Journal of Helminthology

*Fasciola hepatica* in Brazil: genetic diversity provides insights of its origin and geographic dispersion

Jéssyca Bressan Schwantes 1, 2; Pedro de Souza Quevedo 3; Marícia Fantinel D’Ávila 2; Marcelo Beltrão Molento 4; Daniel Angelo Sganzerla Graichen 1, 2

Table S1. *Fasciola hepatica* samples with their respective geographic, haplotypic and GenBank accession numbers.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| State | N | City | Number of the sample | Haplotype of COI | Haplotype of nad1 | Genbank COI | Genbanknad1 |
| Rio Grande do Sul |  | Arroio Grande | 1 | COI\_1 | NAD\_1 | MK838613 | MK838688 |
|  | Arroio Grande | 2 | COI\_1 | NAD\_1 | MK838614 | MK838689 |
|  | Arroio Grande | 3 | COI\_1 | NAD\_1 | MK838615 | MK838690 |
|  | Arroio Grande | 4 | COI\_1 | NAD\_1 | MK838616 | MK838691 |
|  | Arroio Grande | 5 | COI\_2 | NAD\_1 | MK838617 | MK838692 |
|  | Arroio Grande | 6 | COI\_9 | NAD\_2 | MK838618 | MK838693 |
|  | Arroio Grande | 7 | COI\_1 | NAD\_3 | MK838619 | MK838694 |
|  | Arroio Grande | 9 | COI\_1 | NAD\_4 | MK838620 | MK838695 |
|  | Arroio Grande | 10 | COI\_2 | NAD\_5 | MK838621 | MK838696 |
|  | Camaquã | 138 | COI\_3 |  | MK838622 |  |
|  | Camaquã | 139 | COI\_1 | NAD\_6 | MK838623 | MK838697 |
|  | Camaquã | 141 |  | NAD\_7 |  | MK838698 |
|  | Camaquã | 142 | COI\_1 | NAD\_7 | MK838624 | MK838699 |
|  | Camaquã | 145 | COI\_2 |  | MK838625 |  |
|  | Camaquã | 146 | COI\_1 | NAD\_7 | MK838626 | MK838700 |
|  | Canguçu | 22 | COI\_6 | NAD\_8 | MK838627 | MK838701 |
|  | Canguçu | 23 | COI\_6 |  | MK838628 |  |
|  | Canguçu | 24 |  | NAD\_1 |  | MK838702 |
|  | Santa Vitória do Palmar | 177 | COI\_4 | NAD\_1 | MK838629 | MK838749 |
|  | Santa Vitória do Palmar | 178 | COI\_1 | NAD\_7 | MK838630 | MK838750 |
|  | Santa Vitória do Palmar | 179 | COI\_1 | NAD\_7 | MK838631 | MK838751 |
|  | Santa Vitória do Palmar | 180 | COI\_1 | NAD\_7 | MK838632 | MK838752 |
|  | Santa Vitória do Palmar | 181 | COI\_1 | NAD\_7 | MK838633 | MK838753 |
|  | Santa Vitória do Palmar | 182 | COI\_1 | NAD\_7 | MK838634 | MK838754 |
|  | Pejuçara | 195 | COI\_1 | NAD\_1 | MK838635 | MK838733 |
|  | Pejuçara | 196 | COI\_1 |  | MK838636 |  |
|  | Pejuçara | 197 | COI\_1 | NAD\_1 | MK838637 | MK838734 |
|  | Pejuçara | 199 | COI\_1 | NAD\_1 | MK838638 | MK838735 |
|  | Pejuçara | 200 | COI\_1 | NAD\_1 | MK838639 | MK838736 |
|  | Pejuçara | 201 | COI\_1 | NAD\_1 | MK838640 | MK838737 |
|  | São Borja | 202 | COI\_1 | NAD\_1 | MK838641 | MK838757 |
|  | São Borja | 203 | COI\_5 | NAD\_24 | MK838642 | MK838758 |
|  | São Borja | 204 | COI\_1 | NAD\_1 | MK838643 | MK838759 |
|  | São Borja | 205 | COI\_1 | NAD\_1 | MK838644 | MK838760 |
|  | São Borja | 213 | COI\_1 | NAD\_1 | MK838645 | MK838761 |
|  | São Borja | 220 | COI\_5 |  | MK838646 |  |
|  | São Borja | 221 | COI\_1 | NAD\_1 | MK838647 | MK838762 |
|  | São Borja | 223 | COI\_1 | NAD\_1 | MK838648 | MK838763 |
|  | São Borja | 259 | COI\_1 |  | MK838659 |  |
|  | São Borja | 260 | COI\_1 | NAD\_1 | MK838660 | MK838764 |
|  | São Borja | 261 | COI\_1 | NAD\_1 | MK838661 | MK838765 |
|  | São Borja | 262 | COI\_5 | NAD\_24 | MK838662  | MK838766 |
|  | Palmeira das Missões | 229 | COI\_1 |  | MK838649 |  |
|  | Palmeira das Missões | 230 | COI\_1 | NAD\_1 | MK838650 | MK838727 |
|  | Palmeira das Missões | 231 | COI\_1 | NAD\_1 | MK838651 | MK838728 |
|  | Palmeira das Missões | 232 | COI\_1 | NAD\_1 | MK838652 | MK838729 |
|  | Palmeira das Missões | 233 | COI\_1 | NAD\_1 | MK838653 | MK838730 |
|  | Palmeira das Missões | 234 | COI\_1 | NAD\_1 | MK838654 | MK838731 |
|  | Palmeira das Missões | 235 | COI\_1 | NAD\_18 | MK838655 | MK838732 |
|  | Santa Barbara do Sul | 249 | COI\_1 | NAD\_20 | MK838656 | MK838743 |
|  | Santa Barbara do Sul | 250 |  | NAD\_1 |  | MK838744 |
|  | Santa Barbara do Sul | 251 |  | NAD\_7 |  | MK838745 |
|  | Santa Barbara do Sul | 252 |  | NAD\_7 |  | MK838746 |
|  | Santa Barbara do Sul | 253 | COI\_1 | NAD\_21 | MK838657 | MK838747 |
|  | Santa Barbara do Sul | 254 | COI\_1 | NAD\_22 | MK838658 | MK838748 |
|  | Ijuí | 278 | COI\_1 | NAD\_16 | MK838663 | MK838715 |
|  | Júlio de Castilhos | 285 | COI\_1 | NAD\_7 | MK838664 | MK838716 |
|  | Júlio de Castilhos | 288 | COI\_1 |  | MK838665 |  |
|  | Júlio de Castilhos | 289 | COI\_1 |  | MK838666 |  |
|  | Júlio de Castilhos | 290 | COI\_1 | NAD\_17 | MK838667 | MK838717 |
|  | Júlio de Castilhos | 291 | COI\_1 | NAD\_1 | MK838668 | MK838718 |
|  | Júlio de Castilhos | 292 | COI\_5 | NAD\_1 | MK838669 | MK838719 |
|  | Júlio de Castilhos | 293 | COI\_1 | NAD\_7 | MK838670 | MK838720 |
|  | Herval | 314 |  | NAD\_10 |  | MK838707 |
|  | Herval | 316 |  | NAD\_11 |  | MK838708 |
|  | Herval | 317 |  | NAD\_12 |  | MK838709 |
|  | Herval | 318 |  | NAD\_13 |  | MK838710 |
|  | Herval | 319 | COI\_1 | NAD\_14 | MK838678 | MK838711 |
|  | Herval | 320 |  | NAD\_15 |  | MK838712 |
|  | Herval | 321 |  | NAD\_13 |  | MK838713 |
|  | Herval | 322 |  | NAD\_7 |  | MK838714 |
|  | Santo Cristo | 358 | COI\_1 | NAD\_1 | MK838681 | MK838755 |
|  | Santo Cristo | 359 | COI\_1 | NAD\_23 | MK838682 | MK838756 |
|  | Santo Cristo | 360 | COI\_5 |  | MK838683 |  |
|  | Santo Cristo | 361 | COI\_1 |  | MK838684 |  |
|  | Pelotas | 71 | COI\_10 | NAD\_7 | MK838685 | MK838738 |
|  | Pelotas | 73 |  | NAD\_19 |  | MK838739 |
|  | Pelotas | 77 | COI\_1 | NAD\_7 | MK838686 | MK838740 |
|  | Pelotas | 78 | COI\_1 | NAD\_1 | MK838687 | MK838741 |
|  |  | Pelotas | 93 |  | NAD\_1 |  | MK838742 |
| Paraná |  | Curitiba | 297 | COI\_7 | NAD\_9 | MK838671 | MK838703 |
|  | Curitiba | 298 | COI\_7 | NAD\_7 | MK838672 | MK838704 |
|  | Curitiba | 299 | COI\_6 |  | MK838673 |  |
|  | Curitiba | 300 | COI\_7 | NAD\_7 | MK838674 | MK838705 |
|  | Curitiba | 332 | COI\_1 |  | MK838679 |  |
|  | Curitiba | 344 | COI\_1 | NAD\_1 | MK838680 | MK838706 |
|  | Nova Prata do Iguaçu | 301 | COI\_7 | NAD\_7 | MK838675 | MK838721 |
|  | Nova Prata do Iguaçu | 302 |  | NAD\_7 |  | MK838722 |
|  | Nova Prata do Iguaçu | 303 | COI\_7 | NAD\_7 | MK838676 | MK838723 |
|  | Nova Prata do Iguaçu | 304 | COI\_8 | NAD\_7 | MK838677 | MK838724 |
|  | Nova Prata do Iguaçu | 305 |  | NAD\_7 |  | MK838725 |
|  | Nova Prata do Iguaçu | 306 |  | NAD\_7 |  | MK838726 |

Table S2. Sequences of *Fasciola hepatica* for *COI* gene provided GenBank for network analysis.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Number of access  | Country | Gene |
|  |  AB207103.1  | Australia | *COI* |
|  |  LC273025.1  | Ecuador | *COI* |
|  |  LC273026.1  | Ecuador | *COI* |
|  |  LC273027.1  | Ecuador | *COI* |
|  |  LC273028.1  | Ecuador | *COI* |
|  |  LC273029.1  | Ecuador | *COI* |
|  |  LC273030.1  | Ecuador | *COI* |
|  |  LC273031.1  | Ecuador | *COI* |
|  |  LC273032.1  | Ecuador | *COI* |
|  |  LC273033.1  | Ecuador | *COI* |
|  |  LC273034.1  | Ecuador | *COI* |
|  |  LC273035.1  | Ecuador | *COI* |
|  |  LC273036.1  | Ecuador | *COI* |
|  |  LC273037.1  | Ecuador | *COI* |
|  |  LC273038.1  | Ecuador | *COI* |
|  |  LC273039.1  | Ecuador | *COI* |
|  |  LC273040.1  | Ecuador | *COI* |
|  |  LC273041.1  | Ecuador | *COI* |
|  |  LC273042.1  | Ecuador | *COI* |
|  |  LC273043.1  | Ecuador | *COI* |
|  |  LC273044.1  | Ecuador | *COI* |
|  |  LC273045.1  | Ecuador | *COI* |
|  |  LC273047.1  | Ecuador | *COI* |
|  |  LC273048.1  | Ecuador | *COI* |
|  |  LC273049.1  | Ecuador | *COI* |
|  |  LC273050.1  | Ecuador | *COI* |
|  |  LC273051.1  | Ecuador | *COI* |
|  |  LC273052.1  | Ecuador | *COI* |
|  |  LC273053.1  | Ecuador | *COI* |
|  |  LC273054.1  | Ecuador | *COI* |
|  |  LC273056.1  | Ecuador | *COI* |
|  |  LC273057.1  | Ecuador | *COI* |
|  |  LC273059.1  | Ecuador | *COI* |
|  |  LC273060.1  | Ecuador | *COI* |
|  |  LC273061.1  | Ecuador | *COI* |
|  |  LC273062.1  | Ecuador | *COI* |
|  |  LC273063.1  | Ecuador | *COI* |
|  |  LC273064.1  | Ecuador | *COI* |
|  |  LC273065.1  | Ecuador | *COI* |
|  |  LC273066.1  | Ecuador | *COI* |
|  |  LC273067.1  | Ecuador | *COI* |
|  |  LC273068.1  | Ecuador | *COI* |
|  |  LC273069.1  | Ecuador | *COI* |
|  |  LC273070.1  | Ecuador | *COI* |
|  |  LC273071.1  | Ecuador | *COI* |
|  |  LC273072.1  | Ecuador | *COI* |
|  |  LC273073.1  | Ecuador | *COI* |
|  |  LC273074.1  | Ecuador | *COI* |
|  |  LC273075.1  | Ecuador | *COI* |
|  |  LC273076.1  | Ecuador | *COI* |
|  |  LC273077.1  | Ecuador | *COI* |
|  |  LC273078.1  | Ecuador | *COI* |
|  |  LC273079.1  | Ecuador | *COI* |
|  |  LC273080.1  | Ecuador | *COI* |
|  |  LC273081.1  | Ecuador | *COI* |
|  |  LC273082.1  | Ecuador | *COI* |
|  |  LC273083.1  | Ecuador | *COI* |
|  |  LC273084.1  | Ecuador | *COI* |
|  |  LC273085.1  | Ecuador | *COI* |
|  |  LC273086.1  | Ecuador | *COI* |
|  |  LC273087.1  | Ecuador | *COI* |
|  |  LC273088.1  | Ecuador | *COI* |
|  |  LC273089.1  | Ecuador | *COI* |
|  |  LC273090.1  | Ecuador | *COI* |
|  |  LC273091.1  | Ecuador | *COI* |
|  |  LC273092.1  | Ecuador | *COI* |
|  |  LC273093.1  | Ecuador | *COI* |
|  |  LC273094.1  | Ecuador | *COI* |
|  |  LC273095.1  | Ecuador | *COI* |
|  |  LC273096.1  | Ecuador | *COI* |
|  |  LC273097.1  | Ecuador | *COI* |
|  |  LC273098.1  | Ecuador | *COI* |
|  |  LC273099.1  | Ecuador | *COI* |
|  |  LC273100.1  | Ecuador | *COI* |
|  |  LC273101.1  | Ecuador | *COI* |
|  |  LC273102.1  | Ecuador | *COI* |
|  |  LC273103.1  | Ecuador | *COI* |
|  |  LC273104.1  | Ecuador | *COI* |
|  |  LC273105.1  | Ecuador | *COI* |
|  |  LC273106.1  | Ecuador | *COI* |
|  |  LC273107.1  | Ecuador | *COI* |
|  |  LC273108.1  | Ecuador | *COI* |
|  |  LC273109.1  | Ecuador | *COI* |
|  |  LC273110.1  | Ecuador | *COI* |
|  |  LC273111.1  | Ecuador | *COI* |
|  |  LC273112.1  | Ecuador | *COI* |
|  |  LC273113.1  | Ecuador | *COI* |
|  |  AB553812.1  | Egypt | *COI* |
|  |  AB553813.1  | Egypt | *COI* |
|  |  AB553814.1  | Egypt | *COI* |
|  |  AB553817.1  | Egypt | *COI* |
|  |  AB553818.1  | Egypt | *COI* |
|  |  AB553824.1  | Egypt | *COI* |
|  |  FJ895604.1  | Iran | *COI* |
|  |  FJ895605.1  | Iran | *COI* |
|  |  FJ895606.1  | Iran | *COI* |
|  |  GQ398051.1  | Iran | *COI* |
|  |  GQ398052.1  | Iran | *COI* |
|  |  GQ398053.1  | Iran | *COI* |
|  |  GQ398054.1  | Iran | *COI* |
|  |  GQ398055.1  | Iran | *COI* |
|  |  GQ398056.1  | Iran | *COI* |
|  |  KF992216.1  | Iran | *COI* |
|  |  KF992217.1  | Iran | *COI* |
|  |  KF992218.1  | Iran | *COI* |
|  |  KF992219.1  | Iran | *COI* |
|  |  KF992220.1  | Iran | *COI* |
|  |  KT893716.1  | Iran | *COI* |
|  |  KT893717.1  | Iran | *COI* |
|  |  KT893718.1  | Iran | *COI* |
|  |  KT893719.1  | Iran | *COI* |
|  |  KT893720.1  | Iran | *COI* |
|  |  KT893721.1  | Iran | *COI* |
|  |  KT893722.1  | Iran | *COI* |
|  |  KT893723.1  | Iran | *COI* |
|  |  KT893724.1  | Iran | *COI* |
|  |  KT893725.1  | Iran | *COI* |
|  |  MF537583.1  | Iran | *COI* |
|  |  MF537584.1  | Iran | *COI* |
|  |  MF537585.1  | Iran | *COI* |
|  |  MF537586.1  | Iran | *COI* |
|  |  MF537587.1  | Iran | *COI* |
|  |  MF537588.1  | Iran | *COI* |
|  |  MF537589.1  | Iran | *COI* |
|  |  MF537590.1  | Iran | *COI* |
|  |  MF788076.1  | Iran | *COI* |
|  |  MF788077.1  | Iran | *COI* |
|  |  MF788078.1  | Iran | *COI* |
|  |  MF788079.1  | Iran | *COI* |
|  |  MF788080.1  | Iran | *COI* |
|  |  MF788081.1  | Iran | *COI* |
|  |  MF788082.1  | Iran | *COI* |
|  |  MF788083.1  | Iran | *COI* |
|  |  MF788084.1  | Iran | *COI* |
|  |  MF788085.1  | Iran | *COI* |
|  |  MF788086.1  | Iran | *COI* |
|  |  MF788087.1  | Iran | *COI* |
|  |  MF788089.1  | Iran | *COI* |
|  |  MF788091.1  | Iran | *COI* |
|  |  MF788092.1  | Iran | *COI* |
|  |  MF788093.1  | Iran | *COI* |
|  |  MF788094.1  | Iran | *COI* |
|  |  MF788095.1  | Iran | *COI* |
|  |  MF788096.1  | Iran | *COI* |
|  |  MF788097.1  | Iran | *COI* |
|  |  MF788098.1  | Iran | *COI* |
|  |  MF788099.1  | Iran | *COI* |
|  |  MF788100.1  | Iran | *COI* |
|  |  MF788101.1  | Iran | *COI* |
|  |  MF788102.1  | Iran | *COI* |
|  |  MF788103.1  | Iran | *COI* |
|  |  MF788104.1  | Iran | *COI* |
|  |  MF788105.1  | Iran | *COI* |
|  |  MF788106.1  | Iran | *COI* |
|  |  MF788107.1  | Iran | *COI* |
|  |  MF788109.1  | Iran | *COI* |
|  |  MF788110.1  | Iran | *COI* |
|  |  MF788111.1  | Iran | *COI* |
|  |  MF788112.1  | Iran | *COI* |
|  |  MF788113.1  | Iran | *COI* |
|  |  MF788114.1  | Iran | *COI* |
|  |  MF788115.1  | Iran | *COI* |
|  |  MF788116.1  | Iran | *COI* |
|  |  MF788117.1  | Iran | *COI* |
|  |  MF788118.1  | Iran | *COI* |
|  |  MF788119.1  | Iran | *COI* |
|  |  MF788120.1  | Iran | *COI* |
|  |  MF788121.1  | Iran | *COI* |
|  |  MG870566.1  | Iran | *COI* |
|  |  MG987190.1  | Iran | *COI* |
|  |  KJ716910.1  | Peru | *COI* |
|  |  KJ716911.1  | Peru | *COI* |
|  |  KJ716912.1  | Peru | *COI* |
|  |  KJ716913.1  | Peru | *COI* |
|  |  KJ716914.1  | Peru | *COI* |
|  |  KJ716915.1  | Peru | *COI* |
|  |  KJ716916.1  | Peru | *COI* |
|  |  KJ716917.1  | Peru | *COI* |
|  |  KJ716918.1  | Peru | *COI* |
|  |  KJ716919.1  | Peru | *COI* |
|  |  KJ716920.1  | Peru | *COI* |
|  |  KJ716921.1  | Peru | *COI* |
|  |  KJ716922.1  | Peru | *COI* |
|  |  KJ716923.1  | Peru | *COI* |
|  |  KJ716924.1  | Peru | *COI* |
|  |  KJ852772.1  | Peru | *COI* |
|  |  KT869169.1  | Peru | *COI* |
|  |  KR422380.1  | Poland | *COI* |
|  |  KR422381.1  | Poland | *COI* |
|  |  KR422382.1  | Poland | *COI* |
|  |  KR422383.1  | Poland | *COI* |
|  |  KR422384.1  | Poland | *COI* |
|  |  KR422385.1  | Poland | *COI* |
|  |  KR422386.1  | Poland | *COI* |
|  |  KR422387.1  | Poland | *COI* |
|  |  KR422388.1  | United Kingdom | *COI* |
|  |  AB207170.1  | Uruguay | *COI* |

Table S3. Sequences of *Fasciola hepatica* for *nad1* gene provided GenBank for network analysis.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Number of access | Country | Gene |
|  |  LC436788.1  | Afghanistan | *nad1* |
|  |  LC436789.1  | Afghanistan | *nad1* |
|  |  LC436790.1  | Afghanistan | *nad1* |
|  |  LC436791.1  | Afghanistan | *nad1* |
|  |  LC436792.1  | Afghanistan | *nad1* |
|  |  LC436793.1  | Afghanistan | *nad1* |
|  |  LC436794.1  | Afghanistan | *nad1* |
|  |  LC436795.1  | Afghanistan | *nad1* |
|  |  LC436796.1  | Afghanistan | *nad1* |
|  |  LC436797.1  | Afghanistan | *nad1* |
|  |  LC436798.1  | Afghanistan | *nad1* |
|  |  LC436799.1  | Afghanistan | *nad1* |
|  |  LC436801.1  | Afghanistan | *nad1* |
|  |  LC436802.1  | Afghanistan | *nad1* |
|  |  LC436803.1  | Afghanistan | *nad1* |
|  |  LC436804.1  | Afghanistan | *nad1* |
|  |  LC436805.1  | Afghanistan | *nad1* |
|  |  LC436806.1  | Afghanistan | *nad1* |
|  |  LC436807.1  | Afghanistan | *nad1* |
|  |  MF959486.1  | Argentina | *nad1* |
|  |  MF959487.1  | Argentina | *nad1* |
|  |  MF959488.1  | Argentina | *nad1* |
|  |  MF959489.1  | Argentina | *nad1* |
|  |  MF959490.1  | Argentina | *nad1* |
|  |  MF959491.1  | Argentina | *nad1* |
|  |  MF959492.1  | Argentina | *nad1* |
|  |  MF959493.1  | Argentina | *nad1* |
|  |  MF959494.1  | Argentina | *nad1* |
|  |  MF959495.1  | Argentina | *nad1* |
|  |  MF959496.1  | Argentina | *nad1* |
|  |  MF959497.1  | Argentina | *nad1* |
|  |  MF959498.1  | Argentina | *nad1* |
|  |  MF959499.1  | Argentina | *nad1* |
|  |  AB207155.1  | Australia | *nad1* |
|  |  AF216697.1  | Australia | *nad1* |
|  |  MF287675.1 | Brazil | *nad1* |
|  |  AB477357.1  | China | *nad1* |
|  |  AB477358.1  | China | *nad1* |
|  |  AB604926.1  | China | *nad1* |
|  |  AB604927.1  | China | *nad1* |
|  |  AB604929.1  | China | *nad1* |
|  |  AB604930.1  | China | *nad1* |
|  |  LC273114.1  | Ecuador | *nad1* |
|  |  LC273115.1  | Ecuador | *nad1* |
|  |  LC273116.1  | Ecuador | *nad1* |
|  |  LC273117.1  | Ecuador | *nad1* |
|  |  LC273118.1  | Ecuador | *nad1* |
|  |  LC273119.1  | Ecuador | *nad1* |
|  |  LC273120.1  | Ecuador | *nad1* |
|  |  LC273121.1  | Ecuador | *nad1* |
|  |  LC273122.1  | Ecuador | *nad1* |
|  |  LC273123.1  | Ecuador | *nad1* |
|  |  LC273124.1  | Ecuador | *nad1* |
|  |  LC273125.1  | Ecuador | *nad1* |
|  |  LC273126.1  | Ecuador | *nad1* |
|  |  LC273127.1  | Ecuador | *nad1* |
|  |  LC273128.1  | Ecuador | *nad1* |
|  |  LC273129.1  | Ecuador | *nad1* |
|  |  LC273130.1  | Ecuador | *nad1* |
|  |  LC273131.1  | Ecuador | *nad1* |
|  |  LC273132.1  | Ecuador | *nad1* |
|  |  LC273133.1  | Ecuador | *nad1* |
|  |  LC273134.1  | Ecuador | *nad1* |
|  |  LC273135.1  | Ecuador | *nad1* |
|  |  LC273136.1  | Ecuador | *nad1* |
|  |  LC273137.1  | Ecuador | *nad1* |
|  |  LC273138.1  | Ecuador | *nad1* |
|  |  LC273139.1  | Ecuador | *nad1* |
|  |  LC273140.1  | Ecuador | *nad1* |
|  |  LC273141.1  | Ecuador | *nad1* |
|  |  LC273142.1  | Ecuador | *nad1* |
|  |  LC273143.1  | Ecuador | *nad1* |
|  |  LC273144.1  | Ecuador | *nad1* |
|  |  LC273145.1  | Ecuador | *nad1* |
|  |  LC273146.1  | Ecuador | *nad1* |
|  |  LC273147.1  | Ecuador | *nad1* |
|  |  LC273148.1  | Ecuador | *nad1* |
|  |  LC273149.1  | Ecuador | *nad1* |
|  |  LC273150.1  | Ecuador | *nad1* |
|  |  LC273151.1  | Ecuador | *nad1* |
|  |  LC273152.1  | Ecuador | *nad1* |
|  |  LC273153.1  | Ecuador | *nad1* |
|  |  LC273154.1  | Ecuador | *nad1* |
|  |  LC273155.1  | Ecuador | *nad1* |
|  |  LC273156.1  | Ecuador | *nad1* |
|  |  LC273157.1  | Ecuador | *nad1* |
|  |  LC273158.1  | Ecuador | *nad1* |
|  |  LC273159.1  | Ecuador | *nad1* |
|  |  LC273160.1  | Ecuador | *nad1* |
|  |  LC273161.1  | Ecuador | *nad1* |
|  |  LC273162.1  | Ecuador | *nad1* |
|  |  LC273163.1  | Ecuador | *nad1* |
|  |  LC273164.1  | Ecuador | *nad1* |
|  |  LC273165.1  | Ecuador | *nad1* |
|  |  LC273166.1  | Ecuador | *nad1* |
|  |  LC273167.1  | Ecuador | *nad1* |
|  |  LC273168.1  | Ecuador | *nad1* |
|  |  LC273169.1  | Ecuador | *nad1* |
|  |  LC273170.1  | Ecuador | *nad1* |
|  |  LC273171.1  | Ecuador | *nad1* |
|  |  LC273172.1  | Ecuador | *nad1* |
|  |  LC273173.1  | Ecuador | *nad1* |
|  |  LC273174.1  | Ecuador | *nad1* |
|  |  LC273176.1  | Ecuador | *nad1* |
|  |  LC273177.1  | Ecuador | *nad1* |
|  |  LC273178.1  | Ecuador | *nad1* |
|  |  LC273179.1  | Ecuador | *nad1* |
|  |  LC273180.1  | Ecuador | *nad1* |
|  |  LC273181.1  | Ecuador | *nad1* |
|  |  LC273182.1  | Ecuador | *nad1* |
|  |  LC273183.1  | Ecuador | *nad1* |
|  |  LC273184.1  | Ecuador | *nad1* |
|  |  LC273185.1  | Ecuador | *nad1* |
|  |  LC273186.1  | Ecuador | *nad1* |
|  |  LC273187.1  | Ecuador | *nad1* |
|  |  LC273188.1  | Ecuador | *nad1* |
|  |  LC273189.1  | Ecuador | *nad1* |
|  |  LC273190.1  | Ecuador | *nad1* |
|  |  LC273191.1  | Ecuador | *nad1* |
|  |  LC273192.1  | Ecuador | *nad1* |
|  |  LC273193.1  | Ecuador | *nad1* |
|  |  LC273194.1  | Ecuador | *nad1* |
|  |  LC273195.1  | Ecuador | *nad1* |
|  |  LC273196.1  | Ecuador | *nad1* |
|  |  LC273197.1  | Ecuador | *nad1* |
|  |  LC273198.1  | Ecuador | *nad1* |
|  |  LC273199.1  | Ecuador | *nad1* |
|  |  LC273200.1  | Ecuador | *nad1* |
|  |  LC273201.1  | Ecuador | *nad1* |
|  |  LC273202.1  | Ecuador | *nad1* |
|  |  AB554177.1  | Egypt | *nad1* |
|  |  AB554178.1  | Egypt | *nad1* |
|  |  AB554179.1  | Egypt | *nad1* |
|  |  AB554180.1  | Egypt | *nad1* |
|  |  AB554181.1  | Egypt | *nad1* |
|  |  AB554182.1  | Egypt | *nad1* |
|  |  AB554183.1  | Egypt | *nad1* |
|  |  AB554184.1  | Egypt | *nad1* |
|  |  AB554185.1  | Egypt | *nad1* |
|  |  AB554186.1  | Egypt | *nad1* |
|  |  AB554187.1  | Egypt | *nad1* |
|  |  AB554188.1  | Egypt | *nad1* |
|  |  AB554189.1  | Egypt | *nad1* |
|  |  AB554190.1  | Egypt | *nad1* |
|  |  AB554191.1  | Egypt | *nad1* |
|  |  AB554192.1  | Egypt | *nad1* |
|  |  AB554193.1  | Egypt | *nad1* |
|  |  LC076248.1  | Egypt | *nad1* |
|  |  LC076249.1  | Egypt | *nad1* |
|  |  LC076250.1  | Egypt | *nad1* |
|  |  LC076251.1  | Egypt | *nad1* |
|  |  LC076252.1  | Egypt | *nad1* |
|  |  LC076253.1  | Egypt | *nad1* |
|  |  LC076254.1  | Egypt | *nad1* |
|  |  LC076255.1  | Egypt | *nad1* |
|  |  LC076256.1  | Egypt | *nad1* |
|  |  LC076257.1  | Egypt | *nad1* |
|  |  LC076258.1  | Egypt | *nad1* |
|  |  LC076259.1  | Egypt | *nad1* |
|  |  LC076260.1  | Egypt | *nad1* |
|  |  LC076261.1  | Egypt | *nad1* |
|  |  GQ175362.1  | Iran | *nad1* |
|  |  GQ175363.1  | Iran | *nad1* |
|  |  GQ175364.1  | Iran | *nad1* |
|  |  GQ356033.1  | Iran | *nad1* |
|  |  KF992222.1  | Iran | *nad1* |
|  |  KF992223.1  | Iran | *nad1* |
|  |  KF992224.1  | Iran | *nad1* |
|  |  KF992225.1  | Iran | *nad1* |
|  |  KF992226.1  | Iran | *nad1* |
|  |  KT893726.1  | Iran | *nad1* |
|  |  KT893727.1  | Iran | *nad1* |
|  |  KT893728.1  | Iran | *nad1* |
|  |  KT893729.1  | Iran | *nad1* |
|  |  KT893730.1  | Iran | *nad1* |
|  |  KT893731.1  | Iran | *nad1* |
|  |  KT893732.1  | Iran | *nad1* |
|  |  KT893733.1  | Iran | *nad1* |
|  |  KT893734.1  | Iran | *nad1* |
|  |  KT893735.1  | Iran | *nad1* |
|  |  KT893736.1  | Iran | *nad1* |
|  |  KT893737.1  | Iran | *nad1* |
|  |  KT893738.1  | Iran | *nad1* |
|  |  KT893739.1  | Iran | *nad1* |
|  |  KT893740.1  | Iran | *nad1* |
|  |  KT893741.1  | Iran | *nad1* |
|  |  KT893742.1  | Iran | *nad1* |
|  |  KT893743.1  | Iran | *nad1* |
|  |  KT893744.1  | Iran | *nad1* |
|  |  KX712321.1  | Iran | *nad1* |
|  |  KX712322.1  | Iran | *nad1* |
|  |  MF428470.1  | Iran | *nad1* |
|  |  MF428471.1  | Iran | *nad1* |
|  |  MF428473.1  | Iran | *nad1* |
|  |  MF428475.1  | Iran | *nad1* |
|  |  MF428476.1  | Iran | *nad1* |
|  |  MF428477.1  | Iran | *nad1* |
|  |  MF628261.1  | Iran | *nad1* |
|  |  MF628262.1  | Iran | *nad1* |
|  |  MF628263.1  | Iran | *nad1* |
|  |  MF628264.1  | Iran | *nad1* |
|  |  MF628265.1  | Iran | *nad1* |
|  |  MF628266.1  | Iran | *nad1* |
|  |  MF628267.1  | Iran | *nad1* |
|  |  MF628268.1  | Iran | *nad1* |
|  |  MG926383.1  | Iran | *nad1* |
|  |  MG926384.1  | Iran | *nad1* |
|  |  MG926385.1  | Iran | *nad1* |
|  |  MG926386.1  | Iran | *nad1* |
|  |  MG926387.1  | Iran | *nad1* |
|  |  MG926388.1  | Iran | *nad1* |
|  |  MG926389.1  | Iran | *nad1* |
|  |  MG926390.1  | Iran | *nad1* |
|  |  MG926391.1  | Iran | *nad1* |
|  |  MG926392.1  | Iran | *nad1* |
|  |  AB207156.1  | Ireland | *nad1* |
|  |  JF824675.1  | Italy | *nad1* |
|  |  JF824676.1  | Italy | *nad1* |
|  |  JF824677.1  | Italy | *nad1* |
|  |  JF824678.1  | Italy | *nad1* |
|  |  JF824679.1  | Italy | *nad1* |
|  |  KJ716895.1  | Peru | *nad1* |
|  |  KJ716896.1  | Peru | *nad1* |
|  |  KJ716897.1  | Peru | *nad1* |
|  |  KJ716898.1  | Peru | *nad1* |
|  |  KJ716899.1  | Peru | *nad1* |
|  |  KJ716900.1  | Peru | *nad1* |
|  |  KJ716901.1  | Peru | *nad1* |
|  |  KJ716902.1  | Peru | *nad1* |
|  |  KJ716903.1  | Peru | *nad1* |
|  |  KJ716904.1  | Peru | *nad1* |
|  |  KJ716905.1  | Peru | *nad1* |
|  |  KJ716906.1  | Peru | *nad1* |
|  |  KJ716907.1  | Peru | *nad1* |
|  |  KJ716908.1  | Peru | *nad1* |
|  |  KJ716909.1  | Peru | *nad1* |
|  |  KJ852771.1  | Peru | *nad1* |
|  |  LC070666.1  | Peru | *nad1* |
|  |  LC070667.1  | Peru | *nad1* |
|  |  LC070668.1  | Peru | *nad1* |
|  |  LC070669.1  | Peru | *nad1* |
|  |  LC070670.1  | Peru | *nad1* |
|  |  LC070671.1  | Peru | *nad1* |
|  |  LC070672.1  | Peru | *nad1* |
|  |  LC070673.1  | Peru | *nad1* |
|  |  KR422389.1  | Poland | *nad1* |
|  |  KR422390.1  | Poland | *nad1* |
|  |  KR422391.1  | Poland | *nad1* |
|  |  KR422392.1  | Poland | *nad1* |
|  |  KR422393.1  | Poland | *nad1* |
|  |  KR422394.1  | Poland | *nad1* |
|  |  KR422395.1  | Poland | *nad1* |
|  |  KR422396.1  | Poland | *nad1* |
|  |  KR422397.1  | United Kingdom | *nad1* |
|  |  AB207154.1  | Uruguay | *nad1* |

Table S4. Population pairwise FSTs for *COI* gene of *Fasciola hepatica*.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 RS | 2 RS | 3 RS | 4 RS | 5 RS | 6 RS | 7 RS | 8 RS | 9 RS | 10 RS | 11 RS | 12 RS | 13 RS | 14 PR | 15 PR |
| 1 RS | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 RS | -0.14446 | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 RS | 0.3151 | 0.28571 | 0 |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 RS | 0.05263 | 0.02793 | 0.77099 | 0 |  |  |  |  |  |  |  |  |  |  |  |
| 4 RS | 0.00991 | -0.03261 | 0.71084 | 0.01935 | 0 |  |  |  |  |  |  |  |  |  |  |
| 6 RS | -0.77778 | -1 | 1 | -1 | -1 | 0 |  |  |  |  |  |  |  |  |  |
| 7 RS | -0.01613 | -0.07143 | 0.67568 | 0.06897 | 0.01449 | -1 | 0 |  |  |  |  |  |  |  |  |
| 8 RS | 0.07004 | 0.05255 | 0.79361 | 0.00201 | -0.19658 | -1 | 0.09677 | 0 |  |  |  |  |  |  |  |
| 9 RS | -0.77778 | -1 | 1 | -1 | -1 | 0 | -1 | -1 | 0 |  |  |  |  |  |  |
| 10 RS | -0.08068 | -0.13208 | 1 | -0.15385 | -0.09091 | 0 | 0 | -0.16667 | 0 | 0 |  |  |  |  |  |
| 11 RS | 0.07374 | 0.07285 | 1 | 0.02778 | 0.15152 | 0 | 0.3 | 0 | 0 | 0 | 0 |  |  |  |  |
| 12 RS | 0.15196 | 0.14773 | 0.71765 | 0.09848 | -0.2 | -0.63636 | 0.15152 | -0.08896 | -0.63636 | -0.02857 | 0.10954 | 0 |  |  |  |
| 13 RS | 0.05029 | 0.04 | 1 | 0 | 0.11111 | 0 | 0.25 | -0.02439 | 0 | 0 | 0 | 0.08861 | 0 |  |  |
| 14 PR | 0.38537 | 0.36556 | 0.8125 | 0.70652 | 0.64021 | 0.5 | 0.6 | 0.73206 | 0.5 | 0.75 | 0.86538 | 0.7065 | 0.8481 | 0 |  |
| 15 PR | 0.16439 | 0.13505 | 0.46835 | 0.24 | 0.18904 | -0.4 | 0.16923 | 0.26431 | -0.4 | 0.14286 | 0.33333 | 0.31924 | 0.3 | 0.16923 | 0 |

1 RS: Arroio Grande; 2 RS: Camaquã; 3 RS: Canguçu; 4 RS: Herval; 5 RS: Ijui; 6 RS: Julio de Castilhos; 7 RS: Palmeira das Missões; 8 RS: Pejuçara; 9 RS: Pelotas; 10 RS: Santa Bárbara do Sul; 11 RS: Santa Vitória do Palmar; 12 RS: Santo Cristo; 13 RS: São Borja; 14 PR: Curitiba; 15 PR: Nova Prata do Iguaçu.

Table S5. Population pairwise FSTs for *Nad1* gene for *Fasciola hepatica*.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 RS | 2 RS | 3 RS | 4 RS | 5 RS | 6 RS | 7 RS | 8 RS | 9 RS | 10 RS | 11 RS | 12 RS | 13 RS | 14 PR | 15 PR |
| 1 RS | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 RS | 0.20165 | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 RS | -0.12372 | -0.03226 | 0 |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 RS | 0.10246 | 0.05524 | -0.02524 | 0 |  |  |  |  |  |  |  |  |  |  |  |
| 4 RS | 0.47297 | -0.11111 | 0.71429 | 0.12442 | 0 |  |  |  |  |  |  |  |  |  |  |
| 6 RS | 0.05044 | -0.04214 | -0.18077 | -0.04813 | -0.08 | 0 |  |  |  |  |  |  |  |  |  |
| 7 RS | -0.02857 | 0.28144 | 0.53846 | 0.14334 | 1 | 0.07692 | 0 |  |  |  |  |  |  |  |  |
| 8 RS | -0.05596 | 0.23077 | 0.47368 | 0.11833 | 1 | 0.03571 | 0 | 0 |  |  |  |  |  |  |  |
| 9 RS | 0.04539 | 0.03377 | 0.02077 | 0.01733 | 0.53333 | -0.03659 | 0.16832 | 0.125 | 0 |  |  |  |  |  |  |
| 10 RS | 0.2206 | 0.01124 | 0.12658 | -0.03957 | 0.18095 | -0.03987 | 0.33846 | 0.29929 | 0.05926 | 0 |  |  |  |  |  |
| 11 RS | 0.30441 | 0.06103 | 0.64179 | 0.08345 | 0.84615 | 0.06975 | 0.8 | 0.78102 | 0.12916 | 0.0069 | 0 |  |  |  |  |
| 12 RS | -0.12372 | -0.03226 | 0 | -0.02524 | 0.71429 | -0.18077 | 0.53846 | 0.47368 | 0.02077 | 0.12658 | 0.64179 | 0 |  |  |  |
| 13 RS | 0.04782 | 0.37231 | 0.28082 | 0.22576 | 0.88889 | 0.17112 | 0.04 | 0.01235 | 0.20863 | 0.40295 | 0.66437 | 0.28082 | 0 |  |  |
| 14 PR | 0.19205 | -0.04348 | 0.33333 | 0.00523 | 0.6 | -0.0371 | 0.59322 | 0.55224 | -0.00939 | -0.05051 | -0.09804 | 0.33333 | 0.52654 | 0 |  |
| 15 PR | 0.41935 | 0.11111 | 0.87755 | 0.151 | 1 | 0.14286 | 1 | 1 | 0.34375 | 0.04444 | 0 | 0.87755 | 0.81538 | 0.11111 | 0 |

1 RS: Arroio Grande; 2 RS: Camaquã; 3 RS: Canguçu; 4 RS: Herval; 5 RS: Ijui; 6 RS: Julio de Castilhos; 7 RS: Palmeira das Missões; 8 RS: Pejuçara; 9 RS: Pelotas; 10 RS: Santa Bárbara do Sul; 11 RS: Santa Vitória do Palmar; 12 RS: Santo Cristo; 13 RS: São Borja; 14 PR: Curitiba; 15 PR: Nova Prata do Iguaçu.