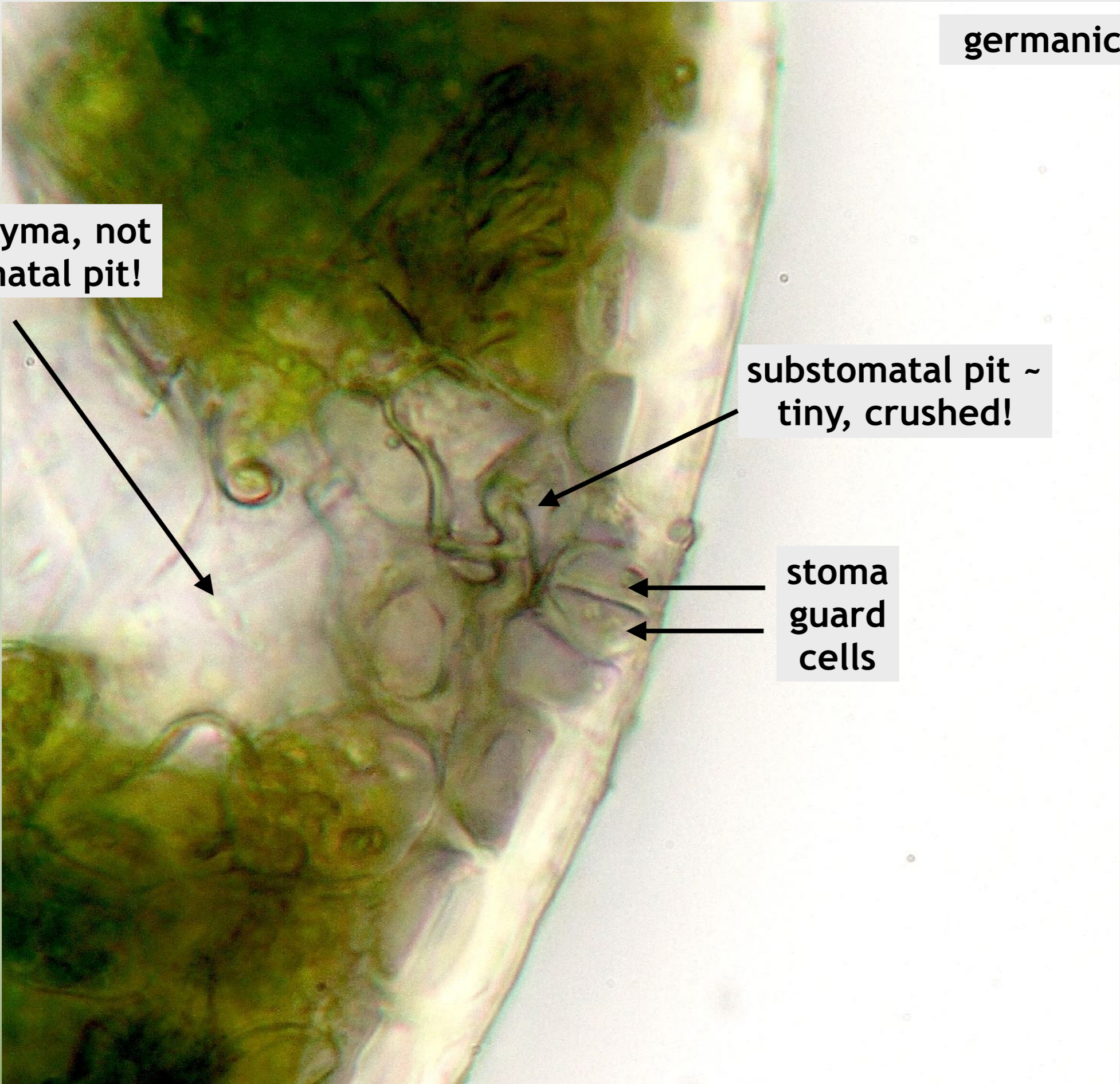
aerenchyma, not
substomatal pit!



substomatal pit ~
tiny, crushed!



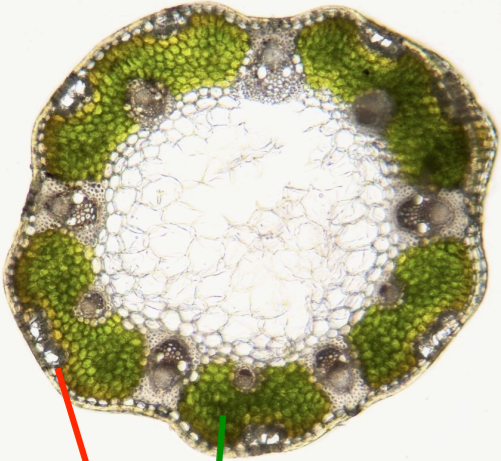
stoma
guard
cells



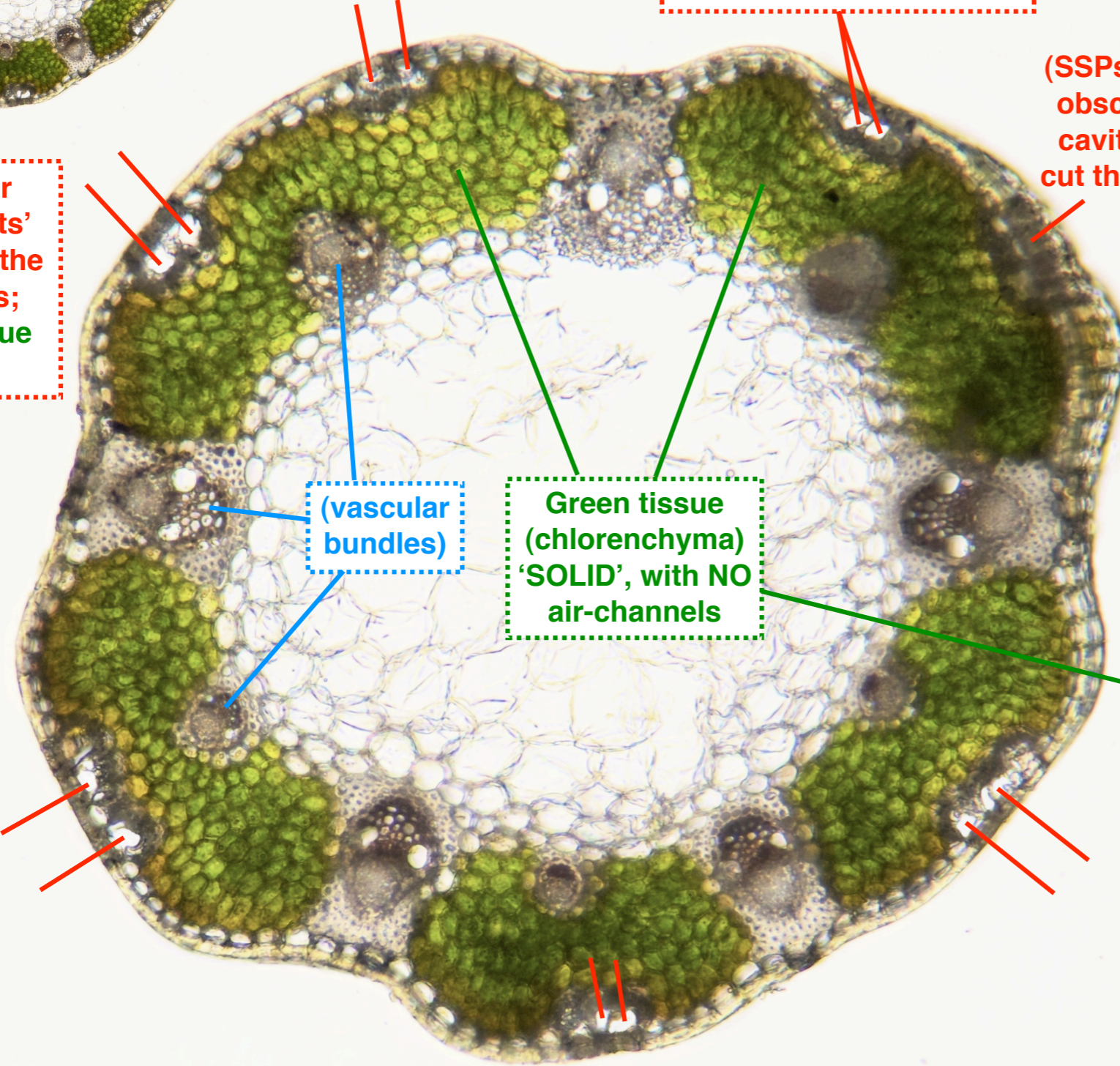
***T. cespitosum* stem-section**

Also on [website](#) ...

Northern Deergrass *Trichophorum cespitosum sensu stricto*



Single, or paired, 'pits' just below the epidermis; green tissue 'solid'

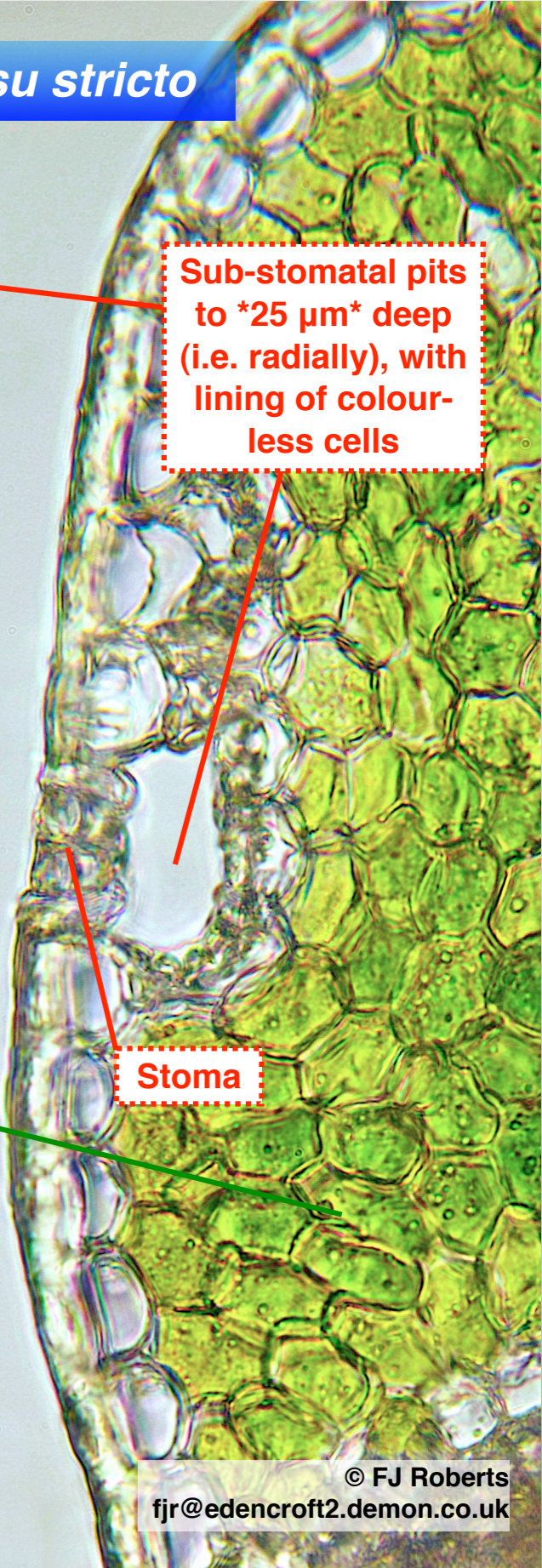


LARGE sub-stomatal pits (indicated by red lines)

(SSPs often obscure if cavity not cut through)

(vascular bundles)

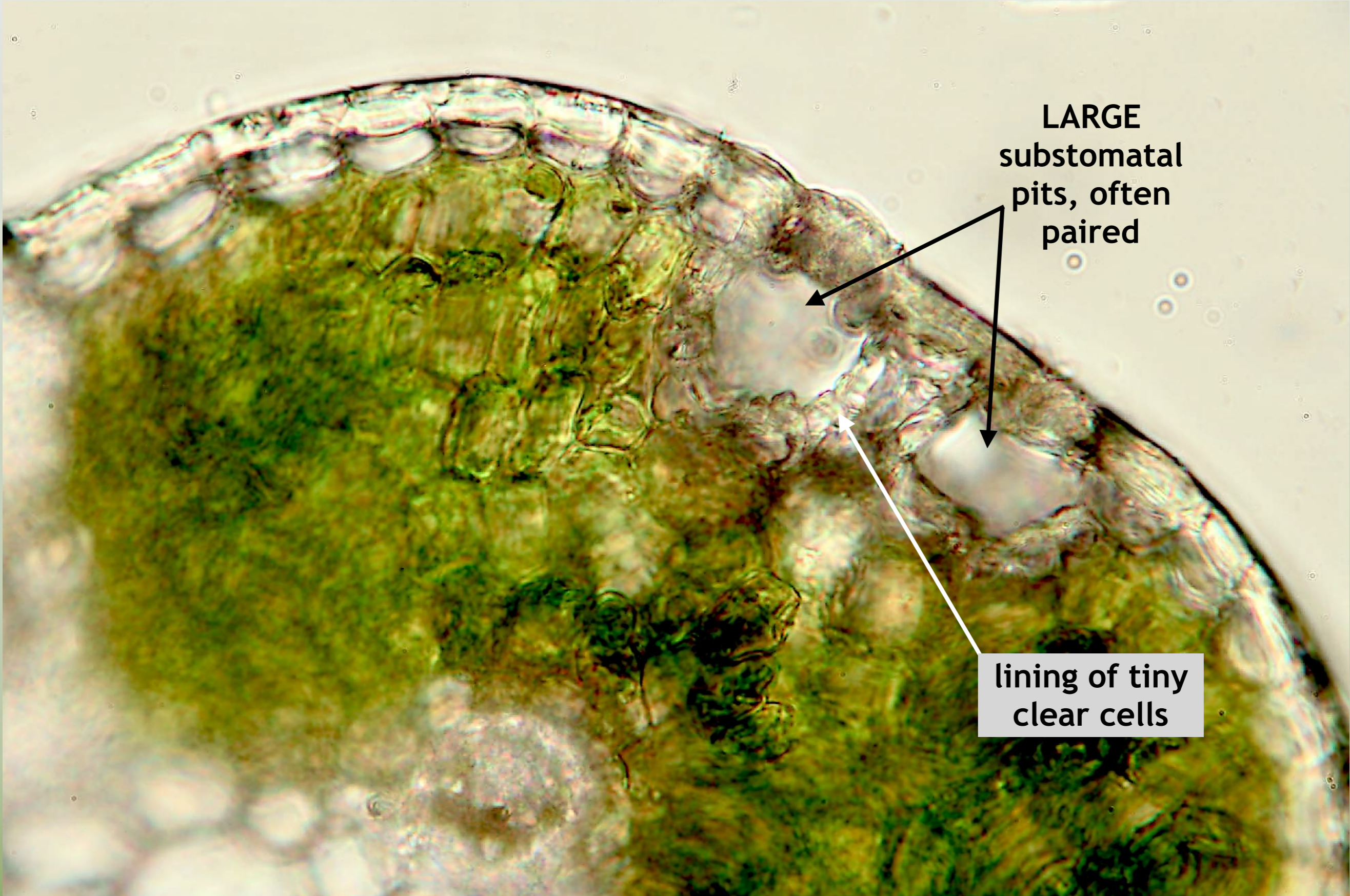
Green tissue (chlorenchyma) 'SOLID', with NO air-channels



Sub-stomatal pits to *25 µm* deep (i.e. radially), with lining of colourless cells

Stoma

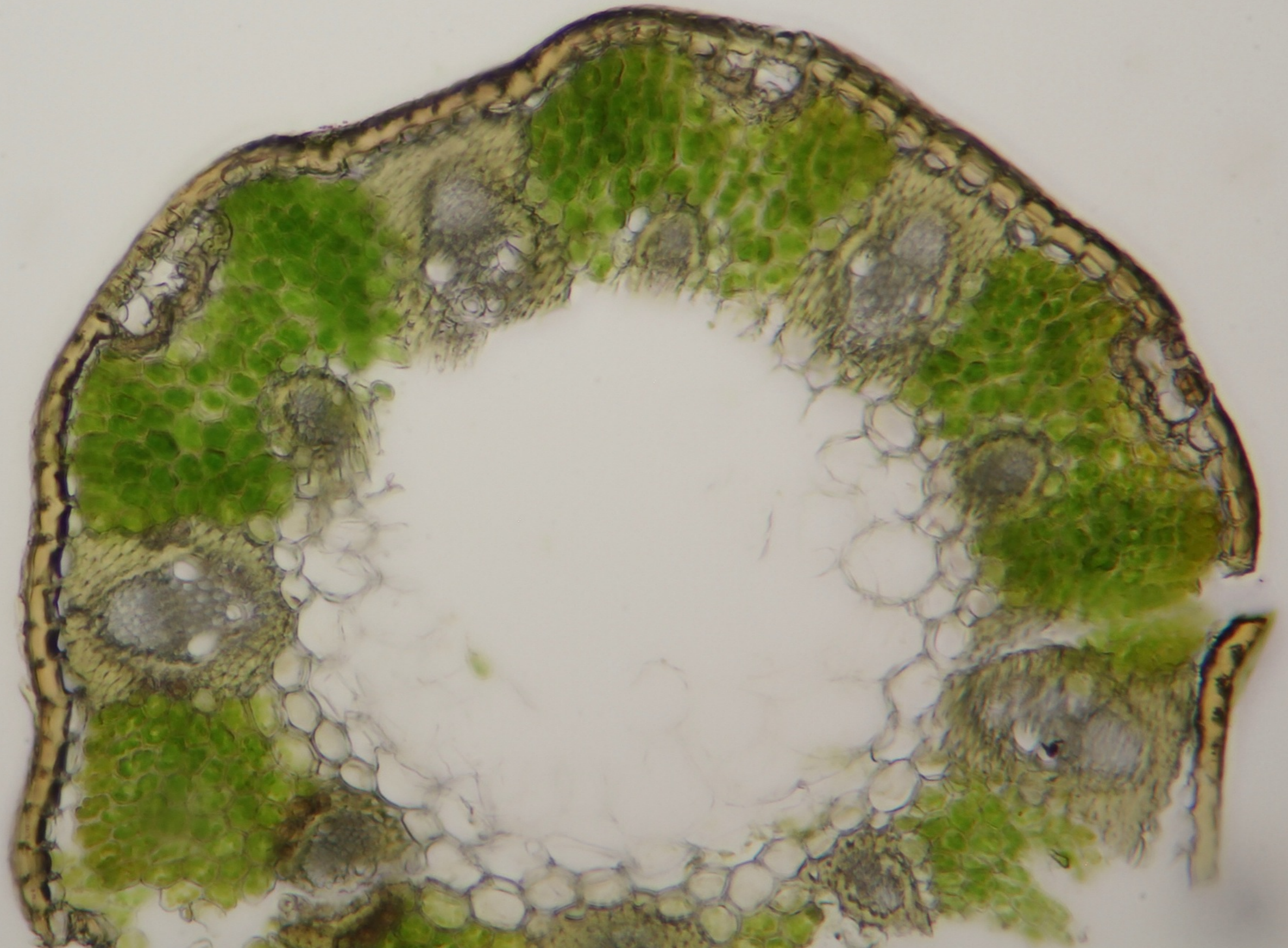
cespitosum



**LARGE
substomatal
pits, often
paired**

**lining of tiny
clear cells**

cespitosum, variation



cespitosum, variation



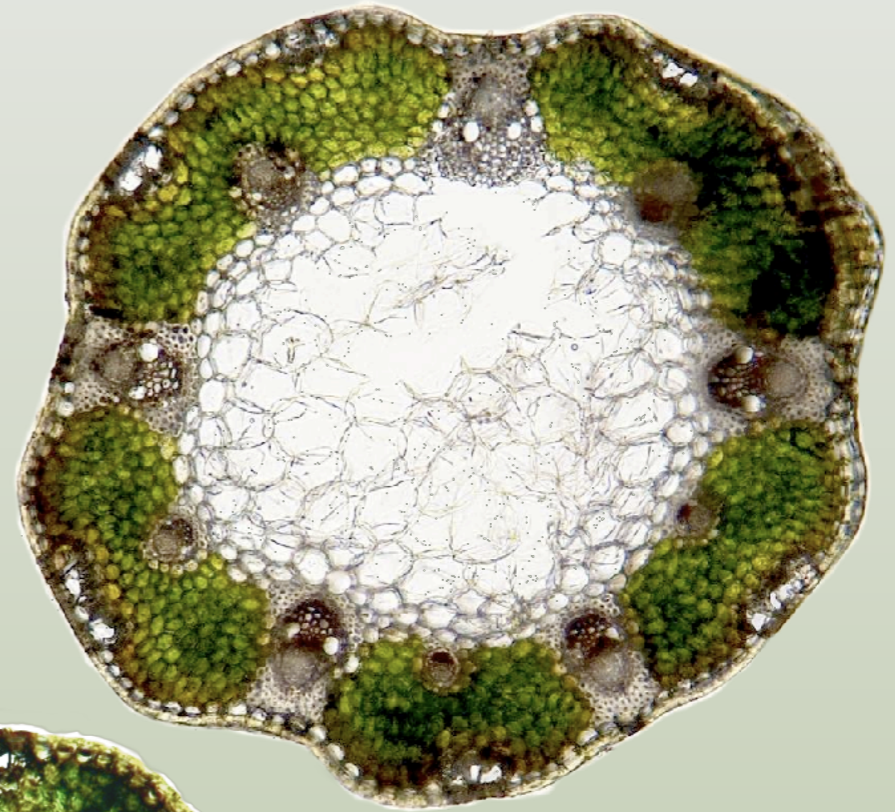
***T. × foersteri* stem-section**

comparison

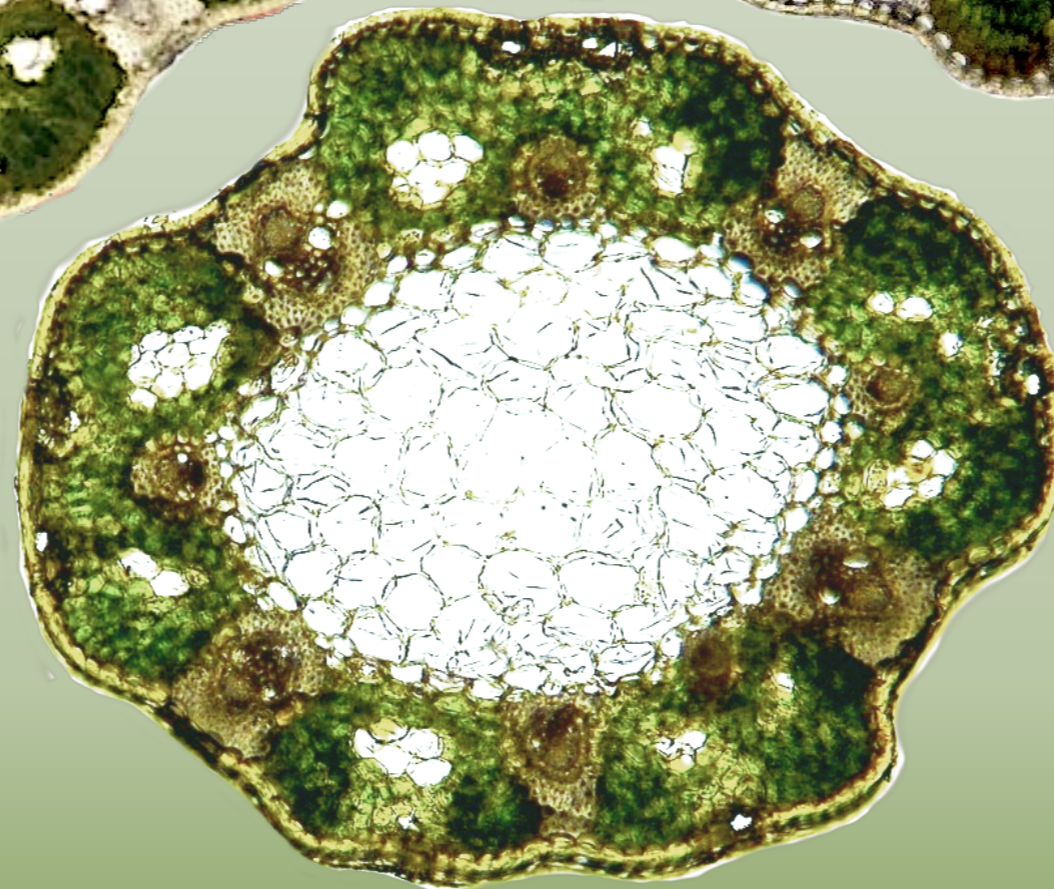
Common Deergrass
T. germanicum



Northern Deergrass
T. cespitosum

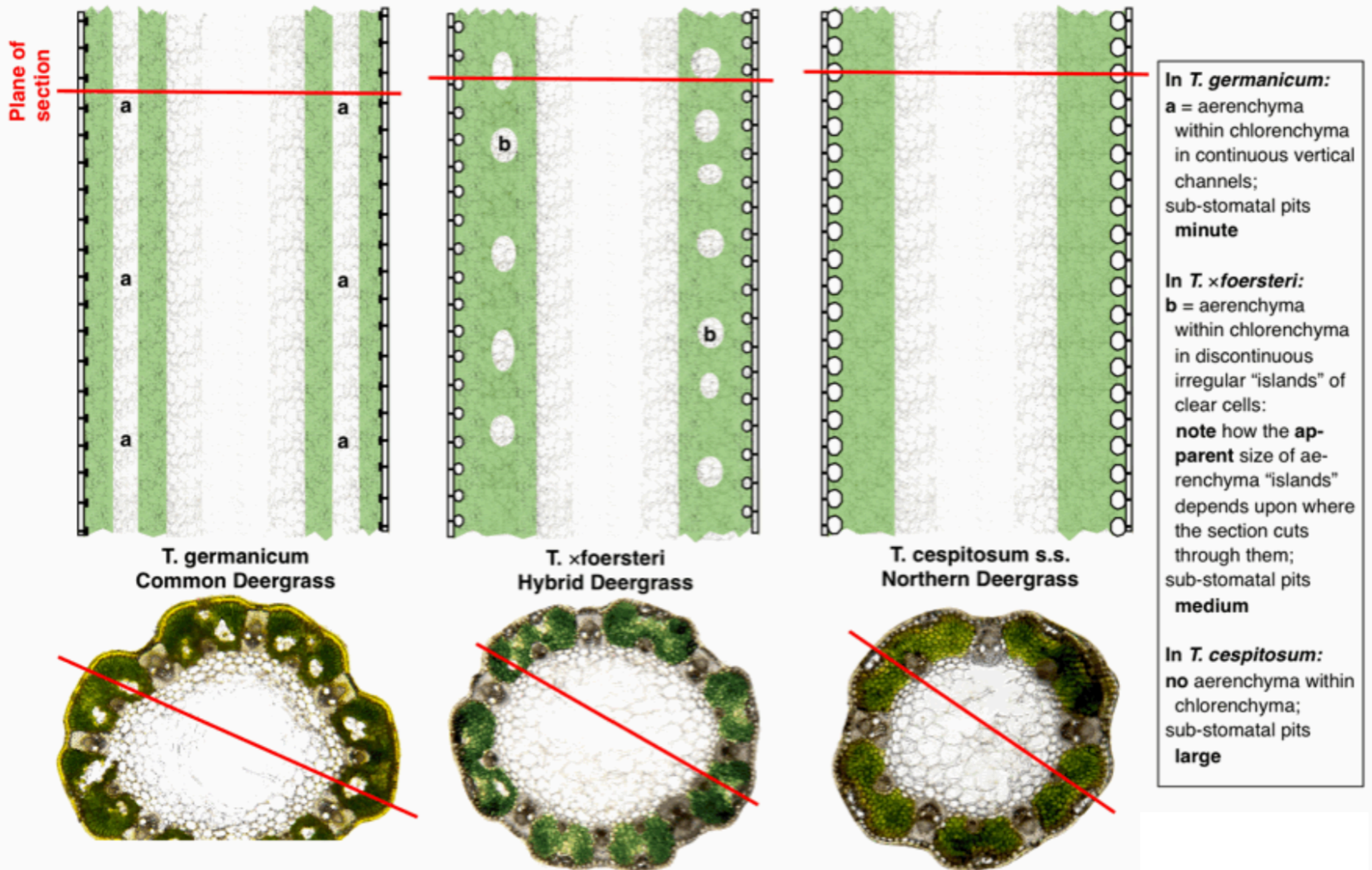


Hybrid Deergrass
T. × foersteri

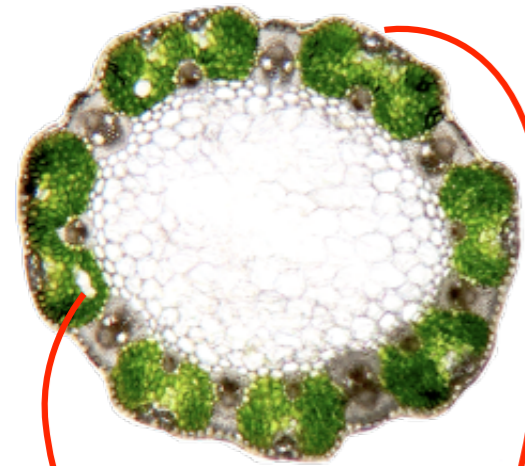


[Repeated slide for clarification ... putative internal structure]

Vertical sections (diagrammatic) through stems of *Trichophorum germanicum* (left); *T. ×foersteri* (centre); *T. cespitosum* (right)



Hybrid Deergass *Trichophorum* × *foersteri*



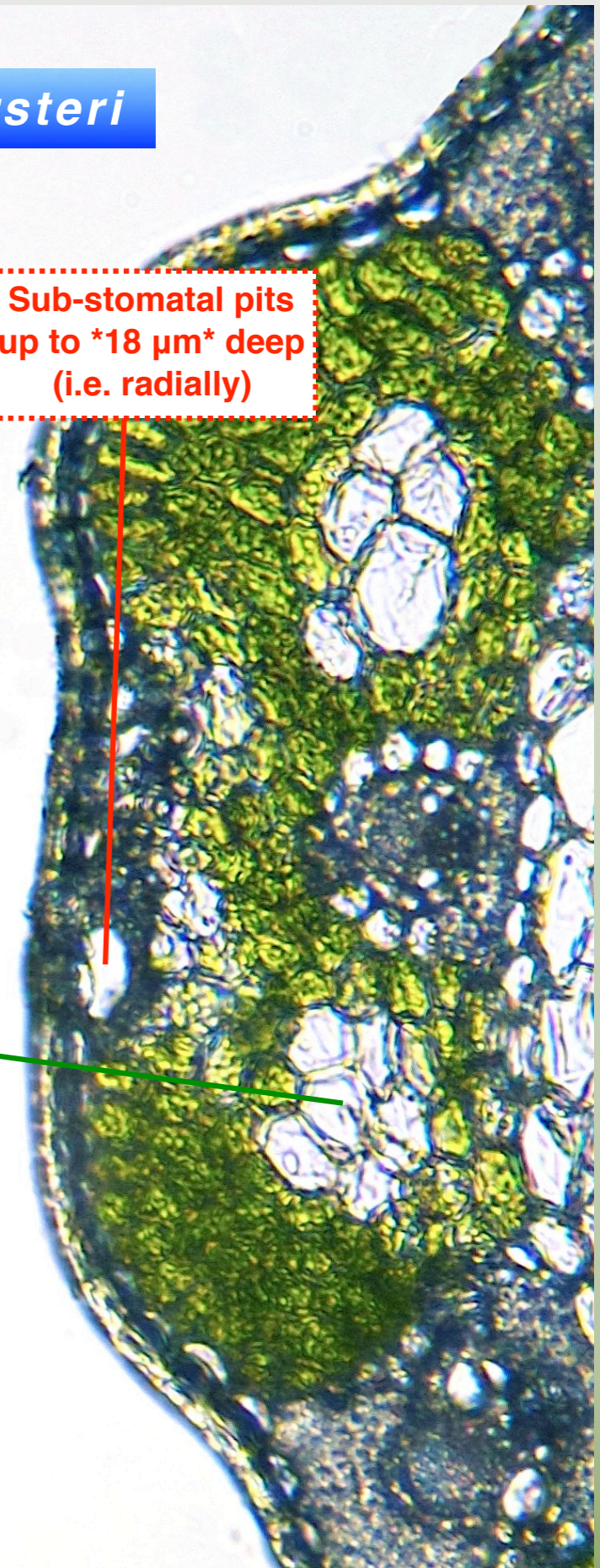
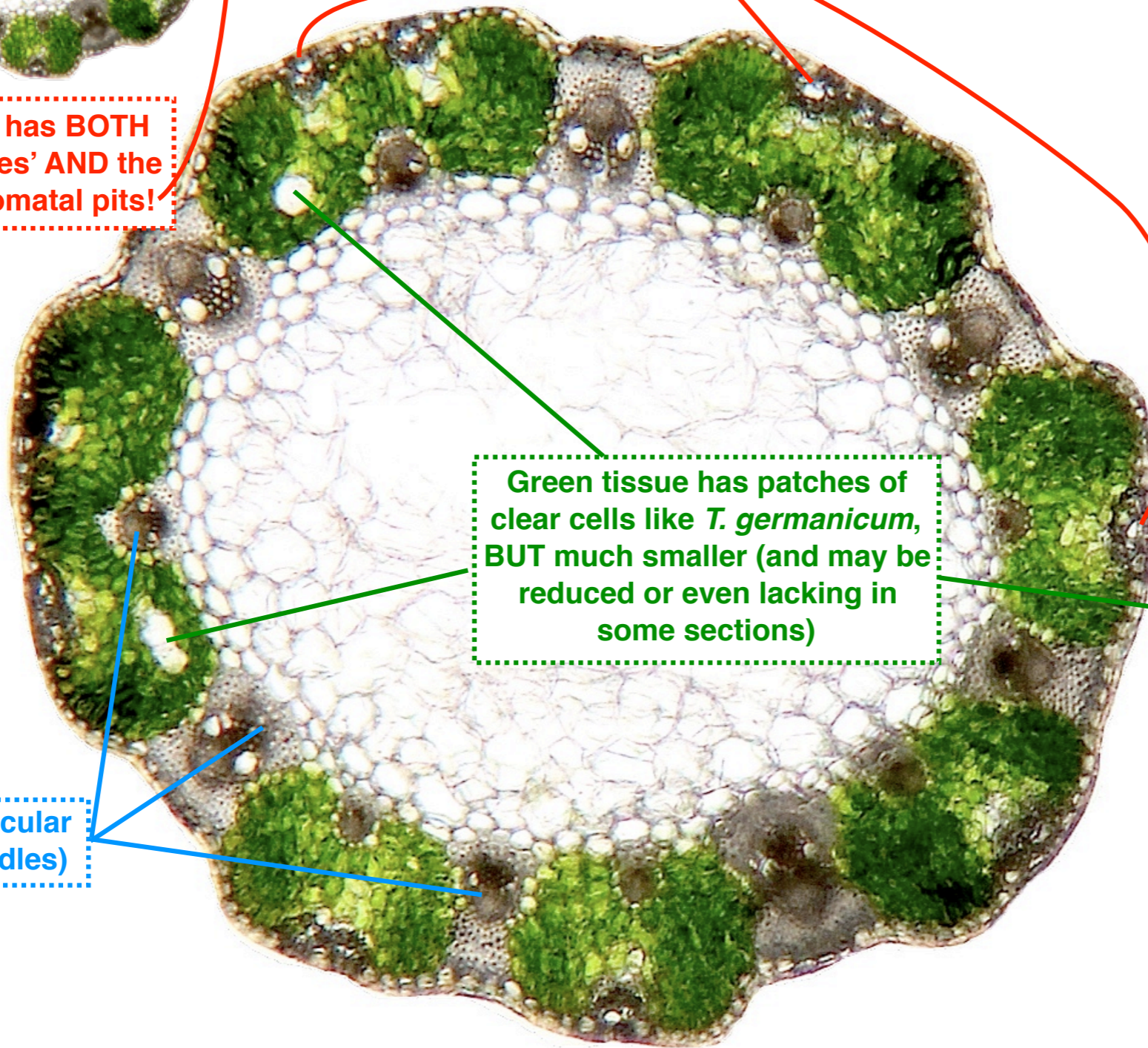
Hybrid has BOTH the 'holes' AND the sub-stomatal pits!

Obvious sub-stomatal pits, like *T. ces-pitosum* (BUT smaller - see right)

Sub-stomatal pits up to *18 µm* deep (i.e. radially)

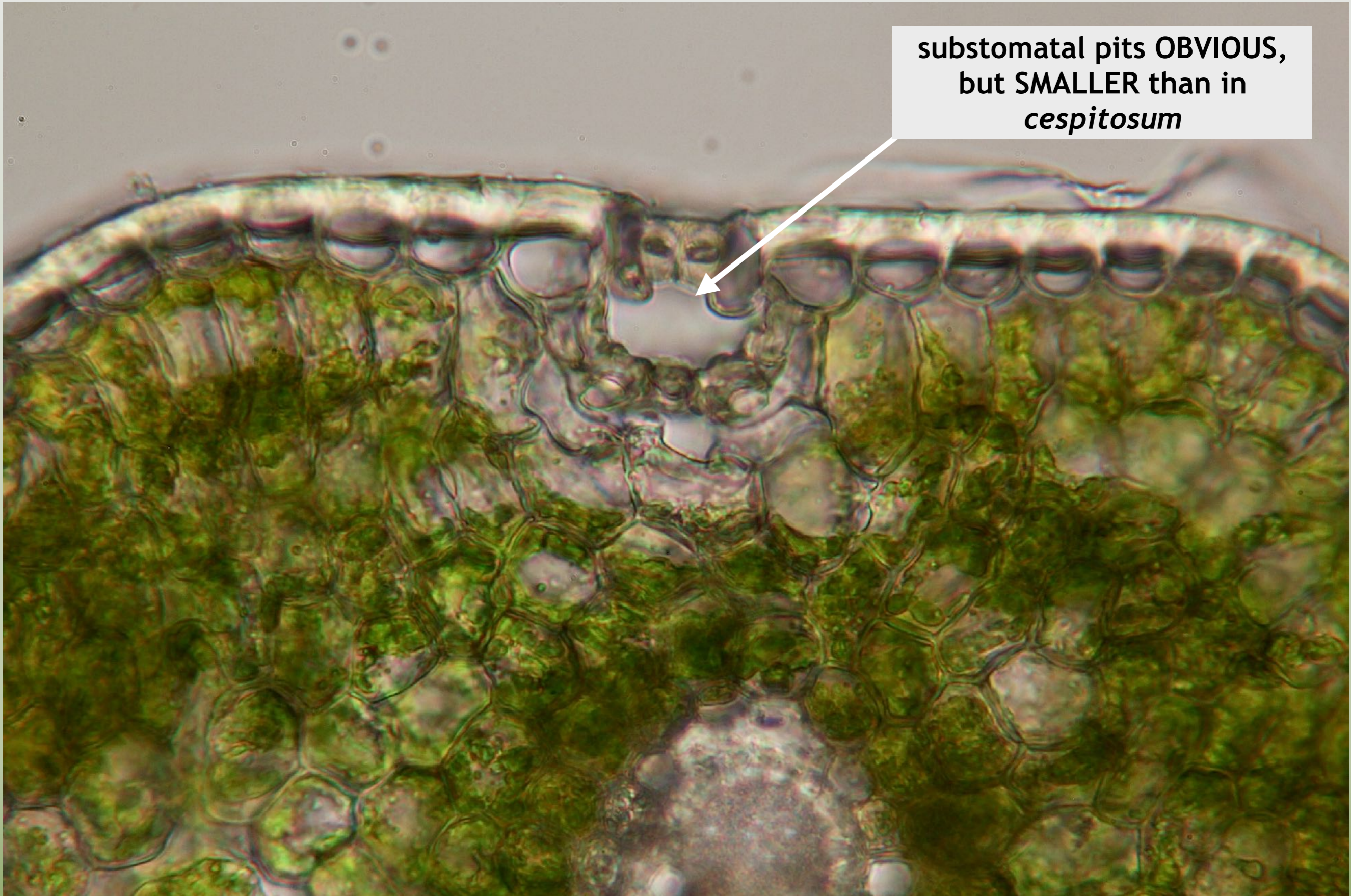
Green tissue has patches of clear cells like *T. germanicum*, BUT much smaller (and may be reduced or even lacking in some sections)

(Vascular bundles)



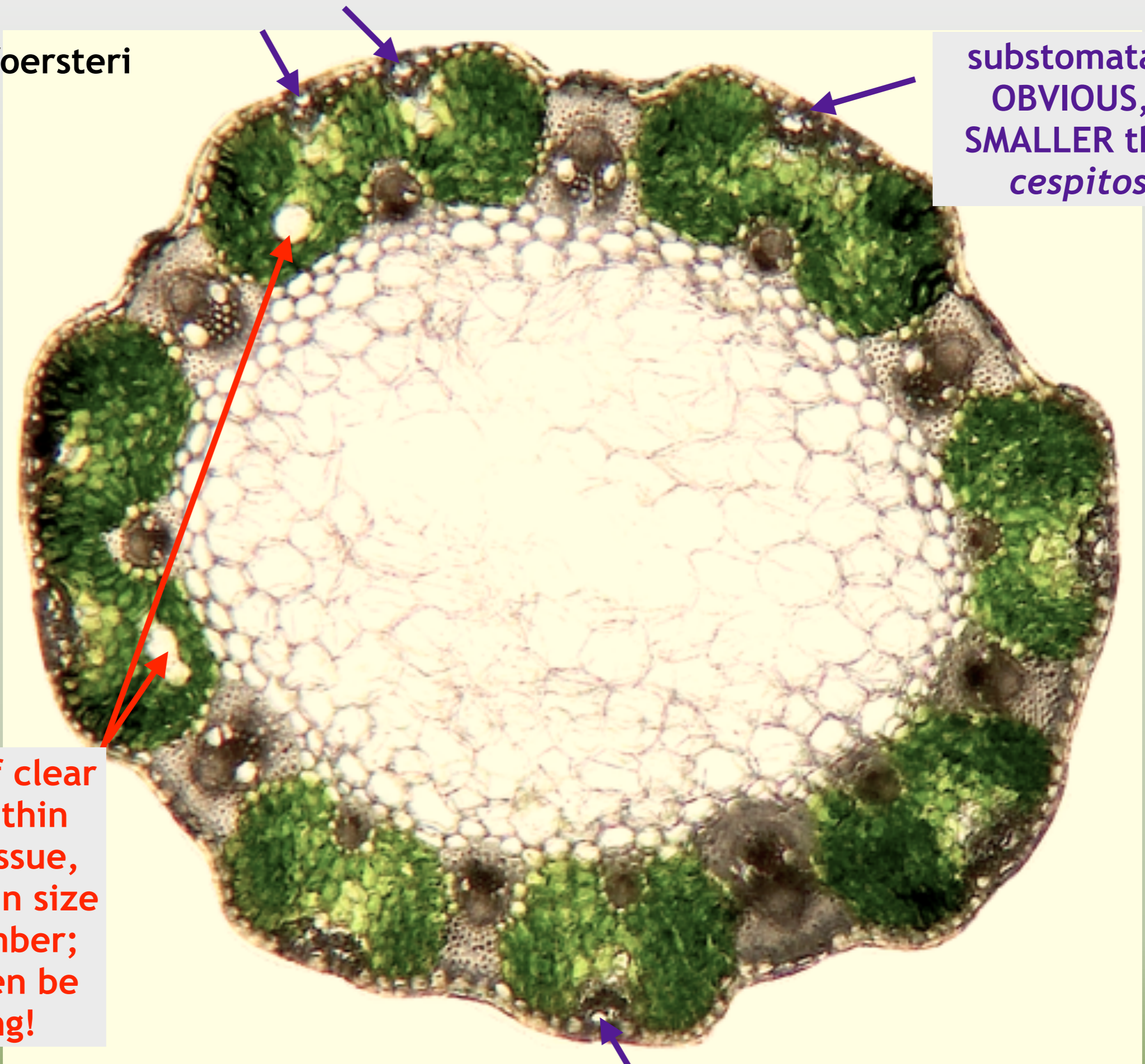
× foersteri

substomatal pits **OBVIOUS**,
but **SMALLER** than in
cespitosum



× foersteri

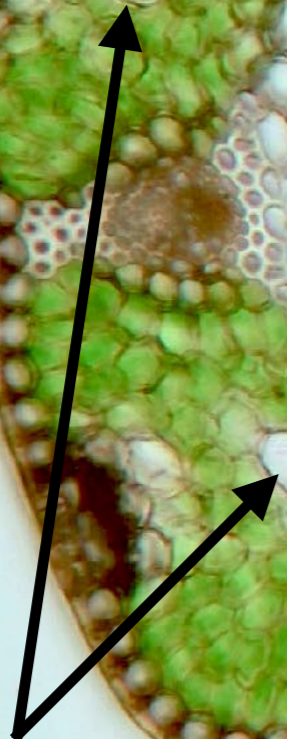
substomatal pits
OBVIOUS, but
SMALLER than in
cespitosum



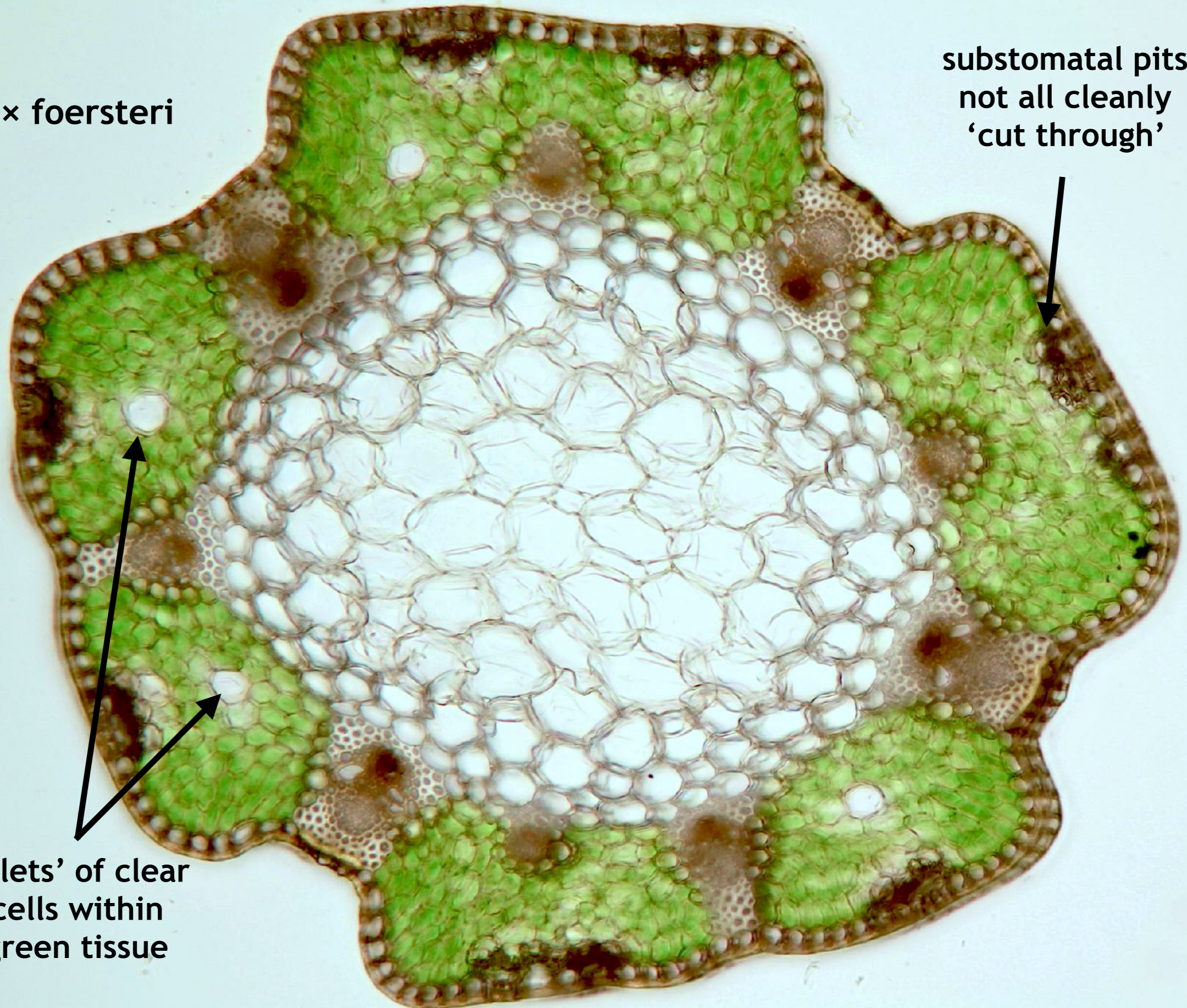
'islets' of clear
cells within
green tissue,
variable in size
and number;
may even be
lacking!

× foersteri

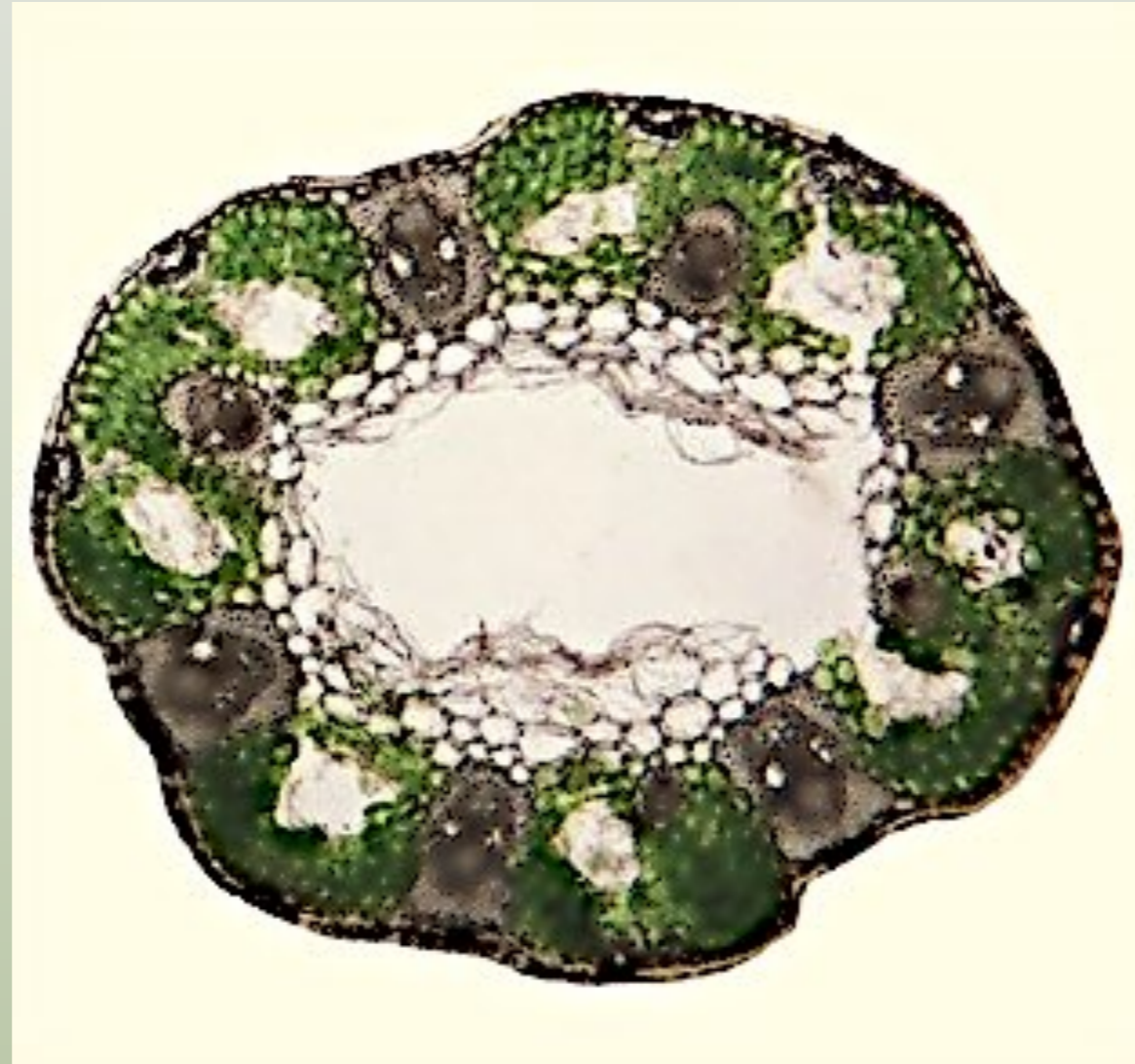
substomatal pits
not all cleanly
'cut through'



'islets' of clear
cells within
green tissue



obvious substomatal pits, so clearly × *foersteri*, but
the hybrid only VERY rarely has ‘islets’ this large!
? possible backcrossing ?



Finally,

... could we have FOUR Trichophorums??

There was

Trichophorum alpinum, Moss of Restenneth, 1791

Cotton Deergrass *Trichophorum alpinum*
(Norway)

... 'like a tiny patch-forming *Eriophorum*'



Cotton Deergrass *Trichophorum alpinum*
(Norway)



Links to:

**a lot more [more information](#) on the genus,
the downloadable [field-guide](#):**

or

google for

‘roberts deergrass’