Dispersal patterns of meiospores shape population spatial structure of saxicolous lichens

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Supplementary material

Table S1. Polar-diblastic spores sampled in the atmosphere of the Castle of Graines and relationships with rainfall events (Year 1: n=35; Year 2: n=134).

S1A-B: Size features of polar-diblastic spores sampled in the atmosphere of the Castle of Graines and assignment to species of Teloschistaceae (*Caloplaca*, *Xanthoria*). Rainfall events closest to the sampling times are reported: rainfall amount (mm), rainfall duration (hrs-a) and time since the end of rainfall event to the beginning of the sampling period during which the spores were detected (hrs-b; 0.0 indicate that the rainfall event was still in act in the 6-hrs period during which the spore was collected). Only eight out of the 169 spores were collected in 6-hrs periods which were not preceded by a rainfall event in the last 24 hrs, data obtained in the second year of mycoaerosol monitoring confirming the positive relationship between the detection of Teloschistaceae spores and rainfall-events statistically characterized during the first year (see Favero-Longo *et al*. 2014).

S1A -Year 1

Spore	Sp. size (µm): l. x w. – septum w.	Assigned species	Sampling day (hours)	Rainfall closest event (mm / hrs / time since)
1	11.2 x 5.0 – 0.8	*C. saxicola* or *X. elegans*	Jul-D2 (18-24)	4.4 / 2.0 / 7.3
2	10.0 x 6.0 – 1.0	*C. saxicola* or *X. elegans*	Jul-D2 (18-24)	4.4 / 2.0 / 7.3
3	11.0 x 5.3 – 1.0	*C. saxicola* or *X. elegans*	Jul-D2 (18-24)	4.4 / 2.0 / 7.3
4	15.7 x 4.5 – 2.0	*C. rubroaurantiaca*	Jul-D2 (18-24)	4.4 / 2.0 / 7.3
5	11.5 x 4.0 – 1.5	*C. rubroaurantiaca*	Jul-D2 (18-24)	4.4 / 2.0 / 7.3
6	12.0 x 4.0 – 1.3	*C. rubroaurantiaca*	Jul-D2 (18-24)	4.4 / 2.0 / 7.3
7	10.0 x 5.0 – 2.0	*C. crenulatella*	Jul-D2 (18-24)	4.4 / 2.0 / 7.3
8	10.0 x 5.0 – 2.1	*C. crenulatella*	Jul-D2 (18-24)	4.4 / 2.0 / 7.3
9	11.0 x 6.0 – 2.5	*C. crenulatella*	Jul-D2 (18-24)	4.4 / 2.0 / 7.3
10	10.0 x 5.0 – 2.5	*C. crenulatella*	Aug-D1 (18-24)	15.6 / 1.1/ 111.0
11	10.0 x 5.0 – 3.0	*C. crenulatella*	Aug-D1 (18-24)	15.6 / 1.1/ 111.0
12	10.0 x 3.5 – 2.0	*C. rubroaurantiaca*	Aug-D1 (18-24)	15.6 / 1.1/ 111.0
13	10.0 x 5.0 – 3.0	*C. crenulatella*	Aug-D4 (18-24)	10.6 / 3.2 / 0.0
14	10.0 x 5.0 – 0.5	*C. saxicola* or *X. elegans*	Aug-D6 (0-6)	30.8 / 26.0 / 0.0
15	12.5 x 5.0 – 2.5	*C. crenulatella*	Aug-D6 (6-12)	30.8 / 26.0 / 3.3
16	10.0 x 3.0 – 1.2	*C. rubroaurantiaca*	Aug-D6 (6-12)	30.8 / 26.0 / 3.3
17	10.0 x 3.0 – 1.2	*C. rubroaurantiaca*	Aug-D6 (6-12)	30.8 / 26.0 / 3.3
18	10.0 x 3.0 – 1.2	*C. rubroaurantiaca*	Aug-D6 (6-12)	30.8 / 26.0 / 3.3
19	12.0 x 4.5 – 1.5	*C. rubroaurantiaca*	Oct-D2 (12-18)	3.0 / 6.0 / 0.3
20	12.0 x 5.0 – 1.5	*C. rubroaurantiaca*	Oct-D2 (12-18)	3.0 / 6.0 / 0.3
21	11.0 x 4.0 – 1.5	*C. rubroaurantiaca*	Oct-D2 (12-18)	3.0 / 6.0 / 0.3
22	12.0 x 4.0 – 1.1	*C. rubroaurantiaca*	Oct-D2 (12-18)	3.0 / 6.0 / 0.3
23	12.0 x 4.0 – 1.5	*C. rubroaurantiaca*	Oct-D2 (12-18)	3.0 / 6.0 / 0.3
24	10.5 x 3.5 – 1.7	*C. rubroaurantiaca*	Oct-D2 (12-18)	3.0 / 6.0 / 0.3
25	11.0 x 3.0 – 2.0	*C. rubroaurantiaca*	Oct-D2 (12-18)	3.0 / 6.0 / 0.3
25	12.0 x 4.5 – 1.5	*C. rubroaurantiaca*	Oct-D2 (12-18)	3.0 / 6.0 / 0.3
27	12.0 x 7.0 – 4.0	*C. crenularia*	Oct-D2 (12-18)	3.0 / 6.0 / 0.3
28	13.3 x 6.5 – 5.0	*C. crenularia*	Feb-D6 (0-6)	3.4 / 5.0 / 0.0
29	12.0 x 8.0 – 4.5	*C. crenularia*	Feb-D6 (0-6)	3.4 / 5.0 / 0.0
30	12.8 x 8 – 1.5	*C. saxicola* or *X. elegans*	Feb-D6 (0-6)	3.4 / 5.0 / 0.0
31	12.0 x 8.5 – 1.0	*C. saxicola* or *X. elegans*	Feb-D6 (0-6)	3.4 / 5.0 / 0.0
32	11.0 x 8.0 – 1.5	*C. saxicola* or *X. elegans*	Feb-D6 (0-6)	3.4 / 5.0 / 0.0
33	12.0 x 8.0 – 1.5	*C. saxicola* or *X. elegans*	Feb-D6 (0-6)	3.4 / 5.0 / 0.0
34	12.0 x 7.5 – 1.8	*C. saxicola* or *X. elegans*	Feb-D6 (0-6)	3.4 / 5.0 / 0.0
35	12.0 x 8.0 – n.d.	*C. saxicola* or *X. elegans*	Feb-D6 (0-6)	3.4 / 5.0 / 0.0

S1B - Year 2

Spore	Sp. size (µm): l. x w. – septum w.	Assigned species	Sampling day (hours)	Rainfall closest event (mm / hrs / time since)
1	16.5 x 6.5 – 2.3	*C. crenulatella*	Aug-D2 (18-24)	6.8 / 3.6 / 69.6
2	18.0 x 6.5 – 2.0	*C. crenulatella*	Aug-D2 (18-24)	6.8 / 3.6 / 69.6
3	16.6 x 6.5 – 1.8	*C. crenulatella*	Aug-D2 (18-24)	6.8 / 3.6 / 69.6
4	16.6 x 6.5 – 2.0	*C. crenulatella*	Aug-D2 (18-24)	6.8 / 3.6 / 69.6
5	10.0 x 4.5 – 1.8	*C. saxicola* or *X. elegans*	Aug-D2 (18-24)	6.8 / 3.6 / 69.6
6	9.5 x 4.5 – 2.5	*C. saxicola* or *X. elegans*	Aug-D3 (0-6)	6.8 / 3.6 / 75.6
7	9.0 x 4.0 – 1.0	*C. saxicola* or *X. elegans*	Aug-D3 (0-6)	6.8 / 3.6 / 75.6
8	18.0 x 7.2 – 2.0	*C. crenulatella*	Aug-D3 (6-12)	6.8 / 3.6 / 81.6
9	14.0 x 8.5 – 2.5	*C. crenulatella*	Aug-D3 (12-18)	6.8 / 3.6 / 87.6
10-16	11.0 x 6.8 – 3.6/4.6	*C. crenularia*	Aug-D5 (6-12)	11.4 / 6.0 / 16.0
17-27	10.0 x 5.5 – 3.8/4.0	*C. crenularia*	Aug-D5 (6-12)	11.4 / 6.0 / 16.0
28-35	10.0 x 5.5 – 1.0/1.2	*C. saxicola* or *X. elegans*	Aug-D5 (6-12)	11.4 / 6.0 / 16.0
36-42	10.8 x 5.4 – 4.5/5.4	*C. crenularia*	Aug-D5 (6-12)	11.4 / 6.0 / 16.0
43	13.5 x 5.0 – 2.3	*C. crenulatella*	Aug-D5 (18-24)	11.4 / 6.0 / 22.0
44	11.0 x 3.5 – 0.7	*C. rubroaurantiaca*	Aug-D5 (6-12)	11.4 / 6.0 / 16.0
45	11.0 x 6.7 – 4.1	*C. crenularia*	Aug-D5 (18-24)	11.4 / 6.0 / 22.0
46-47	13.5 x 5.0 – 2.7	*C. crenulatella*	Aug-D5 (6-12)	11.4 / 6.0 / 16.0
48-53	11.5 x 4.8/5.4 – 4.1	*C. crenularia*	Aug-D5 (12-18)	11.4 / 6.0 / 22.0
54	11.2 x 6.8 – 1.3	*C. saxicola* or *X. elegans*	Aug-D5 (6-12)	11.4 / 6.0 / 16.0
55-56	11.2 x 6.8 – 2.0	*C. saxicola* or *X. elegans*	Aug-D5 (6-12)	11.4 / 6.0 / 16.0
57-58	13.5 x 5.8 – 2.0	*C. crenulatella*	Aug-D6 (6-12)	11.4 / 6.0 / 16.0
59-66	12.0 x 6.3 – 3.8/4.0	*C. crenularia*	Sep-D3 (0-6)	10.8 / 12.3 / 0.0
67-74	11.2 x 5.0 – 3.8	*C. crenularia*	Sep-D6 (6-12)	13.2 / 20.6 / 0.0
75-82	13.5/16.2 x 5.0/6.6 – 1.6/2.1	*C. crenulatella*	Sep-D6 (12-18)	19.2 / 26.6 / 0.0
83-84	11.8 x 5.9 – 3.8	*C. crenularia*	Sep-D6 (6-12)	13.2 / 20.6 / 0.0
85-86	12.0 x 5.0 – 2.2	*C. saxicola* or *X. elegans*	Sep-D6 (6-12)	13.2 / 20.6 / 0.0
87-88	12.0 x 6.0 – 1.8	*C. saxicola* or *X. elegans*	Sep-D6 (6-12)	13.2 / 20.6 / 0.0
89	12.0 x 7.0 – 2.0	*C. saxicola* or *X. elegans*	Sep-D6 (6-12)	13.2 / 20.6 / 0.0
90-91	11.3 x 7.6 – 2.6	*C. saxicola* or *X. elegans*	Mar-D6 (12-18)	5.4 / 3.5 / 0.0
92	10.4 x 5.0 – 2.1	*C. saxicola* or *X. elegans*	Mar-D6 (12-18)	5.4 / 3.5 / 0.0
93-99	12.1 x 6.1 – 4.1	*C. crenularia*	Apr-D4 (6-12)	7.4 / 22.6 / 0.0
100-106	11.8 x 7.2 – 3.9	*C. crenularia*	Apr-D4 (18-24)	33.8 / 34.6 / 0.0
107	11.8 x 7.2 – 4.0	*C. crenularia*	Apr-D4 (0-6)	6.4 / 16.6 / 0.0
108-115	13.5x5.5 – 2.5	*C. crenulatella*	Apr-D5 (12-18)	6.8 / 2.6 / 0.0
116	10.8 x 5.4 – 2.5	*C. saxicola* or *X. elegans*	Apr-D5 (18-24)	13.2 / 8.6 / 0.0
117-118	10.8 x 7.7 – 4.1	*C. crenularia*	Apr-D5 (0-6)	34.6 / 40.6 / 0.0
119-124	10.1 x 6.3 – 1.3	*C. saxicola* or *X. elegans*	Apr-D6 (0-6)	17.4 / 12.6 / 0.0
125-130	13.5 x 6.7 – 5.4	*C. crenularia*	Apr-D7 (18-24)	14.8 / 14.5 / 3.6
131-134	10.6 x 5.9 – 1.9	*C. saxicola* or *X. elegans*	May-D3 (0-6)	19.8 / 12.0 / 0.0

S1C-D - Spearman's rank (C) and Pearson's (D) correlation coefficients between reports of polar diblastic spores (Tel.) and meteorological parameters (T, air temperature; RH, relative humidity; RG, rainfall during the sampling period; RD, rainfall in the previous 24 h; PAR, photosynthetic active radiation). The analyses showed the highest correlation of spore readings with rainfall of the previous 24 h (P<0.001).

(C)	Tel.	T	RH	PAR	RG	RD
Tel.	1					
T	-	1				
RH	**0.188**	-0.111	1			
PAR	-	**0.503**	**-0.193**	1		
RG	**0.213**	-	**0.495**	-	1	
RD	**0.247**	-0.122	**0.455**	-	**0.478**	1

(D)	Tel.	T	RH	PAR	RG	RD
Tel.	1.000					
T	-	1.000				
RH	-	-0.141	1.000			
PAR	-	**0.544**	**-0.254**	1.000		
RG	-	-	**0.348**	-0.101	1.000	
RD	**0.228**	-	**0.394**	-	**0.343**	1.000

Bold: P < 0.001; underlined: P < 0.01; normal: P < 0.05; - : non-significant.

Fig. S1. Study site. A, southern view of the Castle of Graines, where remote observations on lichen colonization were conducted from a temporary scaffolding (E2). B, rock outcrops in the courtyard with dominant lichen (O4) or bryophyte cover (O5). C, trampled rock outcrop (O1) in the proximity of the donjon. D, north-facing inner side of the wall, with rich lichen colonization (T2, T3). E, south-facing wall of the donjon, with rich plant colonization (S5). F, south-facing wall of the chapel, with no lichen colonization (S4).