

Supplementary Table S7. Comparison of the morphological characters for identification among some species of *Fragilaria* and *Ulnaria*

Features	<i>Fragilaria radians</i> (Kützing) D.M.Williams & Round, 1987	<i>Ulnaria acus</i> (Kützing)	<i>Ulnaria danica</i> (Kützing) Compère & Bukhtiyarova, 2006	<i>Synedra acus</i> subsp. <i>radians</i> (Kützing) Skabitshevsky 1960	<i>Synedra acus</i> subsp. <i>acus</i> (Kützing)	<i>Synedra ulna</i> subsp. <i>danica</i> (Kützing) Grunov 1881	<i>Ulnaria ulna</i> (Nitzsch) Compère 2001	<i>Ulnaria acus</i> (Kützing) Aboal 2003	<i>Ulnaria ferefusiformis</i> M.Kulikovsky & H.Lange-Bertalot, 2016	<i>Ulnaria pilum</i> M.Kulikovsky & H.Lange-Bertalot, 2016
Number of strains studied for SEM	22	6	16						3	2
Valve outline	narrow-lanceolate			narrow-lanceolate	linear-lanceolate	linear or linear-lanceolate	needle-shaped	linear-lanceolate	approximately fusiform	needle-shaped
Length (µm)	105-239	90-235	99-427	142-288	90-250	235-445	230-320	80-150	76-152	218-295
Width proximally (µm)	2.5-5.2	2.2-5.4	3.5-6.3	2.2-5	4-5	5-6.4*	6.3-7.7	4.6-5.0	4.0-4.8	5.6-6.3
Width distally below the apices (µm)	0.8-1.9	0.8-1.8	1.6-4.5	0.7-1.3*	1.3*	2.4*	no data	no data	0.7-1.2	no data
Width distally at apices (µm)	0.8-2.0	0.9-2.0	2.4-4.9	1.0-1.8*	1.5*	1.6-4.0*	3-4	no data	1.4-1.6	2.0-2.2
Axial area	narrow, linear	narrow, linear	narrow, linear	narrow, linear	narrow, linear	narrow, linear	narrow, linear	narrow, linear	narrow, linear	narrow, linear
Stria arrangement	mostly alternating sometimes opposite	alternating or opposite	mostly opposite, sometimes alternating	alternating or opposite*	mostly opposite, sometimes alternating*	mostly opposite, sometimes alternating*	mostly opposite, sometimes alternating	mostly opposite, sometimes alternating	alternating or opposite	opposite proximally, alternate distally
Stria per 10 µm	12-22	11-14	9-13	11-22	12-14	8-10	9.2-10.4	10.8-13	12-14	10.0-11.5
Areolae in 10 µm	60-80	40-60	40-50	no data	50-60*	no data	30-35	no data	50	35-40
Areolae in stria	6-14	6-9	6-11	no data	8*	7-8*	5-8	no data	no data	6-9
Central area	rectangular or circular	rectangular or circular	circular or rectangular	rectangular or circular	rectangular, weak ghost striae*	rectangular*	not or centre may be marked by one	not or circular	indistinctly defined due to weak ghost striae	rectangular, ghost striae scarce or missing

							shortened or lacking stria			
Apex	rostrate or weakly subcapitate	subcapitate	subcapitate	weakly subcapitate	subcapitate	weakly subcapitate	protracted and weakly subcapitate	subcapitate	subcapitate	subcapitate
Rimoportula	2	2	2	2	2	2	2	2	2	2
Marginal spines	irregular arranged, very tiny spines	absent	absent	no data	no data	no data	absent	absent	absent	absent
Apical spines	irregular arranged 2-4 spines, varying forms	absent	2 spines	no data	no data	no data	2 short blunt dents	absent	absent	2 spines
Form of apical pore fields	ocellulimbus	ocellulimbus	ocellulimbus	no data	no data	no data	rectangular	no data	ocellulimbus	ocellulimbus
Numbers of transapical rows of apical pore field	5-8	8-11	12-16	no data	no data	no data	18-20	no data	no data	no data
Numbers of perivalvar rows of apical pore field	3-5	3-5	6-8	no data	no data	no data	12	no data	no data	no data
References	This study (strains from Lake Baikal)	This study (strains from Lake Baikal)	This study (strains from Lake Baikal)	Popovskaya et al., 2011 *measured by TEM and SEM: Table 57, Figs 5- 11	Popovskaya et al., 2011 *measured by TEM and SEM: Table 56, Figs 1- 3	Popovskaya et al., 2011 *measured by TEM and SEM: Table 60, Figs 2- 9	Lange– Bertalot & Ulrich 2014	Lange–Bertalot & Ulrich 2014	Kulikovskiy et al. 2016	Kulikovskiy et al. 2016