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Cephaloziella integerrima (Cephaloziellaceae, Marchantiophyta), new for Italy

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Abstract – A new liverwort species, *Cephaloziella integerrima* (Lindb.) Warnst., has been identified for the bryophyte flora of Italy. The species was gathered in the snow-beds of the high Gavia Valley (Stelvio National Park, Lombardy). This work describes the distribution and ecology of this rare species.

Jungermanniopsida / ecology / European distribution / snow-beds

INTRODUCTION

Compared to vascular plants, bryophytes constitute a major part of several alpine plant communities, such as spring communities, peatland and snow-bed communities (Gjærevoll, 1956; Geissler, 1982; Miller, 1982; Dierßen, 1984; Tomaselli, 1991; Spitale *et al.*, 2009; Tomaselli *et al.*, 2011). In particular, snow-bed communities have low species richness of vascular plants up to 18 per m^2, usually 5 to 10 (Gjærevoll, 1956; Onipchenko & Semenova, 1995) which are limited by the length of the snow-free period (Carbognani *et al.*, 2012) and by soil resources (Petraglia *et al.*, 2013). Forbs constitute the dominant growth form, but are often lacking in very late melting snow-beds, which are almost completely dominated by bryophytes.

Among alpine plant communities, snow-beds are regarded as particularly vulnerable to the predicted and occurring climate change (Björk & Molau, 2007). In particular, the interannual variation in snow cover quantity and duration could increase the vegetation dynamics in this peculiar habitat, leading to an increase in vascular species that could interact negatively with bryophyte cover and diversity.

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STUDY AREA

One of the sites selected was the high Gavia Valley (Stelvio National Park), 46°20'21"N-10°29'30"E, 2445-3360 m a.s.l.), on the Italian side of the Rhaetian Alps.

Climatic features for the Gavia Pass indicate a mean annual rainfall of 1150 mm and a mean annual temperature of 1.4°C, with an average maximum of 9.3°C in the warmest month and an average minimum of 10.4°C in the coldest one (Hijmans *et al*., 2005).

This area, developed on siliceous bedrock, is located within the alpine vegetation belt, where *Carex curvula* All. grasslands represent the climax vegetation. Vegetation at this altitude also includes pioneer communities on rock faces and screes, mire and stream communities, dwarf shrub heathlands and snow-beds. These latter differ in their species composition according to length of snow cover, persistence of melt-waters in the soil and soil texture (Petraglia & Tomaselli, 2007).

The aim of this paper is to contribute to the knowledge of the bryoflora of snow-bed plant communities across the Alpine chain.

MATERIALS AND METHODS

At the end of July 1999, the authors carried out a phytosociological and floristic survey in the snow-beds plant communities of the high Gavia Valley to assess the species richness and the relationships between environmental variables and species in different snow-bed habitats, collecting several bryophyte samples. The samples are kept in the CAME Herbarium (University of Camerino). Nomenclature follows Ros *et al.* (2013) for mosses and Ros *et al.* (2007) for liverworts. The samples were identified using the taxonomic keys of Cortini Pedrotti (2001, 2005) and Smith (2004) for mosses, and Paton (1999) for liverworts.

RESULTS

One of the species collected during that survey was identified as *Cephaloziella integerrima* (Lindb.) Warnst.

Italy: High Gavia Valley (Stelvio National Park, Italian side of the Rhaetian Alps), 26°20'35.8"N-10°29'25.7"E, 2650 m a.s.l., 29 July 1999, *leg. A. Petraglia,* det. R. Tacchi, 15 April 2014.

The species was collected within a snow-bed habitat on a sandy, acidic loam soil with a pH of about 4.5, characterized by a scattered cover of vascular plants (*Euphrasia minima* Jacq. ex DC., *Gnaphalium supinum* L., *Leontodon helveticus* Mérat, *Leucanthemopsis alpina* (L.) Heyw., *Pedicularis kerneri* Dalla Torre, *Polygonum viviparum* L., *Primula daonensis* (Leyb.) Leyb., *P. glutinosa* Wulfen, *Sibbaldia procumbens* L., *Veronica alpina* L.) and bryophytes (*Anthelia*

juratzkana (Limpr.) Trevis., *Cephaloziella rubella* (Nees) Warnst., *Hedwigia ciliata* (Hedw.) P. Beauv. var. *ciliata*, *Pohlia drummondii* (Müll. Hal.) A.L. Andrews, *Polytrichastrum sexangulare* (Brid.) G.L. Sm., *Polytrichum juniperinum* Hedw., *P. piliferum* Hedw.).

DISCUSSION

Cephaloziella integerrima is a small leafy liverwort forming, in the samples collected in the Gavia pass, open turfs; the multiangular gemmae are red and the innermost female bracts and bracteole are fused into a shallowly lobed sheath with entire margin will distinguish *C. integerrima* from all *Cephaloziella* species except *C. calyculata* (Durieu & Mont.) Müll. Frib. This latter differs in the unlobed sheath round the lower part of the perianth; in *C. integerrima* the mouth of the perianth is crenulate-denticulate, whilst in *C. calyculata* it is almost entire and the cells are shorter and more heavily thickened (Paton, 1999).

This boreal-montane suboceanic species (Dierßen, 2001) has a disjunct distribution in North America and Europe, where it has been reported in Austria, Croatia, Denmark, Finland, France, Germany, Hungary, Iceland, Ireland, Norway, Poland, Russia, Romania, Spain, Sweden, Switzerland and United Kingdom (Miguel Velasco de, 1989; Paton, 1999; Sabovljević & Natcheva, 2006; Söderström *et al*., 2007; Ştefănuţ & Goia, 2012; Porley, 2013, Porley *et al.*, 2014; Rams *et al.*, 2014). In some countries, because of its rarity and vulnerability, it has been listed as a Vulnerable species in the Red Lists of Great Britain and Switzerland and as Critically Endangered in Romania and Spain (Schnyder *et al*., 2004; Hodgetts, 2011; Garilleti & Albertos, 2012; Ştefănuţ & Goia, 2012). In Switzerland and Austria, it has been reported in some localities of the Alps characterized as sandy and disturbed environments near a glacier between 1885 and 2325 m a.s.l.

In Italy the species was wrongly reported in the past for the Piedmont and Tuscany regions, but after a revision of herbarium specimens these reports were referred to *Cephaloziella calyculata* (Aleffi *et al.*, 2008). Therefore, the discovery of *C. integerrima* in the Gavia Pass is the first confirmed for Italy.

REFERENCES

ALEFFI M., TACCHI R. & CORTINI PEDROTTI C., 2008 — Check-list of the Hornworts, Liverworts and Mosses of Italy. *Bocconea* 22: 1-255.

BJÖRK R.G. & MOLAU U., 2007 — Ecology of alpine snow-beds and the impact of global change. *Arctic, antarctic and alpine research* 39: 34-43.

CARBOGNANI M., PETRAGLIA A. & TOMASELLI M., 2012 — Influence of snowmelt time on species richness, density and production in a late snow-bed community. *Acta oecologica* 43:113-120.

CORTINI PEDROTTI C., 2001 — *Flora dei muschi d'Italia. Sphagnopsida, Andreaeopsida, Bryopsida (I parte)*. Roma, A. Delfino Editore, 817 p.

CORTINI PEDROTTI C., 2005 — *Flora dei muschi d'Italia. Bryopsida (II parte)*. Roma, A. Delfino Editore, 418 p.

DIERßEN K., 1984 — Vergleichende vegetationskundliche Untersuchungen an Schneeböden (zur Abgrenzung der Klasse *Salicetea herbaceae*). *Berichte der Deutschen botanischen Gesellschaft* 97: 359-382.

DIERßEN K., 2001 — Distribution, ecological amplitude and phytosociological characterization of European bryophytes. *Bryophytorum bibliotheca* 56: 1-289.

GARILLETI R. & ALBERTOS B. (coord.), 2012 — *Atlas y Libro Rojo de los Briófitos amenazados de España*. Madrid, Ed. Organismo Autónomo Parques Nacionales.

GEISSLER P., 1982 — *Alpine communities*. *In*: Smith A.J.E. (ed.), *Bryophyte Ecology*. London, Chapman & Hall, pp. 167-189.

GJÆREVOLL O., 1956 — The plant communities of the Scandinavian alpine snow-beds. *Det kongelige Norske videnskabers selskab skrifter* 1: 1-405.

HIJMANS R.J., CAMERON S.E., PARRA J.L., JONES P.G. & JARVIS A., 2005 — Very high resolution interpolated climate surfaces for global land areas. *International journal of climatology* 25: 1965-1978.

HODGETTS N., 2011 — A revised Red List of Bryophytes in Britain. *Field bryology* 103: 40-49.

MIGUEL VELASCO DE, A., 1989 — *Cephaloziella integerrima* (Lindb.) Warnst., novedad para la brioflora de la Península Ibérica. *Anales del jardín botánico de Madrid* 45 (2): 549-550.

MILLER P.C., 1982 — Environmental and vegetational variation across a snow accumulation area in montane tundra in central Alaska. *Holartic ecology* 5: 85-98.

ONIPCHENKO V.G. & SEMENOVA G.V., 1995 — Comparative analysis of the floristic richness of alpine communities in the Caucasus and the Central Alps. *Journal of vegetation science* 6: 299-304.

PATON J.A., 1999 — *The Liverwort Flora of the British Isles*. Colchester, Harley Books, 626 p.

PETRAGLIA A. & TOMASELLI M., 2007 — Phytosociological study of the snow-bed vegetation in the Northern Apennines (Northern Italy). *Phytocoenologia* 37: 67-98.

PETRAGLIA A., CARBOGNANI M. & TOMASELLI M., 2013 — Effects of nutrient amendments on modular growth, flowering effort and reproduction of snow-bed plants. *Plant ecology and diversity* 6: 475-486.

PORLEY R., 2013 — *England's Rare Mosses and Liverworts: Their History, Ecology, and Conservation*. Princeton, New Jersey, Princeton University Press, 224 p.

PORLEY R., HODGETTS N. & RICKERBY C., 2014 — St Kilda revisited: Bryophytes on the edge of the world. *Field bryology* 111: 8-22.

RAMS S., WERNER O. & ROS R.M., 2014 — Updated checklist of the Bryophytes from the Sierra Nevada Mountains (S of Spain). *Cryptogamie, Bryologie* 35 (3) (in press).

ROS R.M., MAZIMPAKA V., ABOU-SALAMA U., ALEFFI M., BLOCKEEL T.L., BRUGUÉS M., CANO M.J., CROS R.M., DIA M.G., DIRKSE G.M., EL-SAADAWI W., ERDAĞ A., GANEVA A., GONZÁLEZ-MANCEBO J.M., HERRNSTADT I., KHALIL K., KÜRSCHNER H., LANFRANCO E., LOSADA-LIMA A., REFAI M.S., RODRÍGUEZ-NUÑEZ S., SABOVLJEVIĆ M., SÉRGIO C., SHABBARA H., SIM-SIM M. & SÖDERSTRÖM L., 2007 — Hepatics and Anthocerotes of the Mediterranean, an annotated checklist. *Cryptogamie, Bryologie* 28 (4): 351-437.

ROS R.M., MAZIMPAKA V., ABOU-SALAMA U., ALEFFI M., BLOCKEEL T.L., BRUGUÉS M., CROS R.M., DIA M.G., DIRKSE G.M., DRAPER I., EL-SAADAWI W., ERDAĞ A., GANEVA A., GABRIEL R., GONZÁLEZ-MANCEBO J.M., GRANGER C., HERRNSTADT I., HUGONNOT V., KHALIL K., KÜRSCHNER H., LOSADA-LIMA A., LUÍS L., MIFSUD S., PRIVITERA M., PUGLISI M., SABOVLJEVIĆ M., SÉRGIO C., SHABBARA H.M., SIM-SIM M., SOTIAUX A., TACCHI R., VANDERPOORTEN A. & WERNER O., 2013 — Mosses of the Mediterranean, an annotated checklist. *Cryptogamie, Bryologie* 34 (2): 99-283.

SABOVLJEVIĆ M. & NATCHEVA R., 2006 — Check-list of the liverworts and hornworts of Southeast Europe. *Phytologia Balcanica* 12 (2): 169-180.

SCHNYDER N., BERGAMINI A., HOFMANN H., MÜLLER N., SCHUBIGER-BOSSARD C. & URMI E., 2004 — *Lista rossa delle briofite minacciate in Svizzera*. Ed. UFAFP, FUB & NISM. Berna, Collana dell'UFAFP: Ambiente-Esecuzione, 101 p.

SMITH A.J.E., 2004 — *The moss flora of Britain and Ireland*. 2nd edition. Cambridge, Cambridge University Press.

SÖDERSTRÖM L., URMI E. & VÁŇA J., 2007 — The distribution of Hepaticae and Anthocerotae in Europe and Macaronesia – Update 1-427. *Cryptogamie, Bryologie* 28 (4): 299-350.

SPITALE D., PETRAGLIA A. & TOMASELLI M., 2009 — Structural equation model detects unexpected differences between bryophyte and vascular plant richness along multiple environmental gradients. *Journal of biogeography* 36: 745-755.

ŞTEFĂNUŢ S. & GOIA I., 2012 — Checklist and Red List of Bryophytes of Romania. *Nova Hedwigia* 95 (1-2): 59-104.

TOMASELLI M., 1991 — The snow-bed vegetation in the Northern Apennines. *Vegetatio* 94: 177-189.

TOMASELLI M., SPITALE D. & PETRAGLIA A., 2011 — Phytosociological and ecological study of springs in Trentino (south-eastern Alps, Italy). *Journal of limnology* 70: 25-53.