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Coscinodon horridus (J.Muñoz & H.Hespanhol) Hugonnot, R.D.Porley & Ignatov
in Wales, a moss new to Britain.

Ronald D. Porley^a and Ralph R. Martin^b

^aUrbanização Ecotur Edifício Paraíso Lt. 8, 8400-011, Calvário-Lagoa, Portugal; ^bSchool of Computer Science, Cardiff
University, UK

Introduction

On the 28 February 2026, a mild, sunny day, while taking a round walk accompanied by his wife, from Nantmor, up Aberglaslyn Gorge to Beddgelert, then back down Cwm Bychan, in Snowdonia/Eryri National Park in North Wales, the second author came across a *Grimmia* growing on a boulder that, on initial inspection, seemed to be different from others and so collected it. At home, using the key to *Grimmia* (Porley 2016), R.R.M. judged it to be *G. montana* on account of the bistratose upper part of the leaf. A sample was also examined by Mark Lawley, who noted that the upper leaf was only bistratose in patches, and suggested *G. muehlenbeckii* might be a better candidate, concerned however that the hairpoint was distinctly spinose. The BBS *Grimmia* referee, Peter Martin, was then consulted and astutely surmised it might be *Grimmia horrida* J.Muñoz & H.Hespanhol. Being unfamiliar with this species, a taxon previously known only from Spain, Portugal and more recently France, P.M. sent material to the first author who was familiar with the plant in Portugal. As a result of a detailed examination of the limited number of stems, and comparison with Portuguese material, R.D.P. confirmed that the material was most likely *G. horrida* (= *Coscinodon horridus*). Two return visits in April 2026 by R.R.M., M.L. and Bob Stevens, also in good weather, resulted in finding the plant on four more boulders near the top of Cwm Bychan, within ca. 100 m radius of the original

find. Additional material was subsequently made available for study by R.D.P., allowing unequivocal verification that the plant is *Coscinodon horridus*.

Coscinodon is closely related to *Grimmia* Hedw. and morphologically can only be separated by sporophytic characters. *Coscinodon* is defined by the large campanulate, plicate calyptra that covers at least half to the entire capsule (Ignatova et al. 2008), while the calyptra in *Grimmia* is mitrate or cucullate and non-plicate, and covers only the opercula (Loeske 1913). Hernández-Maqueda et al. (2008), employing cpDNA analysis, suggested *Coscinodon* and *Grimmia* should be merged (despite including only two species of *Coscinodon* in the analysis). Consensus on this position is therefore lacking and the arguments for maintaining *Coscinodon* as a separate genus are given in Ignatov et al. (2018). There are currently about 12 accepted species world-wide (*op. cit.*), including one in Britain, *Coscinodon cribrosus* (Hedw.) Spruce (Blockeel et al. 2020). The latter species can be easily separated by its plicate leaves (TS) and an acuminate leaf apex running into a smooth or at most weakly denticulate hairpoint.

Grimmia horrida (Muñoz et al. 2009) was initially described on gametophytic characters alone, with attention particularly to the striking ciliate hairpoint, and it was presumed to belong to the subgenus *Orthogrimmia*. Some years later however, the taxon was discovered in the Haute-Loire department of France, this time with sporophytes and the large campanulate and plicate calyptra clearly pointed to a closer affinity to *Coscinodon* Spreng. This was confirmed by DNA sequencing, as a result requiring transfer to the genus *Coscinodon* with the new combination *Coscinodon horridus* (J.Muñoz & H.Hespanhol) Hugonnot, R.D.Porley & Ignatov (Hugonnot et al. 2018).

The nomenclature of bryophytes follows Hodgetts et al. 2020.

Diagnostic characters and comparison of Welsh with continental European plants and with *Grimmia montana*

Morphologically the Welsh plants closely match continental European plants in all respects. Concise descriptions of *C. horridus* including photomicrographs can be found elsewhere and should be consulted (Hugonnot et al. 2018; Muñoz et al. 2009; Porley 2012), it is only necessary here to mention the most important features: (1) the spinose hairpoint (Figure 1A) (in Muñoz et al. 2009 and Porley 2012, the hairpoint is described as ciliate, a term usually applied to fine hair-like structures, whereas Hugonnot et al. 2018 describes the hairpoints as strongly spinulose-ciliate, however, spinose, meaning sharp teeth or spines (Malcolm and Malcolm 2000), is perhaps a better descriptor). Hairpoint length is quite variable, both between cushions and within cushions. The development of teeth is also variable; some plants have very conspicuous spines equal to or longer than the width of the hairpoint, occasionally standing out at right angles, and a few are recurved, in others the spines (or teeth) are less conspicuous. This variation is also seen in Portuguese plants. The hairpoint of *Grimmia montana* is typically only weakly toothed or bluntly denticulate (Maier 2010), rarely 'serrate' (Muñoz 1998); (2) the leaf apex is typically abruptly contracted into the hairpoint in most leaves, though in other leaves a more acuminate apex is evident (Figure 1B). Greven (https://grimmiasoftheworld.com/gallery2/Grimmia_montana_var_horrida) also depicts photographs of Portuguese plants with rather acuminate leaf apices converging into strongly toothed hairpoints, in addition to the typical abruptly obtuse apex. Both the abruptly contracted leaf apex and the distinctly spinose hairpoint are useful field characters and can be seen with a x20 hand lens; (3) the narrow linear leaves in TS are only partially bistratose in the mid- to upper leaf (except extreme apex where tristratose or more) and the laminae are ventrally inserted on the costa, touching proximally, then spreading outwards (Figure 1C-G). In TS the leaves of *G. montana* are completely bistratose apart from the base and the margins are strongly incurved forming a canaliculate upper-leaf to apex. It should be noted that while *G. montana* was not recorded from the

area, *G. incurva* was. It has been asserted (Muñoz et al. 2009, Porley 2012) that the latter species shows some similarities with *C. horridus*; this is superficial at most and is unlikely to cause confusion.

Specimens examined. WALES: Caernarvonshire (vice-county 49): (1) Cwm Bychan, 272 m a.s.l., SH 60643 48067, ledge on boulder, 28 February 2026, *leg.* R. Martin, *det.* R.D. Porley, NMW, dupl. Hb. Porley; (2) same locality, 268 m, SH 60624 448051, top of boulder, 16 April 2026, *leg.* R. Martin, M. Lawley, B. Stevens, *det.* R.D. Porley, NMW, dupl. Hb. Porley; (3) same locality, 245 m, ca. SH 60527 47897, on bedrock, 16 April 2026, *leg.* R. Martin, M. Lawley, B. Stevens, *det.* R.D. Porley, NMW, dupl. Hb. Porley; (4) same locality, 237 m, SH 60546 47866, on bedrock, 16 April 2026, *leg.* R. Martin, M. Lawley, B. Stevens, *det.* R.D. Porley, NMW, dupl. Hb. Porley; (5) same locality, 292 m a.s.l., SH 60596 48085, on bedrock at top of hill, 16 April 2026, *leg.* R. Martin, M. Lawley, B. Stevens, *det.* R.D. Porley, NMW, dupl. Hb. Porley. PORTUGAL: (1) Tras-os-Montes e Alto Douro, Serra do Morão, Covelos, 1070 m a.s.l., 29T 594398 4575374, on siliceous rock outcrops, with *Grimmia montana*, 21 August 2011, *leg.* & *det.* R.D. Porley, Hb. Porley; (2) Minho, Serra da Peneda, Ameijoeria, 850 m a.s.l., 29T 570071 4648614, on outcrop under shelter of overhang, with *Grimmia montana*, 27 August 2013, *leg.* & *det.* R.D. Porley, Hb. Porley. FRANCE: (1) Haute-Loire, Montusclat, La Tortue, 1250-1300 m a.s.l., on large exposed phonolithic boulders, with *Grimmia donniana*, *G. incurva* and *G. montana*, 20 February 2017, *leg.* V. Hugonnot, *conf.* R.D. Porley, Hb. V. Hugonnot; Hb. Porley; (2) Haute-Loire, Queryrières, Forêt domaniale du Meygal, Le Testavoyre, 1410 m a.s.l., on large exposed boulder, 20 July 2015, *leg.* V. Hugonnot, *conf.* R.D. Porley, Hb. V. Hugonnot; Hb. Porley.

Habitat and ecology

The outcrops on which *Coscinodon horridus* were found are termed Cwm Eigiau Formation (Figure 2A), an Ordovician rock in North Wales characterized by sandstones, siltstones and tuffs deposited in a shallow marine environment (British Geological Survey), silica-rich (felsic) and acid. Cwm Bychan, a

deep glacial coastal valley where *C. horridus* occurs, was also once the site of a copper mine, closed in 1929. It has long been known that some *Coscinodon* species are metal-tolerant (Hastings 1999), though there is no evidence that *C. horridus* shares this trait. The cushions occur on exposed faces of the outcrops, not sheltered as in some Portuguese and French populations (Hugonnot et al. 2020; Porley 2012). The area is at an elevation of 237-293 m a.s.l., which is significantly lower than in France (850-1436 m) (Hugonnot et al. 2020), Portugal (646-1070 m) (Muñoz et al. 2009; Porley 2012) and Spain (1800 m) (Muñoz et al. 2009), and it experiences a Hyperoceanic Temperate climate characterized by high rainfall - an annual average of 2400 to 2600 mm - with rain or drizzle occurring on more than 50% of days annually, and with mild summers and cold wet winters. Cwm Bychan in particular, running roughly SSW-NNE, receives consistently damp, windy weather and is one of the wettest regions of the UK, with frequent mist, drizzle and low cloud. The rocky terrain is set amongst upland heathland with *Calluna vulgaris*, *Erica cinerea*, *Galium saxatile*, *Molinia caerulea*, *Sphagnum palustre*, *S. rubellum*, *Ulex gallii*, *Vaccinium myrtillus* and others. The acidic rocks support a range of other bryophytes, including *Andreaea rothii*, *A. rupestris*, *Cynodontium bruntonii*, *Grimmia donniana*, *G. incurva*, *Racomitrium fasciculare*, *R. lanuginosum*, and *R. sudeticum*.

The Spanish and Portuguese populations of *C. horridus* also occur in areas of silica-rich rocks, such as quartzites and granites. At the French localities in Haute-Loire, a volcanic mountain region in the Massif Central (Hugonnot et al. 2020), the geology is rather different. The predominant rocks here are phonolites, silica-undersaturated (hence alkaline) and lacking quartz. Instead, they have a high content of elements such as sodium, potassium and aluminium. Nevertheless, many of the saxicolous bryophytes that co-occur with *C. horridus* in France are the same as those in Wales and the Iberian Peninsula.

Archegonia were seen in two of the Welsh collections (SH 60596 48085; 60624 48057), reflecting the condition in France where the vast majority of plants are female (Hugonnot et al. 2020). Flagelliform

shoots with reduced leaves were present in at least two of the gatherings examined, thus, together with rather fragile leaf apices, may play a role in short-distance dispersal. Following the discovery of the original cushion, intensive searches over two further days, lasting several hours, turned up an additional four cushions of *C. horridus* (Figure 2B, C) on separate boulders, thus indicating that it is rare in the area of search. It would be speculative to maintain it is a relatively recent arrival in Wales or contrarily that it is long-established. With further exploration it may be found elsewhere in Snowdonia given the extent of suitable rock and habitat, but it is significant that in France it is also curiously restricted despite much apparently suitable habitat (Hugonnot 2018), and the same situation holds for the Iberian Peninsula. The taxon has only relatively recently been described (Muñoz et al. 2009), and therefore it has possibly been overlooked in the past or mistaken for a species of *Grimmia*. It would be worthwhile checking herbaria to see if there are any earlier collections in Wales or indeed other upland areas of Britain.

The discovery of *Coscinodon horridus* in Wales extends the known range ca. 1050 km north from the French population, and ca. 1200 km from the Iberian population (Figure 3). It occupies the Oceanic zone in western Europe, though Hugonnot (2018) provisionally considered it a Suboceanic-Temperate species noting however that the French locality is much less oceanic, being continental montane. Apart from the general fact that *Coscinodon* shows an affinity to acid bedrock, the distributions of some species in the genus have given rise to biogeographical conundrums (Hastings 1996, 1999; Ignatov 2018) variously attributed to past geological events, glaciations and climatic factors. At the moment *C. horridus* appears to be a rare endemic of western Europe, an attribute shared also by *C. humilis* Milde and *C. monchiquensis* R.D.Porley, Ochyra & Ignatova.

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ORCID

Ronald D. Porley <http://orcid.org/0000-0002-5329-8926>

Ralph R. Martin <http://orcid.org/0000-0002-8495-8536>

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FIGURES

Figure 1. *Coscinodon horridus* from Cwm Bychan (A) spinose hairpoint on abruptly contracted leaf apex; (B) variability of leaf apex, abruptly contracted (typical state) and acuminate; (C-G) TS of leaves from apex (C) to base (G). (Scale bars 1A, B = 100 µm; C-F = 20 µm; G = 100 µm). **Figure 2.** (A) Habitat, Ordovician Cwm Eigiau Formation outcrops at the top of Cwm Bychan, Beddgelert; (B) *Coscinodon horridus* (in red ellipse) on boulder; (C) close-up of *Coscinodon horridus* cushion beside penknife blade for scale. Photographs (1A-G) R.D. Porley; (2A-C) R.R. Martin. **Figure 3.** Currently known global distribution of *Coscinodon horridus*.









