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# Three new epilithic Xanthoria species from the southwestern Baltic Sea region

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## Abstract

Three species new to science in the genus *Xanthoria* (Teloschistaceae), X. pedersenii, X. pylyporlykii and X. wennergrenii, from the southwestern Baltic Sea region are presented and compared with related species.

## Introduction

*Xanthoria* (Teloschistaceae) is a genus of lichenized fungi with a worldwide



distribution. Before the molecular era, the genus included c. 50 species (Kärnefelt, 1989), but today only 13 species remain in *Xanthoria* in the strict sense (Kondratyuk et al., 2022a). Three or four species of this genus were hitherto reported from the southwestern Baltic Sea region.

## Material & Methods

A method of collecting epilithic lichens thalli without damaging the rock surface with water spray pretreatment was developed. Approximately 2500 specimens were collected at 110 localities (Fig. 1–3). At least 50 ascospores outside of apothecium sections in separate specimens were measured. Conclusions about new species were based on correlation of morphological, anatomical and molecular (nrITS phylogeny) data. The specimens were studied and determined microscopically at the unit of Molecular Cell Biology, Department of Biology, Lund University.



	4/	WI 1928552 Aanthoria polessica BELARUS	
		AM697845 Xanthoria parietina USA Oregon	
		AM697841 Xanthoria narietina SPAIN Canary Islands	
57	100_57	AM697848 Xanthoria parietina SWITZERLAND Zurich	parietina
53		AM697847 Xanthoria parietina SPAIN Madrid	punctina
	25 _	AM697842 Xanthoria parietina USA Fallmonth	
		AM607939 Vantharia parietina USA Failmontii AM607939 Vantharia parietina USA Massaahusatta	
		AM697838 Xanthoria parietina USA Massachusetts	•
		whole genome Xanthoria steineri ISRAEL Negev	steineri
		AJ320142 Xanthoria steineri** CYPRUS Paphos	
		M12 Xanthoria ibizaensis SPAIN Balearic Islands holotype(2)	ibizaensis
75	00	M12 Xanthoria ibizaensis SPAIN Balearic Islands holotype	
	55	AM292818 Xanthoria monofoliosa SPAIN Canary Islands	
	70	AJ320147 Xanthoria monofoliosa ITALY Sicily	
	/ U	AM292842 Xanthoria monofoliosa SPAIN Mallorca	monofoliosa
		EU681294 Xanthoria monofoliosa SOUTH AFRICA	monojonosu
	38 95	AM697817 Xanthoria monofoliosa** SOUTH AFRICA	
		AM408410 Xanthoria mediterranea FRANCE Bretagne	
		AJ320140 Xanthoria cf mediterranea** GREECE SH85	mediterranea
	100 75		
		MZ196456 Xanthoria tendraensis UKRAINE Kherson oblast	tendraensis
	<b>52</b>	MZ303030 Xanthoria tendraensis UKRAINE Kherson oblast	<i>lenui uensis</i>
		MZ196457 Xanthoria tendraensis UKRAINE Kherson oblast	
n	38	AJ320134 Xanthoria cf mediterranea*** Italy Sicily	
	97	AJ292822 Xanthoria cf mediterranea*** TUNISIA Karthago	
	64	AM292822 Xanthoria cf mediterranea***	
		LD-M76 Xanthoria pedersenii DENMARK Gorlose	
	52	LD-M58 Xanthoria pedersenii DENMARK Gorlose LD-M63 Xanthoria pedersenii DENMARK Gorlose	pedersenii
	94	LD-M63 Xanthoria pedersenii DENMARK Gorlose	peuersenn
		LD-M60 Xanthoria pedersenii DENMARK Soborg holotype	
	87 62	LD-M67 Xanthoria pedersenii SWEDEN Ramlosa	
		LD-M65 Xanthoria wennergrenii DENMARK Bornholm Nyker	
	23 01	LD-MOS Aanthoria wennergrenn DENMARK Dormholm Nyker	
		LD-M86 Xanthoria wennergrenii DENMARK Bornholm Nyker	wennergrenii
	66	LD-M83 Xanthoria wennergrenii SWEDEN Bromma	C
		whole genome Xanthoria aureola SPAIN Catalunya	
	100	whole genome Xanthoria mediterranea ISRAEL Negev	
77		LD-M84 Xanthoria aff. aureola 1 DENMARK Bornholm Gorlos	e aff <i>aureola</i>
	94	AJ320152 Xanthoria calcicola SWITZERLAND Lausanne	
	75 7 97	EU681295 Xanthoria calcicola UK FNM-088	
2	27	AJ320130 Xanthoria calcicola*** FRANCE Brittany	calcicola
		AJ320150 Xanthoria calcicola UK Hampshire	Culcicolu
	76-	ON437600 Xanthoria cf aureola* UK Hever	aunoola
		JQ301690 Xanthoria aureola SWEDEN	aureola
		AM292821 Xanthoria aff. ectaneoides*** FRANCE Bretagne	
	67		00
	68	AJJ20147 Adminutia and estangaidae*** IIV Communall	aff ectaneoides
	21	AUSENIUS Aanthoria ani, cetaneolues – OK Cornwan	
	25	AJ320131 Xanthoria aff. ectaneoides*** FRANCE Brittany	
	22	AM408403 Xanthoria aff. ectaneoides*** FRANCE Bretagne	



Fig. 1. Investigated sites with epilithic Xanthoria species in the southwestern Baltic Sea region



Fig. 2. Investigated site: Tofta church, Skåne, Sweden. 02.04.2023



Fig. 3. Tiles of cemetery wall with Xanthoria pylyporlykii. Tofta church, Skåne, Sweden.

## Results & Discussion

Molecular data for specimens of *Xanthoria ectaneoides*, identical with Nylander's type specimen, is presented. The species is positioned in a separate subclade – not in the *Xanthoria calcicola* subclade (Fig. 4). Xanthoria aureola and X. calcicola are found to be rather rare species in the investigated region, while X. ectaneoides and X. pylyporlykii are more common. Three species new to science, Xanthoria pedersenii, X. pylyporlykii and X. wennergrenii are described and illustrated.



- <sup>32</sup> EU681299 Xanthoria aff. ectaneoides\*\*\* UK FNM-087 whole genome Xanthoria sp 1
  AF101284 Martinjahnsia resendei SPAIN BCC-Lich 13176
  EU639641 Martinjahnsia resendei SPAIN
- AF101285 Martinjahnsia resendei SPAIN BCC-Lich 13259 88 AF101283 Martinjahnsia resendei SPAIN BCC-Lich 13175

Fig. 4. Consensus MP tree based on nrITS of the members of the genus Xanthoria \*data are submitted to GenBank as Xanthoria parietina, \*\*as Xanthoria sp., and \*\*\*as Xanthoria ectaneoides.

Xanthoria pylyporlykii S.Y.Kondr., Kärnefelt & A.Thell in Kondratyuk et al. (2024a) (Fig. 6). The species is similar to Xanthoria ectaneoides, but differs in having wider thalline lobes, well-developed overlapping and irregularly orientated in the centre of the thallus, shorter ascospores and narrower ascospore septa.

Etymology: It is named after Pylyp Orlyk (21 Oct 1672–26 May 1742), in-exile Hetman of Ukraine and the author of the Constitution of Pylyp Orlyk (the first constitution of Ukraine). In 1716–1719 Pylyp Orlyk lived in Kristianstad with his family after an official invitation from the Swedish king Karl XII. The Latin-language original of the Constitution of Pylyp Orlyk with his signature is kept in the National Archives of Sweden.

Xanthoria wennergrenii (ined. Kondratyuk et al. 2024b) (Fig. 7). The species is similar to Xanthoria calcicola, but differs in having smaller thalline lobes, well developed in the peripheral zone only, pustule-like isidia and a bulky centre of the thallus, longer ascospores and wider septa.

Etymology: The new species is named after **Axel Wenner-Gren** (originally Wennergren, 5 June 1881 – 24 November 1961), a Swedish industrialist and philanthropist, who established foundations to support research including the fellowship received by the first author for this taxonomic revision of the Xanthoria

Xanthoria pedersenii (ined. Kondratyuk et al. 2024b) (Fig. 5). This species is similar to Xanthoria calcicola, but differs in having thin, paper-like thalline lobes, in having smaller knob-like warts, which may resemble coarse isidia, which never fall off, in having much narrower ascospores and much wider range of variation of ascospore septa, and in having slightly shorter but wider conidia.

Etymology: This species is named after **Christiern Pedersen** (*ca* 1480–16 January 1554), a Danish canon, humanist, writer, printer and publisher, who is best known for the new edition of Saxo's chronicle which thus saved the early Danish history for posterity and the translation of the Bible into Danish, known as 'Christian III's Bible'. His role in Denmark can be compared with the humanist and theologian Erasmus Rotterdam in the Netherlands.

calcicola group.

### References

Kondratyuk et al. (2024a) Acta Botanica Hungarica 66(1–2): 47–77. Kondratyuk et al. (2024b) Acta Botanica Hungarica 66(3–4): (accepted).

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