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-fld. 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 sspp. 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*. ×2·5.

← useful drawing!

1999: two SUBspecies – and recognition of a frequent hybrid

[with a not-very-memorable name!]:

Watsonia **22**: 209–233 (1999)

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

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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); involucral 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*.

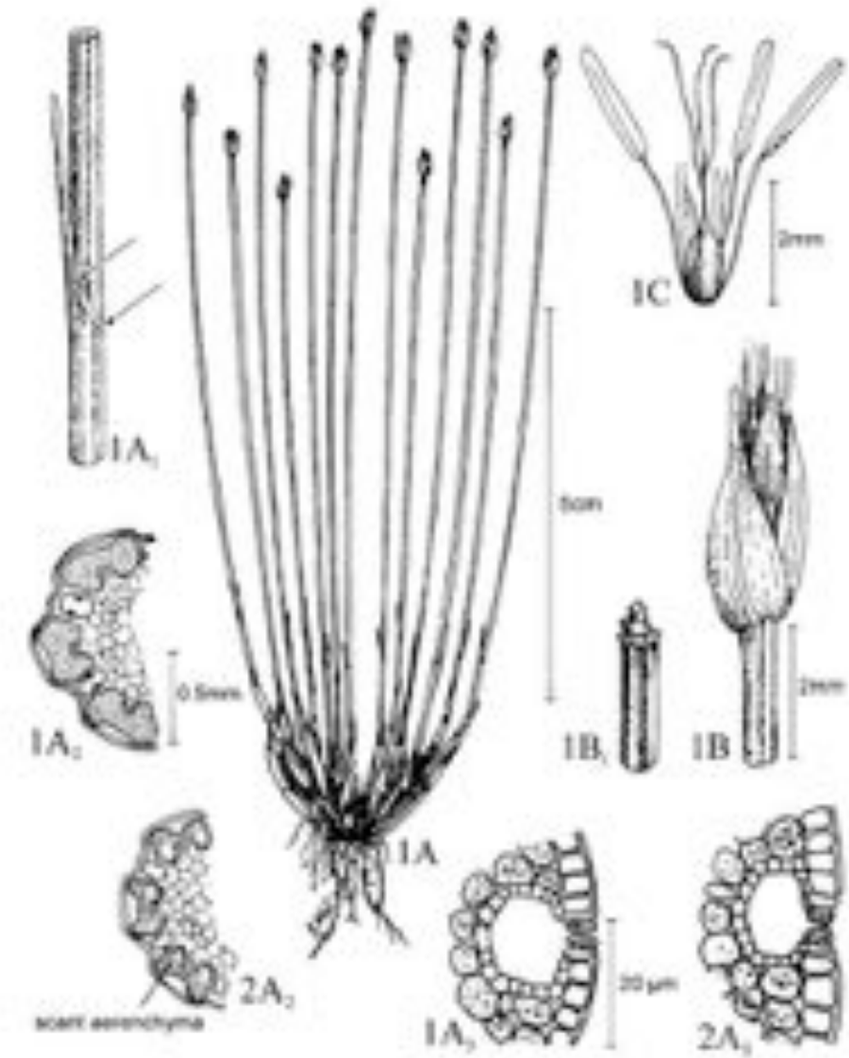
Fr. 5–7.

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* (**MII**).

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 **6**
T.* × *foersteri (*T. cespitosum* × *T. germanicum*) **6 × 5**



1 ***Trichophorum cespitosum*** 2 ***T.* × *foersteri***
A Plant habit and flowering stem; A_1 Upper sheath with leaf (arrows indicating length of opening); A_2 Partial transverse section of stem (with no or little aerenchyma); A_3 Enlarged portion of stem, showing subdermatal pit; **B** Spikelet; B_1 Spikelet rachis, showing glume bases; **C** Floret.

Sedges of the British Isles **(BSBI, 2007)**

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

Deergrass
T. germanicum

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

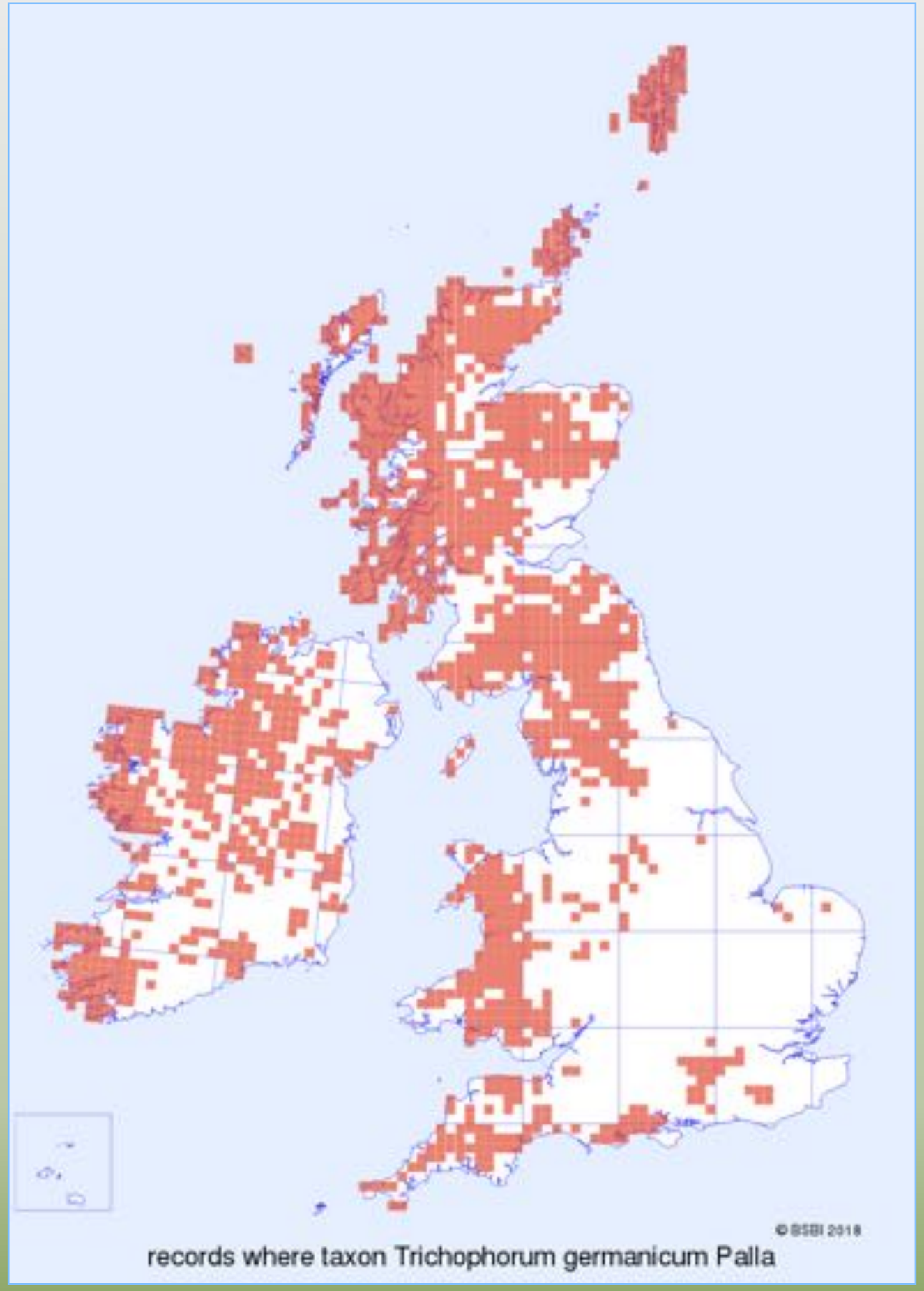
‘Common’ Deergrass

T. germanicum

a local ‘Atlantic-subtlantic’ species

[shallow] peaty soils: blanket bog and wet heath

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



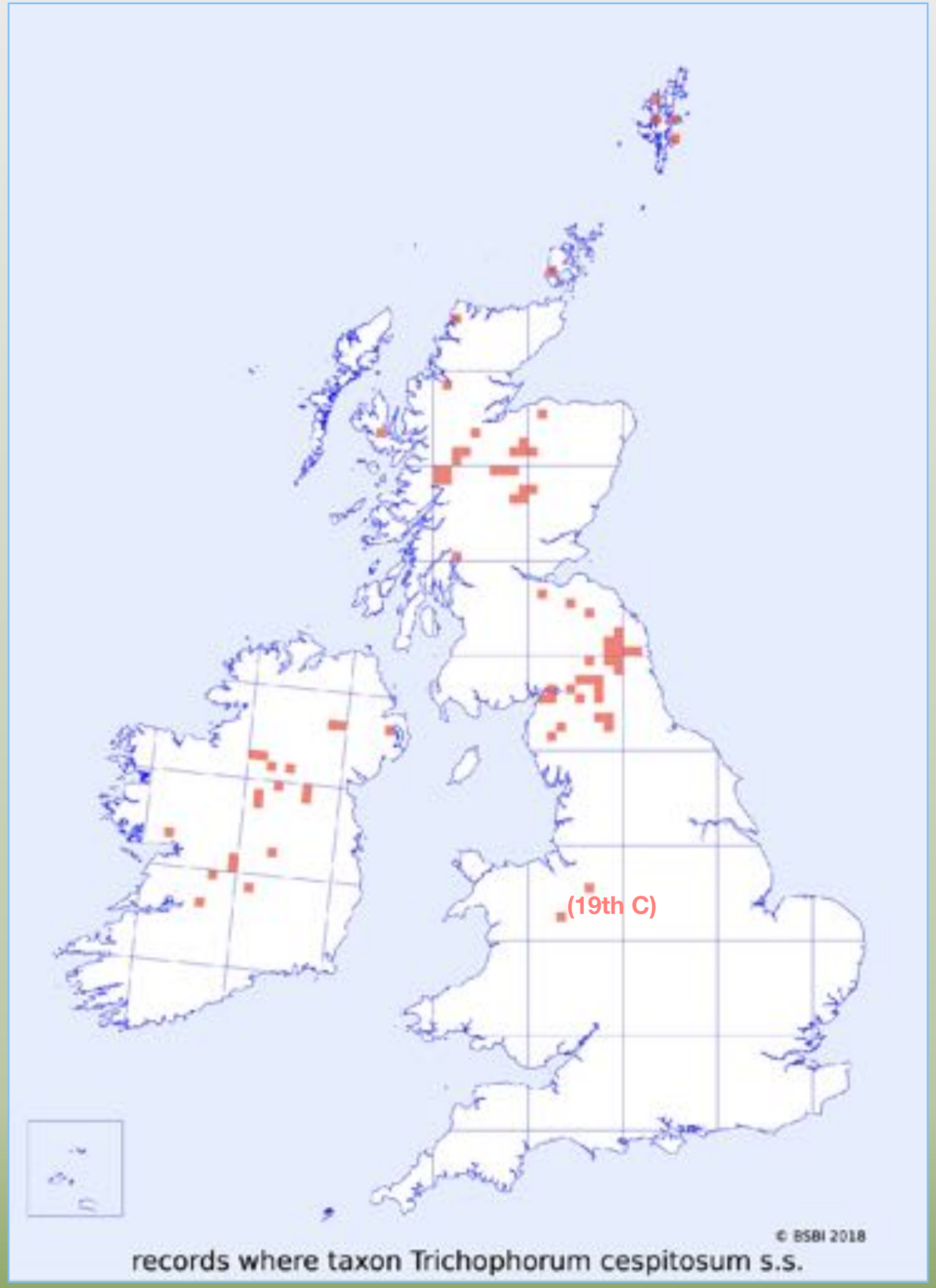
‘Northern’ Deergrass
T. cespitosum s.s.

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

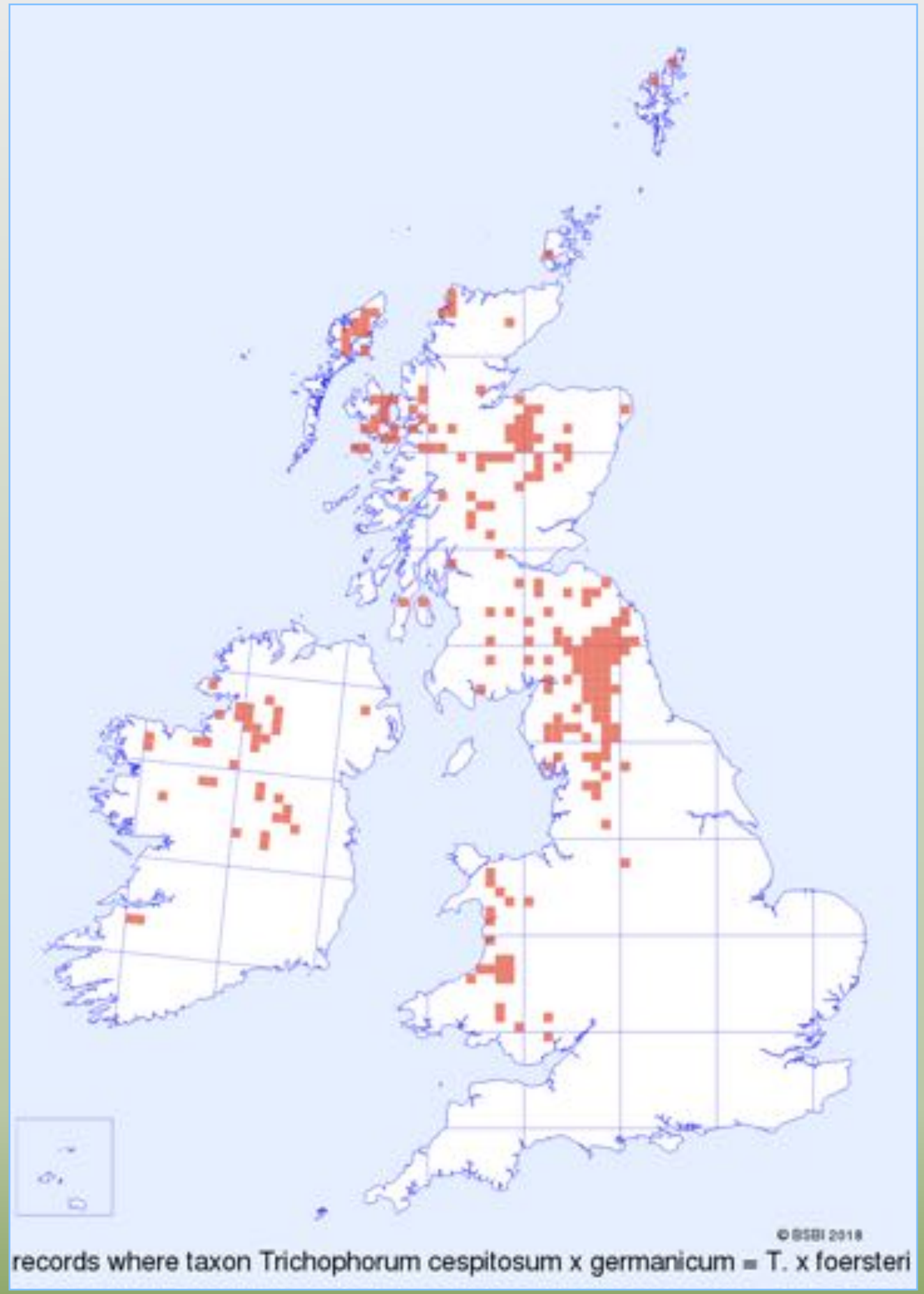
T. × foersteri

in overlap zone of parent species:

‘Atlantic-subtlantic’

base-rich habitats **and**
deep peat mires

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



Where to seek Northern Deergrass,
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

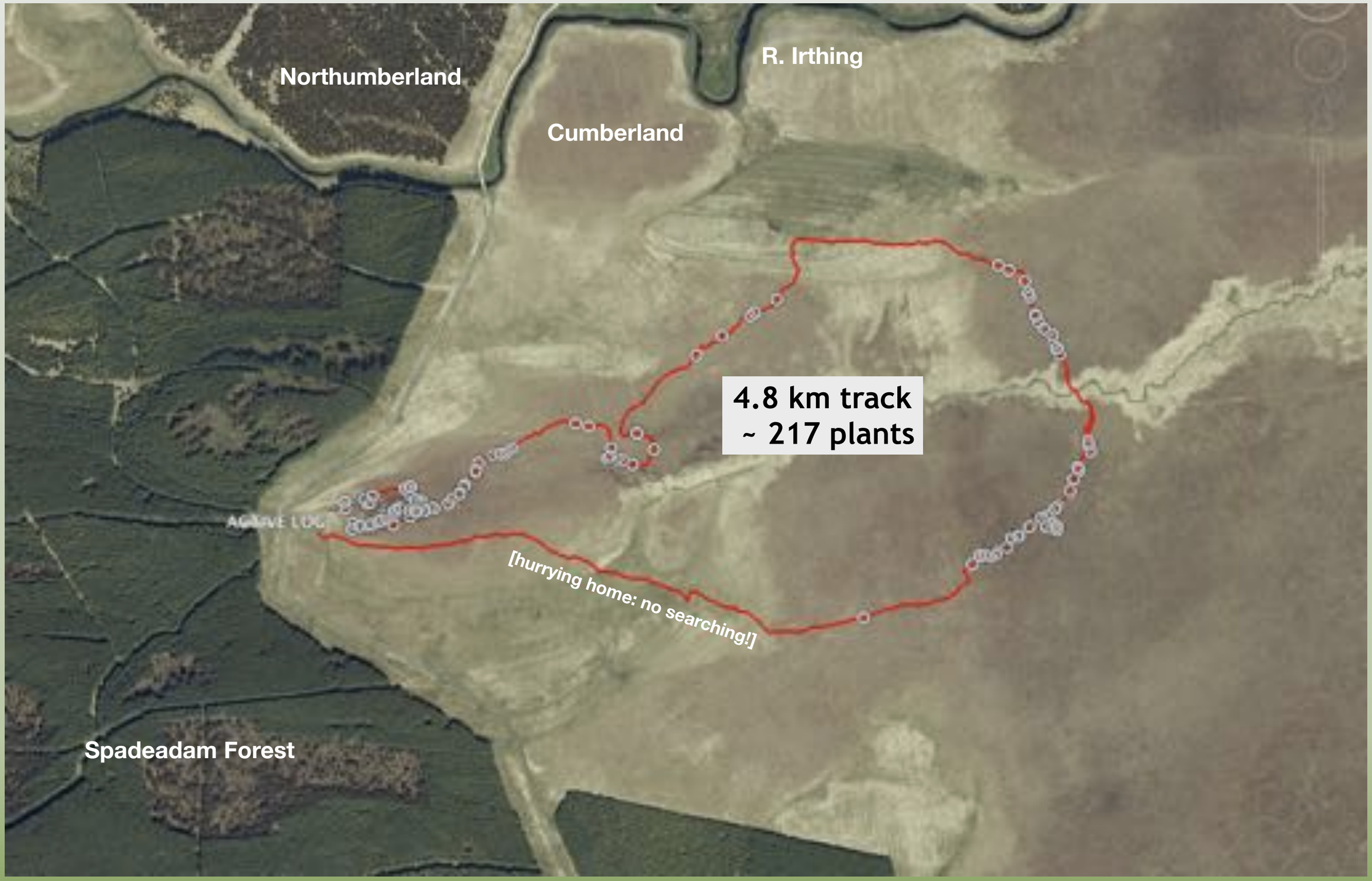
T. × *foersteri* dominating on peat-surface…

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* occuring 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		Widdybank Pasture					Muckle Moss		BE	Butterburn Flow			LM **	DM **	Glen Fender		
		Site 1	Site 2	Site 3	Site 4	Site 5	Site 1	Site 2		Site 1	Site 2	Site 3			Site 1	Site 2	Frequ-ency (/15)
	pH*																
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	y			6
Vaccinium oxycoccos	2						y		y	y				y			4
Trichophorum *foersteri	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
Trigiochin 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 *fulva	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

[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

(prolifery NOT seen in ***cespitosum***)

… note this ***germanicum*** **also has some ripening fruits (arrowed)**

cespitosum

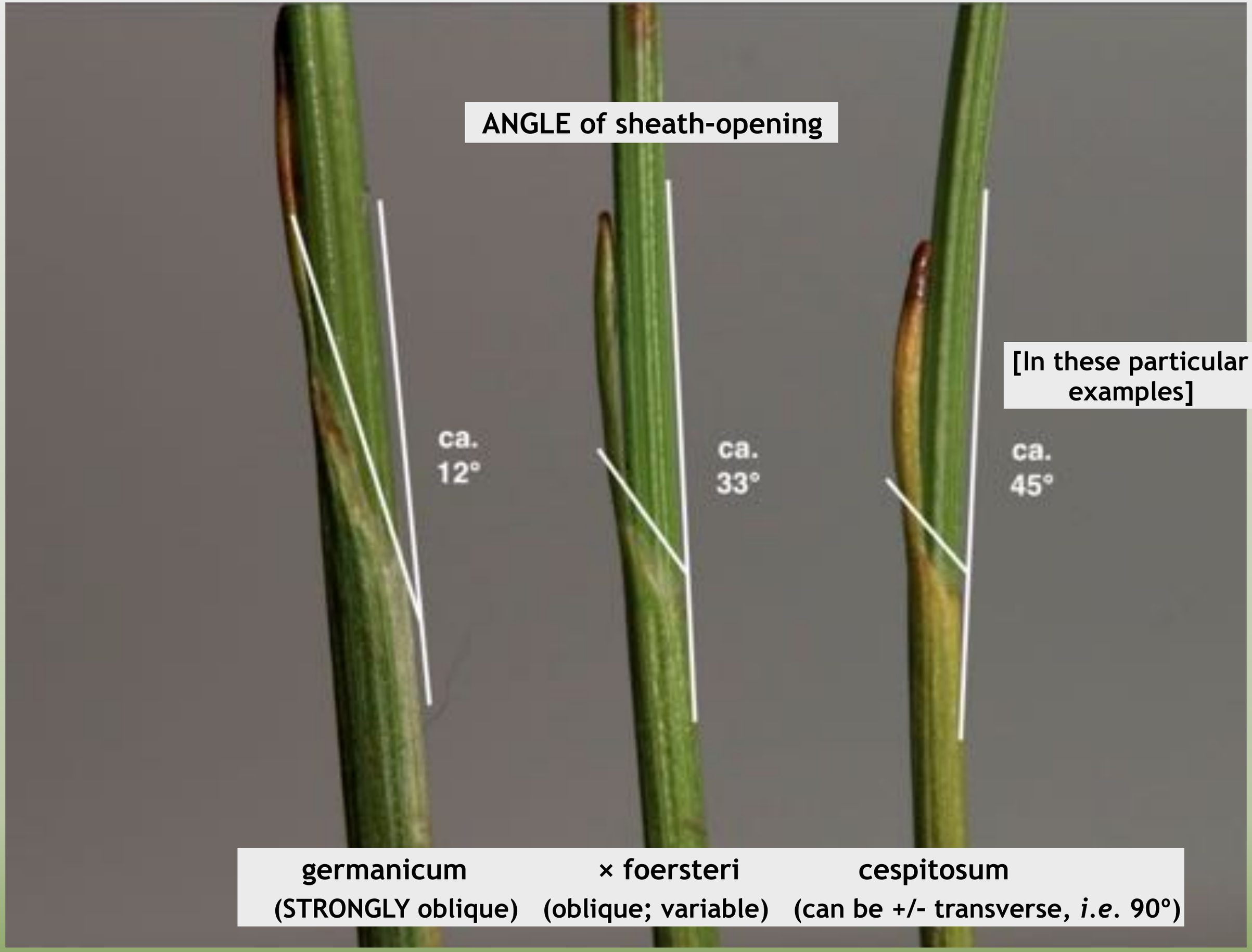
small heads with just a few shiny fruits
(rarely seen in such good fruit!)

cespitosum

cespitosum germanicum

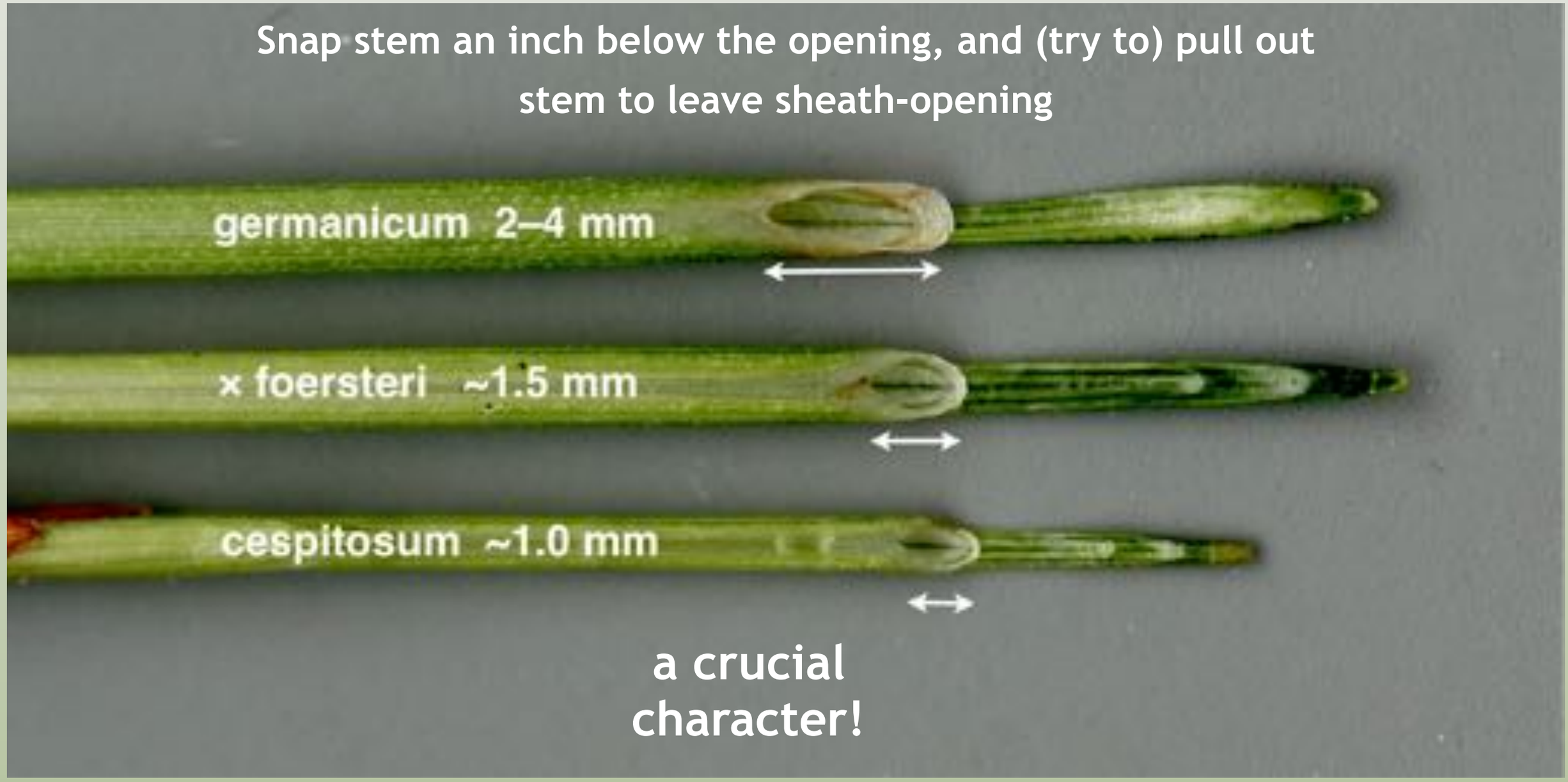
Separation & Identification: 2

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



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]

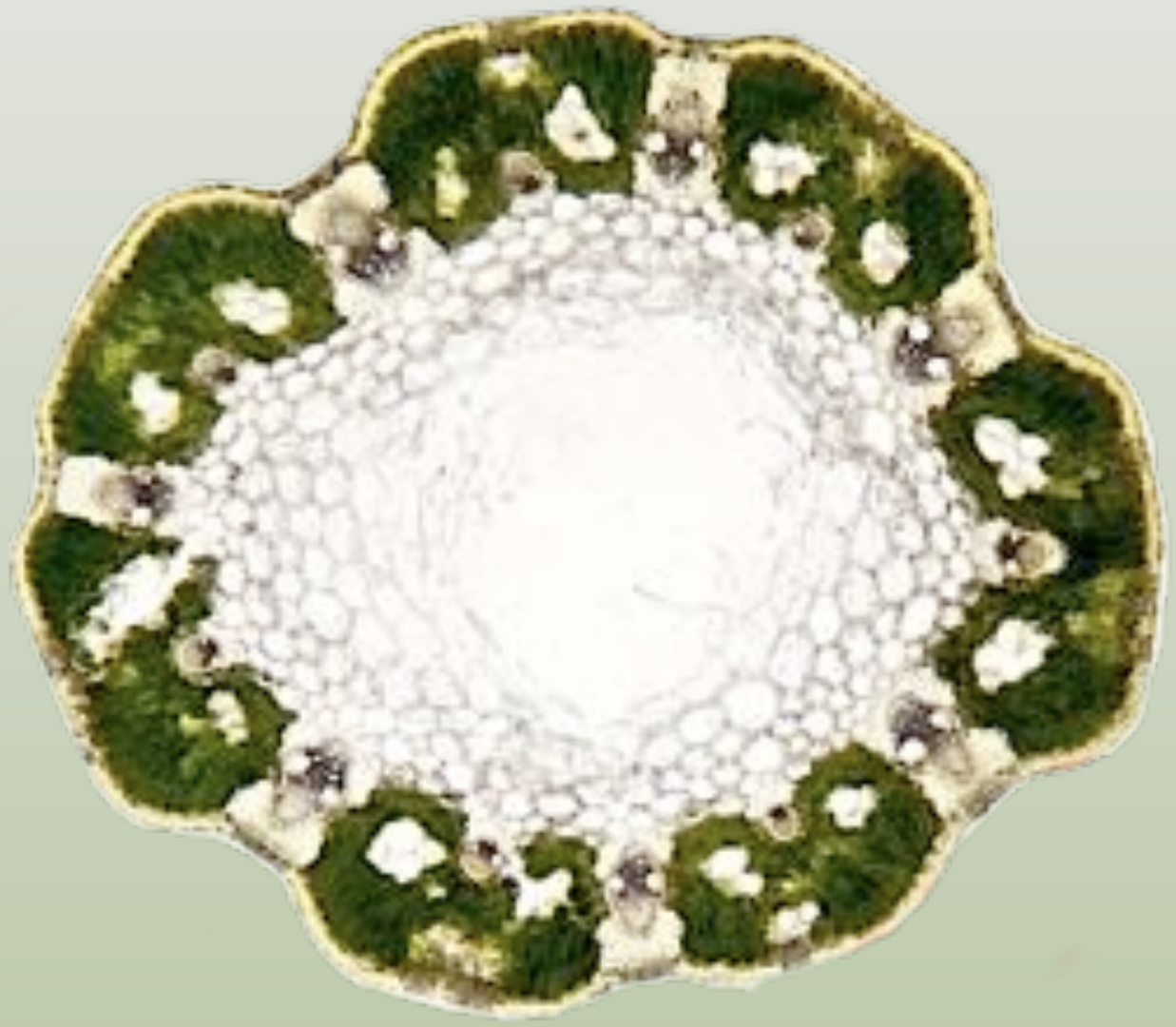
BUT beware ‘tiny’ stunted *germanicum*!!

Separation & Identification: 3

Stem cross-section

[needs compound microscope]

Stem cross-sections

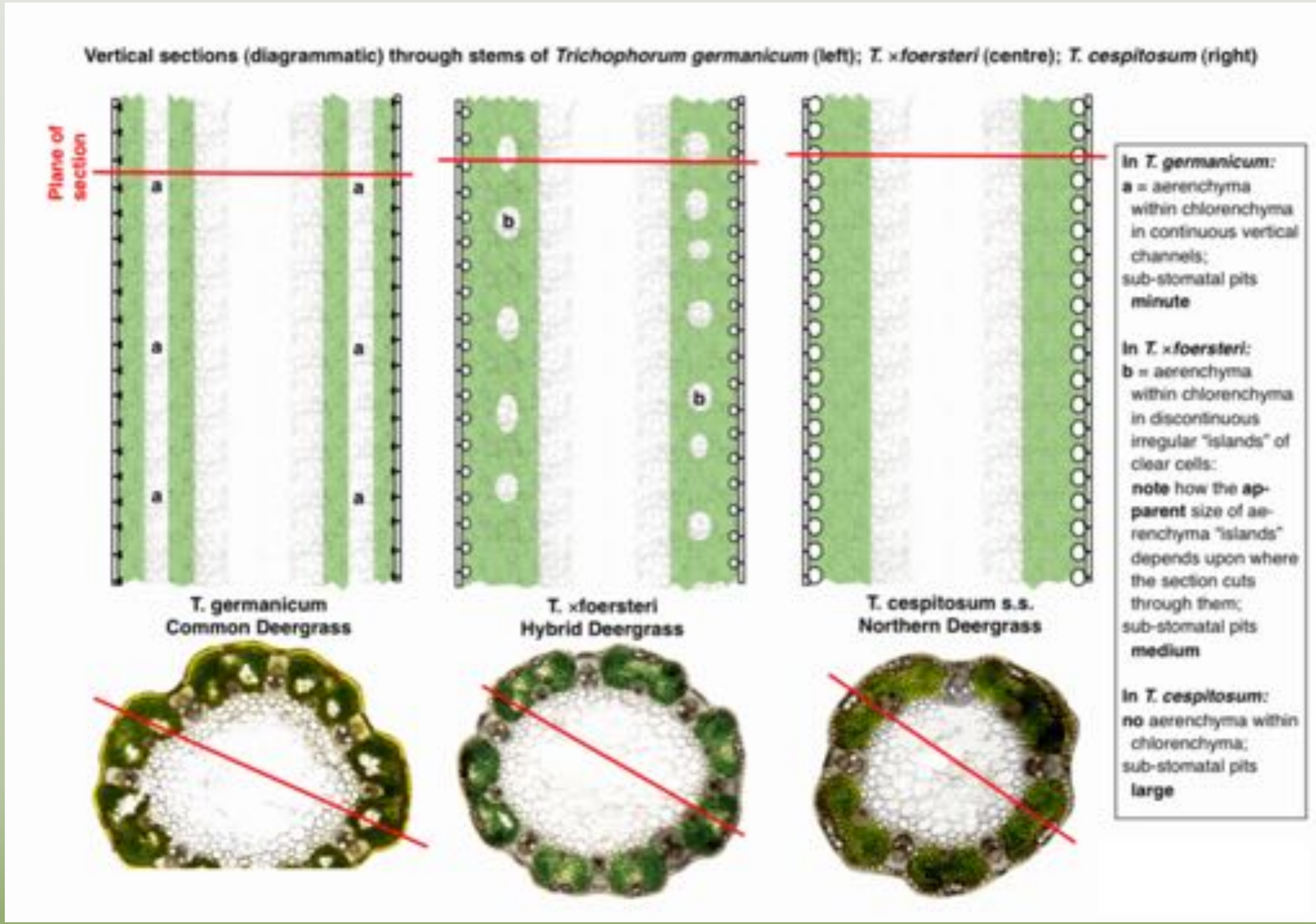


Common Deergrass
Trichophorum germanicum

Northern Deergrass
Trichophorum cespitosum

Putative internal structure of longitudinal stem-section

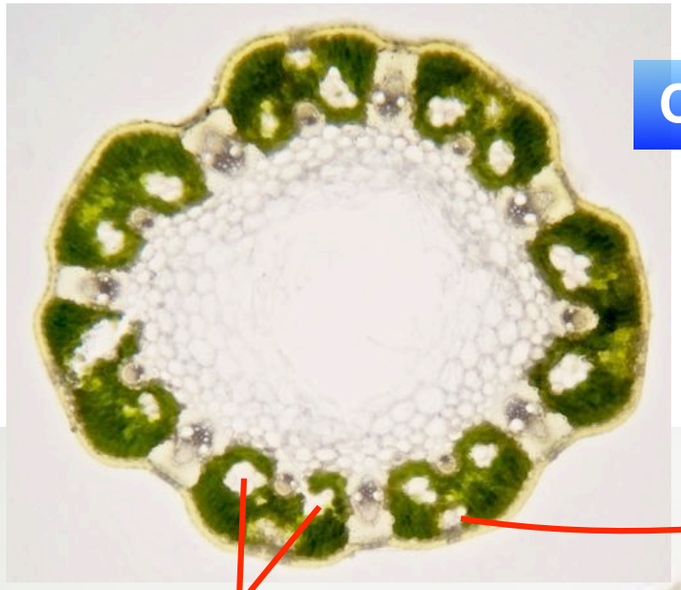
[view on website with explanation]



T. germanicum stem-section

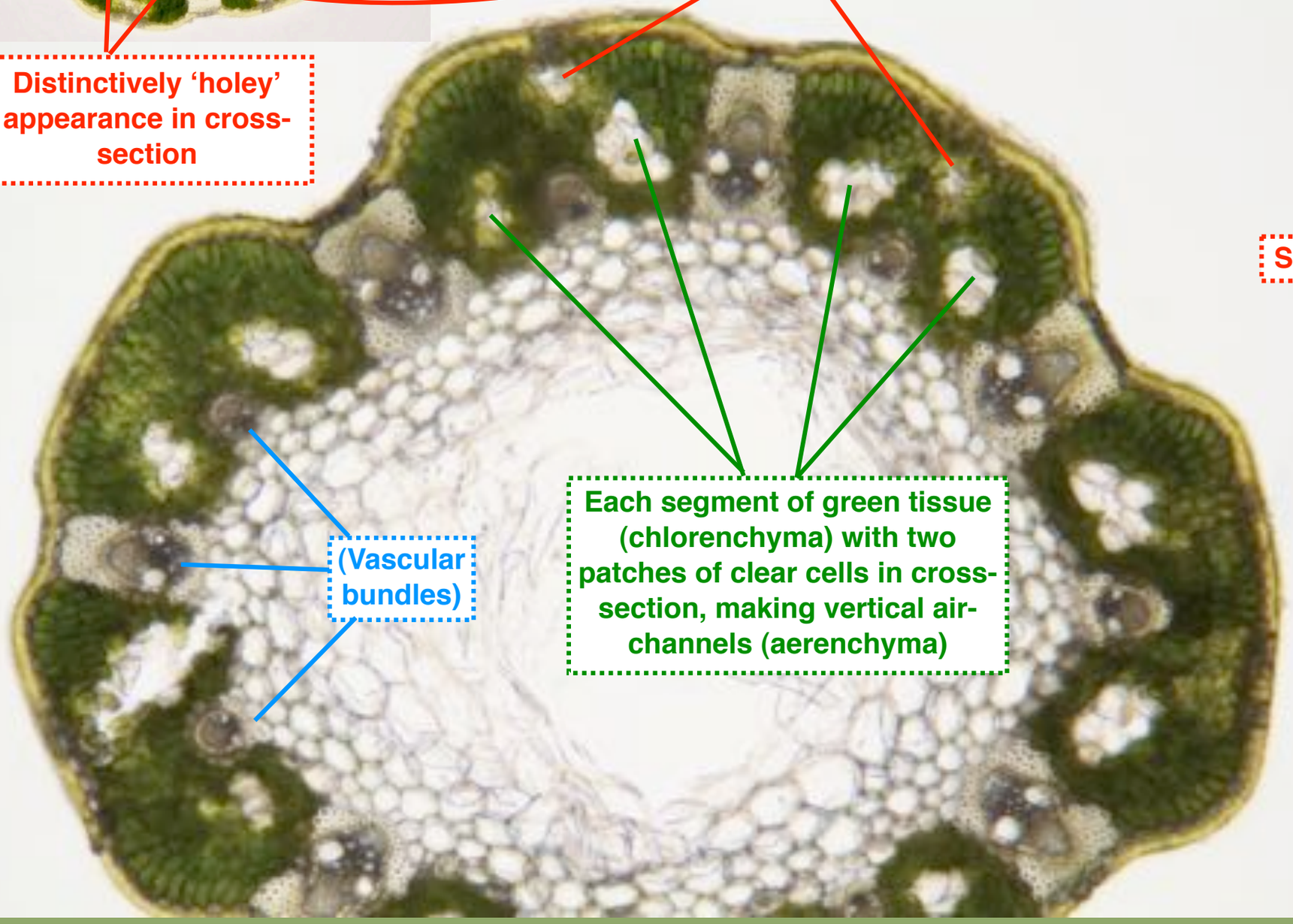
Also on website ...

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

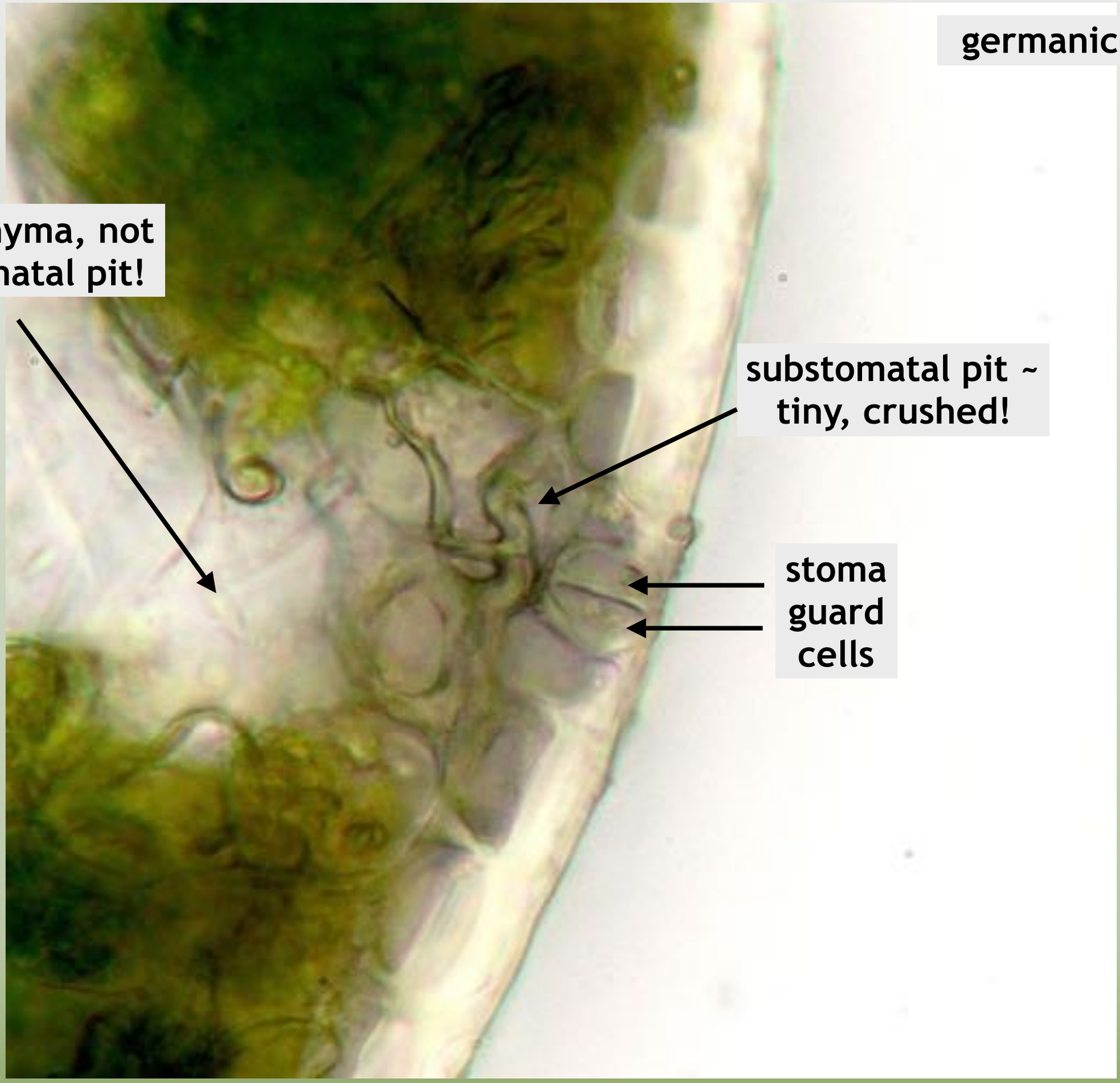
germanicum


aerenchyma patches below stomata
beware: these are NOT substomatal cavities!
substomatal cavity

germanicum, variation

germanicum

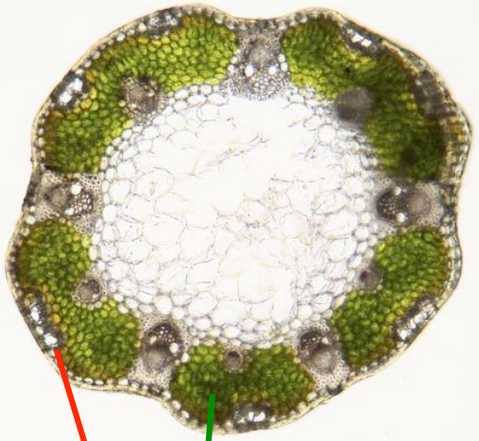
germanicum


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)

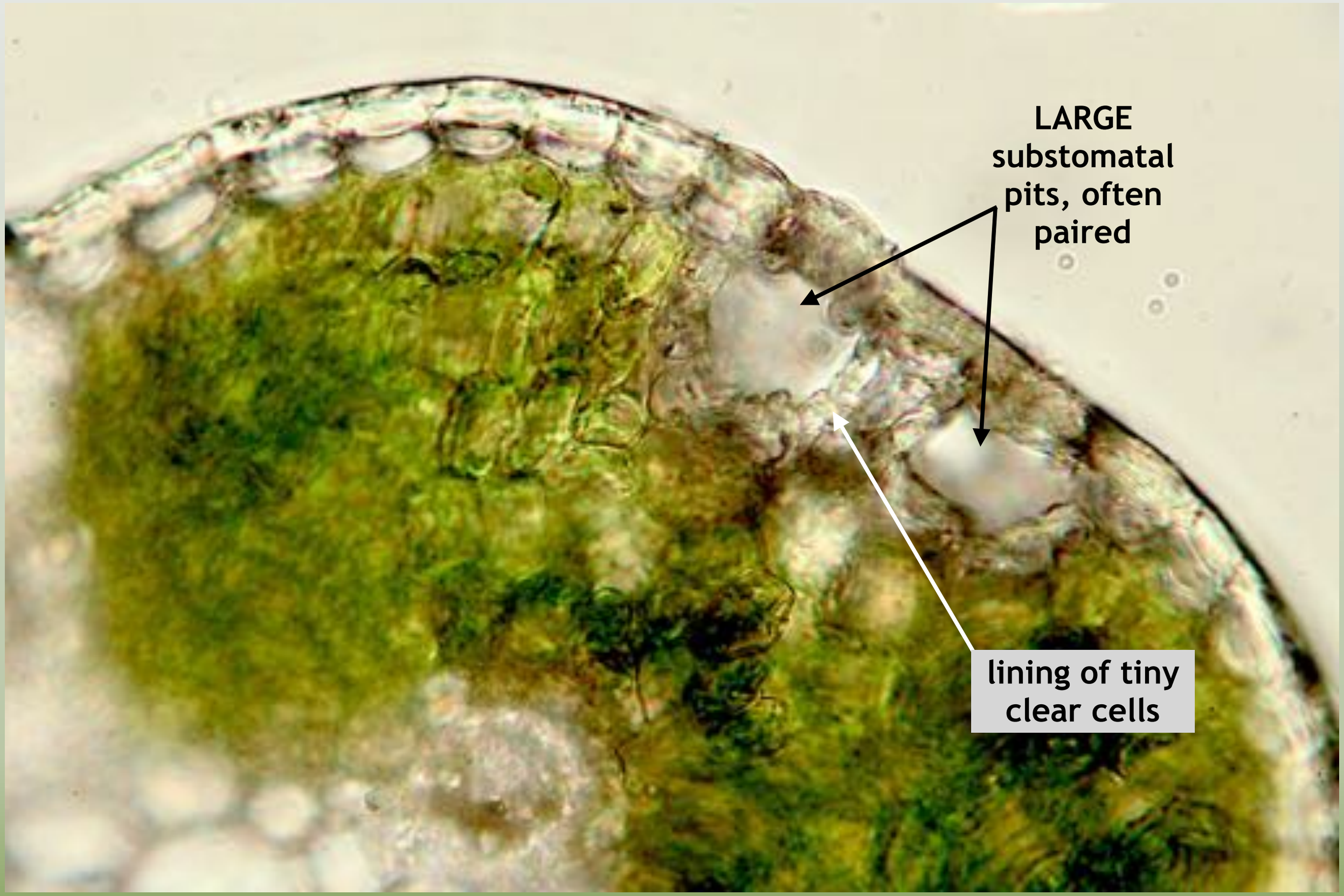
(vascular bundles)

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

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

Stoma

cespitosum


LARGE substomatal pits, often paired
lining of tiny clear cells

cespitosum, variation

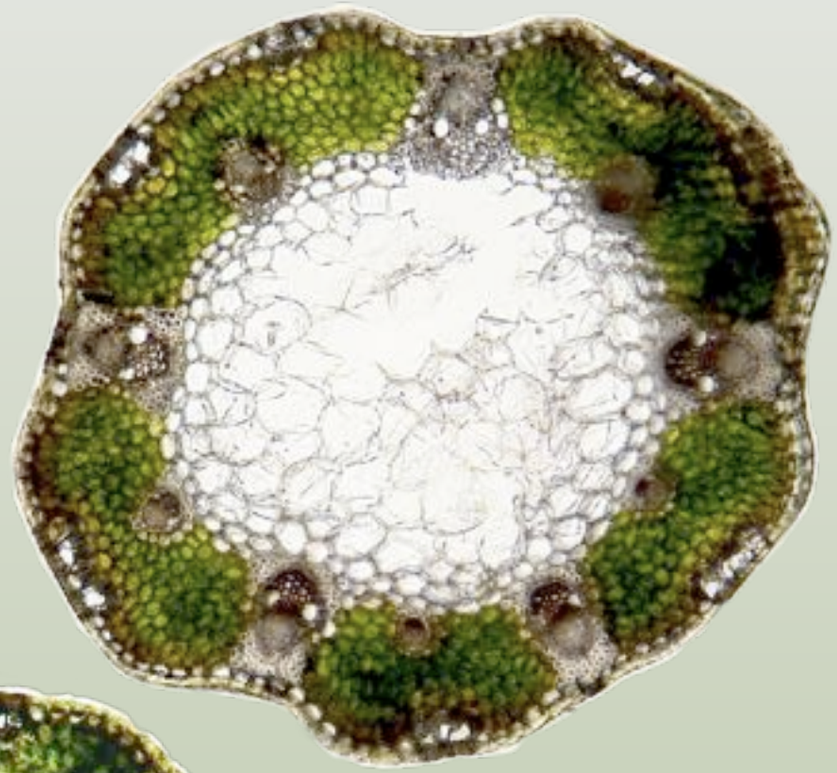
cespitosum, variation

T. × *foersteri* stem-section

comparison

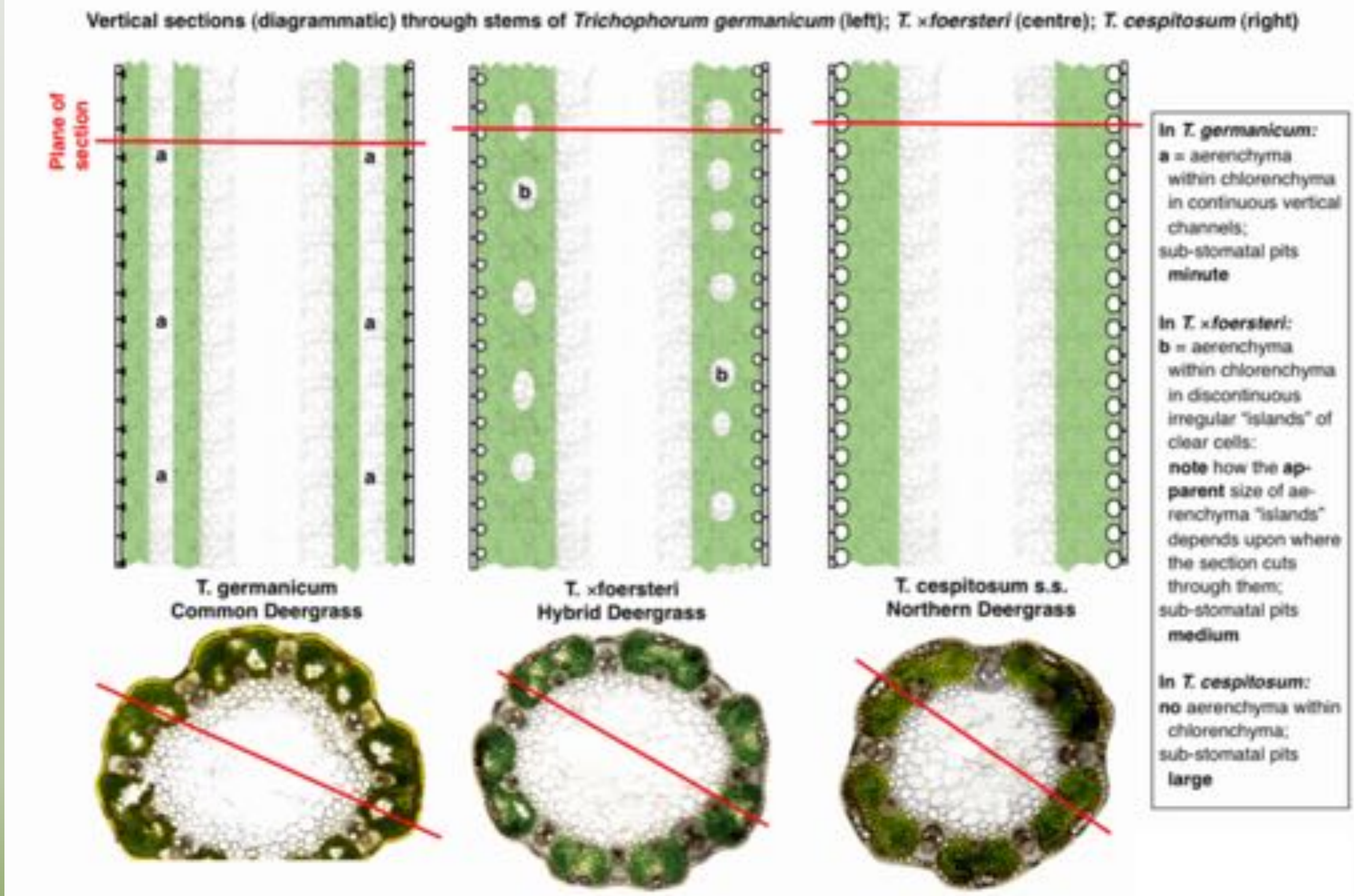
Common Deergrass
T. germanicum

Northern Deergrass
T. cespitosum



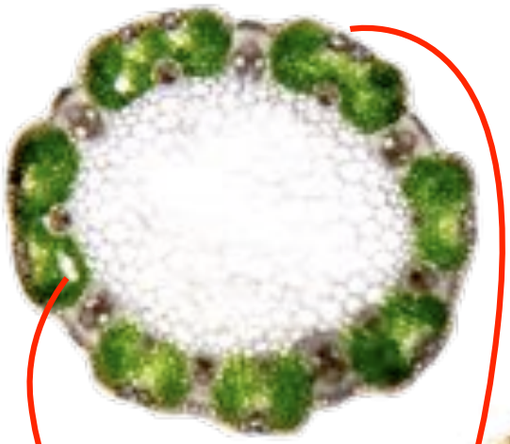
Hybrid Deergrass
T. × foersteri

[Repeated slide for clarification … putative internal structure]



Also on website ...

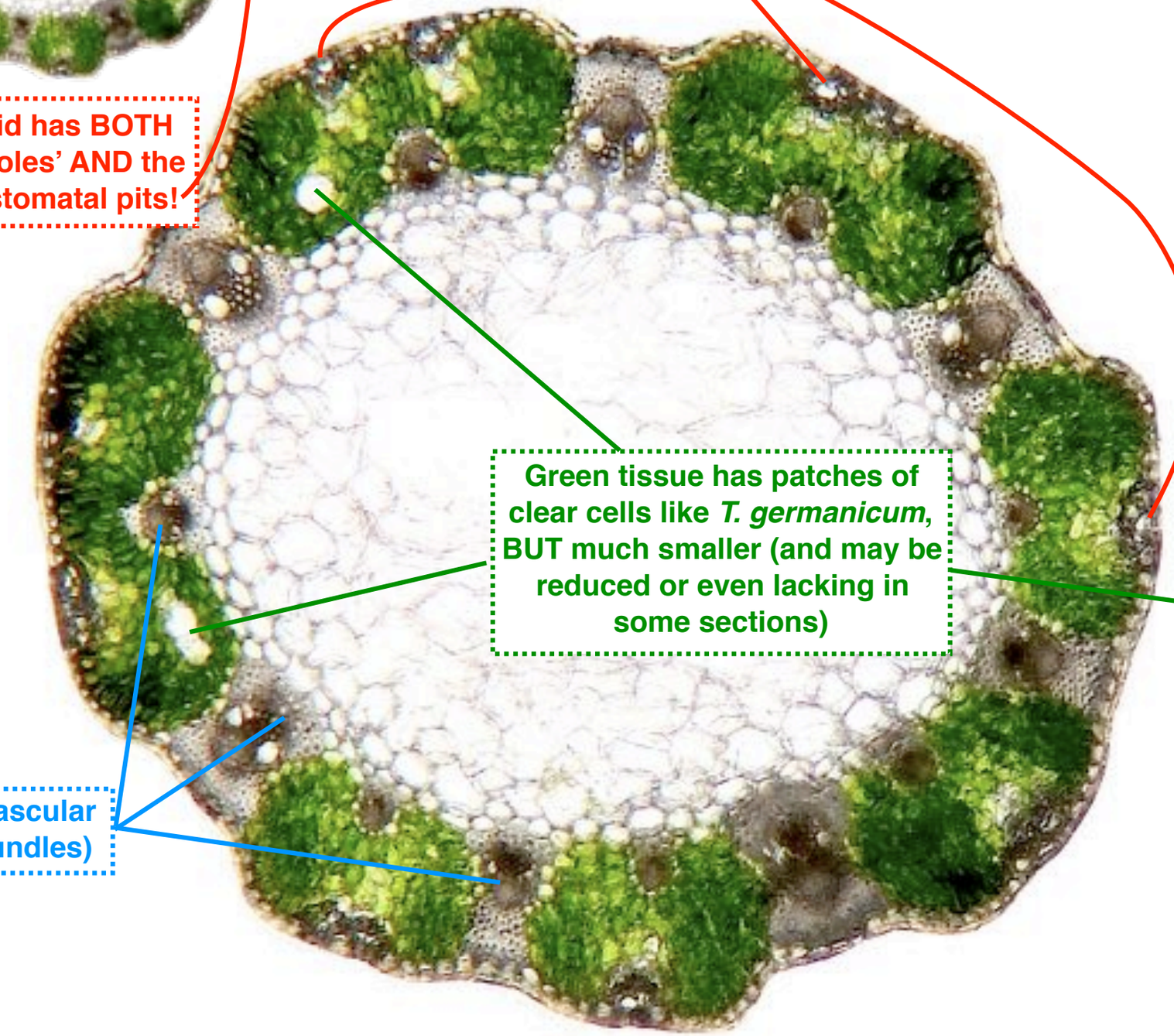
Hybrid Deergrass *Trichophorum ×foersteri*

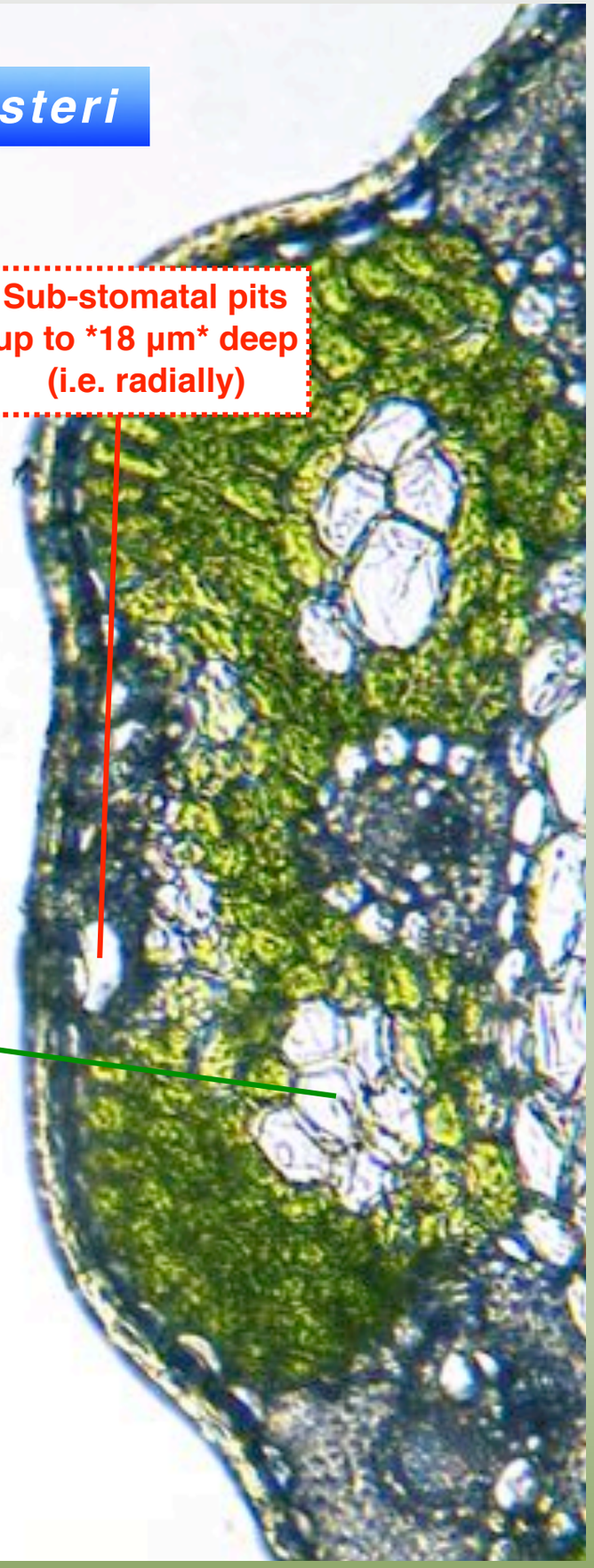


Hybrid has BOTH the 'holes' AND the sub-stomatal pits!

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

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

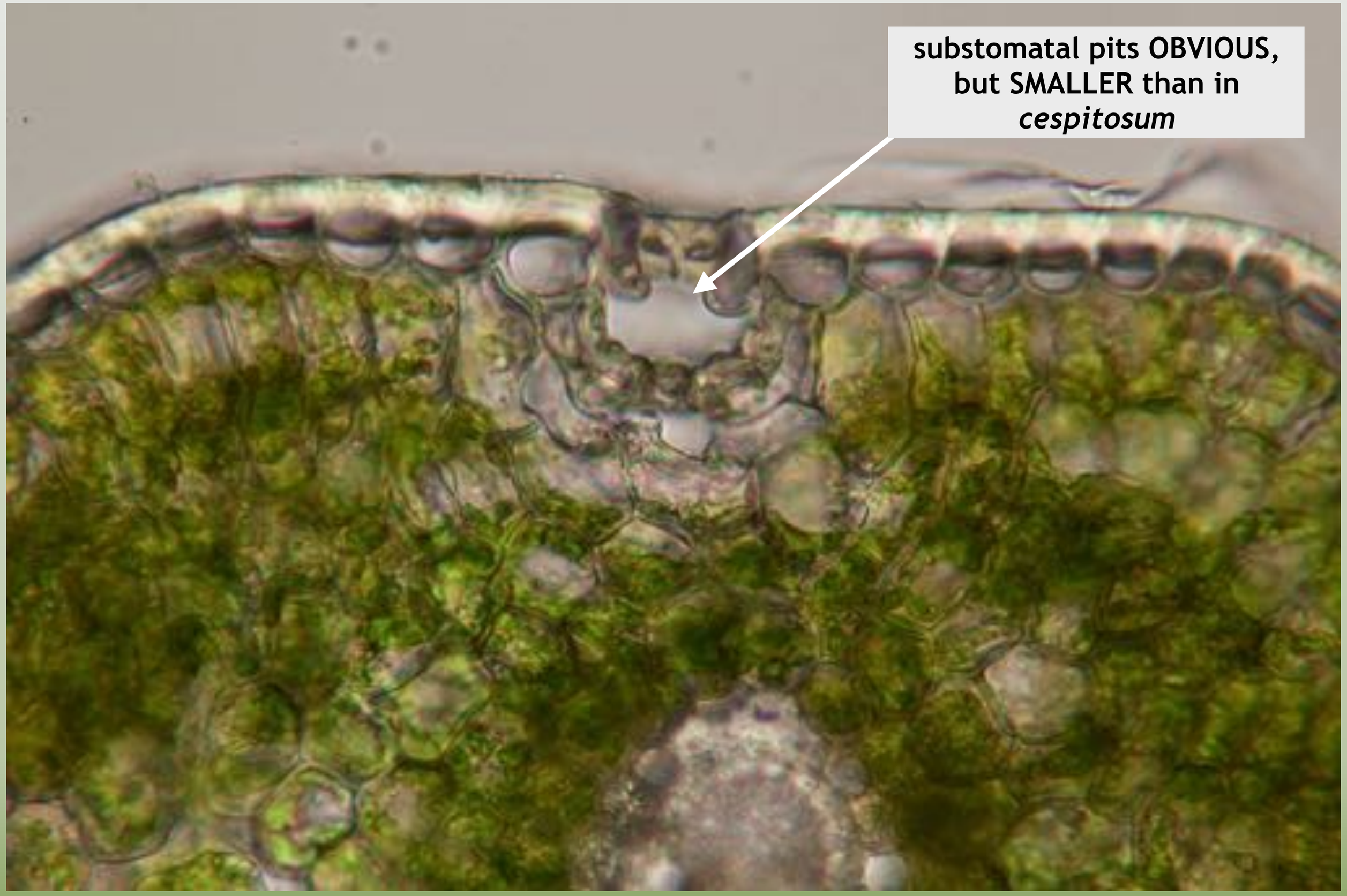




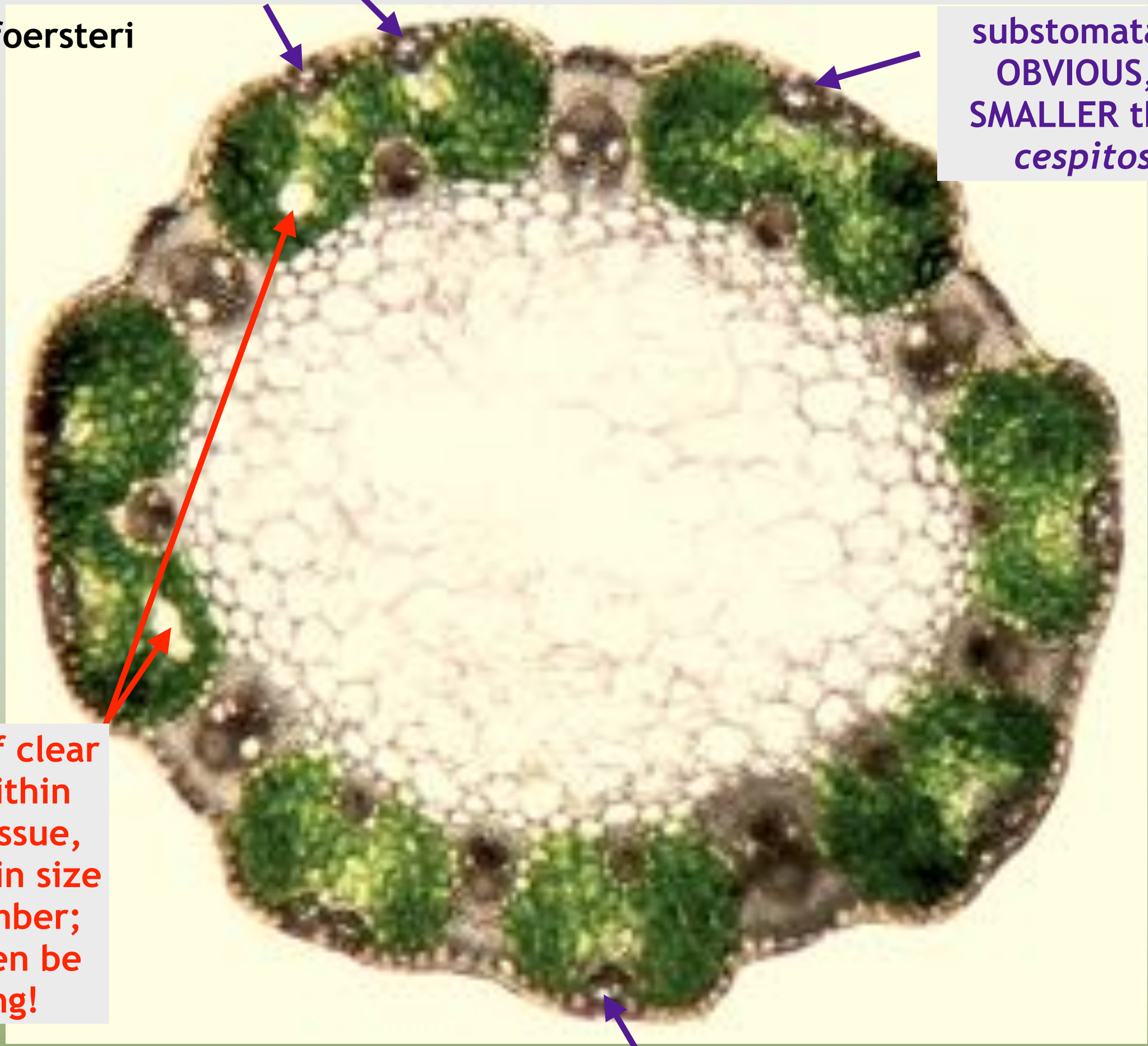
Green tissue has patches of clear cells like *T. germanicum*, BUT much smaller (and may be reduced or even lacking in some sections)

(Vascular bundles)

× foersteri



× foersteri



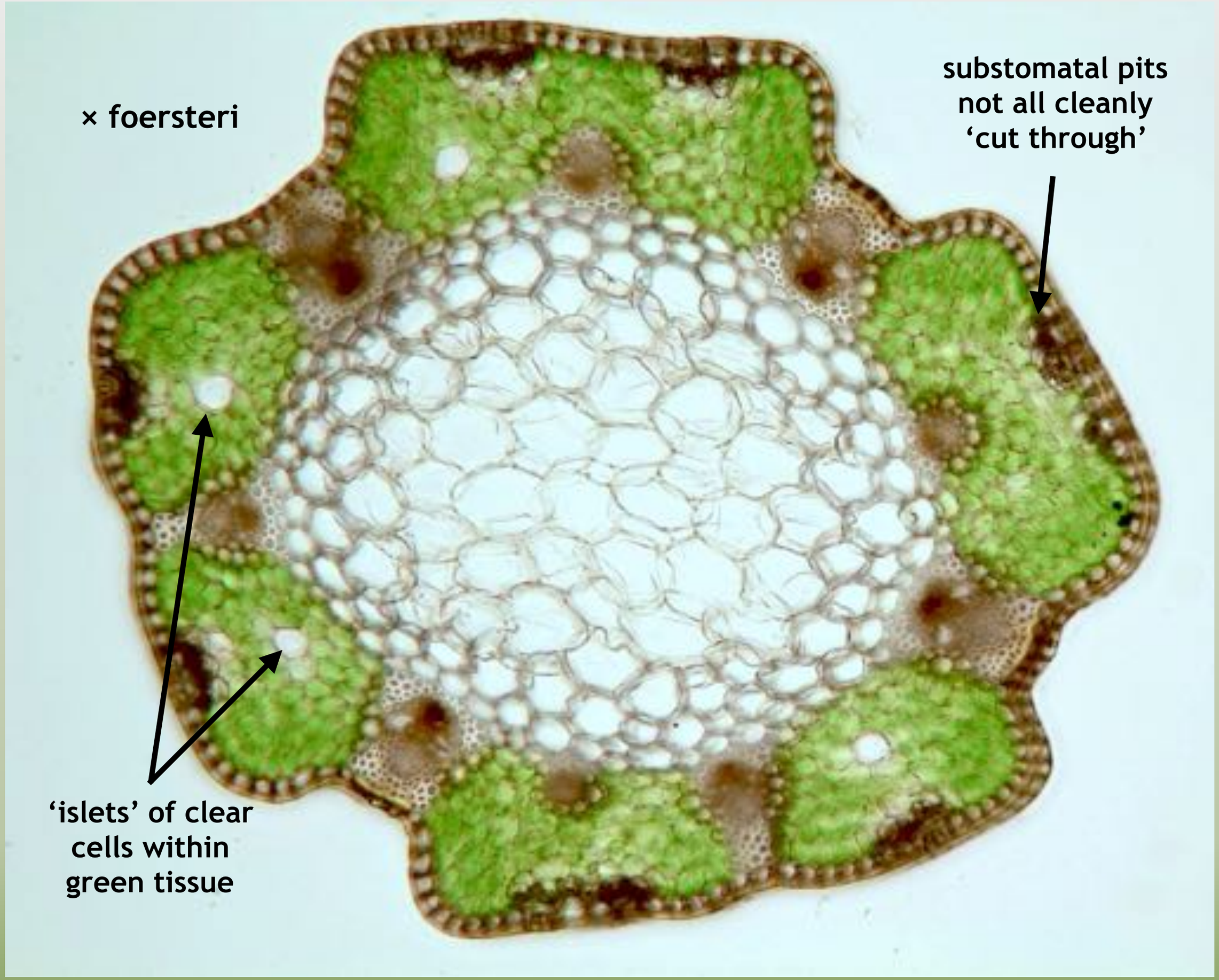
substomatal pits OBVIOUS, but SMALLER than in *cespitosum*

'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 ?

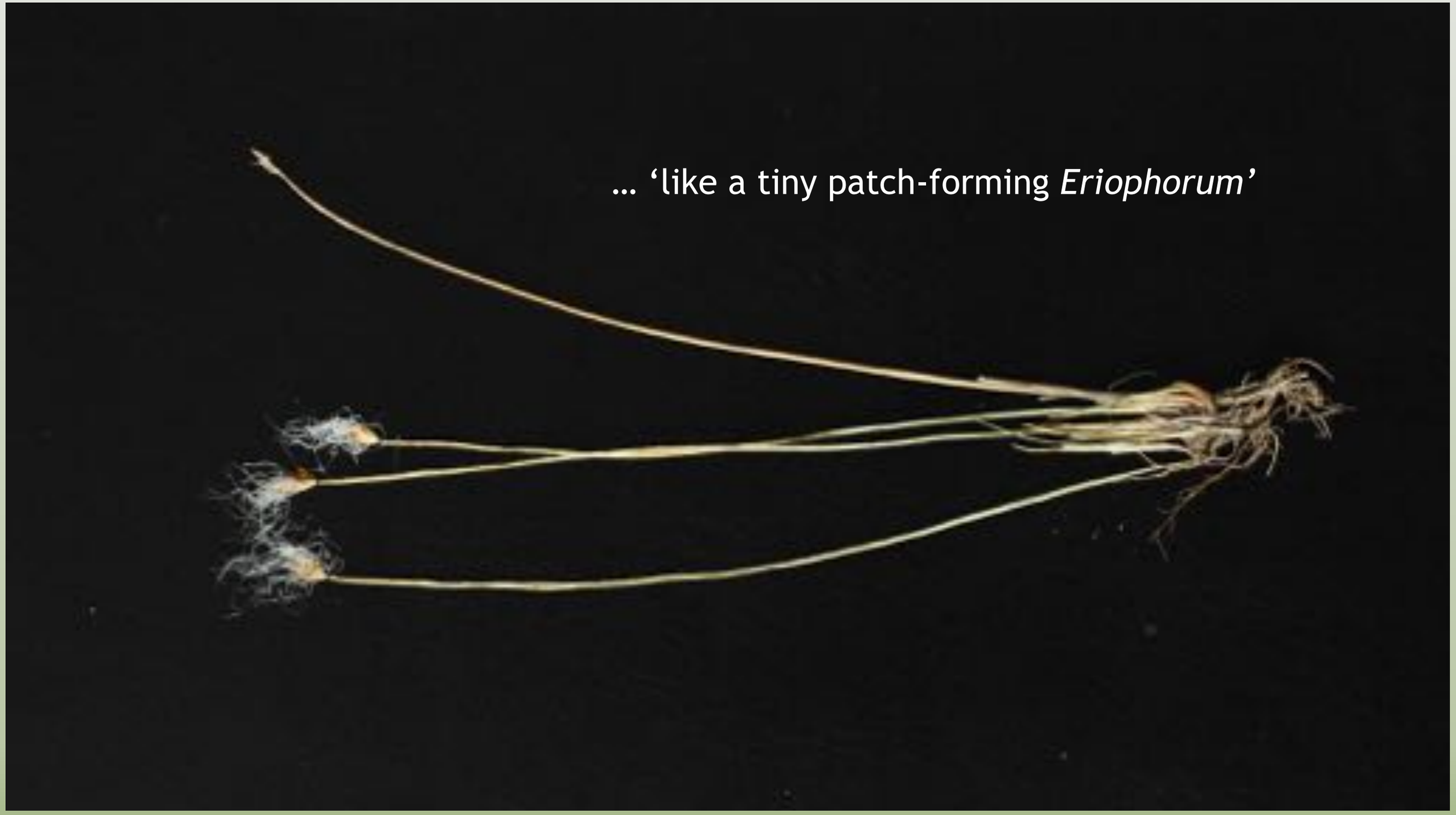
Finally,

… could we have FOUR Trichophorums??

There was

***Trichophorum alpinum*, Moss of Restenneth, 1791**

Cotton Deergrass *Trichophorum alpinum*
(Norway)




Cotton Deergrass *Trichophorum alpinum*
(Norway)

Links to:

a lot more more information on the genus,

the downloadable field-guide:

or

google for

‘roberts deergrass’