

## Supplementary information

*Paralumbricillus* gen. nov. and other new marine enchytraeids from the North AtlanticMårten J. Klinth<sup>1,3</sup>, Emilia Rota<sup>2</sup>, Svante Martinsson<sup>3</sup>, Christer Erséus<sup>3</sup>

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*Lumbricillus* is one of the largest enchytraeid genera and its species can mainly be found on the coasts of temperate and polar regions around the world. However, the monophyly of the genus has been questioned by recent molecular studies. In this paper we further examine the phylogenetic relationships of *Lumbricillus* species and their close relatives by estimating a phylogeny of 62 species, many collected along the Norwegian coastline, with seven genetic markers. We confirm *Lumbricillus* to be non-monophyletic and resolve this issue by establishing the new genus *Paralumbricillus*, into which ten of the known species are transferred: *Paralumbricillus arenarius*, *Paralumbricillus cervisiae*, *Paralumbricillus christenseni*, *Paralumbricillus crymodes*, *Paralumbricillus dubius*, *Paralumbricillus eltoni*, *Paralumbricillus eudioptus*, *Paralumbricillus muscicolus*, *Paralumbricillus nielsenii*, *Paralumbricillus westheidei*, all comb. nov. In this paper we also describe eight new species: *Lumbricillus bibulbus*, *L. boreas*, *L. elisae*, *Paralumbricillus bicornis*, *P. bilobatus*, *P. lofotensis*, *P. sanguineus*, and *Claparedrilus torquatus*.

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## SUPPLEMENTARY INFORMATION

Figure S1. Majority-rule consensus tree for 16S estimated with Bayesian inference. Specimens marked in green are new to this study. Support values are posterior probabilities. Scale bar represents the estimated number of substitutions per site.

Figure S2. Majority-rule consensus tree for ITS2 estimated with Bayesian inference. Specimens marked in green are new to this study. Support values are posterior probabilities. Scale bar represents the estimated number of substitutions per site.

Figure S3. Majority-rule consensus tree for H3 estimated with Bayesian inference. Specimens marked in green are new to this study. Support values are posterior probabilities. Scale bar represents the estimated number of substitutions per site.

Table S1. List of specimens used in this study, with specimen identification number, collection data, GPS coordinates (in decimal degrees, WGS84), GenBank accession numbers for seven different markers (bold numbers are new sequences generated in this study) and voucher numbers. Letters for *Lumbricillus pagenstecheri* refer to barcoding clusters (see Klinth *et al.* 2017a). Country codes: AU=Australia, DK= Denmark, ES=Spain, FR=France, GL=Greenland, NL=Netherlands, NO=Norway, SE=Sweden and UK=United Kingdom. \* Unsuccessfully sequenced marker.



Figure S1. Majority-rule consensus tree for 16S estimated with Bayesian inference. Specimens marked in green are new to this study. Support values are posterior probabilities. Scale bar represents the estimated number of substitutions per site.

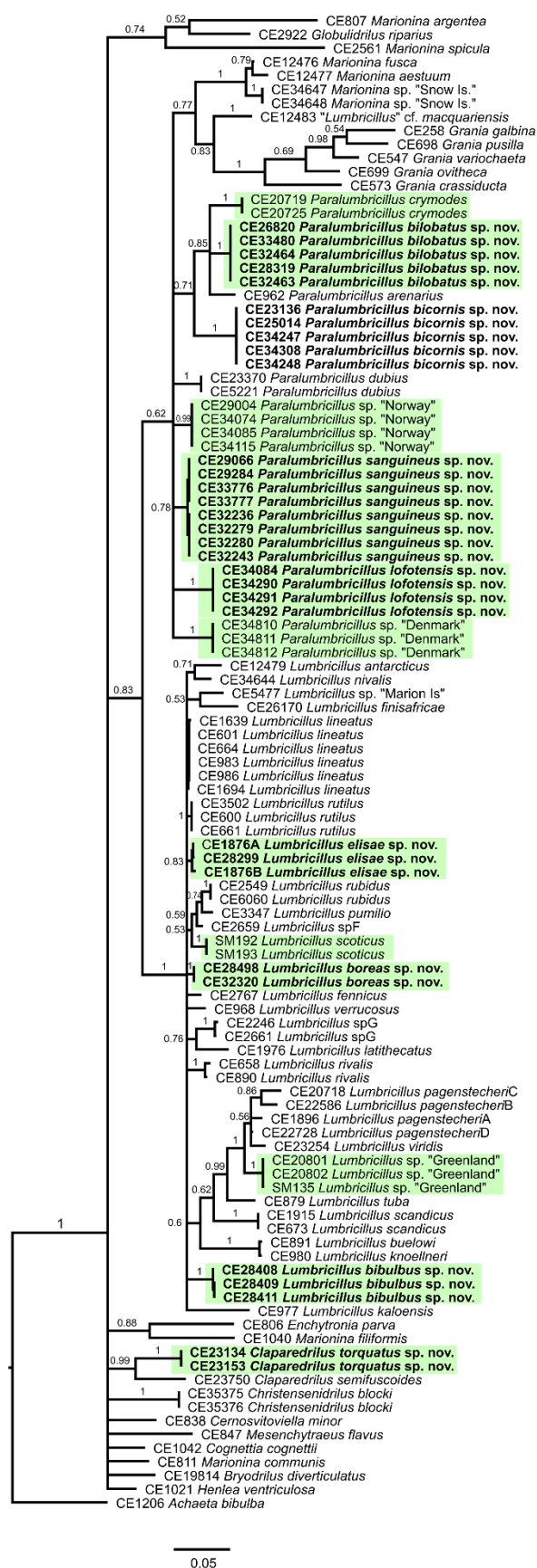


Figure S2. Majority-rule consensus tree for ITS2 estimated with Bayesian inference. Specimens marked in green are new to this study. Support values are posterior probabilities. Scale bar represents the estimated number of substitutions per site.

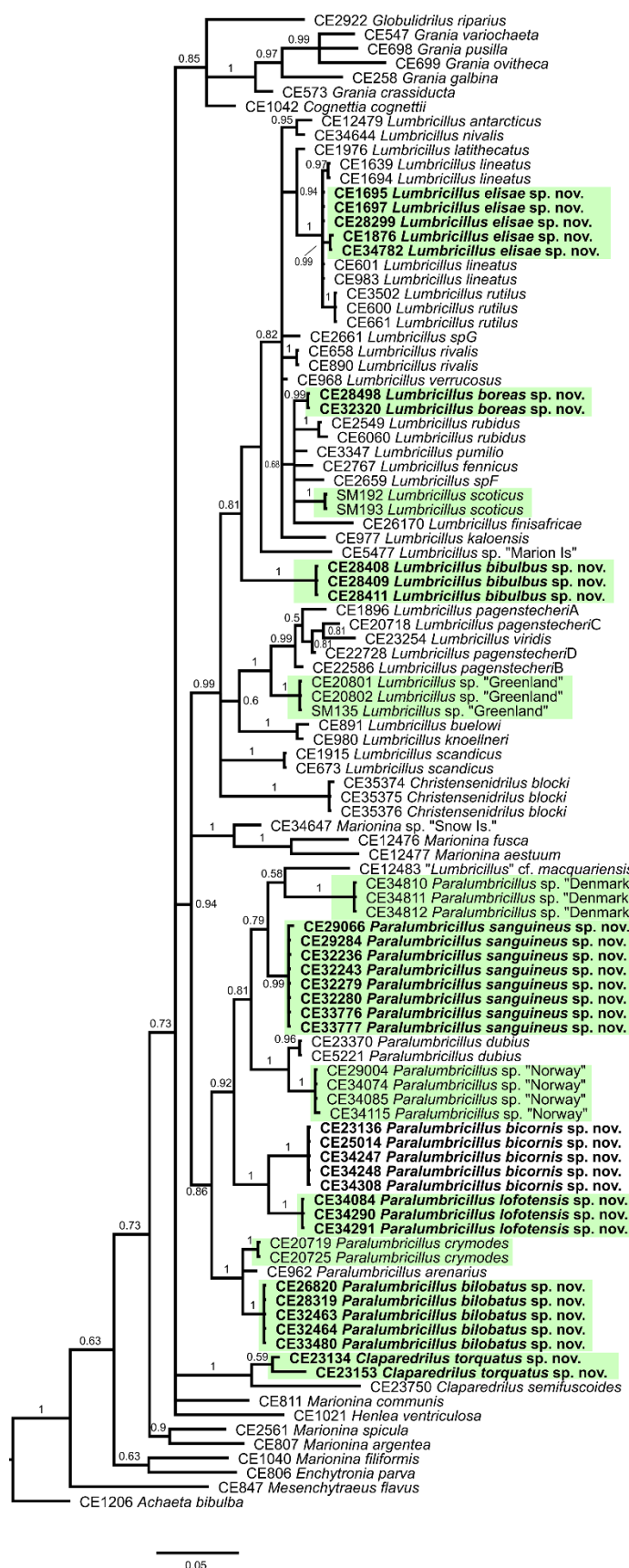


Figure S3. Majority-rule consensus tree for H3 estimated with Bayesian inference. Specimens marked in green are new to this study. Support values are posterior probabilities. Scale bar represents the estimated number of substitutions per site.

**Table S1.** List of specimens used in this study, with specimen identification number, collection data, GPS coordinates (in decimal degrees), GenBank accession numbers for seven different markers (bold numbers are new sequences generated in this study) and voucher numbers. Letters for *Lumbricillus pagenstecheri* refer to barcoding clusters (see Klinth *et al.*, 2017a). Country codes: AU=Australia, DK= Denmark, ES=Spain, FR=France, GL=Greenland, NL=Netherlands, NO=Norway, SE=Sweden and UK=United Kingdom. \* Unsuccessfully sequenced marker.

| Species                            | ID      | Collection locality                                                                                                | Coordinates |           | Date        | Leg                                 | Habitat                                                                                                                                | Genbank Accession No. |                 |                 |                 |                 |                          |                 | Voucher No.          |
|------------------------------------|---------|--------------------------------------------------------------------------------------------------------------------|-------------|-----------|-------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------|-----------------|-----------------|-----------------|--------------------------|-----------------|----------------------|
|                                    |         |                                                                                                                    | Lat.        | Long.     |             |                                     |                                                                                                                                        | COI                   | 12S             | 16S             | 18S             | 28S             | ITS                      | H3              |                      |
| <i>Lumbricillus antarcticus</i>    | CE12479 | South Georgia, Cumberland East Bay, Corral Bay                                                                     | 54.3023 S   | 36.3768 W | 7-Dec-2010  | Paul Brewin & Alison Massey         | Intertidal, 4 m up shore from low tide                                                                                                 | MZ393945              | MZ412954        | MZ412966        | MZ412942        | MZ412908        | MZ412919                 | MZ394819        | SMNH198144           |
| <i>L. antarcticus</i>              | CE12480 | South Georgia, Cumberland East Bay, Corral Bay                                                                     | 54.3023 S   | 36.3768 W | 7-Dec-2010  | Paul Brewin & Alison Massey         | Intertidal, 4 m up shore from low tide                                                                                                 | MZ393946              |                 |                 |                 |                 | MZ412920                 | MZ394820        | SMNH198145           |
| <i>L. antarcticus</i>              | CE12481 | South Georgia, Cumberland East Bay, Corral Bay                                                                     | 54.3023 S   | 36.3768 W | 7-Dec-2010  | Paul Brewin & Alison Massey         | Intertidal, 4 m up shore from low tide                                                                                                 | MZ393947              |                 |                 |                 |                 | MZ412921                 | MZ394821        | SMNH198146           |
| <i>L. antarcticus</i>              | CE12482 | South Georgia, Cumberland East Bay, Corral Bay                                                                     | 54.3023 S   | 36.3768 W | 7-Dec-2010  | Paul Brewin & Alison Massey         | Intertidal, 4 m up shore from low tide                                                                                                 | MZ393948              |                 |                 |                 |                 | MZ412922                 | MZ394822        | SMNH198147           |
| <i>L. antarcticus</i>              | CE34641 | Antarctica, South Shetland Islands, Snow Island                                                                    | 62.7753 S   | 61.2858 W | 15-Jan-2015 | Karla Paresque                      | Algae scraped off rocks in intertidal zone                                                                                             | MZ393949              |                 |                 |                 |                 | MZ412923                 | MZ394823        | SMNH198148           |
| <i>L. antarcticus</i>              | CE34643 | Antarctica, South Shetland Islands, Snow Island                                                                    | 62.7753 S   | 61.2858 W | 15-Jan-2015 | Karla Paresque                      | Algae scraped off rocks in intertidal zone                                                                                             | MZ393950              |                 |                 |                 |                 | MZ412924                 | MZ394824        | SMNH198149           |
| <i>L. bibulbus</i> <b>sp. nov.</b> | CE28408 | NO, Möre og Romsdal, Sula, Sulesund, W of ferry terminal, boulder beach                                            | 62.395 N    | 6.165 E   | 29-Jul-2016 | C. Erséus                           | Marine beach, mid-intertidal, sand and gravel under stones                                                                             | PP181449              | PP938465        | PP168493        | PP938487        | PP938480        | PP169602                 | PP943488        | ZMBN 128888          |
| <i>L. bibulbus</i> <b>sp. nov.</b> | CE28409 | NO, Möre og Romsdal, Sula, Sulesund, W of ferry terminal, boulder beach                                            | 62.3953 N   | 6.1653 E  | 29-Jul-2016 | C. Erséus                           | Marine beach, mid-intertidal, sand and gravel under stones                                                                             | PP181496              |                 | PP168524        |                 |                 | PP169629                 | PP169629        | ZMBN 153439          |
| <i>L. bibulbus</i> <b>sp. nov.</b> | CE28410 | NO, Möre og Romsdal, Sula, Sulesund, W of ferry terminal, boulder beach                                            | 62.395 N    | 6.165 E   | 29-Jul-2016 | C. Erséus                           | Marine beach, mid-intertidal, sand and gravel under stones                                                                             |                       |                 | <b>PP168503</b> |                 |                 |                          |                 | ZMBN 153277          |
| <i>L. bibulbus</i> <b>sp. nov.</b> | CE28411 | NO, Möre og Romsdal, Sula, Sulesund, W of ferry terminal, boulder beach                                            | 62.395 N    | 6.165 E   | 29-Jul-2016 | C. Erséus                           | Marine beach, mid-intertidal, sand and gravel under stones                                                                             | <b>PP181448</b>       |                 | <b>PP168492</b> |                 |                 | <b>PP169601</b>          | <b>PP943489</b> | ZMBN 153278          |
| <i>L. boreas</i> <b>sp. nov.</b>   | CE28498 | NO, Sogn og Fjordane, Bremanger, Rugsundsøy at Skatestraumen, road resting area at Kleivaneset, shore of small bay | 61.873 N    | 5.257 E   | 29-Jul-2016 | C. Erséus                           | Marine beach, lower intertidal, shelly sand                                                                                            | PP181447              | PP938466        | PP168491        | PP938488        | PP938481        | PP169600                 | PP943479        | ZMBN 128903          |
| <i>L. boreas</i> <b>sp. nov.</b>   | CE32320 | NO, Möre og Romsdal, Averøy, Atlanterhavsveien, W side of Geitøya Island                                           | 63.0221 N   | 7.3817 E  | 31-May-2017 | C. Erséus, M. Klinth                | Platform in rocky shore, mid-intertidal coarse sand                                                                                    | <b>PP181474</b>       |                 | <b>PP168510</b> |                 |                 | <b>PP169616</b>          | <b>PP943478</b> | ZMBN 129201          |
| <i>L. buelowi</i>                  | CE891   | SE, Bohuslän, Strömstad, Öddö, Långestrand                                                                         | 58.9019 N   | 11.1405 E | 6-Oct-2004  | E. Rota, A. Ansebo & C. Erséus      | Marine beach 1 m from edge of water, wrack bed of <i>Fucus serratus</i> , <i>Ascophyllum nodosum</i> and <i>Zostera marina</i> on sand | GU902087              | GU901735        | GU901827        | GU901912        | GU901999        | KU894355                 | KU894283        | SMNH 152718          |
| <i>L. elisae</i> <b>sp. nov.</b>   | CE1695  | ES, Galicia, Ponedra, beach at Illa de Arousa                                                                      | 42.56 N     | 8.87 W    | 01-Apr-2006 | Belen Reboreda Rivera               | <i>Uhva</i> compost culture                                                                                                            | <b>PP181457</b>       |                 | <b>PP168499</b> |                 |                 | *                        | <b>PP943482</b> | SMNH 212148          |
| <i>L. elisae</i> <b>sp. nov.</b>   | CE1697  | ES, Galicia, Ponedra, beach at Illa de Arousa                                                                      | 42.56 N     | 8.87 W    | 01-Apr-2006 | Belen Reboreda Rivera               | <i>Uhva</i> compost culture                                                                                                            | <b>PP181456</b>       | <b>PP938467</b> | <b>PP168498</b> | <b>PP938489</b> | <b>PP938477</b> | *                        | <b>PP943483</b> | SMNH 212149          |
| <i>L. elisae</i> <b>sp. nov.</b>   | CE1876  | SE, Blekinge, Karlskrona, Torhamn, beach                                                                           | 56.073 N    | 15.84 E   | 08-Jun-2006 | Lisa Matamoros                      | Stony beach with highly organic sediment                                                                                               | PP181455              |                 | PP168497        |                 |                 | <b>PP169606/PP955314</b> | <b>PP943485</b> | SMNH 212150          |
| <i>L. elisae</i> <b>sp. nov.</b>   | CE28299 | NO, Möre og Romsdal, Giske, Vigra, Roald, Molnes, Harhaugen, boulder beach                                         | 62.582 N    | 6.081 E   | 28-Jul-2016 | C. Erséus                           | Marine beach, upper intertidal, sand and gravel under stones                                                                           | <b>PP181451</b>       |                 | <b>PP168495</b> |                 |                 | <b>PP169604</b>          | <b>PP943484</b> | ZMBN 128876          |
| <i>L. elisae</i> <b>sp. nov.</b>   | CE34782 | DK, Nordjylland, Erslev, Vilsund, Sundbyvej, beach                                                                 | 56.884 N    | 8.639 E   | 16-May-2018 | M. Klinth, Elise Eriksson           | Upper intertidal, shelly sand, gravel and decaying algae, and specimens from under rocks                                               | <b>PP181484</b>       |                 | <b>PP168516</b> |                 |                 | *                        | <b>PP943486</b> | SMNH Type Coll. 9896 |
| <i>L. fennicus</i>                 | CE2767  | SE, Öland, Borgholm, S of Föra                                                                                     | 56.9855 N   | 16.8764 E | 12-Jun-2007 | A. Ansebo, L. Matamoros & C. Erséus | Stream with standing water, muddy clay from lower end of bank, at present water level                                                  | KU894132              | KU862717        | KU862775        | KU862806        | KU862846        | KU894315                 | KU894253        | SMNH 152729          |
| <i>L. finisafricae</i>             | CE26170 | South Africa, Cape Recife                                                                                          | 34.0450 S   | 25.5689 E | 20-Apr-2015 | Gavin Rishworth                     | On stromatolites                                                                                                                       | MZ393951              | MZ412955        | MZ412967        | MZ412943        | MZ412909        | MZ412925                 | MZ394825        | SAMC-A094448         |
| <i>L. kaloensis</i>                | CE977   | SE, Torslanda, Lilleby, Sillvik, Gröne viken Bay, seashore                                                         | 57.7467 N   | 11.755 E  | 10-Apr-2005 | A. Ansebo                           | Intertidal sand                                                                                                                        | GU902088              | GU901737        | GU901828        | GU901913        | GU902000        | KU894316                 | KU894249        | SMNH 108424          |
| <i>L. knoellneri</i>               | CE980   | SE, Västergötland, Göteborg, Fiskebäck, outer end of Hinsholmskilen Bay                                            | 57.6567 N   | 11.8483 E | 15-May-2005 | A. Ansebo                           | Intertidal sand                                                                                                                        | KU894121              | KU862719        | KU862781        | KU862793        | KU862831        | KU894362                 | KU894233        | SMNH 152734          |
| <i>L. latithecatus</i>             | CE1976  | SE, Skåne, Höganäs, S of Mölle, beach N of Lerhamn harbour                                                         | 56.2576 N   | 12.5192 E | 29-Jul-2006 | C. Erséus                           | Decaying algae on fine sand                                                                                                            | KU894053              | KU862716        | KU862770        | KU862812        | KU862840        | KU894327                 | KU894270        | SMNH 152830          |
| <i>L. lineatus</i>                 | CE601   | SE, Blekinge, Karlskrona, Tjurkö, swimming beach on W side of island                                               | 56.1163 N   | 15.6052 E | 17-Jul-2003 | C. Erséus                           | Intertidal sand and gravel                                                                                                             | KU894194              | KU862707        | KU862745        | KU862799        | KU862835        | KU894304                 | KU894266        | -                    |
| <i>L. lineatus</i>                 | CE664   | SE, Gotland, Eksta, Ekstakusten at Vavle, beach                                                                    | 57.2933 N   | 18.1266 E | 3-Sep-2003  | C. Erséus                           | Intertidal, sand and gravel under stones                                                                                               | KU894116              | KU862708        | KU862760        | KU862800        | KU862836        | KU894305                 | *               | -                    |
| <i>L. lineatus</i>                 | CE983   | SE, Västergötland, Göteborg, Fiskebäck, outer end of Hinsholmskilen Bay                                            | 57.6567 N   | 11.8483 E | 15-May-2005 | A. Ansebo                           | Intertidal sand                                                                                                                        | GU902089              | GU901738        | GU901829        | GU901914        | GU902001        | KU894310                 | KU894267        | SMNH 108425          |

Table S1. Continued.

| Species                   | ID      | Collection locality                                                                                                                              | Coordinates |           | Date        | Leg                                 | Habitat                                                                                                                                | Genbank Accession No. |          |          |          |          |          |          | Voucher No.          |
|---------------------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------|-------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------|----------|----------|----------|----------|----------|----------------------|
|                           |         |                                                                                                                                                  | Lat.        | Long.     |             |                                     |                                                                                                                                        | COI                   | 12S      | 16S      | 18S      | 28S      | ITS      | H3       |                      |
| <i>L. lineatus</i>        | CE986   | SE, Halland, Kungsbacka, Gottskär, Utholmen                                                                                                      | 57.3897 N   | 12.0266 E | 20-May-2005 | L. Matamoros, P. De Wit & C. Erséus | Intertidal sand                                                                                                                        | KU894120              | KU862709 | KU862747 | KU862809 | KU862837 | KU894303 | *        | SMNH 152739          |
| <i>L. lineatus</i>        | CE1639  | SE, Bohuslän, Strömstad, beach at Tjärnö Lab                                                                                                     | 58.8766 N   | 11.1456 E | 1-Sep-2004  | C. Erséus                           | Intertidal sand and gravel                                                                                                             | KU894044              | KU862710 | KU862754 | KU862810 | KU862838 | KU894311 | KU894264 | SMNH 152741          |
| <i>L. lineatus</i>        | CE1694  | ES, Galicia, Ponedra, beach at Illa de Arousa                                                                                                    | 42.56 N     | 8.87 W    | 1-Apr-2006  | B. Reboreda Rivera                  | <i>Ulva</i> compost culture                                                                                                            | KU894118              | KU862711 | KU862759 | KU862811 | KU862839 | KU894314 | KU894263 | SMNH 152744          |
| <i>L. nivalis</i>         | CE34644 | Antarctica, South Shetland Islands, Snow Island                                                                                                  | 62.7753 S   | 61.2858 W | 15-Jan-2015 | Karla Paresque                      | Algae scraped off rocks in intertidal zone                                                                                             | MZ393952              | MZ412956 | MZ412968 | MZ412944 | MZ412910 | MZ412926 | MZ394826 | SMNH Type Coll. 9310 |
| <i>L. pagenstecheri</i> A | CE1896  | SE, Öland, Mörbylånga, Skärlov, fishing harbour                                                                                                  | 56.4241 N   | 16.5815 E | 10-Jun-2006 | L. Matamoros                        | Beach with mixed shelley sand, pebbles, and organic material                                                                           | KU893986              | KU862696 | KU862730 | KU862817 | KU862827 | KU894339 | KU894240 | SMNH 152766          |
| <i>L. pagenstecheri</i> B | CE22586 | NO, Finnmark, Porsanger, Roddinessjöen                                                                                                           | 70.0927 N   | 25.0739 E | 11-Aug-2014 | C. Erséus                           | Artificial beach with boulders, decaying algae and rubble in intertidal zone                                                           | KU893983              | KU862694 | KU862733 | KU862819 | KU862826 | KU894337 | KU894247 | ZMBN 107890          |
| <i>L. pagenstecheri</i> C | CE20718 | NO, Svalbard, Spitsbergen, Wijdefjorden, Gunvorvatn                                                                                              | 79.8186 N   | 15.6646 E | 21-Jul-2013 | K. Hårsaker & T. Ekrem              | Decaying seaweed                                                                                                                       | KU893982              | KU862698 | KU862728 | KU862816 | KU862830 | KU894335 | KU894239 | ZMBN 107892          |
| <i>L. pagenstecheri</i> D | CE22728 | NO, Finnmark, Porsanger, Olderfjorden                                                                                                            | 70.4799 N   | 25.209 E  | 12-Aug-2014 | C. Erséus                           | Driftline of dead kelps/algae on beach                                                                                                 | KU894110              | KU862695 | KU862727 | KU862815 | KU862825 | KU894346 | KU894245 | ZMBN 107893          |
| <i>L. pumilio</i>         | CE3347  | UK, Wales, Cardiff, S of Newport, St. Bridge Wentloog                                                                                            | 51.517 N    | 3.000 W   | 13-Nov-2007 | S. Kvist                            | Supralittoral peat                                                                                                                     | KU894195              | KU862704 | KU862774 | KU862804 | KU862850 | KU894291 | KU894254 | SMNH 152776          |
| <i>L. rivalis</i>         | CE658   | SE, Gotland, Eksta, Ekstakusten at Vavle, beach                                                                                                  | 57.2933 N   | 18.1266 E | 3-Sep-2003  | C. Erséus                           | Intertidal, sand and gravel under stones                                                                                               | GU902090              | GU901739 | GU901830 | GU901915 | GU902002 | KU894318 | KU894274 | -                    |
| <i>L. rivalis</i>         | CE890   | SE, Bohuslän, Strömstad, Öddö, Långestrand                                                                                                       | 58.9019 N   | 11.1405 E | 6-Oct-2004  | E. Rota, A. Ansebo & C. Erséus      | Marine beach 1 m from edge of water, wrack bed of <i>Fucus serratus</i> , <i>Ascophyllum nodosum</i> and <i>Zostera marina</i> on sand | KU894060              | KU862712 | KU862762 | KU862813 | KU862841 | KU894319 | KU894275 | -                    |
| <i>L. rubidus</i>         | CE2549  | SE, Saltholmen, Västergötland, Göteborg, Saltholmen                                                                                              | 57.6631 N   | 11.8516 E | 7-Jun-2007  | C. Erséus                           | Supralittoral, upper part of narrow zone of marsh-like vegetation, roots and brown soil                                                | KU894094              | *        | KU862772 | KU862803 | KU862849 | KU894292 | KU894252 | SMNH 152792          |
| <i>L. rubidus</i>         | CE6060  | SE, Bohuslän, Lysekil, Färlev, inner end of Färlevsfjorden, mud flat immediately in front of salt marsh grassland                                | 58.4777 N   | 11.573 E  | 2-May-2009  | C. Erséus, A. Ansebo & M. Johansson | Clay and sand                                                                                                                          | KU894090              | KU862703 | KU862773 | KU862805 | KU862851 | KU894293 | KU894251 | SMNH 152790 Topotype |
| <i>L. rutilus</i>         | CE600   | SE, Blekinge, Karlskrona, Tjurkö, swimming beach on W side of island                                                                             | 56.1163 N   | 15.6052 E | 17-Jul-2003 | C. Erséus                           | Intertidal sand and gravel                                                                                                             | KU894095              | KU862705 | KU862735 | KU862796 | KU862832 | KU894299 | KU894258 | -                    |
| <i>L. rutilus</i>         | CE661   | SE, Gotland, Eksta, Ekstakusten at Vavle, beach                                                                                                  | 57.2933 N   | 18.1266 E | 3-Sep-2003  | C. Erséus                           | Intertidal, sand and gravel under stones                                                                                               | KU894182              | KU862706 | KU862739 | KU862797 | KU862833 | KU894300 | KU894257 | -                    |
| <i>L. rutilus</i>         | CE3502  | UK, Manchester, Urmston, biofilter pilot-plant expanded bed biofilm reactor (EBBR) at the United Utilities, Davyhulme Wastewater Treatment Works | 53.4639 N   | 2.3741 W  | 10-Feb-2008 | M. Dempsey                          | Biofilter (indoors)                                                                                                                    | KU894008              | *        | KU862738 | KU862798 | KU862834 | KU894298 | KU894256 | SMNH 152815          |
| <i>L. scandicus</i>       | CE673   | SE, Gotland, Sundre, Hoburgen, beach at Hoburgsgubben                                                                                            | 56.9228 N   | 18.1286 E | 3-Sep-2003  | C. Erséus                           | Intertidal sand                                                                                                                        | KU893949              | KU862701 | KU862776 | KU862794 | KU862847 | KU894348 | KU894225 | -                    |
| <i>L. scandicus</i>       | CE1915  | SE, Öland, Borgholm, Ölands Norra Udde                                                                                                           | 57.3681 N   | 17.0918 E | 11-Jun-2006 | L. Matamoros                        | Stony beach with coarse to medium sand and stones                                                                                      | KU893952              | KU862702 | KU862778 | KU862795 | KU862848 | KU894351 | KU894226 | SMNH 152723          |
| <i>L. scoticus</i>        | SM192   | GL, Qeqertalik, Disko Island, Qeqertarsuaq town                                                                                                  | 69.249 N    | 53.544 W  | 26-Jul-2013 | S. Martinsson                       | Sandy and rocky beach with algae and seaweed                                                                                           | PP181466              | PP938469 | PP168508 | PP938491 | PP938476 | PP169614 | PP943480 | SMNH 212160          |
| <i>L. scoticus</i>        | SM193   | GL, Qeqertalik, Disko Island, Qeqertarsuaq town                                                                                                  | 69.249 N    | 53.544 W  | 26-Jul-2013 | S. Martinsson                       | Sandy and rocky beach with algae and seaweed                                                                                           | PP181464              |          | PP168506 |          |          | PP169612 | PP943481 | SMNH 212161          |
| <i>L. tuba</i>            | CE879   | SE, Bohuslän, Strömstad                                                                                                                          | 58.9270 N   | 11.1939 E | 5-Oct-2004  | E. Rota, A. Ansebo & C. Erséus      | Grassy area immediately above Phragmites bed, muddy shell debris with decomposing grass                                                | GU902091              | GU901740 | GU901831 | GU901916 | GU902003 | KU894332 | *        | -                    |
| <i>L. verrucosus</i>      | CE968   | SE, Torslanda, Lilleby, Sillvik, Gröne viken Bay, seashore                                                                                       | 57.7467 N   | 11.755 E  | 10-Apr-2005 | A. Ansebo                           | Intertidal sand                                                                                                                        | KU894068              | KU862715 | KU862769 | KU862801 | KU862842 | KU894324 | KU894271 | SMNH 152826          |
| <i>L. viridis</i>         | CE23254 | NO, Troms, Tromsø, Tromsø, Lanes                                                                                                                 | 69.629 N    | 18.9207 E | 14-Aug-2014 | C. Erséus                           | Upper intertidal, sand and gravel                                                                                                      | KU893968              | KU862699 | KU862725 | KU862814 | KU862829 | KU894329 | KU894236 | ZMBN 107937          |
| <i>L. sp. F</i>           | CE2659  | UK, Devon, E of Plymouth, River Plym, beach on W side, North of bridge at Pomphey                                                                | 50.3757 N   | 4.1082 W  | 20-Jul-2007 | L. Matamoros                        | Mid-intertidal, stones and sandy clay                                                                                                  | KU893997              | KU862718 | KU862771 | KU862802 | KU862844 | KU894294 | KU894250 | SMNH 152832          |
| <i>L. sp. G</i>           | CE2246  | UK, Wales, Anglesey, Beaumaris, beach at Lifeboat Station                                                                                        | 53.2623 N   | 4.0914 W  | 15-Feb-2007 | M. Strand & P. Sundberg             | Intertidal sand and algae                                                                                                              | KU894001              | KU862713 | KU862767 | KU862807 | KU862843 | KU894289 | *        | SMNH 152834          |
| <i>L. sp. G</i>           | CE2661  | UK, Devon, E of Plymouth, River Plym, beach on W side, North of bridge at Pomphey                                                                | 50.3757 N   | 4.1082 W  | 20-Jul-2007 | L. Matamoros                        | Mid-intertidal, stones and sandy clay                                                                                                  | KU893999              | KU862714 | KU862768 | KU862808 | KU862845 | KU894290 | KU894268 | SMNH 152835          |

Table S1. Continued.

| Species                                      | ID      | Collection locality                                                                                         | Coordinates |           | Date         | Leg                                                          | Habitat                                                                                                              | Genbank Accession No. |          |          |          |          |          |          | Voucher No.  |
|----------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------|-------------|-----------|--------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------|----------|----------|----------|----------|----------|----------|--------------|
|                                              |         |                                                                                                             | Lat.        | Long.     |              |                                                              |                                                                                                                      | COI                   | 12S      | 16S      | 18S      | 28S      | ITS      | H3       |              |
| <i>L. sp.</i> “Greenland”                    | CE20801 | GL, Qeqertalik, Disko Island, Flakkerhukk, beach with lagoon                                                | 69.644 N    | 51.852 W  | 31-Jul-2013  | Reinardt Kristensen, Alexandra Kerbl, Kirsten Christoffersen | Intertidal hole at low water mark, medium sand                                                                       | PP181463              |          | PP168505 |          |          | PP169611 | PP943461 | SMNH 212151  |
| <i>L. sp.</i> “Greenland”                    | CE20802 | GL, Qeqertalik, Disko Island, Flakkerhukk, beach with lagoon                                                | 69.644 N    | 51.852 W  | 31-Jul-2013  | Reinardt Kristensen, Alexandra Kerbl, Kirsten Christoffersen | Intertidal hole at low water mark, medium sand                                                                       | PP181462              |          | PP168504 |          |          | PP169610 | PP943462 | SMNH 212152  |
| <i>L. sp.</i> “Greenland”                    | CE35532 | NO, Svalbard, Petuniabukten N of Pyramiden                                                                  | 78.685 N    | 16.441 E  | 29-Aug-2018  | Jiri Schlaghamersky                                          | Marine littoral, algal wreck                                                                                         | PP181475              |          | PP168511 |          |          | *        | *        | ZMBN 153287  |
| <i>L. sp.</i> “Greenland”                    | CE35576 | NO, Svalbard, Petuniabukten N of Pyramiden                                                                  | 78.685 N    | 16.441 E  | 29-Aug-2018  | Jiri Schlaghamersky                                          | Upper intertidal                                                                                                     | PP181471              |          |          |          |          |          |          | ZMBN 153288  |
| <i>L. sp.</i> “Greenland”                    | CE35577 | NO, Svalbard, Petuniabukten N of Pyramiden                                                                  | 78.685 N    | 16.441 E  | 29-Aug-2018  | Jiri Schlaghamersky                                          | Upper intertidal                                                                                                     | PP181470              |          |          |          |          |          |          | ZMBN 153289  |
| <i>L. sp.</i> “Greenland”                    | SM135   | GL, Qeqertalik, Disko Island, Qeqertarsuaq town                                                             | 69.249 N    | 53.544 W  | 26-Jul-2013  | S. Martinsson                                                | Sandy and rocky beach with algae and seaweed                                                                         | PP181469              | PP938468 | PP168509 | PP938490 | PP938475 | PP169615 | PP943460 | SMNH 212157  |
| <i>L. sp.</i> “Greenland”                    | SM137   | GL, Qeqertalik, Disko Island, Qeqertarsuaq town                                                             | 69.249 N    | 53.544 W  | 26-Jul-2013  | S. Martinsson                                                | Sandy and rocky beach with algae and seaweed                                                                         | PP181468              |          |          |          |          |          |          | SMNH 212158  |
| <i>L. sp.</i> “Greenland”                    | SM141   | GL, Qeqertalik, Disko Island, Qeqertarsuaq town                                                             | 69.249 N    | 53.544 W  | 26-Jul-2013  | S. Martinsson                                                | Sandy and rocky beach with algae and seaweed                                                                         | PP181467              |          |          |          |          |          |          | SMNH 212159  |
| <i>L. sp.</i> “Marion Is.”                   | CE5477  | Prince Edward Islands, Marion Island                                                                        | 46.9 S      | 37.75 E   | 2008-Apr-May | Herbert Dartnall                                             | Eutrophic freshwater in coastal pool, possibly a wallow (shallow depression enriched by seal and penguin excrements) | MZ393953              | MZ412957 | MZ412969 | MZ412945 | MZ412911 | MZ412927 | MZ394827 | SAMC-A094449 |
| “ <i>L.</i> ” cf. <i>macquariensis</i>       | CE12483 | South Georgia, Cumberland East Bay, Sooty Bluff near King Edward Point                                      | 54.2927 S   | 36.4843 W | 1-Dec-2010   | Paul Brewin & Alison Massey                                  | Intertidal, 1 m up shore from low tide                                                                               | MZ393954              | MZ412958 | MZ412970 | MZ412946 | MZ412912 | MZ412928 | MZ394828 | SMNH198150   |
| “ <i>L.</i> ” cf. <i>macquariensis</i>       | CE12484 | South Georgia, Cumberland East Bay, Sooty Bluff near King Edward Point                                      | 54.2927 S   | 36.4843 W | 1-Dec-2010   | Paul Brewin & Alison Massey                                  | Intertidal, 1 m up shore from low tide                                                                               | MZ393955              |          |          |          |          | MZ412929 | MZ394829 | SMNH198151   |
| “ <i>L.</i> ” cf. <i>macquariensis</i>       | CE12485 | South Georgia, Cumberland East Bay, Sooty Bluff near King Edward Point                                      | 54.2927 S   | 36.4843 W | 1-Dec-2010   | Paul Brewin & Alison Massey                                  | Intertidal, 1 m up shore from low tide                                                                               | MZ393956              |          |          |          |          | MZ412930 | MZ394830 | SMNH198152   |
| “ <i>L.</i> ” cf. <i>macquariensis</i>       | CE12486 | South Georgia, Cumberland East Bay, Sooty Bluff near King Edward Point                                      | 54.2927 S   | 36.4843 W | 1-Dec-2010   | Paul Brewin & Alison Massey                                  | Intertidal, 1 m up shore from low tide                                                                               | MZ393957              |          |          |          |          | MZ412931 | MZ394831 | SMNH198153   |
| <i>Paralumbricillus arenarius</i> comb. nov. | CE962   | SE, Västergötland, Göteborg, Brottkärr, Stora Amundön, seashore                                             | 57.593 N    | 11.905 E  | 15-Apr-2005  | A. Ansebo & C. Erséus                                        | Intertidal sand and gravel                                                                                           | GU902086              | GU901736 | GU901826 | GU901911 | GU901998 | KU894364 | KU894228 | SMNH 108423  |
| <i>P. bicornis</i> <b>sp. nov.</b>           | CE23136 | NO, Troms, Rotsundselv                                                                                      | 69.8001 N   | 20.7158 E | 14-Aug-2014  | C. Erséus                                                    | Seashore, upper intertidal (upper end of Ascophyllum zone), sand with smell of hydrogen sulfide                      | KU893920              | KU862691 | KU862783 | KU862791 | KU862854 | KU894370 | KU894220 | ZMBN 107945  |
| <i>P. bicornis</i> <b>sp. nov.</b>           | CE24967 | NO, Nordland, Gildeskål, Kjöpstad, 2 km S of Kjellingbrua Bridge, at road 17, shore at Holmsundsfjorden Bay | 67.054 N    | 14.273 E  | 11-Sep-2014  | C. Erséus, Endre Willassen                                   | Upper intertidal, rock pool, gravel and grey sand                                                                    | KU893921              |          |          |          |          |          |          | ZMBN 107947  |
| <i>P. bicornis</i> <b>sp. nov.</b>           | CE24968 | NO, Nordland, Gildeskål, Kjöpstad, 2 km S of Kjellingbrua Bridge, at road 17, shore at Holmsundsfjorden Bay | 67.054 N    | 14.273 E  | 11-Sep-2014  | C. Erséus, Endre Willassen                                   | Upper intertidal, rock pool, gravel and grey sand                                                                    | KU893919              |          |          |          |          |          |          | ZMBN 107948  |
| <i>P. bicornis</i> <b>sp. nov.</b>           | CE25014 | NO, Nordland, Gildeskål, Kjöpstad, 2 km S of Kjellingbrua Bridge, at road 17, shore at Holmsundsfjorden Bay | 67.054 N    | 14.273 E  | 11-Sep-2014  | C. Erséus, Endre Willassen                                   | Upper intertidal, rock pool, gravel and grey sand                                                                    | PP181465              |          | PP168507 |          |          | PP169613 | PP943453 | ZMBN 153402  |
| <i>P. bicornis</i> <b>sp. nov.</b>           | CE34247 | NO, Nordland, Lofoten, Vestvågøy, Rolvsfjorden, Straumbukta Bay at Straumbua Bridge                         | 68.191 N    | 13.863 E  | 08-Sep-2017  | C. Erséus, M. Klinth                                         | Upper intertidal, gravel bed with <i>Ascophyllum</i> and sand                                                        | PP181494              |          | PP168522 |          |          | PP169627 | PP946454 | ZMBN 129442  |
| <i>P. bicornis</i> <b>sp. nov.</b>           | CE34248 | NO, Nordland, Lofoten, Vestvågøy, Rolvsfjorden, Straumbukta Bay at Straumbua Bridge                         | 68.191 N    | 13.863 E  | 08-Sep-2017  | C. Erséus, M. Klinth                                         | Upper intertidal, gravel bed with <i>Ascophyllum</i> and sand                                                        | PP181491              |          | PP168520 |          |          | PP169625 | PP943455 | ZMBN 153284  |
| <i>P. bicornis</i> <b>sp. nov.</b>           | CE34308 | NO, Nordland, Lofoten, Vågan, Sundklakkstraumen Strait, at Sundklakk, Hamna                                 | 68.269 N    | 14.16 E   | 08-Sep-2017  | C. Erséus, M. Klinth                                         | Intertidal, under stones                                                                                             | PP181486              |          | PP168517 |          |          | PP169621 | PP943456 | ZMBN 129452  |
| <i>P. crymodes</i> comb. nov.                | CE20719 | NO, Svalbard, Spitsbergen, Nordfjorden, Tschermak Stream                                                    | 78.4903 N   | 15.3289 E | 27-Jul-2013  | Karstein Hårsaker                                            | Freshwater stream                                                                                                    | PP181508              | PP938470 | PP168256 | PP938492 | PP938478 | PP169632 | PP943443 | ZMBN 110573  |

Table S1. Continued.

| Species                              | ID      | Collection locality                                                                                            | Coordinates |           | Date        | Leg                       | Habitat                                                                                  | Genbank Accession No. |          |          |          |          |          |          | Voucher No.   |
|--------------------------------------|---------|----------------------------------------------------------------------------------------------------------------|-------------|-----------|-------------|---------------------------|------------------------------------------------------------------------------------------|-----------------------|----------|----------|----------|----------|----------|----------|---------------|
|                                      |         |                                                                                                                | Lat.        | Long.     |             |                           |                                                                                          | COI                   | 12S      | 16S      | 18S      | 28S      | ITS      | H3       |               |
| <i>P. crymodes</i> comb. nov.        | CE20725 | NO, Svalbard, Spitsbergen, Nordfjorden, Tschermak Stream                                                       | 78.49 N     | 15.329 E  | 27-Jul-2013 | Karstein Hårsaker         | Freshwater stream                                                                        | PP181507              |          | PP168526 |          |          | PP169631 | PP943444 | ZMBN 110574   |
| <i>P. dubius</i> comb. nov.          | CE5221  | SE, Bohuslän, Strömstad, beach at Tjärnö Lab, in front of dining hall                                          | 58.8754 N   | 11.1458 E | 8-Oct-2008  | C. Erséus                 | Upper intertidal, coarse sand                                                            | KU893930              | KU862693 | KU862786 | KU862790 | KU862853 | KU894368 | KU894218 | SMNH 152726   |
| <i>P. dubius</i> comb. nov.          | CE23370 | NO, Troms, Tromsø, Sommarøya, Gurahaugen                                                                       | 69.6321 N   | 18.0278 E | 15-Aug-2014 | C. Erséus                 | Lower intertidal, mixed mineral and shell sand                                           | KU893934              | KU862692 | KU862785 | KU862789 | KU862852 | KU894367 | KU894219 | ZMBN 107836   |
| <i>P. lofotensis</i> <b>sp. nov.</b> | CE34084 | NO, Nordland, Lofoten, Moskenes, Reine, Reinefjorden at Valen (Andøya)                                         | 67.94 N     | 13.078 E  | 07-Sep-2017 | C. Erséus, M. Klinth      | Lower intertidal, pebbles and coarse sand                                                | PP181459              | PP938471 | PP168500 | PP938493 | PP938485 | PP169607 | PP943457 | ZMBN 129414   |
| <i>P. lofotensis</i> <b>sp. nov.</b> | CE34290 | NO, Nordland, Lofoten, Vestvågøy, Rolvsfjorden, Kartfjordpollen threshold inside Straumbrua Bridge             | 68.191 N    | 13.861 E  | 08-Sep-2017 | C. Erséus, M. Klinth      | Tidal stream with pebbles, gravel and sand on bedrock                                    | PP181489              |          | PP168519 |          |          | PP169624 | PP943458 | ZMBN 129448   |
| <i>P. lofotensis</i> <b>sp. nov.</b> | CE34291 | NO, Nordland, Lofoten, Vestvågøy, Rolvsfjorden, Kartfjordpollen threshold inside Straumbrua Bridge             | 68.191 N    | 13.861 E  | 08-Sep-2017 | C. Erséus, M. Klinth      | Tidal stream with pebbles, gravel and sand on bedrock                                    | PP181488              |          | PP168518 |          |          | PP169623 | PP943459 | ZMBN 153285   |
| <i>P. lofotensis</i> <b>sp. nov.</b> | CE34292 | NO, Nordland, Lofoten, Vestvågøy, Rolvsfjorden, Kartfjordpollen threshold inside Straumbrua Bridge             | 68.191 N    | 13.861 E  | 08-Sep-2017 | C. Erséus, M. Klinth      | Tidal stream with pebbles, gravel and sand on bedrock                                    | PP181487              |          | *        |          |          | PP169622 | *        | ZMBN 153286   |
| <i>P. bilobatus</i> <b>sp. nov.</b>  | CE26820 | NO, Hordaland, Eidfjord, Eidfjord, Simadalsfjorden, between Leirvikane and Stavanes, seashore near road        | 60.479 N    | 7.092 E   | 11-Aug-2015 | C. Erséus                 | Seashore, upper intertidal, gravel and coarse sand                                       | PP181452              | PP938472 | PP168496 | PP938494 | PP938484 | PP169605 | PP943445 | ZMBN 111482   |
| <i>P. bilobatus</i> <b>sp. nov.</b>  | CE28319 | NO, Møre og Romsdal, Giske, Vigra, Roald, Molnes, Harhaugen, boulder beach                                     | 62.582 N    | 6.081 E   | 28-Jul-2016 | C. Erséus                 | Marine beach, upper intertidal, sand and gravel under stones                             | PP181450              |          | PP168494 |          |          | PP169603 | PP943446 | ZMBN 153276   |
| <i>P. bilobatus</i> <b>sp. nov.</b>  | CE29420 | NO, Sør-Trøndelag, Agdenes, Slettvik, beach W of road to Stavøya Island                                        | 63.5911 N   | 9.5322 E  | 09-Sep-2016 | C. Erséus                 | Upper intertidal, sand and gravel near freshwater stream on beach                        | PP181442              |          |          |          |          |          |          | NTNU-VM 74104 |
| <i>P. bilobatus</i> <b>sp. nov.</b>  | CE32463 | NO, Møre og Romsdal, Fraena, Ternes, Terneselva River, near sea                                                | 62.841 N    | 7.034 E   | 31-May-2017 | C. Erséus, M. Klinth      | River sediment, in freshwater, sand and gravel                                           | PP181438              |          | PP168483 |          |          | PP169592 | PP943447 | ZMBN 129228   |
| <i>P. bilobatus</i> <b>sp. nov.</b>  | CE32464 | NO, Møre og Romsdal, Fraena, Ternes, Terneselva River, near sea                                                | 62.841 N    | 7.034 E   | 31-May-2017 | C. Erséus, M. Klinth      | River sediment, in freshwater, sand and gravel                                           | PP181479              |          | PP168515 |          |          | PP169620 | PP943448 | ZMBN 153282   |
| <i>P. bilobatus</i> <b>sp. nov.</b>  | CE33480 | NO, Nordland, Narvik, Rombaken Fjord, Søndre Hergot, seashore                                                  | 68.454 N    | 17.704 E  | 06-Sep-2017 | C. Erséus, M. Klinth      | Upper intertidal, sand under stones                                                      | PP181461              |          | PP168502 |          |          | PP169609 | PP943449 | ZMBN 129338   |
| <i>P. sanguineus</i> <b>sp. nov.</b> | CE29066 | NO, Sør-Trøndelag, Agdenes, Slettvik, N side of outflow channel from Hopavågen lagoon, inside bridge           | 63.594 N    | 9.534 E   | 06-Sep-2016 | C. Erséus                 | Subtidal, soft shell sand near tidal current                                             | PP181445              | PP938473 | PP168489 | PP938495 | PP948483 | PP169598 | PP943442 | NTNU-VM 74055 |
| <i>P. sanguineus</i> <b>sp. nov.</b> | CE29284 | NO, Sør-Trøndelag, Agdenes, Slettvik, N side of Hopavågen Lagoon outlet (Straumen), immediately outside bridge | 63.593 N    | 9.534 E   | 08-Sep-2016 | C. Erséus                 | Barely subtidal in Fucus zone, heterogeneous sand                                        | PP181444              |          | PP168488 |          |          | PP169597 | PP943436 | NTNU-VM 74080 |
| <i>P. sanguineus</i> <b>sp. nov.</b> | CE32236 | NO, Møre og Romsdal, Averøy, Atlanterhavsveien, S side of Eldhusøya Island                                     | 63.02 N     | 7.371 E   | 31-May-2017 | C. Erséus, M. Klinth      | Small bay in rocky shore, lower intertidal, muddy shell sand                             | PP181443              |          | PP168487 |          |          | PP169596 | PP943437 | ZMBN 153279   |
| <i>P. sanguineus</i> <b>sp. nov.</b> | CE32243 | NO, Møre og Romsdal, Averøy, Atlanterhavsveien, S side of Eldhusøya Island                                     | 63.02 N     | 7.371 E   | 31-May-2017 | C. Erséus, M. Klinth      | Small bay in rocky shore, subtidal, 1 m, muddy shell sand                                | PP181441              |          | PP168486 |          |          | PP169595 | PP943438 | ZMBN 129189   |
| <i>P. sanguineus</i> <b>sp. nov.</b> | CE32279 | NO, Møre og Romsdal, Averøy, Atlanterhavsveien, S side of Eldhusøya Island                                     | 63.02 N     | 7.371 E   | 31-May-2017 | C. Erséus, M. Klinth      | Small bay in rocky shore, tidal stream in lower intertidal, muddy coarse shell sand      | PP181440              |          | PP168485 |          |          | PP169594 | PP943439 | ZMBN 153280   |
| <i>P. sanguineus</i> <b>sp. nov.</b> | CE32280 | NO, Møre og Romsdal, Averøy, Atlanterhavsveien, S side of Eldhusøya Island                                     | 63.02 N     | 7.371 E   | 31-May-2017 | C. Erséus, M. Klinth      | Small bay in rocky shore, tidal stream in lower intertidal, muddy coarse shell sand      | PP181439              |          | PP168484 |          |          | PP169593 | PP943440 | ZMBN 153281   |
| <i>P. sanguineus</i> <b>sp. nov.</b> | CE33776 | NO, Nordland, Andenes, Andøya, Andenes, sea-shore at Damsgård                                                  | 69.304 N    | 16.06 E   | 06-Sep-2017 | C. Erséus, M. Klinth      | Mid-intertidal between cliffs in <i>Fucus-Ascophyllum</i> zone, pebbles, sand and shells | PP181460              |          | PP168501 |          |          | PP169608 | PP943441 | ZMBN 129380   |
| <i>P. sanguineus</i> <b>sp. nov.</b> | CE33777 | NO, Nordland, Andenes, Andøya, Andenes, sea-shore at Damsgård                                                  | 69.3038 N   | 16.0604 E | 06-Sep-2017 | C. Erséus, M. Klinth      | Mid-intertidal between cliffs in <i>Fucus-Ascophyllum</i> zone, pebbles, sand and shells | PP181436              |          | PP168482 |          |          | PP169591 | PP943435 | ZMBN 129381   |
| <i>P. sp.</i> “Denmark”              | CE34810 | DK, Midtjylland, Struer, Oddesund, Griseta Odde, Beach east side                                               | 56.579 N    | 8.566 E   | 16-May-2018 | M. Klinth, Elise Eriksson | Upper intertidal, beach, sand, gravel                                                    | PP181478              |          | PP168514 | PP938496 | PP938486 | PP169619 | PP943450 | SMNH 212154   |
| <i>P. sp.</i> “Denmark”              | CE34811 | DK, Midtjylland, Struer, Oddesund, Griseta Odde, Beach east side                                               | 56.579 N    | 8.566 E   | 16-May-2018 | M. Klinth, Elise Eriksson | Upper intertidal, beach, sand, gravel                                                    | PP181477              |          | PP168513 |          |          | PP169618 | PP943451 | SMNH 212155   |
| <i>P. sp.</i> “Denmark”              | CE34812 | DK, Midtjylland, Struer, Oddesund, Griseta Odde, Beach east side                                               | 56.579 N    | 8.566 E   | 16-May-2018 | M. Klinth, Elise Eriksson | Upper intertidal, beach, sand, gravel                                                    | PP181476              |          | PP168512 |          |          | PP169617 | PP943452 | SMNH 212156   |

Table S1. Continued.

| Species                                 | ID      | Collection locality                                                                                                       | Coordinates |            | Date        | Leg                                                     | Habitat                                                                                                                                                                                       | Genbank Accession No. |          |          |          |          |          |          | Voucher No.            |
|-----------------------------------------|---------|---------------------------------------------------------------------------------------------------------------------------|-------------|------------|-------------|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------|----------|----------|----------|----------|----------|------------------------|
|                                         |         |                                                                                                                           | Lat.        | Long.      |             |                                                         |                                                                                                                                                                                               | COI                   | 12S      | 16S      | 18S      | 28S      | ITS      | H3       |                        |
| <i>P. sp.</i> “Norway”                  | CE29004 | NO, Sör-Tröndelag, Agdenes, Slettvik, Hopavågen Lagoon E of the point near a house                                        | 63.593 N    | 9.54 E     | 05-Sep-2016 | C. Erséus                                               | Pebbly beach, lower intertidal, sand with pebbles                                                                                                                                             | PP181446              | PP938474 | PP168490 | PP938497 | PP938482 | PP169599 | PP943432 | NTNU-VM 74041          |
| <i>P. sp.</i> “Norway”                  | CE34074 | NO, Nordland, Lofoten, Moskenes, Reine, Reinefjorden at Valen (Andöya)                                                    | 67.94 N     | 13.078 E   | 07-Sep-2017 | C. Erséus, M. Klinth                                    | Lower intertidal, pebbles and coarse sand                                                                                                                                                     | PP181493              |          | PP168521 |          |          | PP169626 | PP943431 | ZMBN 129412            |
| <i>P. sp.</i> “Norway”                  | CE34075 | NO, Nordland, Lofoten, Moskenes, Reine, Reinefjorden at Valen (Andöya)                                                    | 67.94 N     | 13.078 E   | 07-Sep-2017 | C. Erséus, M. Klinth                                    | Lower intertidal, pebbles and coarse sand                                                                                                                                                     | PP181458              |          |          |          |          |          |          | ZMBN 129413            |
| <i>P. sp.</i> “Norway”                  | CE34077 | NO, Nordland, Lofoten, Moskenes, Reine, Reinefjorden at Valen (Andöya)                                                    | 67.94 N     | 13.078 E   | 07-Sep-2017 | C. Erséus, M. Klinth                                    | Lower intertidal, pebbles and coarse sand                                                                                                                                                     | PP181472              |          |          |          |          |          |          | ZMBN 157976            |
| <i>P. sp.</i> “Norway”                  | CE34085 | NO, Nordland, Lofoten, Moskenes, Reine, Reinefjorden at Valen (Andöya)                                                    | 67.94 N     | 13.078 E   | 07-Sep-2017 | C. Erséus, M. Klinth                                    | Lower intertidal, pebbles and coarse sand                                                                                                                                                     | PP181497              |          | PP168525 |          |          | PP169630 | PP943433 | ZMBN 153283            |
| <i>P. sp.</i> “Norway”                  | CE34115 | NO, Nordland, Lofoten, Moskenes, Reine, narrow strait between Reinefjorden and Reinevågen at Valen (Andöya), under bridge | 67.94 N     | 13.077 E   | 07-Sep-2017 | C. Erséus, M. Klinth                                    | Subtidal, 1 m, pebbles and shelly sand                                                                                                                                                        | PP181495              |          | PP168523 |          |          | PP169628 | PP943434 | ZMBN 129422            |
| Outgroups                               |         |                                                                                                                           |             |            |             |                                                         |                                                                                                                                                                                               |                       |          |          |          |          |          |          |                        |
| <i>Achaeta bibulba</i>                  | CE1206  | SE, Västergötland, Göteborg, Rya Skog nature reserve                                                                      | 57.6933 N   | 11.8867 E  | 3-Nov-2005  | E. Rota & C. Erséus                                     | Dark brown humic soil under leaf litter, hazel and oak trees                                                                                                                                  | GU902031              | GU901672 | GU901767 | GU901854 | GU901938 | KU894372 | KU894213 | -                      |
| <i>Bryodrilus diverticulata</i>         | CE19814 | NO, Hedmark, Engerdal , Nymoen at Femundelva (Trysilelva) River, at Nordre Husfloen Farm                                  | 61.6569 N   | 11.8164 E  | 15-Aug-2013 | C. Erséus                                               | Moss on stones in tributary stream                                                                                                                                                            | KX618735              | KX618745 | KX618759 | KX618773 | KX618791 | PP168913 | *        | SMNH 155448            |
| <i>Cernosvitoviella minor</i>           | CE838   | SE, Västergötland, Lerum, Kastenhof                                                                                       | 57.7736 N   | 12.2845 E  | 1-Jun-2004  | E. Rota & C. Erséus                                     | Small stream of spring water; alder and lilies, wet muddy sand                                                                                                                                | GU902043              | GU901687 | GU901780 | GU901865 | GU901951 | KU894371 | *        | -                      |
| <i>Christensenidrilus blocki</i>        | CE35374 | Signy Island, base of Factory Bluffs, close to British Antarctic Survey station                                           | 60.72 S     | 45.63 W    | Jun-2011    | Roger Worland                                           | Peat with moss                                                                                                                                                                                | *                     | MZ412951 | MZ412963 | *        | MZ412905 | *        | MZ394816 | SMNH198141             |
| <i>Christensenidrilus blocki</i>        | CE35375 | Signy Island, base of Factory Bluffs, close to British Antarctic Survey station                                           | 60.72 S     | 45.63 W    | Jun-2011    | Roger Worland                                           | Peat with moss                                                                                                                                                                                | *                     | MZ412952 | MZ412964 | MZ412941 | MZ412906 | MZ412917 | MZ394817 | SMNH198142             |
| <i>Christensenidrilus blocki</i>        | CE35376 | Signy Island, base of Factory Bluffs, close to British Antarctic Survey station                                           | 60.72 S     | 45.63 W    | Jun-2011    | Roger Worland                                           | Peat with moss                                                                                                                                                                                | MZ393944              | MZ412953 | MZ412965 | *        | MZ412907 | MZ412918 | MZ394818 | SMNH198143             |
| <i>Claparedrilus semifuscoides</i>      | CE23750 | NO, Nordland, Bognäs, Tysfjorden                                                                                          | 68.2248 N   | 16.0771 E  | 17-Aug-2014 | C. Erséus                                               | Seashore, high-water level decaying seaweeds and under stones                                                                                                                                 | KU894097              | KU862720 | KU862722 | KU862788 | KU862822 | KU894287 | KU894215 | ZMBN 107908            |
| <i>Claparedrilus torquatus</i> sp. nov. | CE23134 | NO, Troms, Nordreisa, Rotsundselv, near abandoned small foodstore building on road E6                                     | 69.8 N      | 20.716 E   | 14-Aug-2014 | C. Erséus                                               | Seashore, upper intertidal (upper end of <i>Ascophyllum</i> zone), sand with smell of hydrogen sulfide                                                                                        | PP180384              | *        | PP167688 | PP938498 | PP938479 | PP169064 | PP944281 | ZMBN 110970            |
| <i>Claparedrilus torquatus</i> sp. nov. | CE23153 | NO, Troms, Nordreisa, Rotsundselv, near abandoned small foodstore building on road E6                                     | 69.8 N      | 20.716 E   | 14-Aug-2014 | C. Erséus                                               | Seashore, upper intertidal (upper end of <i>Ascophyllum</i> zone), sand with smell of hydrogen sulfide                                                                                        | PP180383              |          | PP167687 |          |          | PP169063 | PP944282 | ZMBN 110972            |
| <i>Cognettia cognettii</i>              | CE1042  | SE, Halland, Laholm, Hallandsåsen, Fladalt                                                                                | 56.3686 N   | 13.1325 E  | 31-May-2005 | E. Rota, P. De Wit, L. Matamoros, A. Ansebo & C. Erséus | Mixed forest of <i>Alnus</i> and rowan (dominant), birch, spruce, ground covered by grass, <i>Vaccinium</i> , moss, fern, <i>Trientalis europea</i> , near stream, moist leaf litter and soil | GU902044              | GU901688 | GU901781 | GU901866 | GU901952 | KF672508 | KF672469 | SMNH 108410            |
| <i>Enchytronia parva</i>                | CE806   | SE, Västergötland, Alingsås, near lake Anten                                                                              | 57.9941 N   | 12.4740 E  | 22-May-2004 | E. Rota & C. Erséus                                     | Forest floor on slope, hazel, oak, moist sandy brown soil                                                                                                                                     | GU902056              | GU901702 | GU901794 | GU901879 | GU901965 | MZ412938 | MN248703 | -                      |
| <i>Grania crassiducta</i>               | CE573   | AU, Western Australia, Esperence, S of Duke of Orleans Bay, near Nares Island, subtidal, 0.5 m                            | 33.9360 S   | 122.5907 W | 17-Feb-2003 | H.-Z. Wang                                              | Muddy coarse sand                                                                                                                                                                             | GU902184              | GU902117 | GU902130 | GU902144 | GU902157 | GU902170 | KU894222 | -                      |
| <i>Grania galbina</i>                   | CE258   | New Caledonia, Loyalty Islands, Lifou, Baie Chateaubriand, Traput (SW of Wé)                                              | 56.92 S     | 167.30 E   | 20-Nov-2000 | C. Erséus                                               | Reef platform, fine to coarse sand                                                                                                                                                            | GU902078              | GU901724 | GU901816 | GU901901 | GU901987 | GU902172 | KU894223 | SMNH 108218 (topotype) |
| <i>Grania ovitheca</i>                  | CE699   | SE, Bohuslän, Strömstad, Kosterfjorden                                                                                    | 58.89 N     | 11.10 E    | 17-Nov-2003 | E. Sjölin & C. Erséus                                   | 4-20 m, shell sand                                                                                                                                                                            | GU473675              | GU902120 | GU902134 | GU902148 | GU90216  | GU473685 | MZ394837 | -                      |
| <i>Grania pusilla</i>                   | CE698   | SE, Bohuslän, Strömstad, Kosterfjorden                                                                                    | 58.88 N     | 11.10 E    | 19-Nov-2003 | E. Sjölin & C. Erséus                                   | 40-200 m, clayey sand                                                                                                                                                                         | GU473676              | GU902122 | GU902136 | GU902150 | GU902163 | GU473684 | KU894278 | -                      |
| <i>Grania variochaeta</i>               | CE547   | SE, Bohuslän, Strömstad, Kosterfjorden                                                                                    | 58.89 N     | 11.10 E    | 15-Nov-2002 | C. Erséus                                               | Subtidal shell sand                                                                                                                                                                           | GU473681              | KU862690 | KU862787 | KU862820 | KU862821 | GU473683 | KU894221 | -                      |
| <i>Globulidrilus riparius</i>           | CE2922  | SE, Öland, Borgholm, E of Egby, at Mellösavik, edge of small pond located at sharp bend of road                           | 56.8621 N   | 16.8539 E  | 12-Jun-2013 | Anna Ansebo, Lisa Matamoros, C. Erséus                  | Wet sandy soil                                                                                                                                                                                | KX618732              | KX618743 | KX618762 | KX618770 | KX618800 | PP955315 | MH382740 | SMNH 155450            |

Table S1. Continued.

| Species                         | ID      | Collection locality                                         | Coordinates |           | Date        | Leg                                                     | Habitat                                                                                                                                                                                       | Genbank Accession No. |          |          |          |          |          |          | Voucher No.            |
|---------------------------------|---------|-------------------------------------------------------------|-------------|-----------|-------------|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------|----------|----------|----------|----------|----------|------------------------|
|                                 |         |                                                             | Lat.        | Long.     |             |                                                         |                                                                                                                                                                                               | COI                   | 12S      | 16S      | 18S      | 28S      | ITS      | H3       |                        |
| <i>Henlea ventriculosa</i>      | CE1021  | SE, Bohuslän, Lysekil, Ingalsröd near Färlevsfjorden        | 58.4333 N   | 11.58 E   | 26-May-2005 | E. Rota, P. De Wit, L. Matamoros, A. Ansebo & C. Erséus | Black soil, one barely humid sample covered by grass, another sample from under dry sand                                                                                                      | GU902085              | GU901734 | GU901825 | GU901910 | GU901996 | KU894285 | KU894281 | SMNH 108422            |
| <i>Marionina aestuum</i>        | CE12477 | South Georgia, Cumberland East Bay, Corral Bay              | 54.3023 S   | 36.3768 W | 7-Dec-2010  | Paul Brewin & Alison Massey                             | Intertidal, 4 m up shore from low tide                                                                                                                                                        | MZ393958              | MZ412959 | MZ412971 | MZ412947 | MZ412913 | MZ412932 | MZ394832 | SMNH 198154            |
| <i>Marionina argentea</i>       | CE807   | SE, Västergötland, Lerum, Aspenäs, south east of Rammberget | 57.7705 N   | 12.2251 E | 25-May-2004 | E. Rota & C. Erséus                                     | Alder and <i>Mercurialis perennis</i> , soil with some sandy clay and sand                                                                                                                    | GU902092              | GU901741 | GU901832 | GU901917 | GU902004 | JN799850 | MZ394838 | -                      |
| <i>Marionina communis</i>       | CE811   | SE, Västergötland, Skara, Drottningkullen Hill              | 58.4024 N   | 13.6411 E | 26-May-2004 | E. Rota & C. Erséus                                     | Brown soil                                                                                                                                                                                    | GU902098              | GU901748 | GU901839 | GU901923 | GU902011 | KU894286 | KU894216 | -                      |
| <i>Marionina filiformis</i>     | CE1040  | SE, Halland, Laholm, Hallandsåsen, Fladalt                  | 56.3686 N   | 13.1325 E | 31-May-2005 | E. Rota, P. De Wit, L. Matamoros, A. Ansebo & C. Erséus | Mixed forest of <i>Alnus</i> and rowan (dominant), birch, spruce, ground covered by grass, <i>Vaccinium</i> , moss, fern, <i>Trientalis europea</i> , near stream, moist leaf litter and soil | GU902099              | GU901749 | GU901840 | GU901924 | GU902012 | MZ412939 | MZ394839 | SMNH 108415 (topotype) |
| <i>Marionina fusca</i>          | CE12475 | South Georgia, Cumberland East Bay, Corral Bay              | 54.3023 S   | 36.3768 W | 7-Dec-2010  | Paul Brewin & Alison Massey                             | Intertidal, 4 m up shore from low tide                                                                                                                                                        | *                     | -        | -        | -        | -        | MZ412933 | MZ394833 | SMNH Type Coll. 9311   |
| <i>Marionina fusca</i>          | CE12476 | South Georgia, Cumberland East Bay, Corral Bay              | 54.3023 S   | 36.3768 W | 7-Dec-2010  | Paul Brewin & Alison Massey                             | Intertidal, 4 m up shore from low tide                                                                                                                                                        | MZ393959              | MZ412960 | MZ412972 | MZ412948 | MZ412914 | MZ412934 | MZ394834 | SMNH Type Coll. 9312   |
| <i>Marionina fusca</i>          | CE12478 | South Georgia, Cumberland East Bay, Corral Bay              | 54.3023 S   | 36.3768 W | 7-Dec-2010  | Paul Brewin & Alison Massey                             | Intertidal, 4 m up shore from low tide                                                                                                                                                        | *                     | -        | -        | -        | -        | MZ412935 | MZ394835 | SMNH Type Coll. 9313   |
| <i>Marionina spicula</i>        | CE2561  | SE, Saltholmen, Västergötland, Göteborg, Saltholmen         | 57.6631 N   | 11.8516 E | 7-Jun-2007  | C. Erséus                                               | Supralittoral, upper part of narrow zone of marsh-like vegetation, roots and brown soil                                                                                                       | KX618730              | KX618755 | KX618763 | KX618769 | KX618802 | MZ412940 | KX644887 | SMNH 155451            |
| <i>Marionina</i> sp. “Snow Is.” | CE34647 | Antarctica, South Shetland Islands, Snow Island             | 62.7753 S   | 61.2858 W | 15-Jan-2015 | Karla Paresque                                          | Algae scraped off rocks in intertidal zone                                                                                                                                                    | MZ393960              | MZ412961 | MZ412973 | MZ412949 | MZ412915 | MZ412936 | MZ394836 | SMNH198155             |
| <i>Marionina</i> sp. “Snow Is.” | CE34648 | Antarctica, South Shetland Islands, Snow Island             | 62.7753 S   | 61.2858 W | 15-Jan-2015 | Karla Paresque                                          | Algae scraped off rocks in intertidal zone                                                                                                                                                    | MZ393961              | MZ412962 | MZ412974 | MZ412950 | MZ412916 | MZ412937 | *        | SMNH198156             |
| <i>Mesenchytraeus flavus</i>    | CE847   | SE, Västergötland, Lerum, Solås                             | 57.7780 N   | 12.2533 E | 1-Jun-2004  | E. Rota & C. Erséus                                     | Mixed deciduous forest (aspen, oak, hazel, rowan, maple, etc.) with <i>Anemone nemorosa</i> , moist, loose silty-sandy, brown soil, under grass                                               | GU902100              | GU901752 | GU901843 | GU901926 | GU902015 | KF672545 | KU894212 | -                      |

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