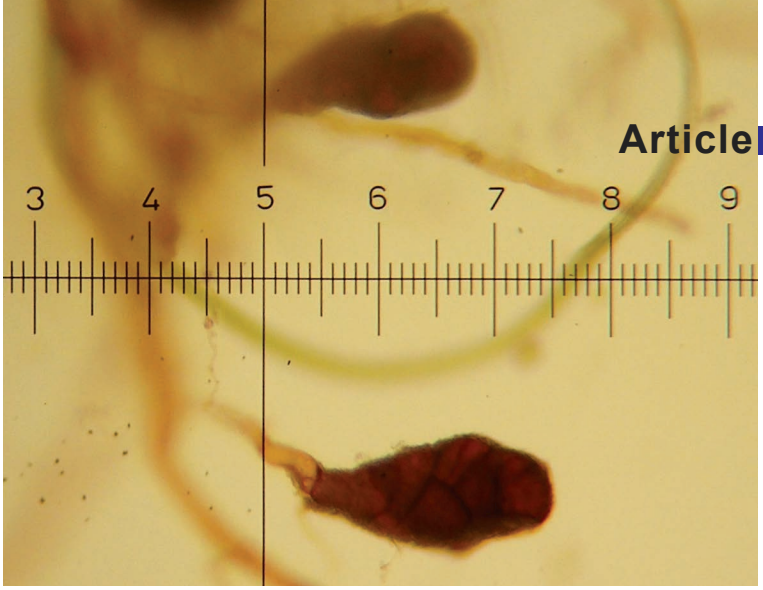

▷Fig. 3. Tubers of *Pleuridium acuminatum* (10 divisions of scale = 100 µm) N.J. Law

Rhizoidal tubers in *Pleuridium acuminatum*

Nick Law and **Tom Blockeel** report the discovery of rhizoidal tubers in this moss in Britain in a stubble field in South Derbyshire

Introduction

Risse (1987) provided a review of the published knowledge of tubers (rhizoidal gemmae) in mosses from the time of their probable first description by T.F.L. Nees von Esenbeck in 1818 up to March 1987. This review encompassed key papers such as that by Whitehouse (1966), which described and illustrated the rhizoidal tubers of twenty-nine species of European mosses. Risse's review (1987) listed 82 European mosses and 36 extra-European mosses from which tubers had been confirmed. Neither of these lists included *Pleuridium acuminatum* although, as noted by Risse, H. Koch had long before reported the occurrence of tubers within the genus (Koch, 1842). Their occurrence within European populations of *P. acuminatum* was confirmed by Arts & Risse (1988), following the discovery by R. Düll in 1986 of a tuber-bearing herbarium specimen of *P. acuminatum*, collected by F. Neu and originally determined as *P. subulatum*. Arts & Risse detected rhizoidal tubers in 11 out of 15 specimens of *P. acuminatum* but were unable to find them in 28 specimens of *P. subulatum* that they examined.

Smith (2004) indicates that rhizoidal tubers sometimes occur in *P. acuminatum* and provides a description of them, but he does not indicate whether this observation is based on material from Britain or continental Europe, and he does not illustrate the tubers. Porley (2008) stated that "large, brown, variably-shaped tubers, surrounded by a hyaline layer, occur commonly on continental specimens of *P. acuminatum* but have not been reported in the British Isles and should be looked out for". He provided a photomicrograph of a tuber from a Portuguese specimen. Finch & Blockeel (in Blockeel *et al.*, 2014) also highlight the frequency of rhizoidal tubers on continental specimens and suggest that they '…doubtless occur in Britain'.

Pleuridium species in arable land

Both *P. acuminatum* and *P. subulatum* occur within arable fields but *P. acuminatum* appears to do so less frequently according to the results of the Survey of Bryophytes on Arable Land

△Fig. 1. Habitat of *Pleuridium acuminatum* at Caldwell, Derbyshire. N.J. Law

(SBAL) conducted over the period 2001-2005 (Preston *et al.,* 2010). Morphologically these two species are very similar but they can be reliably separated by the following characteristics (Smith, 2004):

• *P. subulatum* has antheridia in persistent dwarf axillary buds whereas the antheridia of *P. acuminatum* are naked in the outer perichaetial leaf axils, and;

• the cells at the shoulder of the perichaetial leaves of *P. subulatum* are unistratose whereas those of *P. acuminatum* are bistratose (albeit irregularly in some instances), and the nerve is therefore less well defined.

In addition, the apparent absence of tubers in *P. subulatum* is a further point of distinction.

Both of us enjoy visiting arable stubble fields. They are generally good for boosting species totals when 'tetrad bashing'. They have their own unique assemblage of species but are variable in both species composition and overall species diversity from field to field. Importantly, stubble fields represent a transient habitat; miss an opportunity to record a field of over-wintered stubble and it can be many years before the crop rotation presents the opportunity again. Therefore when one of us (NJL) recently noticed some stubble at Caldwell in South Derbyshire, on land whose owner was known to him, the opportunity for recording was not to be overlooked. Access permission was obtained and a survey was undertaken by NJL on 7 February 2015.

The survey area involved one large field of over-wintered stubble and a second smaller adjacent field (Fig. 1). The centres of both fields were largely devoid of any bryophytes but the field margins supported a good cover. The majority of the assemblage was formed by a small number of common species dominated by *Barbula unguiculata, Bryum dichotomum, B. rubens, Dicranella staphylina* and *Tortula truncata*. A good range of other species was also present, albeit in lesser quantity, including *Bryum klinggraeffii, B. violaceum, Riccia glauca, R. sorocarpa, Riccardia chamedryfolia* and a species of *Pleuridium*. The *Pleuridium* occurred along the north headland of the large field, an area where *Ephemerum minutissimum* was particularly abundant. A collection of the *Pleuridium* was made at SK25781769. In total 21 species were recorded.

Examination of the *Pleuridium* failed to

detect any dwarf axillary buds and subsequent microscopic examination of a cross-section of the leaves showed them to be bistratose at the shoulder (Fig. 2), confirming the identification as *P. acuminatum*. Whilst separating and washing out individual shoots to prepare a voucher for confirmation, NJL noted rhizoidal tubers on a couple of shoots. TLB subsequently examined the gathering and confirmed the identification. He detected solitary axillary buds on two separate shoots, raising initial suspicion that they might belong to *P. subulatum*. However these tiny buds appeared not to contain antheridia, whereas the remains of solitary antheridia were observed in the axils of the perichaetial leaves. The function of the apparently empty buds is unknown but they are a potential source of confusion in the identification of the two *Pleuridium* species.

△Fig. 2. Leaf section of *Pleuridium acuminatum* at shoulder of perichaetial leaf. T.L. Blockeel

The tubers of the Derbyshire plant are attached to short rhizoid branches; they are brown in colour, multicellular, roughly ovoid in shape, up to 200 μm long and 90 μm wide (Figs. 3 & 4). The component cells are very variable in size, reaching 60 μm across. The tubers are similar to those described by Arts & Risse (1988), although they observed a larger range of tubers, some of which were curved and sausage-shaped, reaching 400 μm long. They reported that the tubers were "wrapped by a hyaline layer 3 to 8 μm thick", but we have not been able to detect this in our material. We believe this to be the first confirmation of the presence of rhizoidal tubers in *P. acuminatum* in Britain and Ireland.

▽Fig. 4. Close-up of tuber of *Pleuridium acuminatum.* T.L. Blockeel