Supplementary Material to

Palaeoenvironmental response of mid-latitudinal wetlands to PETM climate change (Schöningen lignite deposits, Germany)

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SI1 Lithologic description of sampled sections

Detailed descriptions of sections "Schö IX", "Schö V", and Schö VI".

Abbreviations for lignite lithotypes:

Makropetrographic lithotype classification adapted from Vogt (1981)

ML = matrix dominated lithotype

TL = tissue dominated lithotype

TML = mixed tissue/matrix lithotype

Section/horizon   Description

Schö VI/24	Dark, more or less clayey silt with layers of dark sand including partially pyritized charcoal fragments; individual layers with foraminifera?, plant remains present and partially pyritized, common slickensides.
Schö VI/23	White to medium grey sand, more clayey, darker and fining upward, almost pure sand at base; locally intensely bioturbated, fine internal bedding with small light colored lenses of sand.

Top Seam 2

Schö VI/22	Medium brown TML, charcoal lenses at base, light colored xylites increasingly common toward top, projecting into overlying sediments at top.
Schö VI/21	As bed 19, but more massive, less finely dispersed charcoal, less rooting, fewer silt pockets, no fern axes.
Schö VI/20	As bed 19, but not bedded, no fern axes.
Schö VI/19	Medium brown TML, intensely rooted with redbrown root traces, distinctly bedded, small charcoal fragments on bedding plains, light colored tissue common, scattered pockets of silt and pyrite, some xylites, possibly fern axes.
Schö VI/18	Medium light colored to brown TML with numerous tissue remains: light colored tissue and charcoal, scattered charcoal lenses in lower and upper part, missing in middle; in upper part strikingly light colored xylites.
Schö VI/17	Dark to medium brown ML with individual layers of tissues, fine rooting, at base 1 to 2cm thick layer finely bedded by charcoal particles (reworked from bed 16).
Schö VI/16	Somewhat degraded medium brown TL with numerous charcoal fragments and particles and small plant remains, bed bounded at base and top by 1 to 2cm thick xylites charred on lower side; laterally changing thickness.
Schö VI/15	Medium brown TML with some gellified tissues and xylite fragments, charcoal also concentrated in lenses, numerous light brown tree stumps not horizontally aligned, large xylites, irregular bedding, but no banding as in lower part of the seam. Resin particles present.
Schö VI/14	Friable charcoal layer.
Schö VI/13	As bed 12, but somewhat darker, root traces more frequent and mostly gellified.
Schö VI/12	Light colored ML with light colored tissues, scattered xylites and common root traces, fine bedding indicated, rare charcoal.
Schö VI/11	Medium light colored TML with light colored tissues as in bed 9, no notable rooting, common charcoal layers.
Schö VI/10	Light colored ML with more or less gellified root traces, scattered charcoal and gellified tissues, 2cm thick charcoal layer on top.

Schö VI/9	Medium light colored TML with numerous light colored tissue, partly in lenses, partly randomly distributed and finely fractured; fine dark root traces diagonally and horizontally to bedding, upward increasing in number, no gellified root branches, no resin, scattered charcoal lenses.
Schö VI/8	Dark TML, well bedded, with gellified and charred tissue on bedding planes, charcoal layers mainly in upper part.
Schö VI/7	Light colored ML with numerous light colored tissue remains and in part large resin grains concentrated in layers; dark layer with partially charred xylites in middle, thick gellified root traces in upper part.
Schö VI/6	Light colored ML with gellified tissues and resin particles, strikingly light colored in weathered section, laterally with horizontally embedded xylites.
Schö VI/5	Dark TML with numerous xylites and light colored tissues, reddish in fresh cut, internal fine bedding, blocky fracture, resin particles and gellified root cross sections.
Schö VI/4	Medium light ML with gellified and light colored tissue remains, several robust gellified root traces, resin particles in upper part.
Schö VI/3	Dark TML with numerous gellified tissues and partly not gellified xylites, somewhat clayey?

Base Seam 2

Schö VI/2	Transition to Seam 2; dark silty clay with numerous gellified root traces and plant remains, slickensides, scattered xylites, small resinous plant remains common (conifer twigs?).
Schö V/34	Dark greyish brown silty clay, permeated by broad coaly root traces increasing upward in number; no bedding, frequent slickensides, pyrite in small concretions; scattered plant remains and detritus.
Schö V/33	Dark brown clayey silt to silty clay, with scattered silt layers, plant detritus, coaly pebbles, coaly root traces; in upper part also layers with fine bedding, common resin particles.
Schö V/32	Dark silty clay, homogeneous, with rare silt laminae, scattered small coaly lenses and fine vertical coaly root traces.
Schö V/31	Dark clayey silt with laminae of light colored silt and fine sand, pyrite?, foraminifera?
Schö V/30	Dark silty clay with laminae and lenses of light colored fine sand, low angle cross-bedding, vertical bioturbation tubes, in part pyritized.
Schö V/29	Light colored to white fine sand to medium? Sand, locally cross-bedded.
Schö V/28	Dark grey (black when fresh) silty clay with silt laminae, irregular contact with underlying and overlying.
Schö V/27	Light colored fine sand with clayey layers, wavy-flasered bedding marked by dark clay laminae, clay fraction very dark to black (carbonaceous?), thin vertical bioturbation tubes, rare cup-shaped depressions.
Schö V/26	Light colored fine sand, distinct cross-bedding marked by clayey layers and laminae, cup-shaped bioturbation imprints (?) common and scattered bioturbation tubes (Ø 1 to 2cm).
Schö V/25	Light colored to white fine sand, slightly coarsening upward, two layers near base and middle with flaser- and cross-bedding indicated by clay drapes and laminae. Sand with horizontal and fine vertical bioturbation tubes, rather frequent in upper part, in lower part cup-shaped depressions up to 2cm in diameter (bioturbation?).
Schö V /24	Dark greyish brown silty clay with laminae of silt and fine sand in lower part, in upper part more massive, no bioturbation; irregular base.
Schö V/23	As bed 21. 4-5cm thick dark clay layer in middle, proportion of fine sand increasing upward.
Schö V/22	As bed 20.

Schö V/21   Light colored fine sand in irregular lenses and layers partly with distinct cross-bedding, some clay layers and scattered fine bioturbation.

Schö V/20   Dark silty clay with numerous lenses and laminae of fine sand partly with cross-bedding, fine bioturbation.

Schö V/19   Fivefold alternation of dark silty clay and laminae of light colored fine sand, in part with cross-bedding, layers of fine sand regularly cross-bedded; lower half mixture of sand and clay layers, charcoal and plant detritus in upper sand layer.

Schö V/18   Laminae and lenses of light colored fine sand with distinct cross-bedding, channels with clay laminae and layers, bioturbation in clayey layers.

Schö V/17   Dark silty clay with laminae and lenses of fine sand, more common upward, there in part with bimodal cross-bedding.

Schö V/16   As bed 14; not as hard, slightly more clayey, somewhat bedded by laminae of silt and fine sand, locally fine bedding; foraminifera present.

Schö V/15   As bed 13; laminae of silt and fine sand more frequent.

Schö V/14   Dark grey clayey silt, no recognizable bedding, homogeneous, fracturing irregularly, hard; scattered fine bioturbation tubes, irregular boundary at top.

Schö V/13   Dark brown clayey silt with light colored laminae and lenses of silt and fine sand, in layers finely bedded with cross-bedding, thin bioturbation tubes.

Schö V/12   Dark grey highly clayey silt, massive, with scattered silt laminae at some levels, completely homogeneous, concoidal fracture.

Schö V/11   Dark grey highly silty clay, homogeneous in appearance, but with few distinct light coloured silt laminae, fine bioturbation tubes recognizable in silt laminae.

Schö V/10   Dark grey clayey silt with very fine laminae of light colored fine sand and silt, thin bioturbation tubes, distinct light/dark lamination.

Schö V/9   Dark silty clay, totally homogeneous, unstructured.

Schö V/8   Greyish brown silty clay with thick lenses and flasers of light colored silt and fine sand, frequently fine sand in bioturbation tubes.

Schö V/7   Brownish grey, highly silty clay with layers and lenses of light colored fine sand, internal fine bedding, pyrite concretions common.

Schö V/6   Medium to light grey, clayey silt with light colored flasers and lenses of fine sand and silt, some layers with charcoal.

Schö V/5   Dark greyish brown clayey silt, homogeneous in appearance, but internally finely laminated, lenticular pyrite concentrations, charcoal fragments, scattered sand flasers, light colored 0.5cm thick sandy layer at base.

Schö V/4   Medium grey silty clay, finely laminated, ostracod steinkerns on bedding planes, scattered charcoal fragments, 1cm in size.

Schö V/3   Medium grey silty clay with light yellowish laminae and flasers of silt to fine sand, locally bioturbation, scattered charcoal and fine root traces.

Top of Seam 1

Schö IX/58   Dark greyish brown TL to TML, well bedded, bedding planes covered with charcoal fragments, gellified tissues and clay drapes, bioturbation tubes and voids filled with kaolinite(?) increasingly common upward, pyrite clusters in upper part.

Schö IX/57   Dark brown TML to ML (in middle), internal fine bedding, charcoal concentrated on bedding planes, red root traces scattered, but common in middle; striate pyritized tubes in upper part.

Schö IX/56   Brown TML with light colored tissue concentrated in layers together with small gellified tissue fragments, dispersed charcoal, scattered resin and gellified tissue, few red root traces.

Schö IX/55   Reddish brown TML with red root traces, charcoal on bedding planes; light coloured tissue in upper part, at top distinct layer of charcoal, laterally replaced by xylite.

Schö IX/54   Reddish brown TML, reddish in fresh cut, few reddish root traces, some charcoal layers and lenses, numerous gellified tissue, scattered small pyrite clusters.

Schö IX/53   Medium brown TML to TL, reddish mottled, with numerous charcoal fragments dispersed and in layers; reddish root traces throughout, some small pyrite concretions, tissue remains partly gellified or pyritized; xylites concentrated near top, increasingly gellified and in part charred.

Schö IX/52   Medium brown tissue bearing ML, reddish in fresh cut, with fine gellified tissue fragments and isolated xylites, succession of charcoal layers and lenses, light colored tissue present, no pyrite; distinct internal bedding.

Schö IX/51   Dark mixed tissue/matrix lignite lithotype (TML) with numerous fine gellified tissue fragments, isolated xylites and few small pyrite concretions (Ø 1-2mm), partly within xylites, some resin and charcoal fragments, charcoal in part associated with xylites, distinct charcoal layer (about 1cm) at top.

Schö IX/50   Medium light colored reddish ML with some light colored tissue, xylites and resin occurring regularly, reddish root traces in upper part; top boundary transitional.

Schö IX/49   Dark ML, reddish in fresh cut, including layers with small tissue fragments and some xylites, small pyrite concretions common, also occurring within partially charred xylites; scattered charcoal at top.

Schö IX/48   Dark brown matrix dominated lignite lithotype (ML) with some gellified and light colored tissues; xylites common, distinct charcoal layer at top.

Base of Seam1

Schö IX/47   Medium to dark greyish brown clay with sand lenses, numerous root branches (tree stumps?), frequent slickensides.

Schö IX/46   Dark brown silty clay with intermittent laminae, lenses and layers of silt to fine sand, no bedding, some flat lying root branches.

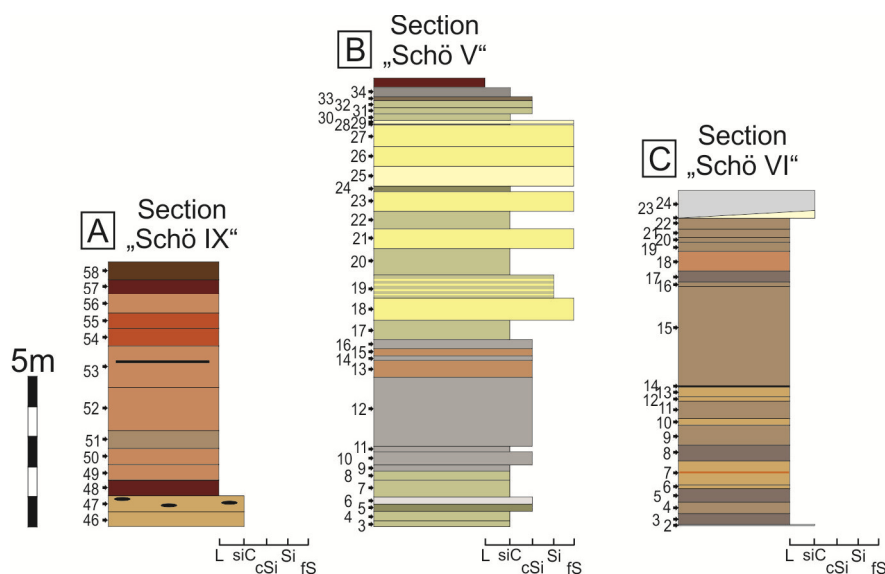



Fig. SI1 Lithological logs of the sections "Schö IX" (A), "Schö V" (B), and "Schö VI" (C). Grain size distribution is based on filed observations. Numbers indicate described horizons (see above).

SI2 Panels

Fig. SI2: Important pollen and spores of the Schöningen microflora. The scale bars represent 20 μm. Spores: **(a)** *Sphagnumsporites* sp. (Sphagnaceae, Seam 2, sample 17), **(b)** *Tripunctisporis* sp. (Sphagnaceae, Seam 2, sample 17), **(c)** *Laevigatosporites nutidus* (Polypodiaceae, Seam 2, sample 17). Pollen: **(d)** *Pompeckjoidaepollenites subhercynicus* (unknown botanical affinity, Seam 2, sample 17), **(e)** *Plicapollis pseudoexcelsus* (Juglandaceae?, Seam 2, sample 17), **(f)** *Triporopollenites robustus* (Corylaceae?, Seam 2, sample 17), **(g)**, **(h)** *Tricolpollenites liblarensis* (e.g., Fagaceae, Fabaceae, Combretaceae, (g) Seam 2, sample 17, (h) Seam 2, sample 17), **(i)**, **(j)**, **(k)** *Tricolporopollenites cingulum* (Fagaceae, (i) Seam 2, sample 17, (j) Seam 2, sample 17, (h) Seam 2, sample 17.)

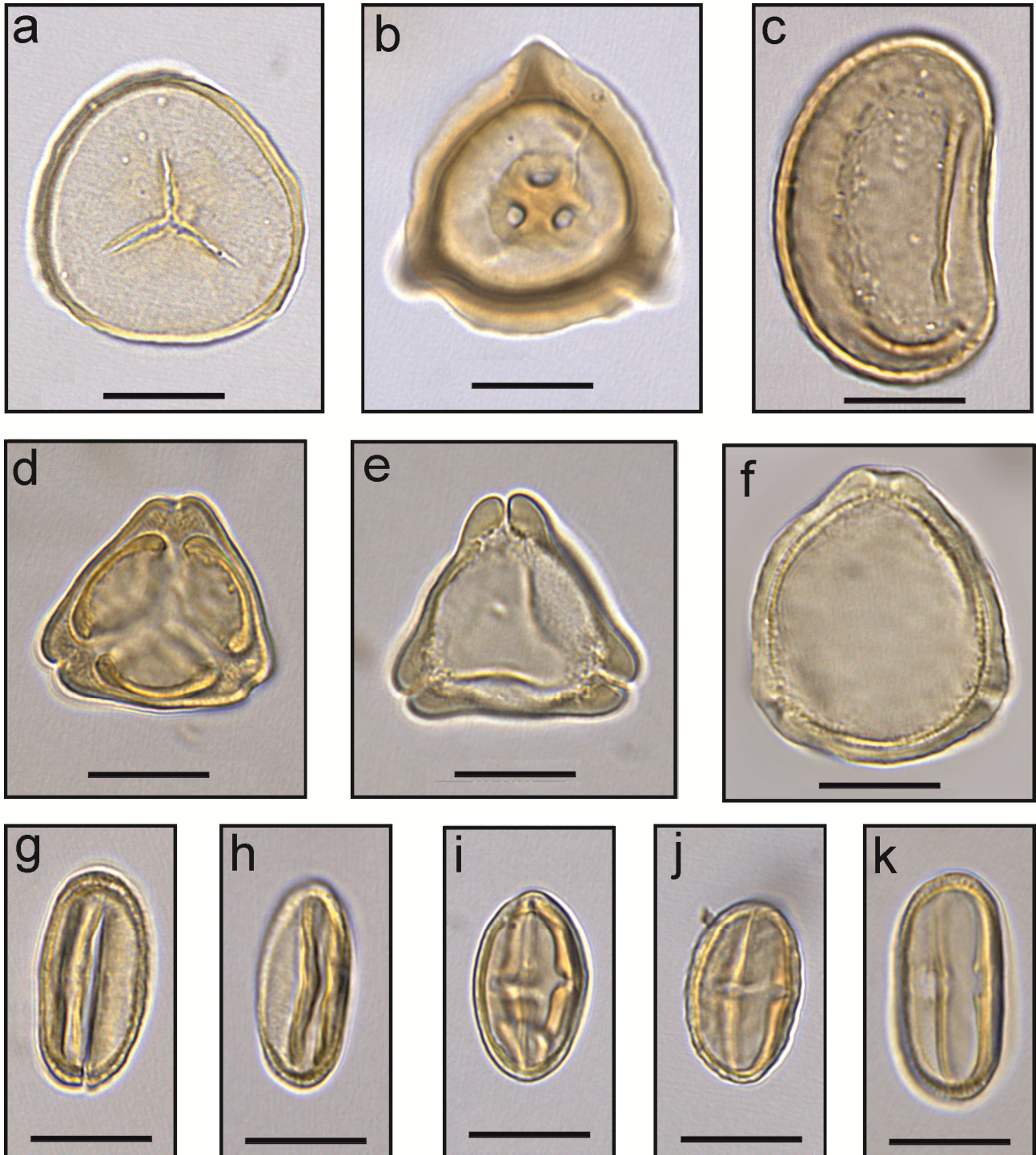



Fig. SI3: Important pollen and freshwater algae of the Schöningen microflora. The scale bars represent 20 μm. Pollen: **(a)** *Thomsonipollis magnificus* (unknown botanical affinity, Seam 2, sample 17), **(b)** *Pistipllipollenites mcgregorii* (Gentianaceae, Seam 2, sample 17), **(c)** *Inaperturopollenites* sp*.* (Cupressaceae, Seam 1, sample 1), **(d)** *Nyssapollenites contortus* (Nyssaceae, Seam 1, sample 1), **(e)** *Nyssapollenites pseudocruciatus* (Nyssaceae, Seam 2, sample 10); Freshwater algae: **(f)** *Botryococcus* cf. *braunii* (Chlorophyta, Seam 2, sample 1), **(g)** *Aleteverrucosispora* sp. (Zygnemataceae, *Debarya*-type, Seam 2, sample 1), **(h)** *Tetraporina* sp. (Zygnemataceae, *Mougeotia*-type, Seam 2, sample 2).

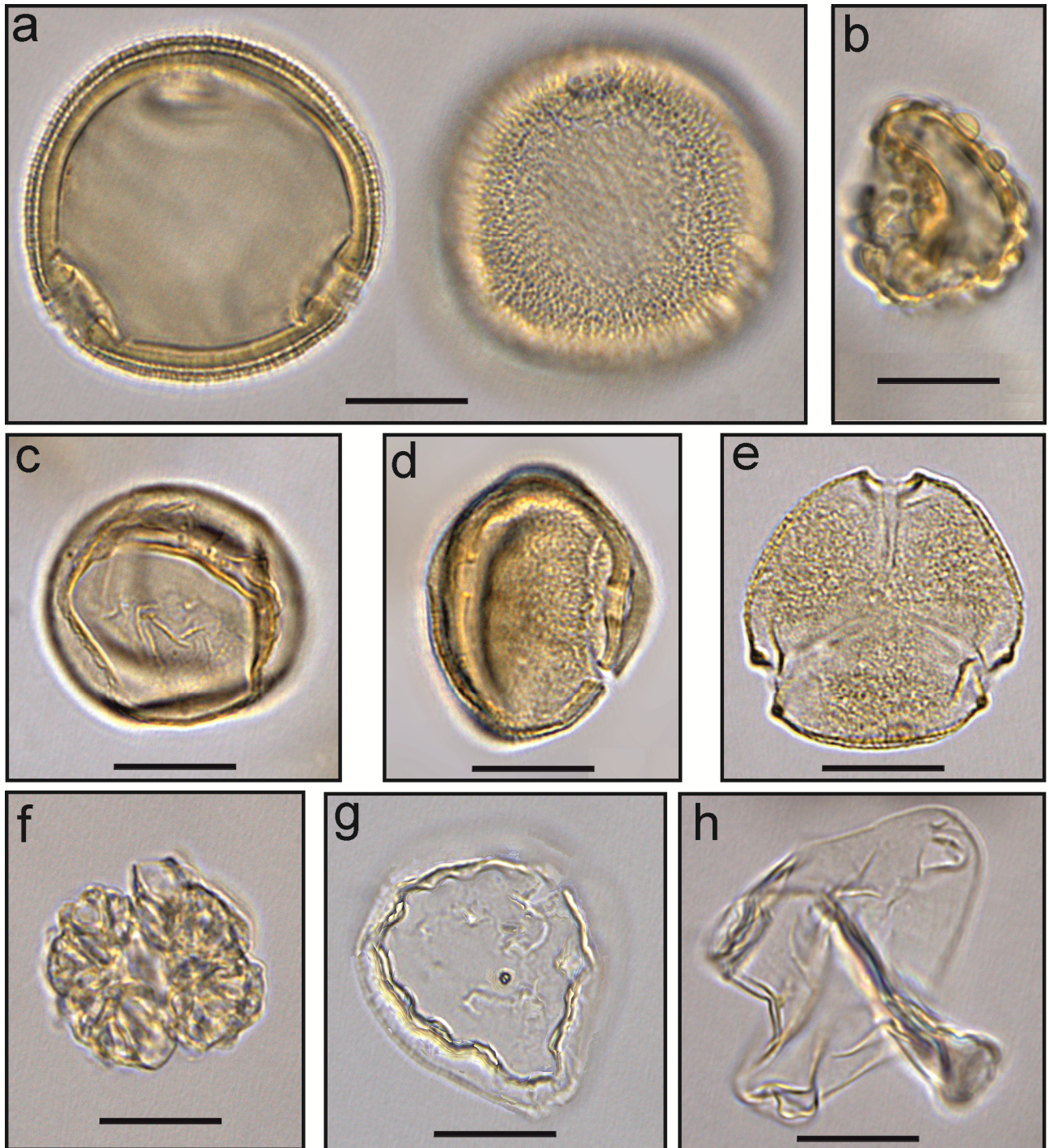
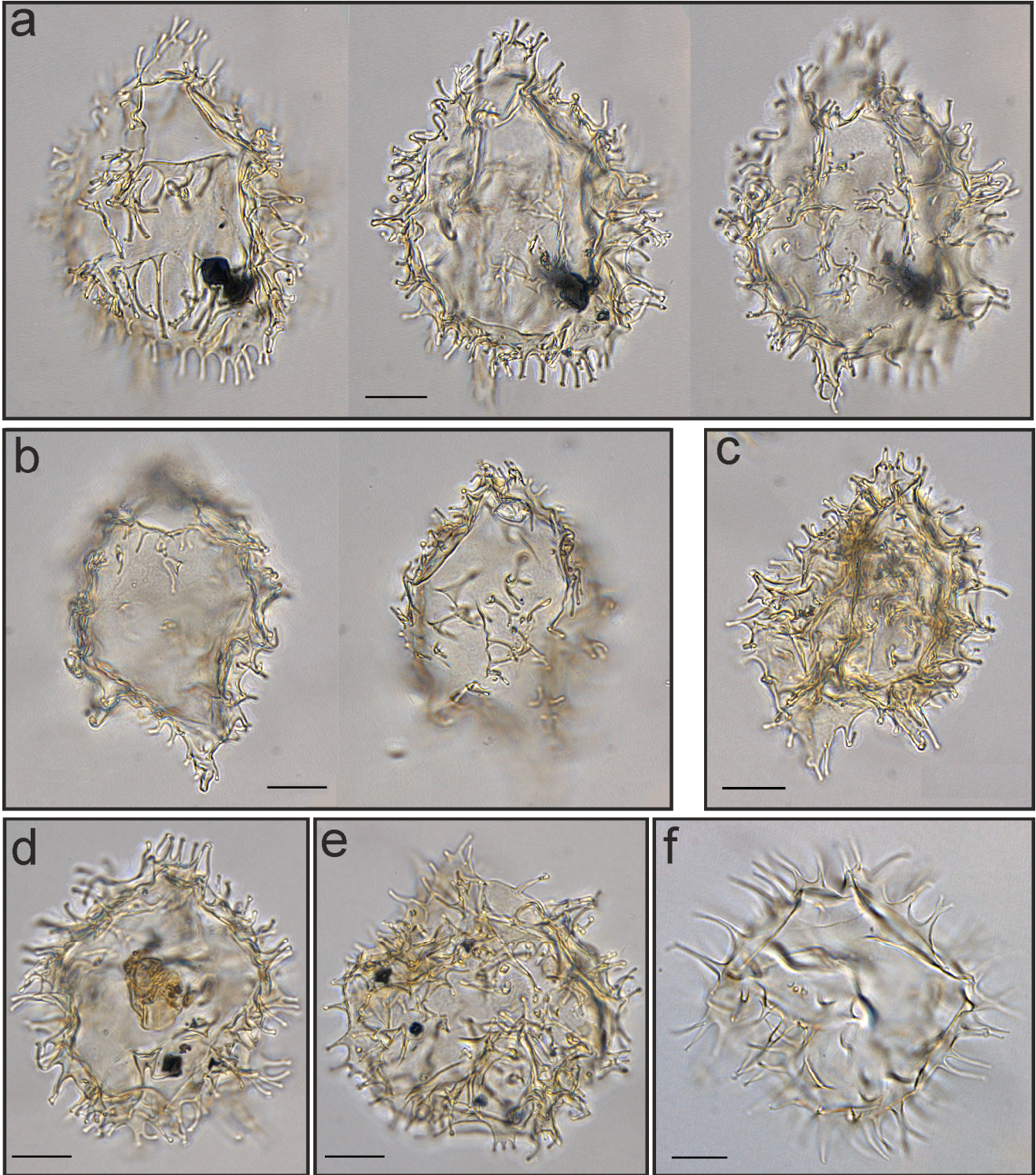



Fig. SI4: *Apectodinium* species from Interbed 2of the lower part of the Schöningen Formation. The scale bars represent 20 μm. **(a)** *Apectodinium longispinosum* (Interbed 2, sample 4), **(b), (c)** *Apectodinium parvum* (Interbed 2, sample 4), **(d), (e)** *Apectodinium homomorphum* (Interbed 2, sample 4), **(f)** *Apectodinium quinquelatum* (Interbed 2, sample 4).

SI3 Data tables

Tab. SI1 Paleolatitudinal position of the discussed lignite deposits. Numbers in brackets give the range based on the 95% confidence interval (van Hinsbergen et al., 2015).

Location	modern latitude	paleolatitude after (van Hinsbergen et al., 2015)	paleolatitude after (Naafs et al., 2018)
Schöningen (D)	52.1° N	41.4° (39.1° - 43.9°) N	~46° N
Cobham (UK)	51.4° N	40.1° (37.8° - 42.5°) N	~48° N
Vasterival (F)	49.9° N	38.6° (36.3° - 41.1°) N	-

Tab. SI2 Total organic carbon concentration (%TOC) and carbon isotope of bulk organics ($\delta^{13}C_{TOC}$).

Sample	strat. position [m]	$\delta^{13}C$ [‰]	TOC (IRMS) [%]	Sample	strat. position [m]	$\delta^{13}C$ [‰]	TOC (IRMS) [%]
Schoe VI 24	15.77	−26.8	12.6	Schoe V 23c	8.80	−27.0	0.6
Schoe VI 22b	15.67	−25.9	60.2	Schoe V 23b	8.71	−27.1	4.0
Schoe VI 22a	15.58	−26.2	61.0	Schoe V 23a	8.63	−27.0	0.6
Schoe VI 21	15.47	−26.4	61.6	Schoe V 22b	8.47	−27.0	3.6
Schoe VI 20	15.36	−26.3	61.0	Schoe V 22a	8.34	−27.1	3.7
Schoe VI 19	15.25	−26.4	59.6	Schoe V 21b	8.18	−27.1	2.5
Schoe VI 18c	15.13	−25.8	63.9	Schoe V 21a	8.01	−27.1	2.8
Schoe VI 18b	14.92	−26.7	63.7	Schoe V 20b	7.82	−27.1	4.8
Schoe VI 18a	14.87	−26.7	62.3	Schoe V 20a	7.60	−27.0	3.8
Schoe VI 17b	14.79	−25.7	63.2	Schoe V 19b	7.46	−27.0	3.1
Schoe VI 17a	14.67	−26.0	62.9	Schoe V 19a	7.16	−26.9	1.4
Schoe VI 16	14.61	−25.1	66.4	Schoe V 18b	7.00	−27.0	1.5
Schoe VI 15f	14.54	−25.8	65.5	Schoe V 18a	6.81	−27.0	1.3
Schoe VI 15e	14.20	−26.7	63.4	Schoe V 17b	6.64	−27.0	4.4
Schoe VI 15d	13.90	−26.1	61.9	Schoe V 17a	6.48	−26.9	5.3
Schoe VI 15c	13.60	−26.6	63.1	Schoe V 16	6.33	−26.9	7.2
Schoe VI 15b	13.30	−26.1	63.1	Schoe V 15	6.19	−27.1	4.5
Schoe VI 15a	12.93	−26.2	65.9	Schoe V 14	6.09	−27.0	7.3
Schoe VI 14	12.90	−26.5	65.0	Schoe V 13	5.91	−26.8	4.3
Schoe VI 13	12.81	−27.4	67.3	Schoe V 12c	5.20	−26.9	8.8
Schoe VI 12	12.70	−27.7	68.1	Schoe V 11	4.58	−26.9	9.4
Schoe VI 11c	12.62	−26.5	63.8	Schoe V 10a	4.37	−27.1	8.7
Schoe VI 11b	12.51	−26.5	62.6	Schoe V 9	4.27	−26.5	8.1
Schoe VI 11a	12.41	−28.3	67.7	Schoe V 8	4.14	−26.5	2.7
Schoe VI 10b	12.36	−27.1	66.0	Schoe V 7b	3.99	−26.9	4.4
Schoe VI 10a	12.30	−27.6	68.4	Schoe V 7a	3.86	−26.8	3.7
Schoe VI 9c	12.23	−27.4	68.2	Schoe V 6	3.72	−27.7	4.1
Schoe VI 9b	12.10	−28.1	55.0	Schoe V 5	3.61	−27.8	7.3
Schoe VI 9a	11.96	−27.9	63.3	Schoe V 4	3.47	−27.9	9.7
Schoe VI 8b	11.86	−27.5	59.2	Schoe V 2	3.25	−28.3	52.8
Schoe VI 8a	11.74	−27.5	56.0	Schoe V 1 = IX 58a	3.24	−28.1	64.4
Schoe VI 7d	11.64	−27.6	60.2	Schoe IX 58b	3.23	−28.0	54.7
Schoe VI 7c	11.52	−28.0	60.9	Schoe IX 58a	3.13	−28.0	59.5
Schoe VI 7b	11.47	−27.7	59.9	Schoe IX 57b	3.02	−28.3	61.1
Schoe VI 7a	11.37	−27.6	60.4	Schoe IX 57a	2.94	−26.6	66.5
Schoe VI 6	11.24	−27.4	58.9	Schoe IX 56b	2.83	−26.7	66.0
Schoe VI 5b	11.15	−27.8	50.0	Schoe IX 56a	2.71	−26.8	62.0
Schoe VI 5a	11.05	−27.8	56.7	Schoe IX 55b	2.60	−26.7	66.0
Schoe VI 4b	10.94	−27.8	59.8	Schoe IX 55a	2.51	−26.5	65.2
Schoe VI 4a	10.85	−27.9	52.9	Schoe IX 54b	2.40	−26.2	66.6
Schoe VI 3b	10.77	−27.9	56.9	Schoe IX 54a	2.30	−26.5	64.7
Schoe VI 3a	10.65	−27.9	55.8	Schoe IX 53d	2.20	−27.0	67.2
Schoe V 36 = VI 3a	10.63	−27.5	64.4	Schoe IX 53c	2.07	−26.5	68.2
Schoe VI 2	10.61	−27.6	39.5	Schoe IX 53b	1.92	−26.5	66.8
Schoe V 35 = VI 2	10.59	−28.1	39.8	Schoe IX 53a	1.75	−26.3	64.9
Schoe VI 1 = V 34	10.58	−26.8	19.7	Schoe IX 52d	1.70	−27.4	63.2
Schoe V 34b	10.56	−27.1	15.7	Schoe IX 52c	1.58	−25.8	67.0
Schoe V 34a	10.49	−27.9	14.5	Schoe IX 52b	1.38	−26.4	66.7
Schoe V 33	10.42	−27.3	27.0	Schoe IX 52a	1.20	−27.2	61.1
Schoe V 32	10.33	−27.3	8.9	Schoe IX 51b	1.12	−27.4	58.8
Schoe V 31	10.22	−27.1	7.0	Schoe IX 51a	1.02	−27.2	57.8
Schoe V 30	10.11	−27.0	3.1	Schoe IX 50b	0.91	−27.1	58.8
Schoe V 29	10.03	−26.8	0.2	Schoe IX 50a	0.81	−27.4	62.1
Schoe V 28				Schoe IX 49b	0.73	−27.4	63.1
Schoe V 27b	9.90	−26.8	0.3	Schoe IX 49a	0.60	−26.5	58.7
Schoe V 27a	9.72	−27.1	1.6	Schoe IX 48b	0.52	−27.0	58.8
Schoe V 26b	9.55	−27.0	0.8	Schoe IX 48a	0.40	−27.4	57.5
Schoe V 26a	9.39	−26.9	0.5	Schoe IX 47b	0.33	−26.7	46.9
Schoe V 25b	9.21	−26.7	0.2	Schoe IX 47a	0.23	−25.7	26.5
Schoe V 25a	9.06	−26.9	0.2	Schoe IX 46	0.09	−26.8	6.9
Schoe V 24	8.92	−27.2	5.2				

Tab. SI3 Palynological data (in %). Pollen and spores were calculated to 100% whereas algae, such as dinocsyts and freshwater algae, were added as additional percentages (in % of the total sum of pollen and spores)

m above top Main Seam	Sphagnaceae (Sphagnumsporites, Tripunctisporis)	Polypodiaceae (Laevigatosporites, Verrucatosporites)	Cupressaceae (Inaperturopollenites)	Nyssaceae (Nyssapollenites)	Thomsonipollis magnificus	Pistillipollenites mcgregorii	Pompeckjoidaepollen. subhercynicus	Plicapollis pseudoexcelsus	Triporopollenites robustus group	Tricolpopollenites. liblarensis	Tricolporopollenites cingulum	other sporomorphs (not presented in the pollen diagram)	freshwater plankton (e.g. Botryococcus, Tetraporina)	Apectodinium spp.	other dinocysts
16.41	6.4	4.1	5.0	1.9	1.7	0.0	7.7	0.3	16.1	0.6	0.0	56.2	1.9	0.0	5.0
16.30	20.3	0.0	2.2	0.0	0.0	0.0	11.7	0.3	11.5	0.8	0.0	53.3	0.0	0.0	0.0
16.07	32.1	0.0	0.9	0.0	0.0	0.0	15.2	0.0	18.8	2.1	0.0	30.9	0.0	0.0	0.0
15.81	14.8	6.5	19.7	2.5	0.0	0.0	5.3	0.0	2.5	1.1	0.3	47.2	0.3	0.0	0.0
15.51	5.8	5.8	5.0	1.7	0.0	0.0	8.7	0.9	17.9	1.2	0.0	52.9	0.0	0.0	0.0
15.21	25.8	10.1	11.9	0.6	2.7	0.0	15.8	0.3	4.5	0.3	0.0	28.0	0.0	0.0	0.0
15.13	28.0	8.6	13.3	2.2	0.6	0.0	7.4	0.0	2.8	1.7	0.0	35.4	0.0	0.0	0.0
14.72	6.8	5.6	6.9	2.4	1.8	0.0	9.7	0.3	5.8	0.8	0.0	59.8	0.0	0.0	0.0
14.43	25.5	4.4	12.4	2.0	3.2	0.0	6.9	0.5	3.5	0.9	0.3	40.3	0.0	0.0	0.0
13.92	31.6	17.0	3.7	0.5	0.5	0.0	27.4	0.6	1.8	0.9	0.0	15.9	0.0	0.0	0.0
13.69	3.9	3.6	1.5	0.3	0.6	0.0	25.1	0.0	11.5	1.2	0.6	51.7	0.0	0.0	0.0
13.42	0.4	6.7	1.8	2.7	0.6	0.0	27.9	1.2	9.4	4.9	2.1	42.3	0.0	0.0	0.0
13.07	0.0	20.0	15.6	4.8	16.0	0.0	0.6	0.3	0.6	0.9	0.0	41.2	0.0	0.0	0.0
12.77	0.0	6.5	12.9	3.1	15.5	0.5	1.1	4.5	0.3	11.0	0.0	44.5	0.0	0.0	5.9
12.60	0.0	5.7	13.3	1.3	18.6	1.0	1.7	6.0	2.7	4.7	4.7	40.3	0.3	14.7	1.3
12.23	0.0	0.4	4.6	0.5	4.6	0.9	4.6	4.2	4.6	5.9	0.0	69.7	2.7	37.2	6.8
11.97	0.0	0.0	1.0	0.0	2.5	1.0	6.0	2.0	6.5	16.0	0.0	65.0	1.0	31.4	0.0
11.50	0.0	0.0	1.0	1.5	0.5	0.5	5.5	3.0	10.0	25.9	0.0	52.0	2.0	20.9	0.0
10.84	0.5	2.5	39.4	1.0	2.5	0.0	2.0	3.0	5.0	2.5	4.5	37.0	1.0	16.9	2.0
10.16	0.4	2.7	45.6	0.9	1.6	0.0	1.3	1.6	6.0	0.9	4.0	34.9	0.0	33.1	1.6
9.94	0.5	3.5	33.4	3.5	1.5	0.0	2.5	2.5	8.0	3.0	0.5	41.0	1.0	99.7	2.0
9.83	0.0	0.4	0.8	1.2	0.4	0.0	5.2	3.2	12.8	12.8	0.0	63.2	0.4	36.3	0.8
9.72	0.0	0.0	3.5	0.4	0.4	0.0	2.7	2.2	13.2	15.5	0.0	62.1	2.7	3.1	0.0
9.59	0.0	2.0	45.4	2.5	1.5	0.0	2.0	2.5	2.0	1.5	1.0	39.5	0.5	11.0	0.0
9.41	11.9	0.0	3.6	0.6	0.3	0.0	3.6	2.4	23.5	0.0	0.3	53.7	2.4	0.0	0.0
9.16	50.4	0.5	2.7	0.0	0.0	0.0	0.5	0.5	18.8	0.0	0.5	26.1	0.0	0.0	0.0
8.91	24.0	0.3	3.2	0.0	0.0	0.0	2.7	0.6	18.2	0.6	0.9	49.4	1.8	0.0	0.0
8.66	28.7	1.5	3.8	0.4	0.0	0.0	1.9	0.4	20.5	0.0	0.4	42.3	0.8	0.0	0.0
8.35	27.1	18.6	10.5	1.8	0.4	0.0	1.1	1.8	1.5	0.0	0.0	37.2	0.4	0.0	0.0
7.91	30.0	18.2	1.2	0.3	0.6	0.0	16.1	0.0	12.5	0.0	0.0	21.1	0.0	0.0	0.0
7.11	18.3	23.4	6.9	0.3	0.0	0.0	27.8	0.0	1.2	0.0	0.6	21.4	0.0	0.0	0.0
6.74	16.1	24.6	17.5	5.4	0.4	0.0	1.2	1.2	0.8	0.4	2.3	30.0	0.0	0.0	0.0
6.40	3.2	21.6	3.3	3.8	1.5	0.0	4.9	1.7	0.6	0.9	1.5	57.0	0.0	0.0	0.0
5.87	0.0	3.0	15.5	4.2	0.6	0.0	0.6	25.4	0.6	0.0	0.0	50.0	0.0	0.0	0.0
5.51	0.0	1.5	37.4	1.5	1.0	0.5	0.5	12.5	1.5	1.5	6.5	35.5	0.5	0.0	1.0
5.20	0.0	1.4	3.6	0.0	0.5	0.0	2.3	7.3	5.9	15.0	0.0	64.0	0.9	0.9	1.4
4.83	1.5	2.0	33.9	1.5	0.0	0.0	1.0	2.5	5.5	6.0	0.5	45.6	0.0	4.0	0.5
4.61	0.0	1.5	55.9	1.0	0.6	0.0	2.5	0.5	3.0	2.0	1.0	32.0	1.0	1.0	0.0
4.32	0.0	1.0	7.0	1.0	0.0	0.5	0.5	0.5	7.5	9.5	0.5	71.9	4.0	0.0	0.0
3.81	0.0	0.0	8.6	0.0	0.6	0.0	1.8	0.6	8.2	12.7	0.0	67.5	3.2	0.0	0.0
3.36	0.0	1.0	43.9	2.0	0.5	0.0	0.5	2.5	3.5	4.5	4.5	37.0	1.0	2.0	0.0
3.15	1.0	2.5	53.3	1.3	0.0	0.0	4.0	0.5	1.0	3.5	1.5	31.3	1.0	0.0	0.0
2.87	0.0	1.8	46.4	0.5	0.9	0.0	0.9	0.5	5.5	1.4	4.5	37.6	1.8	2.3	0.0
2.65	0.5	0.0	20.9	0.0	0.0	0.0	5.0	0.0	8.8	4.5	0.0	60.3	6.0	0.0	0.0
2.49	0.0	1.0	12.5	0.0	0.0	0.0	4.0	1.0	18.5	11.2	0.0	51.8	5.5	0.0	0.0
2.19	0.0	0.0	11.5	0.0	0.0	0.5	12.0	0.0	21.5	7.0	0.0	47.5	1.5	0.0	0.0

m above top Main Seam	Sphagnaceae (*Sphagnumsporites, Tripunctisporis*)	Polypodiaceae (*Laevigatosporites, Verrucatosporites*)	Cupressaceae (*Inaperturopollenites*)	Nyssaceae (*Nyssapollenites*)	*Thomsonipollis magnificus*	*Pistillipollenites mcgregorii*	*Pompeckjoidaepollen. subhercynicus*	*Plicapollis pseudoexcelsus*	*Triporopollenites robustus* group	*Tricolpopollenites. liblarensis*	*Tricolporopollenites cingulum*	other sporomorphs (not presented in the pollen diagram)	freshwater plankton (e.g. *Botryococcus, Tetraporina*)	*Apectodinium* spp.	other dinocysts
1.85	0.0	1.4	46.3	0.0	0.0	0.0	2.3	0.0	4.1	9.6	0.0	36.3	4.6	0.0	0.0
1.63	0.0	1.0	19.5	0.0	1.0	0.0	4.5	0.0	18.9	1.1	6.8	47.2	6.0	0.0	0.0
0.80	0.3	1.7	35.1	1.7	0.0	0.0	11.3	2.8	5.0	1.4	40.0	0.7	0.4	1.2	0.0
0.48	0.0	0.0	3.8	0.0	0.0	0.0	20.5	2.0	6.7	2.8	0.0	64.2	5.5	2.4	0.0
0.36	0.0	1.4	7.1	0.4	0.0	0.0	12.0	0.0	6.4	1.4	0.0	71.2	2.1	2.5	0.0
0.22	0.3	0.7	7.1	1.7	0.0	0.0	7.6	1.1	3.3	36.3	3.3	38.5	0.0	4.0	0.0
0.05	8.9	1.3	12.8	0.4	0.0	0.0	7.7	14.5	11.1	1.4	7.6	34.3	2.1	27.6	0.0
-0.18	0.6	1.6	5.4	3.8	6.0	0.0	21.8	0.8	17.2	5.7	0.3	36.6	0.6	0.0	0.0
-0.44	0.0	4.8	14.3	1.0	1.6	0.0	0.6	0.0	23.4	0.4	7.9	46.0	0.6	0.0	0.0
-0.61	0.0	7.3	39.7	1.5	1.2	0.0	0.3	1.7	14.2	1.2	6.7	26.1	0.6	0.0	0.0
-0.78	0.0	8.3	6.6	2.8	0.4	0.0	2.5	2.1	24.5	0.0	3.8	49.0	0.0	0.0	0.0
-1.13	0.0	0.0	25.7	0.0	1.9	0.0	15.0	1.1	7.1	0.5	13.1	35.6	0.0	0.0	0.0

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