

Table S1. List of *Sarsia* specimens from the White Sea used for phylogenetic analyses: collection data and GenBank accession numbers. Abbreviations: Exp – Experiment. Species: Sl – *Sarsia lovenii*, St – *Sarsia tubulosa*. Sex: Fem – female, male. Gonophore type: 1 – medusoid, 2 – medusa, 3 – attached medusa, 4 – “abnormal medusoid”. Stage: p – polyp, m – medusa, pm – medusoid. Locality (see Fig. 1): W1 – Aquarium at WSBS; W2 – Pier of WSBS; W3 – Ereemeevskie rapids; W4 – saline lake at the Green Cape; W5 – location “Luda”; W6 – location “Krest”; W7 – Rugozerskaya inlet, depth 5-15 m; W8 – Polovye islands; W9 – Velikaya Salma Strait, depth 40-60 m.

| DNA Isolate | Gonophore type when known | Specimen location/ substratum/ crossing scheme/ Stage | Data collection or start and end of experiment | Photo | GenBank accession number | |
|-------------|---------------------------|---|--|-------|--------------------------|---|
| | | | | | COI | ITS |
| H90 | 1 | Barents Sea, Dalnezelenetskaya inlet/p | 7.07.2019 | + | OQ859859 | OQ863006 |
| H93 | - | W4/ <i>Fucus</i> sp./p | 21.08.2019 | + | OQ859860 | OQ863007 |
| H94 | - | W7/ <i>Modiolus modiolus</i> shell/p | 21.08.2019 | + | OQ859861 | OQ863008 |
| H95 | - | W5/ Porifera, stone/p | 16.08.2019 | + | OQ859862 | OQ863009 |
| H97 | 2 | Bering Sea, Senyavin Strait/m | 18.08.2019 | + | OQ859863 | OQ863010 |
| H102 | - | W5/stone/p | 4.08.2019 | + | OQ859724 | OQ862838 |
| H103 | - | W4/stone/p | 21.08.2019 | + | OQ859725 | H103_phase1 – OQ862839; H103_phase2 – OQ862840 |
| H104 | - | W4/stone/p | 22.08.2019 | + | OQ859726 | OQ862841 |
| H105 | - | W5/stone/p | 14.08.2019 | + | OQ859727 | OQ862842 |
| H106 | 1 | W3/stone/p | 29.06.2019 | + | OQ859728 | OQ862843 |
| H107 | - | W3/stone/p | 28.09.2019 | + | OQ859729 | OQ862844 |
| H108 | - | W3/stone/p | 7.07.2019 | + | OQ859730 | OQ862845 |
| H109 | - | W4/stone/p | 8.06.2019 | + | OQ859731 | H109_phase1 – OQ862846; H109_phase2 – OQ862847 |
| H110 | - | W5/stone/p | 4.08.2019 | + | OQ859732 | OQ862848 |
| H111 | - | W3/stone/p | 7.07.2019 | + | OQ859733 | OQ862849 |
| H112 | - | W3/stone/p | 7.07.2019 | + | OQ859734 | OQ862850 |
| H113 | - | W5/Porifera, stone/p | 14.08.2019 | + | OQ859735 | OQ862851 |
| H114 | - | W3/stone/p | 7.07.2019 | + | OQ859736 | OQ862852 |
| H115 | - | W5/stone/p | 14.08.2019 | + | OQ859737 | OQ862853 |
| H116 | - | W3/stone/p | 7.07.2019 | + | OQ859738 | OQ862854 |

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| H117 | 1 | W3/stone/p | 7.07.2019 | + | OQ859739 | OQ862855 |
| H118 | - | W4/stone/p | 21.08.2019 | + | OQ859740 | OQ862856 |
| H119 | 1 | W3/stone/p | 29.06.2019 | + | OQ859741 | OQ862857 |
| H120 | - | W4/stone/p | 21.08.2019 | + | OQ859742 | OQ862858 |
| H130 | 1 | W3/stone/p | 29.06.2019 | + | OQ859744 | OQ862862 |
| H122 | 2 | W2/Exp/ Sl-m-fem x Sl-m -male | 9.07.2019- 17.04.2020 | + | OQ859743 | H122_clone-1: OQ862859; H122_clone-3: OQ862860; H122_clone-8: OQ862861 |
| H135 | - | W1/p | 9.07.2019 | - | OQ859745 | OQ862863 |
| H136 | - | W3/stone/p | 12.12.2019 - 31.05.2020 | + | OQ859746 | OQ862864 |
| H137 | 1 | W3/stone/p | 12.12.2019- 22.05.2020 | + | OQ859747 | OQ862865 |
| H138 | - | W1/p | 28.10.2019- 06.02.2021 | + | OQ859748 | OQ862866 |
| H139 | 1 | W4/ <i>Fucus</i> sp./p | 21.08.2019- 6.04.2020 | + | OQ859749 | OQ862867 |
| H140 | 3 | W2/W3/stone/Exp/ Sl-m fem x Sl-pm male | 9.07.2019- 17.08.2020 | + | OQ859750 | H140_phase1 – OQ862868; H140_phase2 – OQ862869 |
| H141 | 3 | W1/p | 16.09.2019- 31.05.2020 | + | OQ859751 | H141_phase1 – OQ862870; H141_phase2 – OQ862871 |
| H142 | - | W1/p | 2019- 18.05.2020 | + | OQ859752 | OQ862872 |
| H143 | - | W1/p | 16.09.2019- 19.07.2020 | + | OQ859753 | OQ862873 |
| H144 | - | W2/W3/stone/Exp/ Sl-m fem x Sl-pm male | 9.07.2019- 31.05.2020 | + | OQ859754 | H144_phase1 – OQ862877; H144_phase2 – OQ862878; H144_clone-3: OQ862874; H144_clone-7: OQ862875; H144_clone-8: OQ862876 |
| H145 | - | W1/p | 16.09.2019- 6.04.2020 | + | OQ859755 | OQ862879 |
| H148 | 4 | W1/p | 28.10.2019- 31.05.2020 | + | OQ859756 | OQ862880 |
| H149 | 3 | W2/W3/stone/Exp Sl-pm-fem x Sl-m-male | 9.07.2019- 23.01.2021 | + | OQ859757 | H149_phase1 – OQ862881; H149_phase2 – OQ862882 |
| H150 | 3 | W2/W3/stone/Exp/ | 9.07.2019- | + | OQ859758 | H150_phase1 – |

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| | | Sl-pm-fem x Sl-m male | 17.08.2020 | | | OQ862883; H150_phase2 – OQ862884 |
| H151 | 3 | W2/W3/stone/Exp/ Sl-m-fem x Sl-pm- male | 9.07.2019- 15.06.2020 | + | OQ859759 | H151_phase1 – OQ862885; H151_phase2 – OQ862886 |
| H152 | 1 | W3/stone/p | 12.12.2019- 17.08.2020 | + | OQ859760 | OQ862887 |
| H153 | - | W2/W3/stone/Exp/ Sl-m-fem x Sl-pm- male | 9.07.2019- 6.04.2020 | + | OQ859761 | OQ862888 |
| H154 | - | W1/p | 2019- 31.05.2020 | + | OQ859762 | OQ862889 |
| H155 | 3 | W1/p | 16.09.2019- 17.08.2020 | + | OQ859763 | H155_phase1 – OQ862890; H155_phase2 – OQ862891 |
| H156 | - | W5/stone/p | 14.08.2019- 14.03.2020 | + | OQ859764 | OQ862892 |
| H157 | 3 | W2/W3/stone/Exp/ Sl-m-fem x Sl-pm- male | 9.07.2019- 31.05.2020 | + | OQ859765 | H157_phase1 – OQ862893; H157_phase2 – OQ862894 |
| H158 | 3 | W2/W3/stone/Exp/ Sl-pm-fem x Sl-m- male | 9.07.2019- 17.08.2020 | + | OQ859766 | H158_phase1 – OQ862895; H158_phase2 – OQ862896 |
| H159 | 3 | W2/W3/stone/Exp/ Sl-pm-fem x Sl-m- male | 9.07.2019- 23.01.2021 | + | OQ859767 | H159_phase1 – OQ862897; H159_phase2 – OQ862898 |
| H160 | - | W3/stone/p | 7.07.2019- 31.05.2020 | + | OQ859768 | OQ862899 |
| H161 | - | W1/p | 28.10.2019- 12.04.2020 | - | OQ859769 | H161_phase1 – OQ862900; H161_phase2 – OQ862901 |
| H162 | - | W1/p | 2019- 18.05.2020 | - | OQ859770 | OQ862902 |
| H163 | 3 | W2/W3/stone/Exp/ Sl-pm-fem x St-m-male | 9.07.2019- 18.05.2020 | + | OQ859771 | - |
| H164 | 4 | W1/p | 16.09.2019- 05.02.2021 | + | OQ859772 | OQ862903 |
| H166 | - | W3/p | 7.07.2019- 18.08.2020 | + | OQ859773 | OQ862904 |
| H167 | - | W7/red algae/p | 2.08.2019- 17.02.2021 | + | OQ859774 | OQ862905 |
| H168 | 3 | W2/W3/stone/Exp/ Sl-m-fem x Sl-pm-male | 9.07.2019- 20.01.2021 | + | OQ859775 | H168_phase1 – OQ862906; H168_phase2 – OQ862907 |
| H169 | 1 | W3/stone/p | 12.12.2019- | + | OQ859776 | OQ862908 |

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| | | | 31.05.2020 | | | |
| H170 | 3 | W2/W3/stone/Exp/ SI-pm-fem x SI-m-male | 9.07.2019- 18.05.2020 | + | OQ859777 | H170_phase1 – OQ862909; H170_phase2 – OQ862910 |
| H171 | - | W3/stone/p | 7.07.2019- 6.04.2020 | + | OQ859778 | OQ862911 |
| H172 | - | W1/p | 2019- 31.05.2020 | + | OQ859779 | OQ862912 |
| H173 | - | W3/stone/p | 7.07.2019- 31.05.2020 | + | OQ859780 | OQ862913 |
| H174 | - | W3/stone/p | 7.07.2019- 31.05.2020 | + | OQ859781 | OQ862914 |
| H175 | - | W3/stone/p | 7.07.2019- 30.03.2020 | + | OQ859782 | OQ862915 |
| H176 | - | W7/stone/p | 14.08.2019- 6.04.2020 | + | OQ859783 | OQ862916 |
| H177 | - | W3/stone/p | 7.07.2019- 31.05.2020 | + | OQ859784 | OQ862917 |
| H178 | - | W1/p | 2019- 31.05.2020 | + | OQ859785 | OQ862918 |
| H179 | 4 | W5/stone/p | 14.08.2019- 24.07.2020 | + | OQ859786 | H179_phase1 – OQ862919; H179_phase2 – OQ862920 |
| H180 | - | W5/Porifera over stone/p | 14.08.2019- 31.05.2020 | + | OQ859787 | OQ862921 |
| H182 | 4 | W1/p | 16.09.2019- 07.02.2021 | + | OQ859788 | OQ862922 |
| H184 | - | W1/p | 28.10.2019- 12.04.2020 | + | OQ859789 | OQ862923 |
| H231 | 2 | W5/stone/p | 12.08.2020- 21.09.2020 | + | OQ859790 | OQ862924 |
| H232 | - | W8/ <i>Fucus</i> sp./p | 12.08.2020 | + | OQ859791 | H232_phase1 – OQ862925; H232_phase2 – OQ862926 |
| H233 | - | W2/male=(H159+H14 0)/Exp F2/SI-m-fem x SI-F1-male | 08.07.2020- 08.08.2020 | + | OQ859792 | OQ862927 |
| H235 | - | W6/stone/p | 12.08.2020- 5.03.2021 | + | OQ859793 | OQ862928 |
| H236 | - | W2/male=(H159+H14 0)/Exp F2/SI-m-fem x SI-F1-male | 08.07.2020- 08.08.2020 | + | OQ859794 | OQ862929 |
| H237 | - | W5/stone/p | 12.08.2020- 21.01.2021 | + | OQ859795 | OQ862930 |
| H238 | - | W2/Exp/ SI-m x SI-m | 08.07.2020 - 09.08.2020 | + | OQ859796 | H238_phase1 – OQ862931; H238_phase2 – OQ862932 |
| H247 | - | W5/stone/p | 12.08.2020 | + | OQ859797 | H247_phase1 – OQ862933; |

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| | | | | | | H247_phase2 – OQ862934 |
| H248 | - | W9/ <i>Coryna</i> sp. over <i>Pectinaria hyperborea</i> tube/p | 30.08.2020 | + | OQ859798 | H248_phase1 – OQ862935; H248_phase2 – OQ862936 |
| H249 | 2 | W2/Exp/ St-fem x St-male | 08.07.2020 - 20.03.2021 | + | OQ859799 | OQ862937 |
| H250 | - | W5/stone/p | 12.08.2020- 5.03.2021 | + | OQ859800 | OQ862938 |
| H251 | - | W2/Exp/ Sl-m x Sl-m | 08.07.2020 - 09.08.2020 | + | OQ859801 | OQ862939 |
| H252 | - | W4/stone/p | 12.08.2020- 20.03.2021 | + | OQ859802 | OQ862940 |
| H253 | 2 | W8/ <i>Fucus</i> sp./p | 12.08.2020- 20.03.2021 | + | OQ859803 | OQ862941 |
| H254 | 4 | W5/p | 12.08.2020- 20.03.2021 | + | OQ859804 | OQ862942 |
| H256 | - | W5/stone/p | 12.08.2020- 20.03.2021 | + | OQ859805 | OQ862943 |
| H257 | - | W4/stone/p | 12.08.2020- 5.03.2021 | + | OQ859806 | OQ862944 |
| H258 | - | W3/stone/p | 12.08.2020- 5.03.2021 | + | OQ859807 | OQ862945 |
| H259 | 4 | W5/p | 12.08.2020- 20.03.2021 | + | OQ859808 | OQ862946 |
| H260 | - | W8/ <i>Fucus</i> sp./p | 12.08.2020- 5.03.2021 | + | OQ859809 | H260_phase1 – OQ862947; H260_phase2 – OQ862948 |
| H261 | - | W5/stone/p | 12.08.2020- 5.03.2021 | + | OQ859810 | OQ862949 |
| H262 | - | W4/stone/p | 12.08.2020- 5.03.2021 | + | OQ859811 | OQ862950 |
| H263 | - | W4/stone/p | 12.08.2020- 5.03.2021 | + | OQ859812 | OQ862951 |
| H264 | - | W4/stone/p | 12.08.2020- 5.03.2021 | + | OQ859813 | OQ862952 |
| H265 | 4 | W5/stone/p | 12.08.2020- 26.01.2021 | + | OQ859814 | OQ862953 |
| H266 | - | W6/stone/p | 12.08.2020- 5.03.2021 | + | OQ859815 | OQ862954 |
| H267 | - | W1/p | 2019- 20.03.2021 | + | OQ859816 | OQ862955 |
| H268 | - | W4/stone/p | 12.08.2020- 20.03.2021 | + | OQ859817 | OQ862956 |
| H269 | - | W3/stone/p | 12.08.2020- 20.03.2021 | + | OQ859818 | OQ862957 |
| H270 | - | W4/stone/p | 12.08.2020- 20.03.2021 | + | OQ859819 | OQ862958 |
| H271 | - | W5/stone/p | 12.08.2020- 20.03.2021 | + | OQ859820 | H271_phase1 – OQ862959; H271_phase2 – |

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| | | | | | | OQ862960 |
| H272 | - | W5/stone/p | 12.08.2020- 21.09.2020 | + | OQ859821 | OQ862961 |
| H273 | 2 | W2/St/m | 27.06.2020 | + | OQ859822 | OQ862962 |
| H276 | 2 | W2/St/m | 27.06.2020 | + | OQ859823 | OQ862963 |
| H277 | 2 | W2/Sl/m | 06.2020 | - | OQ859824 | H277_phase1 – OQ862964; H277_phase2 – OQ862965 |
| H278 | 2 | W2/St/m/fem | 18.06.2020 | + | OQ859825 | OQ862966 |
| H279 | 2 | W2/St/m | 27.06.2020 | + | OQ859826 | OQ862967 |
| H280 | 2 | W2/St/m | 27.06.2020 | + | OQ859827 | OQ862968 |
| H281 | 2 | W2/St/m/fem | 19.06.2020 | + | OQ859828 | OQ862969 |
| H282 | 2 | W2/St/m/fem | 19.06.2020 | + | OQ859829 | OQ862970 |
| H283 | 2 | W2/St/m | 27.06.2020 | + | OQ859830 | OQ862971 |
| H284 | 2 | W2/St/m/male | 19.06.2020 | + | OQ859831 | OQ862972 |
| H285 | 2 | W2/St/m/male | 19.06.2020 | + | OQ859832 | OQ862973 |
| H286 | 2 | W2/St/m | 18.06.2020 | + | OQ859833 | OQ862974 |
| H287 | 2 | W2/Sl/m | 06.2020 | - | OQ859834 | OQ862975 |
| H288 | 2 | W2/St/m | 27.06.2020 | + | OQ859835 | OQ862976 |
| H289 | 1 | W3/stone/Sl/p | 2019-2020 14.07.2020 | + | OQ859836 | OQ862977 |
| H290 | 3 | W2/W3/stone/Exp/ Sl-pm-fem x Sl-m male | 9.07.2019- 17.08.2020 | - | OQ859837 | H290_phase1 – OQ862978; H290_phase2 – OQ862979 |
| H291 | 3 | W2/W3/stone/Exp/ Sl-pm-fem x Sl-m- male | 9.07.2019- 23.01.2021 | - | OQ859838 | H291_phase1 – OQ862980; H291_phase2 – OQ862981 |
| H332 | - | W3/stone/Sl/p | 12.05.2021 | + | OQ859839 | OQ862982 |
| H333 | - | W3/stone/p | 12.05.2021 | + | OQ859840 | OQ862983 |
| H334 | 4 | W3/stone/Sl/p | 12.05.2021 | + | OQ859841 | OQ862984 |
| H335 | 3 | W3/stone/Sl/p | 12.05.2021 | + | OQ859842 | H335_phase1 – OQ862985; H335_phase2 – OQ862986 |
| H336 | 4 | W3/stone/Sl/p | 12.05.2021 | + | OQ859843 | OQ862987 |
| H337 | 3 | W3/stone/Sl/p | 12.05.2021 | + | OQ859844 | OQ862988 |
| H338 | 3 | W3/stone/p | 12.05.2021 | + | OQ859845 | H338_phase1 – OQ862989; H338_phase2 – OQ862990 |
| H339 | 4 | W3/stone/p | 12.05.2021 | + | OQ859846 | OQ862991 |
| H340 | 4 | W3/stone/p | 12.05.2021 | + | OQ859847 | H340_phase1 – OQ862992; H340_phase2 – OQ862993 |
| H341 | 4 | W3/stone/p | 12.05.2021 | + | OQ859848 | OQ862994 |
| H346 | 1 | W3/stone/p | 9.06.2021 | + | OQ859849 | OQ862995 |
| H347 | 1 | W3/stone/p | 10.06.2021 | + | OQ859850 | OQ862996 |
| H348 | 1 | W3/stone/p | 10.06.2021 | + | OQ859851 | OQ862997 |

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| H349 | 1 | W3/stone/p | 11.06.2021 | + | OQ859852 | OQ862998 |
| H355 | 2 | W3/stone/Sl/p | 31.03.2021 | + | OQ859853 | H355_phase1 – OQ862999; H355_phase2 – OQ863000 |
| H356 | 2 | W3/stone/Sl/p | 31.03.2021 | + | OQ859854 | OQ863001 |
| H357 | 2 | W3/stone/Sl/p | 31.03.2021 | + | OQ859855 | OQ863002 |
| H358 | 2 | W3/stone/Sl/p | 31.03.2021 | + | OQ859856 | OQ863003 |
| H359 | 2 | W3/stone/Sl/p | 1.04.2021 | + | OQ859857 | OQ863004 |
| H360 | - | W3/stone/Sl/p | 30.03.2021 | + | OQ859858 | OQ863005 |
| S20 | See Prudkovsky et al., 2019 | | | | | S20_phase1 – OQ863011; S20_phase2 – OQ863012 |
| S25 | See Prudkovsky et al., 2019 | | | | | S25_phase1 – OQ863013; S25_phase2 – OQ863014 |