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Helminth communities in amphibians from Latvia with an emphasis on their connection to host ecology

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Supplementary Table S1

Results of parasitological investigation into post-metamorphic and larval amphibians from Latvia: infection intensity (I), given as the range (median) of helminth counts in infected hosts; prevalence (P,%), estimated as the percentage of infected hosts (percentage of infected sites in parentheses); abundance (A), given as mean±SD per sample

| Species | *Bufo bufo* (n=53; 22 sites) | *Rana temporaria* (n=26; 7 sites) | *Rana arvalis* (n=3; 2 sites) | *Pelophylax* spp. (n=370; 107 sites) | *Pelophylax* tadpoles (n=92; 10 sites) | *Lissotriton vulgaris* larvae (n=249; 53 sites) | *Triturus cristatus* larvae (n=18; 13 sites) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| I | P, % | A | I | P, % | A | I | P, % | A | I | P, % | A | I | P, % | A | I | P, % | A | I | P, % | A |
| **Monogenea** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Polystoma integerrimum*, ad | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | <1 (1) | 0.00±0.05 | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 |
| **Trematoda** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Alaria alata*, msc | 0 | 0 | 0 | 6˗37 (17) | 12 (15) | 2.31±7.89 | 2 | 33 (50) | 0.67±1.15 | 1˗237 (4.5) | 18 (25) | 4.50±22.15 | 1˗95 (4) | 51 (9) | 4.47±12.36 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Diplodiscus subclavatus*, ad | 1-7 (1) | 6 (14) | 0.15±0.97  | 2 | 4 (15) | 0.08±0.39 | 12 | 33 (50) | 4.00±6.93 | 1˗32 (3) | 22 (29) | 1.04±3.26 | 1-2 (2) | 3 (9) | 0.05±0.31 | 1-2 (1.5) | 1 (2) | 0.01±0.14 | 0 | 0 | 0 |
| *Diplostomum spathacerum*, mtc | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1˗1 (1) | <1 (2) | 0.01±0.07 | 1˗3 (1) | 3 (18) | 0.09±0.64 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Echinoparyphium recurvatum*, mtc | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1˗52 (5) | 14 (21) | 1.06±4.09 | 2 | 1 (9) | 0.02±0.21 | 1-8 (1) | 4 (8) | 0.08±0.58 | 2˗2 (2) | 11 (15) | 0.22±0.65 |
| *Encyclometra colubrimurorum*, mtc | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1˗27 (3) | 2 (4) | 0.19±1.71 | 1-3 (1) | 3 (9) | 0.05±0.34 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Gorgodera varsoviensis*, ad | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1˗9 (1) | 5 (8) | 0.10±0.64 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Haematoloechus variegatus*, ad | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1˗13 (2) | 5 (12) | 0.19±1.12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Opisthioglyphe ranae*, ad | 0 | 0 | 0  | 1 | 4 (14) | 0.04±0.20 | 0 | 0 | 0 | 1˗213 (5) | 21 (38) | 2.73±13.53 | 0 | 0 | 0 | 2˗32 (7) | 4 (6) | 0.48±3.29 | 0 | 0 | 0 |
| *Opisthioglyphe ranae*, mtc | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1˗47 (3) | 21 (32) | 1.38±4.90 | 1˗14 (2) | 41 (36) | 1.47±2.72 | 1˗48 (5) | 22 (26) | 2.06±6.26 | 1˗4 (2) | 16 (15) | 0.39±1.04 |
| *Opisthioglyphe ranae*, all stages | 0 | 0 | 0 | 1 | 4 (14) | 0.04±0.20 | 0 | 0 | 0 | 1˗243 (4) | 33 (54) | 4.11±15.49 | 1˗14 (2) | 41 (36) | 1.47±2.72 | 1-50 (5) | 23 (26) | 2.54±7.52 | 1˗4 (2) | 16 (15) | 0.39±1.04 |
| *Paralepoderma cloacicola*, mtc | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1˗112 (3) | 4 (6) | 0.52±6.17 | 3˗11 (7) | 3 (18) | 0.15±1.19 | 1˗27 (4.5) | 14 (23) | 0.79±2.94 | 0 | 0 | 0 |
| *Pleurogenes claviger*, ad | 1 | 2 (5) | 0.02±0.14 | 1 | 4 (14) | 0.04±0.20 | 0 | 0 | 0 | 1˗53 (4) | 4 (11) | 0.48±4.19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Pleurogenoides medians*, ad | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1˗186 (3) | 9 (11) | 2.08±15.35  | 0 | 0 | 0 | 5˗8 (7) | 1 (4) | 0.08±0.74 | 0 | 0 | 0 |
| *Prosotocus confusus*, ad | 0 | 0 | 0 | 1 | 4 (14) | 0.04±0.20 | 0 | 0 | 0 | 1˗37 (6) | 2 (7) | 0.24±2.41 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Skrjabinoeces similis,* ad | 0 | 0 | 0 | 1˗8 (4.5) | 8 (14) | 0.35±1.57 | 0 | 0 | 0 | 1˗33 (2) | 25 (47) | 0.90±2.75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Strigea falconis*, mtc | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1˗49 (10.5) | 1 (4 | 0.19±2.75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Strigea sphaerula*, mtc | 2 | 2 (5) | 0.04±0.27 | 1˗11 (6) | 8 (14) | 0.46±2.16 | 0 | 0 | 0 | 1˗35 (4) | 4 (12) | 0.32±2.37 | 0 | 0 | 0 | 1˗5 (1) | 5 (11) | 0.09±0.48 | 1 | 6 (8) | 0.06±0.24 |
| *Strigea strigis*, mtc | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1˗259 (5) | 11 (23) | 1.98±14.71 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Tylodelphys excavata*, mtc | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | 1˗180 (5) | 15 (23) | 2.76±15.72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Cestoda** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cestoda, ad | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | <1 (1) | 0.02±0.42 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cestoda, larv | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 (9) | 0.02±0.21 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Nematoda** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Cosmocera ornata*, ad | 1 | 2 (5) | 0.04±0.27 | 0 | 0 | 0 | 0 | 0 | 0 | 1˗8 (1) | 8 (15) | 0.15±0.71 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Gyrinicola tba,* ad | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1-5 (1) | 4 (27) | 0.09±0.55 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Hedruris androphora,* ad | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1˗2 (1) | 3 (11) | 0.03±0.20 | 1˗8 (3) | 28 (31) | 1.11±2.25 |
| *Heligmosomoides polygyrus*, ad | 4-12 (6) | 6 (14) | 0.42±1.90 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | <1 (1) | 0.04±0.83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Neoraillietnema praeputiale*, ad | 3˗35 (9) | 81 (82) | 9.96±10.62 | 1˗22 | 50 (29) | 2.19±4.49 | 5 | 33 (50) | 1.67±2.89 | 1˗21 (2) | 9 (21) | 0.30±1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Oswaldocruzia filiformis*, ad | 1˗97 (8) | 81 (82) | 10.53±17.51 | 1˗31 (3.5) | 62 (72) | 3.54±6.51 | 1˗3 (2) | 67 (100) | 1.33±1.53 | 1˗33 (2) | 9 (13) | 0.40±2.46 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Rhabdias bufonis*, ad | 1˗29 (6) | 77 (86) | 5.98±6.53 | 1˗15 (2) | 50 (54) | 2.54±4.29 | 1 | 33 (50) | 0.33±0.58 | 1 | <1 (1) | 0.00±0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Acantocephala** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Acanthocephalus ranae*, ad | 1˗29 (1.5) | 8 (14) | 0.62±3.99 | 2 | 4 (14) | 0.08±0.39 | 0 | 0 | 0 | 1˗6 (1) | 9 (14) | 0.17±0.67 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Parasite stage abbreviations: msc – mesocercariae, mtc – metacercariae, larv – larvae, ad – adults

Supplementary Table S2

Helminth predilection sites in post-metamorphic *Pelophylax* spp*.* frogs (n=370) (total count; I, average, ± SD in parentheses)

| Helminth species, stage | Stomach\*  | Intestine\*  | Cloaca\*  | Urine bladder | Liver\* | Lungs\* | Kidneys | Eyes | Brain & spinal cord | Under skin | Serosa of internal organs | Body cavity | Walls of the mouth cavity  | Other muscles |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Polystoma integerrimum*, ad |  |  |  |  |  |  |  |  |  |  |  | 1 (1) |  |  |
| *Alaria alata*, msc | 7 (2.3±1.5) | 309 (14.1±20.8) |  |  | 441 (46.7±42.1) | 8 (8) | 24 (24) |  |  | 264 (8.5±12.4) | 646 (15.3±25.7) | 55 (7.9±10.5) | 13 (3.1±4.3) |  |
| *Diplodiscus subclavatus*, ad | 2 (1.0±0.0) | 309 (4.6±5.7 | 129 (6.1±11.3) |  |  |  |  |  |  |  |  | 2 (1.0±0.0) |  |  |
| *Diplostomum spathacerum*, mtc |  |  |  |  |  |  |  | 1 (1) |  | 1 (0) |  |  |  |  |
| *Echinoparyphium recurvatum*, mtc |  |  |  |  |  |  |  | 78 (6.0±5.0) | 7 (2.3±2.3) | 301 (6.9±8.7) | 9 (4.5±4.9) |  |  |  |
| *Encyclometra colubrimurorum*,mtc |  | 9 (2.3±1.0) |  |  |  |  |  |  |  | 3 (3) | 67 (11.2±8.6) |  | 18 (9.0±1.0) |  |
| *Gorgodera varsoviensis*, ad | 2 (2) | 18 (2.0±2.6) |  | 5 (1.0±0.0) |  |  |  |  |  |  | 2 (1.0±0.0) | 10 (5.0±1.0) |  |  |
| *Haematoloechus variegatus*, ad |  |  |  |  |  | 70 (3.7±3.4) |  |  |  |  |  |  | 2 (2) |  |
| *Opisthioglyphe ranae*, ad | 3 (1.5±0.5) | 950 (12.1±17.9) | 28 (7.0±8.4) |  |  |  |  |  |  |  | 1 (1) | 3 (1.0±0.0) |  |  |
| *Opisthioglyphe ranae*, mtc | 18 (3.6±2.1) | 145 (5.8±9.3) | 22 (7.3±10.1) |  | 1 (1) |  |  | 5 (1.3±0.5) |  | 86 (3.2±2.1) | 248 (8.4±6.5) |  | 1 (1) |  |
| *Paralepoderma cloacicola*, mtc |  | 19 (2.7±2.1) |  |  |  |  |  |  |  |  | 165 (23.6±35.5) |  | 9 (9) | 2 (2) |
| *Pleurogenes claviger*, ad | 1 (1) | 165 (11.8±17.2) |  |  |  |  |  |  |  |  | 9 (4.5±4.9) |  |  |  |
| *Pleurogenoides medians*, ad |  | 776 (21.6±45.3) |  |  |  |  |  |  |  |  |  | 1 (1) |  |  |
| *Prosotocus confusus*, ad | 30 (7.5±9.4) | 115 (16.4±16.5) |  |  |  |  |  |  |  |  |  |  | 5 (1.6±0.6) |  |
| *Skrjabinoeces similis*, ad | 1 (1) |  |  |  |  | 338 (3.6±4.5) |  |  |  |  |  |  |  |  |
| *Strigea falconis*, mtc |  | 1 (1) |  |  |  |  |  |  |  |  | 62 (31.0±15.6) |  | 7 (7) | 1 (1) |
| *Strigea sphaerula*, mtc |  | 44 (5.5±6.0) | 1 (1) |  |  |  |  |  |  |  | 74 (6.7±5.8) |  |  |  |
| *Strigea strigis*, mtc |  | 1 (1) |  |  |  |  |  |  |  |  | 404 (14.4±41.6) |  |  |  |
| *Tylodelphys excavata*, mtc |  | 11 (2.2±1.3) |  |  |  |  |  |  | 580 (16.6±36.9) | 51 (5.7±6.3) | 380 (23.4±43.1) |  |  |  |
| Cestoda indet, ad |  |  |  |  |  |  |  |  |  |  | 6 (4.0±2.8) |  |  |  |
| *Cosmocerca ornata*, ad | 3 (2) | 34 (1.7±1.4) | 15 (2.5±1.9) |  |  |  |  | 2 (2) |  |  |  | 2 (1.0±0.0) |  |  |
| *Heligmosomoides polygyrus*, ad |  | 16 (16) |  |  |  |  |  |  |  |  |  |  |  |  |
| *Neoraillietnema praeputiale*, ad | 2 (1.0±0.0) | 88 (2.9±3.8) | 30 (3.3±3.1) |  |  |  |  |  |  |  |  |  |  |  |
| *Oswaldocruzia filiformis*, ad | 7 (1.2±0.4) | 135 (4.5±7.5) | 6 (2.0±1.0) |  |  |  |  |  |  |  |  |  |  |  |
| *Rhabdias bufonis*, ad |  |  |  |  |  | 1 (1) |  |  |  |  |  |  |  |  |
| *Acanthocephalus ranae*, ad | 1 (1) | 62 (1.81.2) | 1 (1) |  |  |  |  |  |  |  |  |  |  |  |

\* include all their cavities and walls except serosa

Supplementary Table S3

Helminth predilection sites in post-metamorphic *Bufo bufo* toads (n=53), *Rana arvalis* (n=3), and *R.temporaria* (n=26) frogs (total count; I, average, ± SD in parentheses)

| Host | Helminth species, stage | Stomach\* | Intestine\*  | Cloaca\* | Gall bladder | Lungs\* | Serosa of internal organs | Walls of the mouth cavity  | Under skin |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Bufo bufo* | *Diplodiscus subclavatus*, ad |  | 9 (3.0±3.5) |  |  |  |  |  |  |
| *Pleurogenes claviger*, ad |  | 1 (1) |  |  |  |  |  |  |
| *Strigea sphaerula*, mtc |  |  |  |  |  | 2 (2) |  |  |
| *Cosmocerca ornata*, ad |  | 1 (1) |  |  |  |  |  |  |
| *Heligmosomoides polygyrus*, ad |  | 22 (7.3±4.2) |  |  |  |  |  |  |
| *Neoraillietnema praeputiale*, ad | 10 (10) | 485 (10.8±10.2) | 25 (25) | 13 (4.3±5.8) |  |  | 1 (1) |  |
| *Oswaldocruzia filiformis*, ad | 2 (2) | 526 (11.4±16.0) |  |  |  |  |  |  |
| *Rhabdias bufonis*, ad |  |  |  |  | 317 (7.6±6.4) |  |  |  |
| *Acanthocephalus ranae*, ad |  | 33 (8.3±13.8) |  |  |  |  |  |  |
| *Rana arvalis* | *Alaria alata*, msc |  |  |  |  |  |  |  | 2 (2) |
| *Diplodiscus subclavatus*, ad |  | 8 (8) | 4 (4) |  |  |  |  |  |
| *Neoraillietnema praeputiale*, ad |  | 5 (5) |  |  |  |  |  |  |
| Oswaldocruzia filiformis, ad |  | 3 (3) | 1 (1) |  |  |  |  |  |
| *Rhabdias bufonis*, ad |  |  |  |  | 1 (1) |  |  |  |
| *Rana temporaria* | *Alaria alata*, msc |  | 6 (6) |  |  |  | 12 (6.0±7.1) |  | 42 (21.0±21.2) |
| *Diplodiscus subclavatus*, ad |  | 2 (2) |  |  |  |  |  |  |
| *Opisthioglyphe ranae*, ad |  | 1 (1) |  |  |  |  |  |  |
| *Pleurogenes claviger*, ad |  | 1 (1) |  |  |  |  |  |  |
| *Prosotocus confusus*, ad |  | 1 (1) |  |  |  |  |  |  |
| *Skrjabinoeces similis*, ad |  |  |  |  | 9 (4.5±4.9) |  |  |  |
| *Strigea sphaerula*, mtc |  | 12 (6.0±7.1) |  |  |  |  |  |  |
| *Neoraillietnema praeputiale*, ad | 1 (1) | 51 (3.4±2.6) |  |  |  |  |  |  |
| *Oswaldocruzia filiformis*, ad |  | 92 (5.4±5.2) |  |  |  |  |  |  |
| *Rhabdias bufonis*, ad |  |  |  |  | 66 (4.5±4.9) |  |  |  |
| *Acanthocephalus ranae*, ad |  | 2 (2) |  |  |  |  |  |  |

\* include all their cavities and walls except serosa

Supplementary Table S4

Helminth predilection sites in *Pelophylax* spp*.* tadpoles (n=92) (total count; I, average, ± SD in parentheses)

| Helminth species, stage | Eyes | Body cavity | Under skin | Tail muscles | Hind leg muscles | Intestine\*  | Mesentery | Serosa of internal organs |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Alaria alata*, msc | 4 (1.0±0.0) | 42 (2.9±2.7) | 536 (7.8±15.1) |  | 8 (2.0±1.4) | 9 (4.5±4.9) |  | 8 (2.0±1.4) |
| *Diplostomum spathacerum*, mtc | 2 (1.0±0.0) |  |  |  |  |  |  |  |
| *Encyclometra colubrimurorum*, mtc |  |  |  | 1 (1) |  |  |  |  |
| *Opisthioglyphe ranae*, mtc | 1 (1) | 6 (1.5±0.6) | 17 (1.8±0.9) | 20 (6.0±5.6) |  |  | 13 (4.3±4.0) | 62 (3.3±3.3) |
| *Paralepoderma cloacicola*, mtc |  |  |  |  |  |  |  | 3 (3) |
| *Gyrinicola tba*, ad |  |  |  |  |  | 2 (2) |  |  |

\* include all their cavities and walls except serosa

Supplementary Table S5

Helminth predilection sites in larval *Lissotriton vulgaris* (n=249) and *Triturus cristatus* (n=18) (total count; I, average, ± SD in parentheses)

| Host | Helminth species, stage | Around eyes | Body cavity  | Under skin | Muscles | Stomach\* | Intestine\* | Serosa of internal organs |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Lissotriton vulgaris* | *Diplodiscus subclavatus*, ad |  |  |  |  |  | 3 (1.5±0.5) |  |
| *Echinoparyphium recurvatum*, mtc |  |  | 4 (1.3±0.6) |  |  |  | 13 (2.8±3.0) |
| *Opisthioglyphe ranae*, ad |  |  |  |  |  | 120 (12.0±12.0) |  |
| *Opisthioglyphe ranae*, mtc | 3 (1.5±0.5) | 59 (29.5±12.0) | 111 (8.5±6.7) |  |  | 9 (4.5±0.5) | 39 (4.3±4.5) |
| *Paralepoderma cloacicola*, mtc |  |  | 6 (6) | 91 (6.5±3.8) |  | 3 (1.0±0.0) | 18 (3.0±2.5) |
| *Pleurogenoides medians*, ad |  |  |  |  |  | 20 (6.7±1.5) |  |
| *Strigea sphaerula*, mtc |  |  | 3 (1.5±0.5) |  |  |  | 17 (2.8±2.0) |
| *Hedruris androphora*, ad |  |  |  |  | 1 (1)  | 4 (1.3±0.5) |  |
| *Triturus cristatus* | *Echinoparyphium recurvatum*, mtc |  |  | 4 (2.0±0.0) |  |  |  |  |
| *Opisthioglyphe ranae*, mtc |  |  | 5 (1.7±0.6) |  |  |  | 2 (2) |
| *Strigea sphaerula*, mtc |  |  |  |  |  |  | 1 (1) |
| *Hedruris androphora*, ad |  |  |  |  | 3 (3) | 17 (4.3±3.0) |  |

\* include all their cavities and walls except serosa

Supplementary Table S6

Kendall rank correlation for helminth species associations matrix; tau-b in the upper right section and level of significance (P) in the lower left section

|  | A.alat, msc | D.subc, ad | D.spha, mtc | E.recu, mtc | E.colu, mtc | G.vars, ad | H.vari, ad | O.rana,mtc | O.rana,ad | P.cloa, mtc | P.clav, ad | P.medi, ad | P.conf, ad | S.simi, ad | S.falc, mtc | S.spha, mtc | S.stri, mtc | T.exca, mtc | C.orna | G.tba | H.andr | H.poly | N.prae | O.fili | R.bufo | A.rana |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A.alat, msc | X | 0.1857 | 0.0972 | 0.1623 |  |  | 0.0900 | 0.1771 |  |  |  | 0.2168 | 0.1021 |  |  |  | 0.2563 |  | 0.0974 |  |  |  |  |  |  | 0.1733 |
| D.subc, ad | 0.0000 | X |  | 0.2444 |  | 0.1040 | 0.1468 | 0.0953 | 0.2423 |  |  | 0.3334 | 0.1487 | 0.1284 |  |  | 0.2213 | 0.1062 | 0.2005 |  |  |  | 0.1171 | 0.1963 |  | 0.2345 |
| D.spha, mtc | 0.0041 |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| E.recu, mtc | 0.0000 | 0.0000 |  | X |  |  | 0.0763 | 0.1897 | 0.1054 |  |  | 0.2683 |  | 0.0845 |  |  | 0.1164 |  | 0.0891 | 0.0728 |  |  |  |  | -0.0779 | 0.1079 |
| E.colu, mtc |  |  |  |  | X | 0.1858 |  |  |  |  |  | 0.0732 |  | 0.1466 |  |  | 0.1123 |  | 0.0843 |  |  |  |  |  |  |  |
| G.vars, ad |  | 0.0023 |  |  | 0.0000 | X |  |  | 0.1059 |  | 0.2033 |  |  | 0.2037 |  |  | 0.1087 |  | 0.1876 |  |  |  |  |  |  | 0.0813 |
| H.vari, ad | 0.0077 | 0.0000 |  | 0.0262 |  |  | X | 0.0727 |  |  |  | 0.0855 |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.1175 |
| O.rana,mtc | 0.0000 | 0.0036 |  | 0.0000 |  |  | 0.0291 | X |  | 0.0963 |  | 0.0854 |  |  |  |  |  |  |  |  |  |  | -0.1318 | -0.0888 | -0.1310 |  |
| O.rana,ad |  | 0.0000 |  | 0.0017 |  | 0.0019 |  |  | X |  | 0.1156 |  | 0.1412 | 0.1942 |  |  | 0.0790 |  | 0.0832 |  |  |  |  |  | -0.0779 | 0.2234 |
| P.cloa, mtc |  |  |  |  |  |  |  | 0.0036 |  | X |  |  |  |  |  |  |  |  |  |  |  |  | -0.0729 | -0.0886 | -0.0673 |  |
| P.clav, ad |  |  |  |  |  | 0.0000 |  |  | 0.0007 |  | X |  | 0.2185 | 0.1365 |  | 0.1028 |  |  |  |  |  |  |  |  |  | 0.1310 |
| P.medi, ad | 0.0000 | 0.0000 |  | 0.0000 | 0.0346 |  | 0.0134 | 0.0100 |  |  |  | X |  | 0.0921 |  |  | 0.2173 |  | 0.1510 |  |  |  |  |  |  | 0.1759 |
| P.conf, ad | 0.0026 | 0.0000 |  |  |  |  |  |  | 0.0000 |  | 0.0000 |  | X | 0.1623 |  |  | 0.0748 |  |  |  |  |  |  |  |  | 0.0812 |
| S.simi, ad |  | 0.0000 |  | 0.0121 | 0.0000 | 0.0000 |  |  | 0.0000 |  | 0.0001 | 0.0067 | 0.0000 | X | 0.1369 |  | 0.1729 |  | 0.2371 |  |  |  |  |  | -0.0669 | 0.0811 |
| S.falc, mtc |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.0001 | X |  |  |  |  |  |  |  |  |  |  |  |
| S.spha, mtc |  |  |  |  |  |  |  |  |  |  | 0.0030 |  |  |  |  | X |  | 0.0672 |  |  |  |  |  |  |  |  |
| S.stri, mtc | 0.0000 | 0.0000 |  | 0.0006 | 0.0012 | 0.0017 |  |  | 0.0192 |  |  | 0.0000 | 0.0304 | 0.0000 |  |  | X |  | 0.1627 |  |  |  |  | 0.0790 |  | 0.1296 |
| T.exca, mtc |  | 0.0017 |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.0500 |  | X |  |  |  |  | 0.0784 |  | -0.0714 |  |
| C.orna | 0.0039 | 0.0000 |  | 0.0093 | 0.0153 | 0.0000 |  |  | 0.0145 |  |  | 0.0000 |  | 0.0000 |  |  | 0.0000 |  | X |  |  |  |  | 0.0850 |  | 0.1113 |
| G.tba |  |  |  | 0.0346 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| H.andr |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |
| H.poly |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X | 0.1968 | 0.1363 | 0.1892 |  |
| N.prae |  | 0.0005 |  |  |  |  |  | 0.0001 |  | 0.0306 |  |  |  |  |  |  |  | 0.0198 |  |  |  | 0.0000 | X | 0.6008 | 0.6561 | 0.0686 |
| O.fili |  | 0.0000 |  |  |  |  |  | 0.0065 |  | 0.0086 |  |  |  |  |  |  | 0.0193 |  | 0.0123 |  |  | 0.0001 | 0.0000 | X | 0.5993 | 0.1644 |
| R.bufo |  |  |  | 0.0216 |  |  |  | 0.0001 | 0.0213 | 0.0483 |  |  |  | 0.0475 |  |  |  | 0.0357 |  |  |  | 0.0000 | 0.0000 | 0.0000 | X |  |
| A.rana | 0.0000 | 0.0000 |  | 0.0016 |  | 0.0192 | 0.0007 |  | 0.0000 |  | 0.0002 | 0.0000 | 0.0194 | 0.0172 |  |  | 0.0002 |  | 0.0013 |  |  |  | 0.0431 | 0.0000 |  | X |