Table S1. Sequences obtained from online databases and used in the molecular phylogenetic analysis.

| Species name | Process ID | Accession No. | Sex | Locality | Reference |
| --- | --- | --- | --- | --- | --- |
| *Nemophora degeerella* | NLLEA497-12 | KX048634 |  | Netherlands | Mutanen *et al.* 2016 |
| *Nemophora degeerella* | NLLEA741-12 | KX049191 |  | Netherlands | Mutanen *et al.* 2016 |
| *Nemophora degeerella* | DEEUR1022-16 |  |  | Germany | Ratnasingham & Hebert 2007 |
| *Nemophora degeerella* | CGUKB088-09 |  |  | United Kingdom | Ratnasingham & Hebert 2007 |
| *Nemophora degeerella* | LEFID582-10 | HM873347 | F | Finland | Unpublished |
| *Nemophora degeerella* | CGUKC763-09 |  |  | United Kingdom | Ratnasingham & Hebert 2007 |
| *Nemophora degeerella* | LEFIE624-10 | HM874347 |  | Finland | Unpublished |
| *Nemophora scopolii* | FBLMU253-09 | GU707081 | M | Germany | Unpublished |
| *Nemophora scopolii* | FBLMU444-09 | GU707093 |  | Germany | Unpublished |
| *Nemophora scopolii* | DEPAL174-20 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nemophora scopolii* | LEATE573-13 | KX061970 |  | Italy | Kozlov *et al.* 2017 |
| *Nemophora scopolii* | PHLAI684-13 | KX061985 |  | Austria | Kozlov *et al.* 2017 |
| *Nemophora chalybeella* | LTOLB809-11 | KF523807 |  | South Korea | Unpublished |
| *Nemophora amatella* | LEFIG444-10 | HM876120 |  | Finland | Unpublished |
| *Nemophora amatella* | LEFIJ5443-16 | MZ610153 |  | Finland | Roslin *et al.* 2022 |
| *Nemophora amatella* | LEFIE864-10 | HM874582 |  | Finland | Unpublished |
| *Nemophora amatella* | LEFIG647-10 | HM876310 | M | Finland | Unpublished |
| *Nemophora amatella* | LEFIB229-10 | HM871132 |  | Finland | Unpublished |
| *Nemophora amatella* | LEFIG646-10 | HM876309 |  | Finland | Unpublished |
| *Nemophora bellela* | LEPVM198-13 |  |  | Norway | Ratnasingham & Hebert 2007 |
| *Nemophora bellela* | LEFIK488-10 | JF854097 |  | Finland | Unpublished |
| *Nemophora bellela* | LON2637-15 |  |  | Norway | Ratnasingham & Hebert 2007 |
| *Nemophora bellela* | LON2638-15 |  |  | Norway | Ratnasingham & Hebert 2007 |
| *Nemophora bellela* | LEFIA788-10 | HM386929 |  | Finland | Unpublished |
| *Nemophora bellela* | LEFIJ2422-14 | MZ609817 | I | Finland | Roslin *et al.* 2022 |
| *Nemophora congruella* | FBLMU290-09 | HM902043 | M | Germany | Unpublished |
| *Nemophora congruella* | LEATI349-15 |  |  | Austria | Huemer & Hebert 2016 |
| *Nemophora ochsenheimerella* | FBLMU293-09 | HM902044 | F | Germany | Unpublished |
| *Nemophora ochsenheimerella* | FBLMT548-09 | HM422129 | F | Germany | Unpublished |
| *Nemophora ochsenheimerella* | LEATC523-13 | KP253585 |  | Austria | Unpublished |
| *Nemophora ochsenheimerella* | FBLMW209-10 | JN261649 | F | Germany | Unpublished |
| *Nemophora ochsenheimerella* | LEEUA033-11 | JN261650 |  | Denmark | Unpublished |
| *Nemophora* sp. | LNOUD2421-12 | MH418099 |  | Madagascar | Lopez-Vaamonde *et al.* 2019 |
| *Nemophora* sp. | MADAM182-15 | MH417254 |  | Madagascar | Lopez-Vaamonde *et al.* 2019 |
| *Nemophora fasciella* | PHLAF560-11 |  |  | France | Ratnasingham & Hebert 2007 |
| *Nemophora fasciella* | PHLAF552-11 |  |  | France | Ratnasingham & Hebert 2007 |
| *Nemophora minimella* | LEATC538-13 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nemophora* sp. | GMGMK882-14 |  |  | Germany | Ratnasingham & Hebert 2007 |
| *Nemophora* sp. | GMGMK898-14 |  |  | Germany | Ratnasingham & Hebert 2007 |
| *Nemophora cupriacella* | LEFIL243-10 | JF854548 |  | Finland | Unpublished |
| *Nemophora raddaella* | PHLAF548-11 |  |  | France | Ratnasingham & Hebert 2007 |
| *Nemophora pfeifferella* | PHLAF553-11 |  |  | France | Ratnasingham & Hebert 2007 |
| *Nemophora metallica* | LEFID606-10 | HM873371 | M | Finland | Unpublished |
| *Nemophora metallica* | LEFID607-10 | HM873372 | M | Finland | Unpublished |
| *Nemophora metallica* | PHLAF547-11 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nemophora metallica* | PHLAV195-12 | KM573376 |  | Austria | Huemer *et al.* 2014 |
| *Nemophora* sp. | ANICF717-10 | HQ922256 |  | Australia | Hebert *et al.* 2013 |
| *Nemophora topazias* | ANICF712-10 | JF840364 |  | Australia | Hebert *et al.* 2013 |
| *Nemophora topazias* | ANICF711-10 | JF840363 |  | Australia | Hebert *et al.* 2013 |
| *Nemophora topazias* | PHLCC1344-12 |  |  | Australia | Ratnasingham & Hebert 2007 |
| *Nematopogon prolai* | LEASU1159-18 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon prolai* | LEAST1537-18 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nemophora smaragdaspis* | SaY441 | ON256889 | M | Japan | Hirowatari *et al.* 2022 |
| *Nemophora rubrofascia* | SaY541 | ON256890 | M | Japan | Hirowatari *et al.* 2022 |
| *Nemophora chrysoprasias* | SaY456 | ON256892 | M | China | Hirowatari *et al.* 2022 |
| *Nemophora chrysoprasias* | SaY540 | ON256891 | F | China | Hirowatari *et al.* 2022 |
| *Nematopogon adansoniella* | PHLAD501-11 | JN307345 |  | Italy | Unpublished |
| *Nematopogon adansoniella* | LEASS827-17 |  |  | Greece | Ratnasingham & Hebert 2007 |
| *Nematopogon adansoniella* | LEATJ1437-16 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nematopogon adansoniella* | LEAST1392-17 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon adansoniella* | LEASU530-18 |  |  | Montenegro | Ratnasingham & Hebert 2007 |
| *Nematopogon adansoniella* | LEASS828-17 |  |  | Greece | Ratnasingham & Hebert 2007 |
| *Nematopogon adansoniella* | FBLMZ206-12 | KX045595 | M | Germany | Mutanen *et al.* 2016 |
| *Nematopogon adansoniella* | NLLEA1374-14 |  |  | Netherlands | Ratnasingham & Hebert 2007 |
| *Nematopogon adansoniella* | NLLEA117-12 | KX049078 |  | Netherlands | Mutanen *et al.* 2016 |
| *Nematopogon adansoniella* | NLLEA119-12 | KX049659 |  | Netherlands | Mutanen *et al.* 2016 |
| *Nematopogon adansoniella* | NLLEA120-12 | KX049469 |  | Netherlands | Mutanen *et al.* 2016 |
| *Nematopogon adansoniella* | NLLEA116-12 | KX048872 |  | Netherlands | Mutanen *et al.* 2016 |
| *Nematopogon adansoniella* | NLLEA118-12 | KX048543 |  | Netherlands | Mutanen *et al.* 2016 |
| *Nematopogon adansoniella* | PHLAD502-11 | JN307346 |  | Italy | Unpublished |
| *Nematopogon garganellus* | LEALT277-16 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon garganellus* | LEALT278-16 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon garganellus* | LEALT273-16 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon garganellus* | LEALT275-16 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon garganellus* | LEALT272-16 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon garganellus* | LEALT274-16 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon garganellus* | LEALT276-16 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon robertella* | NOEGE365-18 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nematopogon robertella* | PHLAE043-11 | JN307388 |  | Austria | Unpublished |
| *Nematopogon robertella* | FBLMW483-10 | HQ563615 | F | Germany | Unpublished |
| *Nematopogon robertella* | PHLAA514-09 | HM381396 |  | Austria | Unpublished |
| *Nematopogon robertella* | LEATB266-13 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nematopogon robertella* | PHLAC030-10 | JF859656 |  | Italy | Huemer & Hebert 2012 |
| *Nematopogon robertella* | PHLAV103-12 | KM572521 |  | Austria | Huemer *et al.* 2014 |
| *Nematopogon robertella* | LEFID203-10 | HM873006 |  | Finland | Huemer *et al.* 2014 |
| *Nematopogon robertella* | LON2650-15 |  |  | Norway | Ratnasingham & Hebert 2007 |
| *Nematopogon robertella* | LON1273-14 |  | M | Norway | Ratnasingham & Hebert 2007 |
| *Nematopogon robertella* | LEFIG230-10 | HM875909 |  | Finland | Huemer *et al.* 2014 |
| *Nematopogon robertella* | LEFIC079-10 | HM871947 |  | Finland | Huemer *et al.* 2014 |
| *Nematopogon robertella* | GMFIM243-13 | KM573039 |  | Finland | Huemer *et al.* 2014 |
| *Nematopogon robertella* | PHLAC138-10 | JF859757 |  | Italy | Huemer & Hebert 2012 |
| *Nematopogon sericinellus* | LEALT282-16 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon sericinellus* | LEALT283-16 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon sericinellus* | LEALT284-16 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon stenochlora* | LEEUA341-11 | KX047895 |  | Spain | Mutanen *et al.* 2016 |
| *Nematopogon stenochlora* | LEASU1160-18 |  |  | Spain | Ratnasingham & Hebert 2007 |
| *Nematopogon stenochlora* | LEASU1161-18 |  |  | Spain | Ratnasingham & Hebert 2007 |
| *Nematopogon swammerdamella* | LEATB263-13 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nematopogon swammerdamella* | PHLAD758-11 | JN307370 |  | Italy | Huemer & Hebert 2012 |
| *Nematopogon swammerdamella* | LEATF315-14 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nematopogon swammerdamella* | LEATB262-13 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nematopogon swammerdamella* | PHLAC343-10 | JF859928 |  | Italy | Huemer & Hebert 2012 |
| *Nematopogon swammerdamella* | FBLMW226-10 | HQ563487 | M | Germany | Unpublished |
| *Nematopogon swammerdamella* | LEPVM003-12 |  |  | Norway | Ratnasingham & Hebert 2007 |
| *Nematopogon swammerdamella* | LEFIF929-10 | HM875611 |  | Finland | Huemer *et al.* 2014 |
| *Nematopogon swammerdamella* | LEFIG140-10 | HM875820 |  | Finland | Huemer *et al.* 2014 |
| *Nematopogon swammerdamella* | LON1341-14 |  |  | Norway | Ratnasingham & Hebert 2007 |
| *Nematopogon swammerdamella* | LON1342-14 |  |  | Norway | Ratnasingham & Hebert 2007 |
| *Nematopogon swammerdamella* | ODOPE086-11 | KX040513 | M | Germany | Mutanen *et al.* 2016 |
| *Nematopogon swammerdamella* | FBLMT559-09 | GU706718 | F | Germany | Ratnasingham & Hebert 2007 |
| *Nematopogon swammerdamella* | PHLAV101-12 | KM572853 |  | Austria | Huemer *et al.* 2014 |
| *Nematopogon swammerdamella* | FBLMW222-10 | HQ563483 | F | Germany | Unpublished |
| *Nematopogon swammerdamella* | LON1343-14 |  |  | Norway | Ratnasingham & Hebert 2007 |
| *Nematopogon swammerdamella* | CGUKC897-09 |  |  | United Kingdom | Ratnasingham & Hebert 2007 |
| *Nematopogon swammerdamella* | NLLEA1338-14 |  |  | Netherlands | Ratnasingham & Hebert 2007 |
| *Nematopogon swammerdamella* | CGUKD581-09 | KX044173 |  | United Kingdom | Mutanen *et al.* 2016 |
| *Nematopogon swammerdamella* | LEPVM395-14 |  |  | Norway | Ratnasingham & Hebert 2007 |
| *Nematopogon swammerdamella* | LEFIA1243-10 | GU828715 |  | Finland | Mutanen *et al.* 2010 |
| *Nematopogon swammerdamella* | PHLAC051-10 | JF859674 |  | Italy | Huemer & Hebert 2012 |
| *Nematopogon swammerdamella* | DEEUR1168-17 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nematopogon swammerdamella* | DEEUR1167-17 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nematopogon swammerdamellus* |  | KC559517 |  | Finland | Malm *et al.* 2013 |
| *Nematopogon argentellus* | LEALT279-16 |  |  | France | Ratnasingham & Hebert 2007 |
| *Nematopogon argentellus* | LEALT280-16 |  |  | France | Ratnasingham & Hebert 2007 |
| *Nematopogon argentellus* | LEALT281-16 |  |  | France | Ratnasingham & Hebert 2007 |
| *Nematopogon pilella* | LEFIJ061-10 | KM573238 |  | Finland | Huemer *et al.* 2014 |
| *Nematopogon pilella* | LEATB252-13 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nematopogon pilella* | LEATJ724-15 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon pilella* | LEATJ725-15 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon pilella* | FBLMW225-10 | HQ563486 | M | Germany | Unpublished |
| *Nematopogon pilella* | LEFIE247-10 | HM873981 | F | Finland | Huemer *et al.* 2014 |
| *Nematopogon pilella* | LEFIJ237-10 | JF853482 |  | Finland | Huemer *et al.* 2014 |
| *Nematopogon pilella* | LON2646-15 |  |  | Norway | Ratnasingham & Hebert 2007 |
| *Nematopogon pilella* | FBLMW221-10 | HQ563482 | F | Germany | Unpublished |
| *Nematopogon pilella* | LEASU1167-18 | MW378677 |  | France | Huemer & Van Nieukerken 2021 |
| *Nematopogon pilella* | LEASU765-18 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nematopogon pilella* | LEATC526-13 | KM573440 |  | Austria | Huemer *et al.* 2014 |
| *Nematopogon pilella* | NOEGE511-18 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nematopogon metaxella* | LEFIG294-10 | HM875973 |  | Finland | Unpublished |
| *Nematopogon metaxella* | FBLMU098-09 | GU707203 | M | Germany | Unpublished |
| *Nematopogon metaxella* | LEATI099-15 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nematopogon metaxella* | LEATC499-13 | KP253419 |  | Austria | Huemer & Hebert 2015 |
| *Nematopogon metaxella* | ABOLB336-15 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nematopogon metaxella* | CGUKC768-09 |  |  | United Kingdom | Ratnasingham & Hebert 2007 |
| *Nematopogon metaxella* | CGUKD582-09 | KX043166 |  | United Kingdom | Mutanen *et al.* 2016 |
| *Nematopogon metaxella* | LON4330-16 |  | M | Norway | Ratnasingham & Hebert 2007 |
| *Nematopogon metaxella* | LEFIC300-10 | HM872144 |  | Finland | Unpublished |
| *Nematopogon metaxella* | PHLAI802-13 |  |  | Austria | Huemer & Hebert 2016 |
| *Nematopogon schwarziellus* | CGUKC734-09 |  |  | United Kingdom | Ratnasingham & Hebert 2007 |
| *Nematopogon schwarziellus* | CGUKC915-09 |  |  | United Kingdom | Ratnasingham & Hebert 2007 |
| *Nematopogon schwarziellus* | FBLMT558-09 | GU706716 | M | Germany | Unpublished |
| *Nematopogon schwarziellus* | LASTS781-15 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon schwarziellus* | LEATI133-15 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon schwarziellus* | LEFIE814-10 | HM874533 |  | Finland | Huemer *et al.* 2014 |
| *Nematopogon schwarziellus* | PHLAJ470-14 |  |  | Italy | Ratnasingham & Hebert 2007 |
| *Nematopogon schwarziellus* | LON5908-17 |  |  | Norway | Ratnasingham & Hebert 2007 |
| *Nematopogon schwarziellus* | NOEGE368-18 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nematopogon schwarziellus* | FBLMT373-09 | HQ955169 | M | Germany | Unpublished |
| *Nematopogon schwarziellus* | FBLMT554-09 | GU706715 | M | Germany | Unpublished |
| *Nematopogon schwarziellus* | FBLMW220-10 | HQ563481 | M | Germany | Unpublished |
| *Nematopogon schwarziellus* | LEATB265-13 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nematopogon schwarziellus* | LEATF262-14 |  |  | Austria | Ratnasingham & Hebert 2007 |
| *Nematopogon schwarziellus* | LEFIG169-10 | HM875849 |  | Finland | Huemer *et al.* 2014 |
| *Nematopogon schwarziellus* | LEFIJ145-10 | JF853458 |  | Finland | Huemer *et al.* 2014 |
| *Nematopogon schwarziellus* | LON1205-14 |  | M | Norway | Ratnasingham & Hebert 2007 |
| *Nematopogon schwarziellus* | LON2647-15 |  |  | Norway | Ratnasingham & Hebert 2007 |
| *Nematopogon schwarziellus* | PHLAE042-11 | JN307387 |  | Austria | Unpublished |
| *Nematopogon schwarziellus* | PHLAG800-12 | KM573016 |  | Austria | Huemer *et al.* 2014 |
| *Nematopogon schwarziellus* | FBLMW223-10 | HQ563484 | M | Germany | Unpublished |
| *Nematopogon schwarziellus* | ODOPE024-11 | KX040795 | M | Germany | Mutanen *et al.* 2016 |
| *Nematopogon schwarziellus* | LON2690-16 |  | M | Norway | Ratnasingham & Hebert 2007 |
| *Nematopogon schwarziellus* | PHLAV102-12 | KM572011 |  | Austria | Huemer *et al.* 2014 |
| *Nematopogon magna* | LEFIE171-10 | HM873917 |  | Finland | Unpublished |
| *Nematopogon magna* | LEFIE251-10 | HM873985 | M | Finland | Unpublished |
| *Nematopogon magna* | LON2648-15 |  |  | Norway | Ratnasingham & Hebert 2007 |
| *Nematopogon magna* | LEFIB969-10 | HM871843 |  | Finland | Unpublished |
| *Nematopogon magna* | LEFIB581-10 | HM871461 |  | Finland | Unpublished |
| *Vespina meridiana* | LCQ806 | ON321861 |  | Japan | Liao *et al.* 2023 |
| *Incurvaria* sp. | LCQ807 | ON321875 |  | Japan | Liao *et al.* 2023 |
| *Paraclemensia caerulea* | LCQ809 | ON321863 |  | Japan | Liao *et al.* 2023 |

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