

## **Supplementary materials**

**Table S1 Information regarding the samples used in this study\***

| SampleID            | Diet          | Living style | Species           | Location      | Group1 | Group2             |
|---------------------|---------------|--------------|-------------------|---------------|--------|--------------------|
| gSRR5415505         | Bamboo-eating | Captive      | Giant panda       | Yaan          | GPC    | GPYA <sup>1</sup>  |
| SRR5130540          | Bamboo-eating | Captive      | Giant panda       | Yaan          | GPC    | GPYA <sup>1</sup>  |
| SRR5415504          | Bamboo-eating | Captive      | Giant panda       | Yaan          | GPC    | GPYA <sup>1</sup>  |
| SRR5150002          | Bamboo-eating | Captive      | Giant panda       | Yaan          | GPC    | GPYA <sup>1</sup>  |
| SRR5149981          | Bamboo-eating | Captive      | Giant panda       | Yaan          | GPC    | GPYA <sup>1</sup>  |
| SRR5149936          | Bamboo-eating | Captive      | Giant panda       | Yaan          | GPC    | GPYA <sup>1</sup>  |
| SRR5149935          | Bamboo-eating | Captive      | Giant panda       | Yaan          | GPC    | GPYA <sup>1</sup>  |
| SRR5149886          | Bamboo-eating | Captive      | Giant panda       | Yaan          | GPC    | GPYA <sup>1</sup>  |
| SRR5130583          | Bamboo-eating | Captive      | Giant panda       | Yaan          | GPC    | GPYA <sup>1</sup>  |
| SRR5130565          | Bamboo-eating | Captive      | Giant panda       | Yaan          | GPC    | GPYA <sup>1</sup>  |
| ERX2429102          | Bamboo-eating | Captive      | Giant panda       | Chengdu       | GPC    | GPCD <sup>2</sup>  |
| ERX2429101          | Bamboo-eating | Captive      | Giant panda       | Chengdu       | GPC    | GPCD <sup>2</sup>  |
| ERX2429100          | Bamboo-eating | Captive      | Giant panda       | Chengdu       | GPC    | GPCD <sup>2</sup>  |
| ERX2429099          | Bamboo-eating | Captive      | Giant panda       | Chengdu       | GPC    | GPCD <sup>2</sup>  |
| ERX2429098          | Bamboo-eating | Captive      | Giant panda       | Chengdu       | GPC    | GPCD <sup>2</sup>  |
| ERX2429087          | Bamboo-eating | Captive      | Giant panda       | Chengdu       | GPC    | GPCD <sup>2</sup>  |
| ERX2333382          | Bamboo-eating | Captive      | Giant panda       | Chengdu       | GPC    | GPCD <sup>2</sup>  |
| SAMC011136          | Bamboo-eating | Wild         | Giant panda       | Qinling       | GPW    | GPQIN <sup>3</sup> |
| SAMC011114          | Bamboo-eating | Wild         | Giant panda       | Qinling       | GPW    | GPQIN <sup>3</sup> |
| SAMC011133          | Bamboo-eating | Wild         | Giant panda       | Qinling       | GPW    | GPQIN <sup>3</sup> |
| SAMC011132          | Bamboo-eating | Wild         | Giant panda       | Qinling       | GPW    | GPQIN <sup>3</sup> |
| SAMC011131          | Bamboo-eating | Wild         | Giant panda       | Qinling       | GPW    | GPQIN <sup>3</sup> |
| SAMC011127          | Bamboo-eating | Wild         | Giant panda       | Qinling       | GPW    | GPQIN <sup>3</sup> |
| SAMC011121          | Bamboo-eating | Wild         | Giant panda       | Qinling       | GPW    | GPQIN <sup>3</sup> |
| SAMC011118          | Bamboo-eating | Wild         | Giant panda       | Qinling       | GPW    | GPQIN <sup>3</sup> |
| SAMC011115          | Bamboo-eating | Wild         | Giant panda       | Qinling       | GPW    | GPQIN <sup>3</sup> |
| SRR5149961          | Bamboo-eating | Wild         | Giant panda       | Qionglai      | GPW    | GPQIO <sup>1</sup> |
| SRR5149913          | Bamboo-eating | Wild         | Giant panda       | Qionglai      | GPW    | GPQIO <sup>1</sup> |
| SRR5149902          | Bamboo-eating | Wild         | Giant panda       | Qionglai      | GPW    | GPQIO <sup>1</sup> |
| SRR5149862          | Bamboo-eating | Wild         | Giant panda       | Qionglai      | GPW    | GPQIO <sup>1</sup> |
| SRR5130600          | Bamboo-eating | Wild         | Giant panda       | Qionglai      | GPW    | GPQIO <sup>1</sup> |
| SRR5130560          | Bamboo-eating | Wild         | Giant panda       | Qionglai      | GPW    | GPQIO <sup>1</sup> |
| SRR5130537          | Bamboo-eating | Wild         | Giant panda       | Qionglai      | GPW    | GPQIO <sup>1</sup> |
| 20140128-zx-F03     | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>4</sup> |
| 20131124-ZX-F03     | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>4</sup> |
| 50                  | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>4</sup> |
| 34                  | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>4</sup> |
| 31                  | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>4</sup> |
| 9                   | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>4</sup> |
| TT2                 | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>4</sup> |
| 19                  | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>4</sup> |
| TT1                 | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>4</sup> |
| LZP                 | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>4</sup> |
| LX3                 | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>4</sup> |
| CDXM40              | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>4</sup> |
| CDXM39              | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>4</sup> |
| CDXM27              | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>4</sup> |
| CDXM18              | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>4</sup> |
| 23                  | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>4</sup> |
| 1                   | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>5</sup> |
| 6                   | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>6</sup> |
| 8                   | Bamboo-eating | Wild         | Giant panda       | Xiaoxiangling | GPW    | GPXXL <sup>6</sup> |
| C2                  | Bamboo-eating | Wild         | Red panda         | Xiaoxiangling | RP     | RP <sup>4</sup>    |
| C18                 | Bamboo-eating | Wild         | Red panda         | Xiaoxiangling | RP     | RP <sup>4</sup>    |
| C14                 | Bamboo-eating | Wild         | Red panda         | Xiaoxiangling | RP     | RP <sup>4</sup>    |
| B2-4                | Bamboo-eating | Wild         | Red panda         | Xiaoxiangling | RP     | RP <sup>4</sup>    |
| B1-2                | Bamboo-eating | Wild         | Red panda         | Xiaoxiangling | RP     | RP <sup>4</sup>    |
| A4                  | Bamboo-eating | Wild         | Red panda         | Xiaoxiangling | RP     | RP <sup>4</sup>    |
| MJ22813045835_PY    | HE            | Captive      | Argali            | Beijing Zoo   | HE     | HE <sup>7</sup>    |
| MJ22813045835_BTCBY | HE            | Captive      | Hoolock.gibbon    | Beijing Zoo   | HE     | HE <sup>7</sup>    |
| MJ22813045835_BJZML | HE            | Captive      | Père David's deer | Beijing Zoo   | HE     | HE <sup>7</sup>    |
| 7                   |               |              |                   |               |        |                    |
| LN                  | HE            | Captive      | Takin             | Beijing Zoo   | HE     | HE <sup>7</sup>    |

|                       |    |         |                             |                                     |    |                 |
|-----------------------|----|---------|-----------------------------|-------------------------------------|----|-----------------|
| MJ22813045835_MHL     | HE | Captive | Sika.deer                   | Beijing Zoo                         | HE | HE <sup>7</sup> |
| MJ22813045835_MGYL    | HE | Captive | Onager                      | Beijing Zoo                         | HE | HE <sup>7</sup> |
| MJ22813045835_MAL     | HE | Captive | Red.deer                    | Beijing Zoo                         | HE | HE <sup>7</sup> |
| MJ22813045835_HYH     | HE | Captive | Francois's Langur           | Beijing Zoo                         | HE | HE <sup>7</sup> |
| MJ22813045835_HJ      | HE | Captive | Hairy.fronted.muntj<br>ac   | Beijing Zoo                         | HE | HE <sup>7</sup> |
| MJ22813045835_EHL     | HE | Captive | Goitered.gazelle            | Beijing Zoo                         | HE | HE <sup>7</sup> |
| MJ22813045835_DJSH    | HE | Captive | Black.snub.nosed.m<br>onkey | Beijing Zoo                         | HE | HE <sup>7</sup> |
| MJ22813045835_BXCBY   | HE | Captive | white.cheeked.gibbo<br>n    | Beijing Zoo                         | HE | HE <sup>7</sup> |
| NM                    | CA | Captive | Caracal                     | Beijing ZooC                        | CA | CA <sup>7</sup> |
| MJ22813045835_CH      | CA | Captive | Red.fox                     | Beijing Zoo                         | CA | CA <sup>7</sup> |
| MJ22813045835_CA      | CA | Captive | Dhole                       | Beijing Zoo                         | CA | CA <sup>7</sup> |
| MJ22813045835_BHB-NJ  | CA | Captive | Spotted.seal                | Nanjing<br>Underwater<br>World Park | CA | CA <sup>7</sup> |
| LB                    | CA | Captive | Cheetah                     | Beijing Zoo                         | CA | CA <sup>7</sup> |
| HN13                  | CA | Captive | Indochinese.leopard         | Beijing Zoo                         | CA | CA <sup>7</sup> |
| HB                    | CA | Captive | Black.leopard               | Beijing Zoo                         | CA | CA <sup>7</sup> |
| FZS                   | CA | Captive | LionBJ                      | Beijing Zoo                         | CA | CA <sup>7</sup> |
| DBH                   | CA | Captive | Siberian.tiger              | Beijing Zoo                         | CA | CA <sup>7</sup> |
| BXL                   | CA | Captive | Maned.wolf                  | Beijing Zoo                         | CA | CA <sup>7</sup> |
| MJLH                  | CA | Captive | Bengal.tiger                | Beijing Zoo                         | CA | CA <sup>7</sup> |
| BLG                   | CA | Captive | Spotted.hyena               | Beijing Zoo                         | CA | CA <sup>7</sup> |
| MJ22813045835_YH      | CA | Captive | Silver fox                  | Beijing Zoo                         | CA | CA <sup>7</sup> |
| MJ22813045835_SH      | CA | Captive | Corsac.fox                  | Beijing Zoo                         | CA | CA <sup>7</sup> |
| MJ22813045835_NMHB-NJ | CA | Captive | Spotted.sealNJ2             | Nanjing<br>Underwater<br>World Park | CA | CA <sup>7</sup> |
| MJ22813045835_LH      | CA | Captive | Arctic.fox                  | Beijing Zoo                         | CA | CA <sup>7</sup> |
| MJ22813045835_HW2B    | CA | Captive | Jaguar                      | Beijing Zoo                         | CA | CA <sup>7</sup> |
| MJ22813045835_HBHL    | CA | Captive | Black.backed.jackal         | Beijing Zoo                         | CA | CA <sup>7</sup> |
| MJ22813045835_GLG     | CA | Captive | Striped hyena               | Beijing Zoo                         | CA | CA <sup>7</sup> |
| ZH                    | OC | Captive | Hog.badger                  | Beijing Zoo                         | OC | OC <sup>7</sup> |
| MJ22813045835_MLX     | OC | Captive | Sun.bear                    | Beijing Zoo                         | OC | OC <sup>7</sup> |
| MJ22813045835_HX      | OC | Captive | Raccoon                     | Beijing Zoo                         | OC | OC <sup>7</sup> |
| SRR5130595            | OC | Captive | Black bear                  | Yaan                                | OC | OC <sup>8</sup> |
| SRR5130563            | OC | Captive | Black bear                  | Yaan                                | OC | OC <sup>8</sup> |
| SRR5130533            | OC | Captive | Black bear                  | Yaan                                | OC | OC <sup>8</sup> |
| SRR5130531            | OC | Captive | Black bear                  | Yaan                                | OC | OC <sup>8</sup> |
| SRR5130527            | OC | Captive | Black bear                  | Yaan                                | OC | OC <sup>8</sup> |
| MJ22813045835_ZX      | OC | Captive | Brow.bear                   | Beijing Zoo                         | OC | OC <sup>7</sup> |

|                  |    |         |                             |             |      |                   |
|------------------|----|---------|-----------------------------|-------------|------|-------------------|
| MJ22813045835_MX | OC | Captive | Kinkajou                    | Beijing Zoo | OC   | OC                |
| X-31             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| X-33             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| X-36             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| X-37             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| X-39             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| X-43             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| X-44             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| X-45             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| X-48             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| X-50             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| X-53             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| X-56             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| X-60             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| X-64             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| X-65             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| X-66             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| W-7              | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| W-10             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| W-12             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| W-24             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| W-25             | HE | Wild    | Yunnan snub-nosed<br>monkey | Yunnan      | YSNM | YSNM <sup>6</sup> |
| W-29             | HE | Wild    | Yunnan snub-nosed           | Yunnan      | YSNM | YSNM <sup>6</sup> |

|      |    |      |                   |        |      |                   |
|------|----|------|-------------------|--------|------|-------------------|
|      |    |      | monkey            |        |      |                   |
| W-30 | HE | Wild | Yunnan snub-nosed | Yunnan | YSNM | YSNM <sup>6</sup> |
|      |    |      | monkey            |        |      |                   |
| W-42 | HE | Wild | Yunnan snub-nosed | Yunnan | YSNM | YSNM <sup>6</sup> |
|      |    |      | monkey            |        |      |                   |

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\*This table is reworked on the table S1 in our previous published study.

CA, meat-eating carnivorans. OC, omnivorous carnivorans. HE, herbivores. GPCD, Chengdu giant panda Breeding center. GPYA, giant panda research center in Yaan. GPQIN, the wild giant pandas in Qinling Mountain. GPQIO, the wild giant pandas in Qionglai Mountain. GPXXL, the wild giant pandas in Xiaoxiangling Mountain. RP, the wild red pandas in Xiaoxiangling Mountain. YSNM, the wild Yunnan snub-nosed monkeys in Yunnan. GPC, the combine of GPYA and GPCD. GPW, The combine of GPQIN, GPQIO, and GPXXL.

Group1, the group for co-occurrence analysis. Group2, the group for composition analysis.

Table S2 The comparisons (paiwise Kruskal-Wallis test) on the relative abundance of the putative *Neocallimastigomycetes* among the mammal groups in this study

|                               | Group | Group | p-value   |
|-------------------------------|-------|-------|-----------|
| <i>Neocallimastigomycetes</i> | RP    | YSNM  | 1.72E-06  |
| <i>Neocallimastigomycetes</i> | OC    | YSNM  | 2.11E-06  |
| <i>Neocallimastigomycetes</i> | GPYA  | YSNM  | 2.17E-06  |
| <i>Neocallimastigomycetes</i> | GPQIO | YSNM  | 2.22E-06  |
| <i>Neocallimastigomycetes</i> | GPCD  | YSNM  | 2.71E-06  |
| <i>Neocallimastigomycetes</i> | CA    | YSNM  | 0.0002812 |
| <i>Neocallimastigomycetes</i> | RP    | HE    | 0.0055308 |
| <i>Neocallimastigomycetes</i> | OC    | HE    | 0.0064634 |
| <i>Neocallimastigomycetes</i> | GPYA  | HE    | 0.006649  |
| <i>Neocallimastigomycetes</i> | GPQIO | HE    | 0.0067848 |
| <i>Neocallimastigomycetes</i> | GPCD  | HE    | 0.0079493 |
| <i>Neocallimastigomycetes</i> | HE    | YSNM  | 0.0417325 |
| <i>Neocallimastigomycetes</i> | RP    | CA    | 0.0441685 |
| <i>Neocallimastigomycetes</i> | GPQIN | YSNM  | 0.0463395 |
| <i>Neocallimastigomycetes</i> | CA    | OC    | 0.0564552 |
| <i>Neocallimastigomycetes</i> | GPYA  | CA    | 0.0596813 |
| <i>Neocallimastigomycetes</i> | GPQIO | CA    | 0.0618907 |
| <i>Neocallimastigomycetes</i> | GPCD  | CA    | 0.0794924 |
| <i>Neocallimastigomycetes</i> | CA    | HE    | 0.1333017 |
| <i>Neocallimastigomycetes</i> | GPXXL | RP    | 0.1409287 |
| <i>Neocallimastigomycetes</i> | GPXXL | OC    | 0.1484266 |
| <i>Neocallimastigomycetes</i> | GPXXL | GPYA  | 0.1498189 |
| <i>Neocallimastigomycetes</i> | GPQIO | GPXXL | 0.1508051 |
| <i>Neocallimastigomycetes</i> | GPXXL | GPCD  | 0.1587225 |
| <i>Neocallimastigomycetes</i> | GPCD  | RP    | 0.2164183 |
| <i>Neocallimastigomycetes</i> | GPQIN | RP    | 0.2385839 |
| <i>Neocallimastigomycetes</i> | GPQIN | OC    | 0.2566254 |
| <i>Neocallimastigomycetes</i> | GPQIN | GPYA  | 0.2600506 |
| <i>Neocallimastigomycetes</i> | GPQIN | GPQIO | 0.262474  |
| <i>Neocallimastigomycetes</i> | GPQIN | GPCD  | 0.282006  |
| <i>Neocallimastigomycetes</i> | RP    | OC    | 0.3236203 |
| <i>Neocallimastigomycetes</i> | GPXXL | CA    | 0.3358147 |
| <i>Neocallimastigomycetes</i> | GPYA  | RP    | 0.3758138 |
| <i>Neocallimastigomycetes</i> | GPQIO | RP    | 0.3800004 |
| <i>Neocallimastigomycetes</i> | GPCD  | OC    | 0.4780964 |
| <i>Neocallimastigomycetes</i> | GPQIN | GPXXL | 0.4963765 |
| <i>Neocallimastigomycetes</i> | GPXXL | YSNM  | 0.524825  |
| <i>Neocallimastigomycetes</i> | GPQIN | HE    | 0.5262328 |
| <i>Neocallimastigomycetes</i> | GPYA  | GPCD  | 0.5728652 |
| <i>Neocallimastigomycetes</i> | GPQIO | GPCD  | 0.6301518 |
| <i>Neocallimastigomycetes</i> | GPXXL | HE    | 0.7377902 |

|                             |       |      |           |
|-----------------------------|-------|------|-----------|
| <i>Neocallimastigomyces</i> | GPQIN | CA   | 0.738376  |
| <i>Neocallimastigomyces</i> | GPQIO | OC   | 0.8426795 |
| <i>Neocallimastigomyces</i> | GPYA  | OC   | 0.8988386 |
| <i>Neocallimastigomyces</i> | GPQIO | GPYA | 0.9421881 |

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Table S3 The comparisons (paiwise Kruskal-Wallis test) on the relative abundance of the putative *Methanocorpusculaceae* among the mammal groups in this study

|                              | Group | Group | p-value   |
|------------------------------|-------|-------|-----------|
| <i>Methanocorpusculaceae</i> | GPQIN | YSNM  | 0.0005463 |
| <i>Methanocorpusculaceae</i> | GPQIN | HE    | 0.0526828 |
| <i>Methanocorpusculaceae</i> | GPYA  | HE    | 0.056621  |
| <i>Methanocorpusculaceae</i> | HE    | YSNM  | 0.0603502 |
| <i>Methanocorpusculaceae</i> | GPQIN | CA    | 0.0610389 |
| <i>Methanocorpusculaceae</i> | RP    | HE    | 0.0643886 |
| <i>Methanocorpusculaceae</i> | GPYA  | CA    | 0.0763735 |
| <i>Methanocorpusculaceae</i> | GPQIO | HE    | 0.0806907 |
| <i>Methanocorpusculaceae</i> | CA    | YSNM  | 0.0905535 |
| <i>Methanocorpusculaceae</i> | GPQIN | OC    | 0.0909531 |
| <i>Methanocorpusculaceae</i> | OC    | HE    | 0.0928125 |
| <i>Methanocorpusculaceae</i> | RP    | CA    | 0.1118372 |
| <i>Methanocorpusculaceae</i> | GPQIN | GPXXL | 0.1159977 |
| <i>Methanocorpusculaceae</i> | GPXXL | HE    | 0.1176414 |
| <i>Methanocorpusculaceae</i> | GPQIN | GPQIO | 0.1387293 |
| <i>Methanocorpusculaceae</i> | GPYA  | OC    | 0.141538  |
| <i>Methanocorpusculaceae</i> | GPXXL | GPYA  | 0.1562179 |
| <i>Methanocorpusculaceae</i> | GPQIN | RP    | 0.1850422 |
| <i>Methanocorpusculaceae</i> | OC    | YSNM  | 0.1898171 |
| <i>Methanocorpusculaceae</i> | GPXXL | YSNM  | 0.1931029 |
| <i>Methanocorpusculaceae</i> | CA    | HE    | 0.2038667 |
| <i>Methanocorpusculaceae</i> | GPQIO | CA    | 0.2130785 |
| <i>Methanocorpusculaceae</i> | GPQIO | GPYA  | 0.2188366 |
| <i>Methanocorpusculaceae</i> | GPXXL | RP    | 0.2522827 |
| <i>Methanocorpusculaceae</i> | RP    | OC    | 0.2877591 |
| <i>Methanocorpusculaceae</i> | GPQIO | YSNM  | 0.2984879 |
| <i>Methanocorpusculaceae</i> | CA    | OC    | 0.3000938 |
| <i>Methanocorpusculaceae</i> | GPQIN | GPCD  | 0.3601023 |
| <i>Methanocorpusculaceae</i> | GPYA  | GPCD  | 0.373325  |
| <i>Methanocorpusculaceae</i> | GPCD  | YSNM  | 0.3857971 |
| <i>Methanocorpusculaceae</i> | GPCD  | RP    | 0.3980079 |
| <i>Methanocorpusculaceae</i> | GPQIN | GPYA  | 0.4140558 |
| <i>Methanocorpusculaceae</i> | GPYA  | RP    | 0.4242344 |
| <i>Methanocorpusculaceae</i> | GPQIO | GPCD  | 0.4436252 |
| <i>Methanocorpusculaceae</i> | GPQIO | RP    | 0.4495797 |
| <i>Methanocorpusculaceae</i> | GPYA  | YSNM  | 0.460849  |
| <i>Methanocorpusculaceae</i> | GPCD  | OC    | 0.4741602 |
| <i>Methanocorpusculaceae</i> | GPXXL | CA    | 0.4964402 |
| <i>Methanocorpusculaceae</i> | GPQIO | GPXXL | 0.5125431 |
| <i>Methanocorpusculaceae</i> | GPXXL | GPCD  | 0.5255729 |
| <i>Methanocorpusculaceae</i> | GPCD  | HE    | 0.6613448 |

|                              |       |      |           |
|------------------------------|-------|------|-----------|
| <i>Methanocorpusculaceae</i> | RP    | YSNM | 0.6631362 |
| <i>Methanocorpusculaceae</i> | GPCD  | CA   | 0.6708379 |
| <i>Methanocorpusculaceae</i> | GPXL  | OC   | 0.7040665 |
| <i>Methanocorpusculaceae</i> | GPQIO | OC   | 0.7230925 |

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Table S4 The proportion of the correlation-type (positive or negative) in the co-occurrence analysis in this study

| Group     | Positive | Negative |
|-----------|----------|----------|
| GPW       | 0.99991  | 0.00009  |
| GPC       | 0.950134 | 0.049866 |
| RP        | 0.88624  | 0.11376  |
| CA        | 0.95734  | 0.04266  |
| OC        | 0.90373  | 0.09627  |
| HE        | 0.87626  | 0.12374  |
| YSNM      | 0.99342  | 0.00658  |
| GPC-GPCD  | 0.65383  | 0.34617  |
| GPC-GPYA  | 0.76492  | 0.23508  |
| GPW-GPQIN | 0.83071  | 0.16929  |
| GPW-GPQIO | 0.69888  | 0.30112  |
| GPW-GPXXL | 0.99959  | 0.00041  |

The 123 metagenomes used in these analyses belonged to 52 giant pandas (9 from the Qinling Mountains [GPQIN, wild]<sup>3</sup>, 7 from the Qionglai Mountains [GPQIO, wild]<sup>1</sup>, 19 from the Xiaoxiangling Mountains [GPXXL, wild]<sup>4,5</sup>, 7 from the Chengdu Breeding Center [GPCD, captive]<sup>2</sup>, and 10 from the Yaan research base of the Wolong Research Center [GPYA, captive])<sup>1</sup>; 6 red pandas from the Xiaoxiangling Mountains (RP, wild)<sup>12</sup>; 19 meat-eating carnivorans (CA)<sup>7</sup>; 10 omnivorous carnivorans (OC)<sup>7,8</sup>; 12 herbivores (HE)<sup>7</sup>; and 24 Yunnan snub-nosed monkeys (YSNM, wild)<sup>6</sup>.

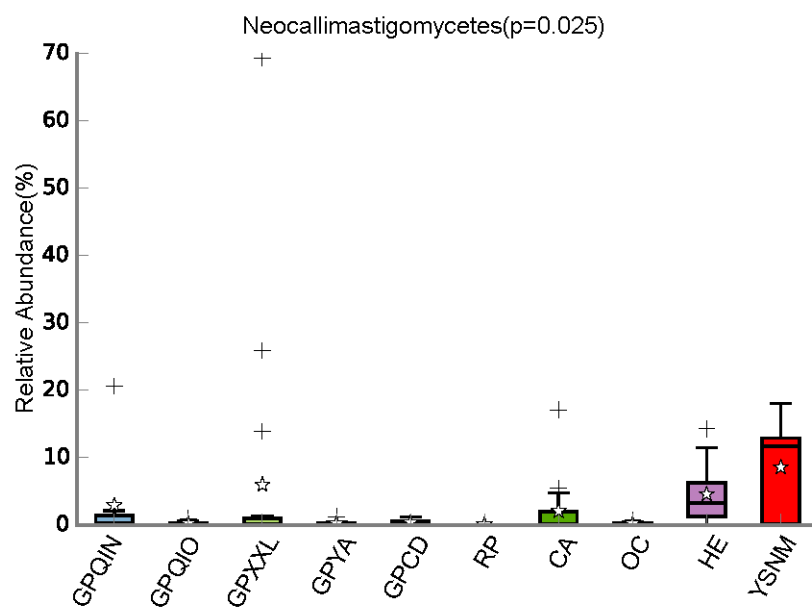


Figure S1 The relative abundance of fungi Neocallimastigomycetes among ten mammal groups

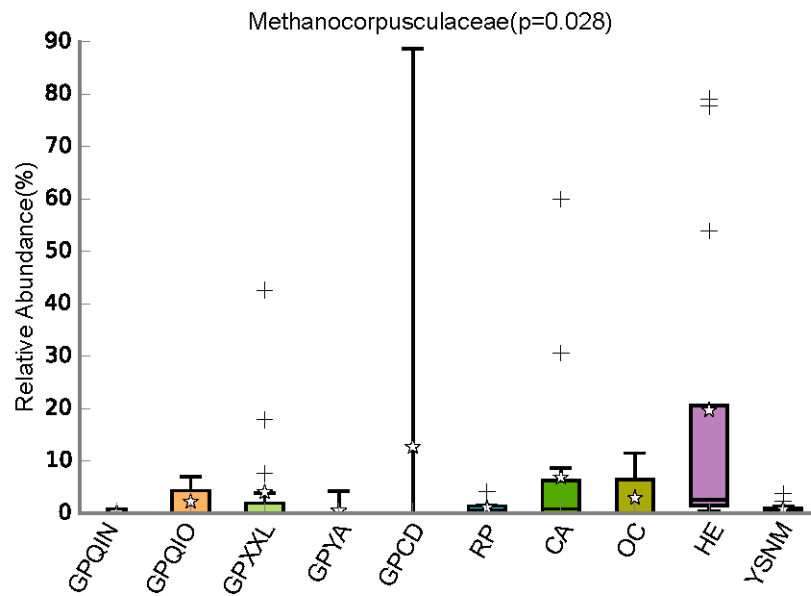


Figure S2 The relative abundance of fungi Methanocorpusculaceae among ten mammal groups

The TPM of total Archaea of GPCD group was lowest among these ten mammal groups. The 'outlier' pattern in GPCD caused by the calculation method of relative abundance.

## References:

- 1 Guo, W. *et al.* Comparative study of gut microbiota in wild and captive giant pandas (*Ailuropoda melanoleuca*). *Genes* **10**, 827 (2019).
- 2 Zhang, W. *et al.* Age-associated microbiome shows the giant panda lives on hemicelluloses, not on cellulose. *The ISME journal* **12**, 1319-1328 (2018).
- 3 Wu, Q. *et al.* Seasonal variation in nutrient utilization shapes gut microbiome structure and function in wild giant pandas. *Proceedings of the Royal Society B: Biological Sciences* **284**, 20170955 (2017).
- 4 Zhu, L. *et al.* Potential mechanism of detoxification of cyanide compounds by gut microbiomes of bamboo-eating pandas. *MSphere* **3**, e00229-00218 (2018).
- 5 Yao, R. *et al.* Fly-over phylogeny across invertebrate to vertebrate: The giant panda and insects share a highly similar gut microbiota. *Computational and structural biotechnology journal* **19**, 4676-4683 (2021).
- 6 Xia, W. *et al.* Functional convergence of Yunnan snub-nosed monkey and bamboo-eating panda gut microbiomes revealing the driving by dietary flexibility on mammal gut microbiome. *Computational and Structural Biotechnology Journal* (2022).
- 7 Zhu, L. *et al.* Adaptive evolution to a high purine and fat diet of carnivorans revealed by gut microbiomes and host genomes. *Environmental microbiology* **20**, 1711-1722 (2018).
- 8 Guo, W. *et al.* Metagenomic study suggests that the gut microbiota of the giant panda (*Ailuropoda melanoleuca*) may not be specialized for fiber fermentation. *Frontiers in microbiology* **9**, 229 (2018).

## Supplementary excel file 1

The co-occurrence network for each mammal group

(1) GPC (captive giant panda group)

| source  | target   | weight     | cor-type | p-value     | connection | source-type | source-genus(family)            | source-degree | target-type | target-abundance | target-genus(family)  | target-degree |
|---------|----------|------------|----------|-------------|------------|-------------|---------------------------------|---------------|-------------|------------------|-----------------------|---------------|
| virus6  | bac2882  | -0.8222696 | negative | 5.10E-05    | External   | virus       | f_Genomoviridae                 | 12            | bac         | 5.892754093      | g_Arsenophonus        | 10            |
| virus15 | bac2882  | -0.8222696 | negative | 5.10E-05    | External   | virus       | f_Poxviridae                    | 14            | bac         | 5.892754093      | g_Arsenophonus        | 10            |
| virus23 | bac2882  | -0.825015  | negative | 4.58E-05    | External   | virus       | f_Ackermannviridae              | 8             | bac         | 5.892754093      | g_Arsenophonus        | 10            |
| virus26 | bac2861  | -0.8689656 | negative | 5.99E-06    | External   | virus       | f_Demereciviridae               | 43            | bac         | 5.820367756      | g_Shimwellia          | 15            |
| virus34 | bac2882  | -0.840434  | negative | 1.71E-05    | External   | virus       | f_Schitoviridae                 | 6             | bac         | 5.892754093      | g_Arsenophonus        | 10            |
| virus35 | bac2880  | -0.8406863 | negative | 5.49E-06    | External   | virus       | f_Siphoviridae                  | 4             | bac         | 5.680298881      | g_Obesumbacterium     | 1             |
| arc80   | bac1261  | -0.8469926 | negative | 1.79E-05    | External   | arc         | g_Methanococcoides              | 37            | bac         | 9.454382577      | g_Lactiplantibacillus | 1             |
| arc90   | bac2861  | -0.8266068 | negative | 4.30E-05    | External   | arc         | g_Methanococcoides              | 37            | bac         | 5.820367756      | g_Shimwellia          | 15            |
| bac14   | fungi291 | -0.8117166 | negative | 7.61E-05    | External   | bac         | g_Terriglobus                   | 5             | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac84   | fungi291 | -0.8651961 | negative | 0           | External   | bac         | g_Rhodococcus                   | 1             | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac94   | fungi291 | -0.8073911 | negative | 8.91E-05    | External   | bac         | g_Blastococcus                  | 2             | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac121  | fungi291 | -0.8362927 | negative | 2.88E-05    | External   | bac         | g_Oerskovia                     | 1             | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac162  | fungi291 | -0.8341958 | negative | 3.14E-05    | External   | bac         | g_Terrabacter                   | 13            | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac182  | fungi291 | -0.8004427 | negative | 0.000113704 | External   | bac         | g_Coryzicola                    | 13            | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac191  | fungi291 | -0.8014949 | negative | 0.000109643 | External   | bac         | g_Glacibacter                   | 3             | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac192  | fungi291 | -0.8634895 | negative | 8.00E-06    | External   | bac         | g_Glacihabitans                 | 20            | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac202  | fungi291 | -0.8137255 | negative | 9.09E-05    | External   | bac         | g_Leifsonia                     | 10            | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac214  | fungi291 | -0.8101264 | negative | 8.07E-05    | External   | bac         | g_Plantibacter                  | 13            | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac265  | fungi291 | -0.8137255 | negative | 9.09E-05    | External   | bac         | g_Sanguibacter                  | 4             | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac316  | fungi291 | -0.8345629 | negative | 3.10E-05    | External   | bac         | g_Arachnia                      | 8             | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac334  | fungi291 | -0.8355169 | negative | 2.97E-05    | External   | bac         | g_Tessaracoccus                 | 14            | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac449  | fungi291 | -0.8273893 | negative | 4.16E-05    | External   | bac         | g_Patulibacter                  | 18            | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac2377 | fungi291 | -0.8809611 | negative | 3.02E-06    | External   | bac         | g_Hydrogenophaga                | 3             | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac2410 | fungi291 | -0.8161765 | negative | 7.99E-05    | External   | bac         | g_Massilia                      | 7             | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac2520 | fungi291 | -0.8015505 | negative | 0.000109432 | External   | bac         | g_Dechloromonas                 | 8             | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac2645 | fungi58  | -0.8071749 | negative | 8.98E-05    | External   | bac         | g_Syntrophus                    | 2             | fungi       | 3.816260723      | g_Didymella           | 54            |
| bac2645 | fungi277 | -0.8188586 | negative | 5.82E-05    | External   | bac         | g_Syntrophus                    | 2             | fungi       | 4.770481214      | g_Colletotrichum      | 1             |
| bac2838 | fungi253 | -0.8177753 | negative | 6.07E-05    | External   | bac         | g_Cedecea                       | 3             | fungi       | 3.441283105      | g_Saccharomyces       | 9             |
| bac2839 | fungi86  | -0.8330116 | negative | 3.31E-05    | External   | bac         | g_Citrobacter                   | 2             | fungi       | 3.283876739      | g_Bipolaris           | 33            |
| bac2846 | fungi52  | -0.8761878 | negative | 4.00E-06    | External   | bac         | g_Klebsiella                    | 7             | fungi       | 2.795694711      | g_Corynespora         | 57            |
| bac2846 | fungi86  | -0.8355169 | negative | 2.97E-05    | External   | bac         | g_Klebsiella                    | 7             | fungi       | 3.283876739      | g_Bipolaris           | 33            |
| bac2846 | fungi96  | -0.8253943 | negative | 4.51E-05    | External   | bac         | g_Klebsiella                    | 7             | fungi       | 2.517454508      | g_Trematosphaeria     | 58            |
| bac2846 | fungi111 | -0.8104639 | negative | 7.97E-05    | External   | bac         | g_Klebsiella                    | 7             | fungi       | 4.198139397      | g_Cyphellophora       | 55            |
| bac2846 | fungi117 | -0.8192325 | negative | 5.74E-05    | External   | bac         | g_Klebsiella                    | 7             | fungi       | 4.394387424      | g_Rhinocladiella      | 70            |
| bac2846 | fungi304 | -0.80014   | negative | 0.000114895 | External   | bac         | g_Klebsiella                    | 7             | fungi       | 3.361763312      | g_Neonectria          | 13            |
| bac2847 | fungi52  | -0.8761878 | negative | 4.00E-06    | External   | bac         | g_Kluyvera                      | 12            | fungi       | 2.795694711      | g_Corynespora         | 57            |
| bac2847 | fungi86  | -0.8705911 | negative | 5.48E-06    | External   | bac         | g_Kluyvera                      | 12            | fungi       | 3.283876739      | g_Bipolaris           | 33            |
| bac2847 | fungi96  | -0.8584101 | negative | 1.04E-05    | External   | bac         | g_Kluyvera                      | 12            | fungi       | 2.517454508      | g_Trematosphaeria     | 58            |
| bac2847 | fungi111 | -0.8092113 | negative | 8.34E-05    | External   | bac         | g_Kluyvera                      | 12            | fungi       | 4.198139397      | g_Cyphellophora       | 55            |
| bac2847 | fungi116 | -0.8229179 | negative | 4.98E-05    | External   | bac         | g_Kluyvera                      | 12            | fungi       | 4.556746455      | g_Philophora          | 68            |
| bac2847 | fungi117 | -0.8129692 | negative | 7.27E-05    | External   | bac         | g_Kluyvera                      | 12            | fungi       | 4.394387424      | g_Rhinocladiella      | 70            |
| bac2847 | fungi335 | -0.8025373 | negative | 0.000105741 | External   | bac         | g_Kluyvera                      | 12            | fungi       | 3.741471904      | g_Podospora           | 11            |
| bac2847 | fungi336 | -0.8040321 | negative | 0.000100349 | External   | bac         | g_Kluyvera                      | 12            | fungi       | 3.961289247      | g_Thermothelomyces    | 22            |
| bac2847 | fungi480 | -0.8104639 | negative | 7.97E-05    | External   | bac         | g_Kluyvera                      | 12            | fungi       | 5.736265799      | g_Lentinus            | 39            |
| bac2847 | fungi602 | -0.8177423 | negative | 6.08E-05    | External   | bac         | g_Kluyvera                      | 12            | fungi       | 7.526776795      | g_Phycomyces          | 9             |
| bac2848 | fungi52  | -0.8152356 | negative | 6.68E-05    | External   | bac         | g_Kosakonia                     | 4             | fungi       | 2.795694711      | g_Corynespora         | 57            |
| bac2848 | fungi86  | -0.8129692 | negative | 7.27E-05    | External   | bac         | g_Kosakonia                     | 4             | fungi       | 3.283876739      | g_Bipolaris           | 33            |
| bac2848 | fungi96  | -0.812696  | negative | 7.34E-05    | External   | bac         | g_Kosakonia                     | 4             | fungi       | 2.517454508      | g_Trematosphaeria     | 58            |
| bac2854 | fungi52  | -0.8660291 | negative | 7.01E-06    | External   | bac         | g_Pluralibacter                 | 3             | fungi       | 2.795694711      | g_Corynespora         | 57            |
| bac2854 | fungi86  | -0.8179798 | negative | 6.02E-05    | External   | bac         | g_Pluralibacter                 | 3             | fungi       | 3.283876739      | g_Bipolaris           | 33            |
| bac2855 | fungi58  | -0.8015949 | negative | 0.000109264 | External   | bac         | g_Pseudoscherichia              | 2             | fungi       | 3.816260723      | g_Didymella           | 54            |
| bac2857 | fungi52  | -0.8304737 | negative | 3.67E-05    | External   | bac         | g_Raoutella                     | 6             | fungi       | 2.795694711      | g_Corynespora         | 57            |
| bac2857 | fungi86  | -0.8568119 | negative | 1.12E-05    | External   | bac         | g_Raoutella                     | 6             | fungi       | 3.283876739      | g_Bipolaris           | 33            |
| bac2857 | fungi96  | -0.8050769 | negative | 9.67E-05    | External   | bac         | g_Raoutella                     | 6             | fungi       | 2.517454508      | g_Trematosphaeria     | 58            |
| bac2857 | fungi113 | -0.8015505 | negative | 0.000109432 | External   | bac         | g_Raoutella                     | 6             | fungi       | 5.03348556       | g_Cladophialophora    | 71            |
| bac2857 | fungi480 | -0.8380222 | negative | 2.67E-05    | External   | bac         | g_Raoutella                     | 6             | fungi       | 5.736265799      | g_Lentinus            | 39            |
| bac2861 | fungi14  | -0.8148171 | negative | 6.79E-05    | External   | bac         | g_Shimwellia                    | 15            | fungi       | 1.73094733       | g_Polychaeton         | 12            |
| bac2861 | fungi26  | -0.8734856 | negative | 4.66E-06    | External   | bac         | g_Shimwellia                    | 15            | fungi       | 4.093577602      | g_Cercospora          | 45            |
| bac2861 | fungi52  | -0.8333026 | negative | 3.27E-05    | External   | bac         | g_Shimwellia                    | 15            | fungi       | 2.795694711      | g_Corynespora         | 57            |
| bac2861 | fungi108 | -0.8222696 | negative | 5.10E-05    | External   | bac         | g_Shimwellia                    | 15            | fungi       | 2.646387541      | g_Cryomyces           | 29            |
| bac2861 | fungi111 | -0.8079385 | negative | 8.73E-05    | External   | bac         | g_Shimwellia                    | 15            | fungi       | 4.198139397      | g_Cyphellophora       | 55            |
| bac2861 | fungi112 | -0.8540702 | negative | 1.28E-05    | External   | bac         | g_Shimwellia                    | 15            | fungi       | 4.618708133      | g_Capronia            | 76            |
| bac2861 | fungi117 | -0.8335467 | negative | 3.23E-05    | External   | bac         | g_Shimwellia                    | 15            | fungi       | 4.394387424      | g_Rhinocladiella      | 70            |
| bac2861 | fungi335 | -0.8216207 | negative | 5.23E-05    | External   | bac         | g_Shimwellia                    | 15            | fungi       | 3.741471904      | g_Podospora           | 11            |
| bac2861 | fungi339 | -0.8129727 | negative | 7.27E-05    | External   | bac         | g_Shimwellia                    | 15            | fungi       | 3.520608721      | g_Neurospora          | 36            |
| bac2861 | fungi343 | -0.8099389 | negative | 8.12E-05    | External   | bac         | g_Shimwellia                    | 15            | fungi       | 2.30587966       | g_Phaeoacremonium     | 42            |
| bac2861 | fungi348 | -0.8066581 | negative | 9.14E-05    | External   | bac         | g_Shimwellia                    | 15            | fungi       | 3.445565083      | g_Hypoxylon           | 42            |
| bac2861 | fungi404 | -0.8266068 | negative | 4.30E-05    | External   | bac         | g_Shimwellia                    | 15            | fungi       | 3.459812142      | g_Tuloseus            | 44            |
| bac2861 | fungi480 | -0.8540333 | negative | 1.29E-05    | External   | bac         | g_Shimwellia                    | 15            | fungi       | 5.736265799      | g_Lentinus            | 39            |
| bac2864 | fungi86  | -0.8229904 | negative | 4.96E-05    | External   | bac         | g_Trabutsiella                  | 3             | fungi       | 3.283876739      | g_Bipolaris           | 33            |
| bac2864 | fungi96  | -0.8152356 | negative | 6.68E-05    | External   | bac         | g_Trabutsiella                  | 3             | fungi       | 2.517454508      | g_Trematosphaeria     | 58            |
| bac2877 | fungi336 | -0.8288479 | negative | 3.93E-05    | External   | bac         | g_Edwardsiella                  | 1             | fungi       | 3.961289247      | g_Thermothelomyces    | 22            |
| bac2882 | fungi62  | -0.8011561 | negative | 0.000110937 | External   | bac         | g_Arsenophonus                  | 10            | fungi       | 3.252465328      | g_Bimuria             | 31            |
| bac2882 | fungi78  | -0.8099389 | negative | 8.12E-05    | External   | bac         | g_Arsenophonus                  | 10            | fungi       | 3.150896725      | g_Stagonospora        | 50            |
| bac2882 | fungi112 | -0.8138329 | negative | 7.04E-05    | External   | bac         | g_Arsenophonus                  | 10            | fungi       | 4.618708133      | g_Capronia            | 76            |
| bac2882 | fungi113 | -0.805363  | negative | 9.57E-05    | External   | bac         | g_Arsenophonus                  | 10            | fungi       | 5.03348556       | g_Cladophialophora    | 71            |
| bac2882 | fungi198 | -0.804747  | negative | 9.79E-05    | External   | bac         | g_Arsenophonus                  | 10            | fungi       | 3.920506915      | g_Helotiales_norank   | 53            |
| bac2882 | fungi340 | -0.8015581 | negative | 0.000109403 | External   | bac         | g_Arsenophonus                  | 10            | fungi       | 2.924236272      | g_Sordaria            | 32            |
| bac2891 | fungi358 | -0.9105263 | negative | 3.88E-07    | External   | bac         | g_Affibrenneria                 | 1             | fungi       | 4.987755537      | g_Monosporascus       | 8             |
| bac3118 | fungi291 | -0.8319751 | negative | 3.45E-05    | External   | bac         | g_Rhodnobacter                  | 13            | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac3121 | fungi291 | -0.8147393 | negative | 6.81E-05    | External   | bac         | g_Xanthomonadaceae_Unclassified | 5             | fungi       | 6.915708568      | g_Beauveria           | 35            |
| bac167  | pro178   | -0.8602644 | negative | 9.44E-06    | External   | bac         | g_Kytococcus                    | 1             | pro         | 8.585126008      | g_Trichuris           | 11            |

## (2) YSNM (Yunnan snub-nosed monkey group)

| source  | target   | weight     | cor-type | p-value  | connection | source-type | source-abundance | source-genus(family)               | source-degree | target-type | target-abundance | target-genus(family)    | target-degree |
|---------|----------|------------|----------|----------|------------|-------------|------------------|------------------------------------|---------------|-------------|------------------|-------------------------|---------------|
| arc13   | bac614   | -0.9043478 | negative | 2.67E-06 | External   | arc         | 6.136077747      | g_Candidatus Woesearchaeota_norank | 16            | bac         | 4.590371219      | g_Salegentibacter       | 1             |
| arc13   | bac1519  | -0.9074205 | negative | 9.57E-10 | External   | arc         | 6.136077747      | g_Candidatus Woesearchaeota_norank | 16            | bac         | 2.921547375      | g_Lutibaculum           | 3             |
| arc38   | bac281   | -0.9042739 | negative | 1.36E-09 | External   | arc         | 2.425245106      | g_Halobiforma                      | 2             | bac         | 3.563627974      | g_Sciscionella          | 2             |
| arc38   | bac652   | -0.935787  | negative | 1.96E-11 | External   | arc         | 2.425245106      | g_Halobiforma                      | 2             | bac         | 5.764325525      | g_Pseudoshingobacterium | 2             |
| arc78   | bac1504  | -0.9052174 | negative | 2.66E-06 | External   | arc         | 6.124195307      | g_Thermoplasmatales_norank         | 2             | bac         | 7.980790923      | g_Agrobacterium         | 1             |
| arc79   | bac1494  | -0.9243478 | negative | 2.42E-06 | External   | arc         | 6.624228561      | g_Thermoplasmata_norank            | 5             | bac         | 8.204493574      | g_Mesorhizobium         | 1             |
| bac390  | fungi207 | -0.902509  | negative | 1.65E-09 | External   | bac         | 8.452013398      | g_Odoribacter                      | 1             | fungi       | 4.343506676      | g_Sporothrix            | 9             |
| bac999  | fungi103 | -0.9041096 | negative | 1.39E-09 | External   | bac         | 11.43611579      | g_Clostridiales_Unclassified       | 1             | fungi       | 5.633331398      | g_Phialophora           | 14            |
| bac1061 | fungi103 | -0.9032399 | negative | 1.52E-09 | External   | bac         | 7.083016134      | g_Aminicella                       | 1             | fungi       | 5.633331398      | g_Phialophora           | 14            |
| bac1062 | fungi24  | -0.9073651 | negative | 9.83E-10 | External   | bac         | 7.293641295      | g_Anaerofustis                     | 1             | fungi       | 4.827769589      | g_Paraphaeosphaeria     | 2             |
| bac1081 | fungi103 | -0.9271581 | negative | 7.52E-11 | External   | bac         | 10.46189813      | g_Lachnospiraceae_Unclassified     | 1             | fungi       | 5.633331398      | g_Phialophora           | 14            |
| bac1084 | fungi91  | -0.9002851 | negative | 2.09E-09 | External   | bac         | 7.819452678      | g_Agathobacter                     | 1             | fungi       | 4.805086051      | g_Botrytis              | 11            |
| bac1091 | fungi103 | -0.909763  | negative | 7.30E-10 | External   | bac         | 8.870000144      | g_Bariatricus                      | 1             | fungi       | 5.633331398      | g_Phialophora           | 14            |
| bac1094 | fungi103 | -0.913242  | negative | 4.81E-10 | External   | bac         | 7.168889786      | g_Catonella                        | 1             | fungi       | 5.633331398      | g_Phialophora           | 14            |
| bac1110 | fungi103 | -0.9006306 | negative | 2.02E-09 | External   | bac         | 11.7573585       | g_Lachnospiridium                  | 1             | fungi       | 5.633331398      | g_Phialophora           | 14            |
| bac1127 | fungi103 | -0.9171559 | negative | 2.95E-10 | External   | bac         | 9.192545885      | g_Tyzzerella                       | 2             | fungi       | 5.633331398      | g_Phialophora           | 14            |
| bac1128 | fungi78  | -0.9060899 | negative | 1.11E-09 | External   | bac         | 12.30368666      | g_Oscillibacter                    | 1             | fungi       | 3.903083164      | g_Erysiphe              | 8             |
| bac1149 | fungi24  | -0.9117464 | negative | 5.77E-11 | External   | bac         | 5.772711344      | g_Acetonaerobium                   | 1             | fungi       | 4.827769589      | g_Paraphaeosphaeria     | 2             |
| bac1153 | fungi30  | -0.9191304 | negative | 2.50E-06 | External   | bac         | 5.437352958      | g_Filifactor                       | 1             | fungi       | 6.769852058      | g_Alternaria            | 1             |
| bac1176 | fungi103 | -0.9115025 | negative | 5.94E-10 | External   | bac         | 8.004349199      | g_Candidatus Soleaferrea           | 1             | fungi       | 5.633331398      | g_Phialophora           | 14            |
| bac1187 | fungi103 | -0.9006306 | negative | 2.02E-09 | External   | bac         | 9.078959808      | g_Massiliamiae                     | 1             | fungi       | 5.633331398      | g_Phialophora           | 14            |
| bac1213 | fungi308 | -0.9045432 | negative | 1.32E-09 | External   | bac         | 4.135470511      | g_Levyella                         | 1             | fungi       | 4.037350841      | g_Trichosporon          | 2             |
| bac1260 | fungi103 | -0.9289876 | negative | 5.81E-11 | External   | bac         | 6.832109972      | g_Candidatus Stoquefichus          | 1             | fungi       | 5.633331398      | g_Phialophora           | 14            |
| bac1266 | fungi103 | -0.9088933 | negative | 8.08E-10 | External   | bac         | 9.057315641      | g_Erysipelatoclostridium           | 1             | fungi       | 5.633331398      | g_Phialophora           | 14            |
| bac1280 | fungi98  | -0.9025457 | negative | 1.64E-09 | External   | bac         | 5.882806935      | g_Merdibacter                      | 1             | fungi       | 5.506408192      | g_Rhynchosporium        | 3             |
| bac1291 | fungi31  | -0.9104348 | negative | 2.61E-06 | External   | bac         | 7.007845833      | g_Anaerovibrio                     | 1             | fungi       | 5.305972987      | g_Bipolaris             | 1             |
| bac1317 | fungi103 | -0.9202001 | negative | 1.98E-10 | External   | bac         | 6.956804457      | g_Dialister                        | 1             | fungi       | 5.633331398      | g_Sclerotinia           | 14            |
| bac1333 | fungi93  | -0.9460404 | negative | 3.03E-12 | External   | bac         | 6.39720795       | g_Murdochella                      | 1             | fungi       | 5.741071837      | g_Sclerotinia           | 9             |
| bac1978 | fungi3   | -0.9006803 | negative | 2.01E-09 | External   | bac         | 5.434376811      | g_Bradymonadaleae_Unclassified     | 1             | fungi       | 4.625423692      | g_Neofusisicoccum       | 3             |
| bac2060 | fungi180 | -0.9060056 | negative | 1.12E-09 | External   | bac         | 5.143568174      | g_Syntrophus                       | 1             | fungi       | 3.883520645      | g_Pochonia              | 1             |
| bac2494 | fungi103 | -0.9123723 | negative | 5.35E-10 | External   | bac         | 8.097361476      | g_Anaeroplasmata                   | 1             | fungi       | 5.633331398      | g_Phialophora           | 14            |

## (3) CA (meat-eating carnivorans)

| source  | target   | weight     | cor-type | p-value  | connection | source-type | source-abundance | source-genus(family)     | source-degree | target-type | target-abundance | target-genus(family)  | target-degree |
|---------|----------|------------|----------|----------|------------|-------------|------------------|--------------------------|---------------|-------------|------------------|-----------------------|---------------|
| bac485  | fungi481 | -0.8309129 | negative | 1.05E-05 | External   | bac         | 8.328129759      | g_Duncaniella            | 1             | fungi       | 6.007505205      | g_Polyporus           | 9             |
| bac499  | fungi362 | -0.820404  | negative | 1.69E-05 | External   | bac         | 7.679213977      | g_Porphyrromonas         | 2             | fungi       | 3.751243738      | g_Xylona              | 7             |
| bac499  | fungi481 | -0.810511  | negative | 2.58E-05 | External   | bac         | 7.679213977      | g_Porphyrromonas         | 2             | fungi       | 6.007505205      | g_Polyporus           | 9             |
| bac514  | fungi267 | -0.8093585 | negative | 2.70E-05 | External   | bac         | 6.683472329      | g_Millioneella           | 1             | fungi       | 4.733941517      | g_Coniochaeta         | 7             |
| bac1110 | fungi481 | -0.8354922 | negative | 8.48E-06 | External   | bac         | 3.656717767      | g_Peribacillus           | 1             | fungi       | 6.007505205      | g_Polyporus           | 9             |
| bac1298 | fungi121 | -0.8018013 | negative | 3.66E-05 | External   | bac         | 6.026095416      | g_Candidatus Arthromitus | 1             | fungi       | 4.497328818      | g_Aspergillus         | 5             |
| bac1353 | fungi362 | -0.804428  | negative | 3.30E-05 | External   | bac         | 4.509616977      | g_Hornelia               | 1             | fungi       | 3.751243738      | g_Xylona              | 7             |
| bac1367 | fungi267 | -0.8255587 | negative | 1.35E-05 | External   | bac         | 7.281859743      | g_Anaerocolumna          | 2             | fungi       | 4.733941517      | g_Coniochaeta         | 7             |
| bac1367 | fungi448 | -0.8087635 | negative | 2.77E-05 | External   | bac         | 7.281859743      | g_Anaerocolumna          | 2             | fungi       | 3.691825111      | g_Hydnum              | 3             |
| bac1416 | fungi481 | -0.8142204 | negative | 2.21E-05 | External   | bac         | 6.629512516      | g_Pseudobutyrvibrio      | 1             | fungi       | 6.007505205      | g_Polyporus           | 9             |
| bac1417 | fungi481 | -0.8735714 | negative | 1.04E-06 | External   | bac         | 6.843855487      | g_Robinsoniella          | 2             | fungi       | 6.007505205      | g_Polyporus           | 9             |
| bac1420 | fungi601 | -0.822807  | negative | 1.01E-05 | External   | bac         | 7.273662177      | g_Sellimonas             | 1             | fungi       | 5.749176402      | g_Thamnidium          | 1             |
| bac1432 | fungi339 | -0.8172245 | negative | 1.94E-05 | External   | bac         | 6.856425142      | g_Acuralibacter          | 1             | fungi       | 3.313676784      | g_Neurospora          | 8             |
| bac1474 | fungi362 | -0.8276005 | negative | 1.23E-05 | External   | bac         | 8.746856721      | g_Subdoligranulum        | 3             | fungi       | 3.751243738      | g_Xylona              | 7             |
| bac1474 | fungi481 | -0.8160752 | negative | 2.04E-05 | External   | bac         | 8.746856721      | g_Subdoligranulum        | 3             | fungi       | 6.007505205      | g_Polyporus           | 9             |
| bac1684 | fungi362 | -0.8225003 | negative | 1.54E-05 | External   | bac         | 4.104377398      | g_Sporanaerobacter       | 2             | fungi       | 3.751243738      | g_Xylona              | 7             |
| bac1696 | fungi177 | -0.8006556 | negative | 3.83E-05 | External   | bac         | 11.462515        | g_Cetobacterium          | 1             | fungi       | 2.735211309      | g_Cudoniella          | 4             |
| bac3025 | fungi216 | -0.8534245 | negative | 3.39E-06 | External   | bac         | 5.80320238       | g_Actinobacillus         | 4             | fungi       | 1.973108331      | g_Tirmania            | 11            |
| bac3025 | fungi222 | -0.8140351 | negative | 2.20E-05 | External   | bac         | 5.80320238       | g_Actinobacillus         | 4             | fungi       | 5.065256046      | g_Wilcoxina           | 3             |
| bac3025 | fungi267 | -0.816748  | negative | 1.98E-05 | External   | bac         | 5.80320238       | g_Actinobacillus         | 4             | fungi       | 4.733941517      | g_Coniochaeta         | 7             |
| bac3025 | fungi337 | -0.8580107 | negative | 2.63E-06 | External   | bac         | 5.80320238       | g_Actinobacillus         | 4             | fungi       | 3.598817976      | g_Thermothielavioides | 10            |
| bac3099 | fungi362 | -0.8173432 | negative | 1.93E-05 | External   | bac         | 4.180476386      | g_Photorbacterium        | 2             | fungi       | 3.751243738      | g_Xylona              | 7             |
| bac3099 | fungi481 | -0.8349871 | negative | 8.69E-06 | External   | bac         | 4.180476386      | g_Photorbacterium        | 2             | fungi       | 6.007505205      | g_Polyporus           | 9             |
| bac3179 | fungi481 | -0.8272035 | negative | 1.25E-05 | External   | bac         | 7.522604645      | g_Treponema              | 1             | fungi       | 6.007505205      | g_Polyporus           | 9             |

#### (4) OC (Omnivorous carnivorans)

| source  | target   | weight    | cor-type | p-valeur  | connection | source-type | source-abu | source-genus(family)           | source-degree | target-type | target-abundance | target-gen/target-degree |
|---------|----------|-----------|----------|-----------|------------|-------------|------------|--------------------------------|---------------|-------------|------------------|--------------------------|
| bac1063 | fungi535 | -0.903226 | negative | 0.0003409 | External   | bac         | 2.2178983  | g_Amphibacillus                | 1             | fungi       | 3.627402907      | g_Tremella8              |
| bac1070 | fungi212 | -0.922581 | negative | 0.000143  | External   | bac         | 5.2147401  | g_Caldakalibacillus            | 9             | fungi       | 2.747783603      | g_Ascodes3               |
| bac1070 | fungi219 | -0.947086 | negative | 3.22E-05  | External   | bac         | 5.2147401  | g_Caldakalibacillus            | 9             | fungi       | 4.817163807      | g_Pyronem10              |
| bac1070 | fungi221 | -0.917887 | negative | 0.00018   | External   | bac         | 5.2147401  | g_Caldakalibacillus            | 9             | fungi       | 4.525639847      | g_Trichoph21             |
| bac1070 | fungi267 | -0.917887 | negative | 0.00018   | External   | bac         | 5.2147401  | g_Caldakalibacillus            | 9             | fungi       | 5.902390134      | g_Conioch13              |
| bac1070 | fungi300 | -0.905227 | negative | 0.0003144 | External   | bac         | 5.2147401  | g_Caldakalibacillus            | 9             | fungi       | 7.481625559      | g_Fusarium1              |
| bac1070 | fungi316 | -0.922581 | negative | 0.000143  | External   | bac         | 5.2147401  | g_Caldakalibacillus            | 9             | fungi       | 5.429687676      | g_Pyriculari4            |
| bac1070 | fungi335 | -0.943208 | negative | 4.25E-05  | External   | bac         | 5.2147401  | g_Caldakalibacillus            | 9             | fungi       | 6.092677724      | g_Podosp13               |
| bac1070 | fungi342 | -0.944211 | negative | 3.96E-05  | External   | bac         | 5.2147401  | g_Caldakalibacillus            | 9             | fungi       | 4.879044874      | g_Madurell5              |
| bac1070 | fungi549 | -0.922581 | negative | 0.000143  | External   | bac         | 5.2147401  | g_Caldakalibacillus            | 9             | fungi       | 5.991442047      | g_Ustilago3              |
| bac1119 | fungi535 | -0.903226 | negative | 0.0003409 | External   | bac         | 5.0838424  | g_Robertmurraya                | 1             | fungi       | 3.627402907      | g_Tremella8              |
| bac1214 | fungi535 | -0.906693 | negative | 0.0002959 | External   | bac         | 8.4518947  | g_Lactobacillales_Unclassified | 1             | fungi       | 3.627402907      | g_Tremella8              |
| bac1262 | fungi535 | -0.969223 | negative | 3.78E-06  | External   | bac         | 11.601024  | g_Lactobacillus                | 1             | fungi       | 3.627402907      | g_Tremella8              |
| bac1270 | fungi535 | -0.919199 | negative | 0.000169  | External   | bac         | 7.4074494  | g_Liquorilactobacillus         | 1             | fungi       | 3.627402907      | g_Tremella8              |
| bac1274 | fungi535 | -0.925452 | negative | 0.0001234 | External   | bac         | 6.5727719  | g_Pediococcus                  | 1             | fungi       | 3.627402907      | g_Tremella8              |
| bac1282 | fungi535 | -0.925452 | negative | 0.0001234 | External   | bac         | 14.114406  | g_Streptococcus                | 1             | fungi       | 3.627402907      | g_Tremella8              |
| bac1290 | fungi600 | -0.903226 | negative | 0.0003409 | External   | bac         | 4.9492633  | g_Alkaliphilus                 | 1             | fungi       | 4.357567432      | g_Parasitel1             |
| bac1292 | fungi325 | -0.901908 | negative | 0.0003593 | External   | bac         | 5.0468258  | g_Anaerophilus                 | 1             | fungi       | 10.99602801      | g_Sporoth13              |
| bac1321 | fungi221 | -0.938721 | negative | 5.73E-05  | External   | bac         | 12.972085  | g_Sarcina                      | 1             | fungi       | 4.525639847      | g_Trichoph21             |
| bac1574 | fungi267 | -0.910808 | negative | 0.0002483 | External   | bac         | 4.4300665  | g_Thermoanaerobacterium        | 3             | fungi       | 5.902390134      | g_Conioch13              |
| bac1574 | fungi335 | -0.923116 | negative | 0.0001392 | External   | bac         | 4.4300665  | g_Thermoanaerobacterium        | 3             | fungi       | 6.092677724      | g_Podosp13               |
| bac1574 | fungi344 | -0.934541 | negative | 7.42E-05  | External   | bac         | 4.4300665  | g_Thermoanaerobacterium        | 3             | fungi       | 3.830596007      | g_Arthrinii5             |
| bac1588 | fungi535 | -0.903226 | negative | 0.0003409 | External   | bac         | 2.6703483  | g_Sharpea                      | 1             | fungi       | 3.627402907      | g_Tremella8              |
| bac2123 | fungi190 | -0.902439 | negative | 0.0003518 | External   | bac         | 4.3146574  | g_Phaeobacter                  | 1             | fungi       | 10.40492023      | g_Moniliini15            |
| bac2562 | fungi190 | -0.972349 | negative | 2.47E-06  | External   | bac         | 4.3281379  | g_Desulfotoluna                | 2             | fungi       | 10.40492023      | g_Moniliini15            |
| bac2677 | fungi190 | -0.957317 | negative | 1.38E-05  | External   | bac         | 4.9416924  | g_Dongshaea                    | 1             | fungi       | 10.40492023      | g_Moniliini15            |
| bac2680 | fungi190 | -0.920732 | negative | 0.0001568 | External   | bac         | 5.6850583  | g_Tolumonas                    | 2             | fungi       | 10.40492023      | g_Moniliini15            |
| bac2714 | fungi190 | -0.923116 | negative | 0.0001392 | External   | bac         | 5.381196   | g_Ferrimonas                   | 1             | fungi       | 10.40492023      | g_Moniliini15            |
| bac2718 | fungi57  | -0.949986 | negative | 2.58E-05  | External   | bac         | 4.0449617  | g_Pseudidiomarina              | 3             | fungi       | 4.230593093      | g_Ascocy31               |
| bac2718 | fungi220 | -0.914651 | negative | 0.0002092 | External   | bac         | 4.0449617  | g_Pseudidiomarina              | 3             | fungi       | 4.785665075      | g_Sphaero22              |
| bac2718 | fungi363 | -0.919771 | negative | 0.0001644 | External   | bac         | 4.0449617  | g_Pseudidiomarina              | 3             | fungi       | 4.70663412       | g_Saitoella25            |
| bac2723 | fungi57  | -0.943208 | negative | 4.25E-05  | External   | bac         | 4.0367684  | g_Psychrosphaera               | 4             | fungi       | 4.230593093      | g_Ascocy31               |
| bac2723 | fungi220 | -0.938721 | negative | 5.73E-05  | External   | bac         | 4.0367684  | g_Psychrosphaera               | 4             | fungi       | 4.785665075      | g_Sphaero22              |
| bac2723 | fungi277 | -0.905227 | negative | 0.0003144 | External   | bac         | 4.0367684  | g_Psychrosphaera               | 4             | fungi       | 6.531139984      | g_Colletotri25           |
| bac2723 | fungi363 | -0.925466 | negative | 0.0001233 | External   | bac         | 4.0367684  | g_Psychrosphaera               | 4             | fungi       | 4.70663412       | g_Saitoella25            |
| bac2729 | fungi190 | -0.921997 | negative | 0.0001473 | External   | bac         | 4.5745873  | g_Motilimonas                  | 1             | fungi       | 10.40492023      | g_Moniliini15            |
| bac2824 | fungi187 | -0.914179 | negative | 0.0002137 | External   | bac         | 6.3456258  | g_Sodalis                      | 4             | fungi       | 9.674532271      | g_Botryoti2              |
| bac2824 | fungi188 | -0.901908 | negative | 0.0003593 | External   | bac         | 6.3456258  | g_Sodalis                      | 4             | fungi       | 11.00885824      | g_Botrytis3              |
| bac2824 | fungi193 | -0.901908 | negative | 0.0003593 | External   | bac         | 6.3456258  | g_Sodalis                      | 4             | fungi       | 10.47670555      | g_Sclerotiu3             |
| bac2827 | fungi190 | -0.935425 | negative | 7.03E-05  | External   | bac         | 5.413595   | g_Insecthabitans               | 1             | fungi       | 10.40492023      | g_Moniliini15            |
| bac2831 | fungi190 | -0.911858 | negative | 0.0002371 | External   | bac         | 5.5616235  | g_Pragia                       | 2             | fungi       | 10.40492023      | g_Moniliini15            |
| bac2845 | fungi190 | -0.924016 | negative | 0.000133  | External   | bac         | 5.1182812  | g_Lejubacter                   | 1             | fungi       | 10.40492023      | g_Moniliini15            |
| bac2846 | fungi97  | -0.919199 | negative | 0.000169  | External   | bac         | 10.79131   | g_Klebsiella                   | 3             | fungi       | 4.50511778       | g_Aaosph2                |
| bac2846 | fungi186 | -0.919199 | negative | 0.000169  | External   | bac         | 10.79131   | g_Klebsiella                   | 3             | fungi       | 8.280110439      | g_Rutstro3               |
| bac2877 | fungi60  | -0.912946 | negative | 0.000226  | External   | bac         | 9.0868953  | g_Edwardsiella                 | 3             | fungi       | 3.225930879      | g_Macrove11              |
| bac2877 | fungi523 | -0.92645  | negative | 0.0001171 | External   | bac         | 9.0868953  | g_Edwardsiella                 | 3             | fungi       | 5.24209616       | g_Puccinia6              |
| bac2911 | fungi57  | -0.931705 | negative | 8.76E-05  | External   | bac         | 12.288642  | g_Plesiomonas                  | 4             | fungi       | 4.230593093      | g_Ascocy31               |
| bac2911 | fungi190 | -0.984807 | negative | 2.29E-07  | External   | bac         | 12.288642  | g_Plesiomonas                  | 4             | fungi       | 10.40492023      | g_Moniliini15            |
| bac2911 | fungi523 | -0.901908 | negative | 0.0003593 | External   | bac         | 12.288642  | g_Plesiomonas                  | 4             | fungi       | 5.24209616       | g_Puccinia6              |
| bac3042 | fungi188 | -0.92645  | negative | 0.0001171 | External   | bac         | 4.4793008  | g_Mannheimia                   | 2             | fungi       | 11.00885824      | g_Botrytis3              |
| bac3042 | fungi193 | -0.92645  | negative | 0.0001171 | External   | bac         | 4.4793008  | g_Mannheimia                   | 2             | fungi       | 10.47670555      | g_Sclerotiu3             |
| bac3096 | fungi190 | -0.957317 | negative | 1.38E-05  | External   | bac         | 5.0059309  | g_Enterovibrio                 | 1             | fungi       | 10.40492023      | g_Moniliini15            |
| bac3100 | fungi57  | -0.944211 | negative | 3.96E-05  | External   | bac         | 5.1618904  | g_Saliniivibrio                | 1             | fungi       | 4.230593093      | g_Ascocy31               |
| bac3102 | fungi190 | -0.935425 | negative | 7.03E-05  | External   | bac         | 3.9341758  | g_Veronia                      | 2             | fungi       | 10.40492023      | g_Moniliini15            |
| pro178  | fungi187 | -0.901908 | negative | 0.0003593 | External   | pro         | 7.9575526  | g_Trichuris                    | 11            | fungi       | 9.674532271      | g_Botryoti2              |
| pro178  | fungi190 | -0.948333 | negative | 2.93E-05  | External   | pro         | 7.9575526  | g_Trichuris                    | 11            | fungi       | 10.40492023      | g_Moniliini15            |
| bac119  | pro155   | -0.914179 | negative | 0.0002137 | External   | bac         | 2.0818137  | g_Actinotalea                  | 1             | pro         | 7.996863884      | g_Onchoce14              |
| bac2151 | pro155   | -0.927273 | negative | 0.0001302 | External   | bac         | 4.9815772  | g_Acetobacter                  | 2             | pro         | 7.996863884      | g_Onchoce14              |
| bac2422 | pro178   | -0.936175 | negative | 6.72E-05  | External   | bac         | 3.312439   | g_Mesosutterella               | 1             | pro         | 7.957552603      | g_Trichuris11            |
| bac2438 | pro178   | -0.938721 | negative | 5.73E-05  | External   | bac         | 6.7680023  | g_Rhizobacter                  | 3             | pro         | 7.957552603      | g_Trichuris11            |

## (5) HE (Herbivores)

| source  | target   | weight    | cor-type | p-value  | connection | source-type | source-abu | source-genus(family)                   | source-degree | target-type | target-abundance | target-genus(family) | target-degr |
|---------|----------|-----------|----------|----------|------------|-------------|------------|----------------------------------------|---------------|-------------|------------------|----------------------|-------------|
| virus10 | bac1498  | -0.922666 | negative | 1.91E-05 | External   | virus       | 5.7108276  | f_Phycodnaviridae                      | 2             | bac         | 3.046330326      | g_Acetoanaerobium    | 2           |
| arc17   | bac1902  | -0.906956 | negative | 4.69E-05 | External   | arc         | 9.0557982  | g_Methanomassilicoccales_norank        | 1             | bac         | 5.488871608      | g_Nitratireductor    | 3           |
| arc31   | bac1511  | -0.908473 | negative | 4.33E-05 | External   | arc         | 4.8936444  | g_Candidatus Methanofastidiosia_norank | 1             | bac         | 3.292943796      | g_Tepidibacter       | 1           |
| arc48   | bac479   | -0.92935  | negative | 1.23E-05 | External   | arc         | 1.4369875  | g_Natronobacterium                     | 11            | bac         | 5.899171062      | g_Petrimonas         | 2           |
| arc63   | bac1069  | -0.900177 | negative | 6.59E-05 | External   | arc         | 5.2388221  | g_Methanoculleus                       | 7             | bac         | 10.38882535      | g_Bacillus           | 2           |
| arc63   | bac1070  | -0.91769  | negative | 2.59E-05 | External   | arc         | 5.2388221  | g_Methanoculleus                       | 7             | bac         | 5.514488668      | g_Caldalkalibacillus | 1           |
| arc63   | bac1902  | -0.912285 | negative | 3.52E-05 | External   | arc         | 5.2388221  | g_Methanoculleus                       | 7             | bac         | 5.488871608      | g_Nitratireductor    | 3           |
| arc89   | bac1415  | -0.93007  | negative | 0        | External   | arc         | 6.0932605  | g_Methanomicrobia_norank               | 2             | bac         | 5.733483662      | g_Porcincola         | 1           |
| bac483  | fungi65  | -0.901431 | negative | 6.20E-05 | External   | bac         | 6.8869891  | g_Candidatus Amuluruptor               | 1             | fungi       | 1.54734972       | g_Paraphaeosphaeria  | 1           |
| bac970  | fungi221 | -0.906392 | negative | 4.83E-05 | External   | bac         | 3.4437778  | g_Cyanothecae                          | 1             | fungi       | 3.983208139      | g_Trichophaea        | 1           |
| bac1282 | fungi114 | -0.906956 | negative | 4.69E-05 | External   | bac         | 9.5169889  | g_Streptococcus                        | 1             | fungi       | 1.219649284      | g_Exophiala          | 2           |
| bac1379 | fungi342 | -0.951049 | negative | 0        | External   | bac         | 6.0157034  | g_Catenibacillus                       | 1             | fungi       | 4.183850049      | g_Madurella          | 1           |
| bac1446 | fungi325 | -0.902098 | negative | 0        | External   | bac         | 10.946514  | g_Faecalibacterium                     | 1             | fungi       | 3.205425777      | g_Sporothrix         | 3           |
| bac1540 | fungi246 | -0.922509 | negative | 1.93E-05 | External   | bac         | 3.6914262  | g_Levyella                             | 3             | fungi       | 4.238488195      | g_Pichia             | 1           |
| bac1540 | fungi572 | -0.904807 | negative | 5.24E-05 | External   | bac         | 3.6914262  | g_Levyella                             | 3             | fungi       | 3.63819124       | g_Nematocida         | 1           |
| bac2424 | fungi230 | -0.911176 | negative | 3.75E-05 | External   | bac         | 8.5519967  | g_Sutterella                           | 1             | fungi       | 3.069911672      | g_Lodderomyces       | 4           |
| bac2425 | fungi277 | -0.951049 | negative | 0        | External   | bac         | 5.3618413  | g_Turicimonas                          | 1             | fungi       | 4.274218682      | g_Colletotrichum     | 3           |
| bac2922 | fungi230 | -0.932532 | negative | 9.82E-06 | External   | bac         | 5.7278961  | g_Legionella                           | 1             | fungi       | 3.069911672      | g_Lodderomyces       | 4           |
| bac3042 | fungi590 | -0.908043 | negative | 4.43E-05 | External   | bac         | 4.5604029  | g_Mannheimia                           | 1             | fungi       | 1.968090899      | g_Mortierella        | 1           |
| bac3204 | fungi395 | -0.906956 | negative | 4.69E-05 | External   | bac         | 7.0743437  | g_Mycoplasma                           | 1             | fungi       | 2.036011984      | g_Flamulina          | 2           |
| arc63   | pro1     | -0.9443   | negative | 3.84E-06 | External   | arc         | 5.2388221  | g_Methanoculleus                       | 7             | pro         | 4.479935707      | g_Hepatocystis       | 10          |
| bac479  | pro3     | -0.942648 | negative | 4.44E-06 | External   | bac         | 5.8991711  | g_Petrimonas                           | 2             | pro         | 6.641760332      | g_Babesia            | 3           |
| bac485  | pro1     | -0.942648 | negative | 4.44E-06 | External   | bac         | 7.7658506  | g_Duncaniella                          | 1             | pro         | 4.479935707      | g_Hepatocystis       | 10          |
| bac1353 | pro1     | -0.913643 | negative | 3.27E-05 | External   | bac         | 6.060503   | g_Hornelia                             | 1             | pro         | 4.479935707      | g_Hepatocystis       | 10          |
| bac1564 | pro1     | -0.902256 | negative | 5.95E-05 | External   | bac         | 4.2957604  | g_Calorimonas                          | 3             | pro         | 4.479935707      | g_Hepatocystis       | 10          |
| bac1597 | pro1     | -0.906392 | negative | 4.83E-05 | External   | bac         | 3.3942735  | g_Breznakia                            | 3             | pro         | 4.479935707      | g_Hepatocystis       | 10          |
| bac3021 | pro1     | -0.918877 | negative | 2.41E-05 | External   | bac         | 3.3183953  | g_Gilliamella                          | 3             | pro         | 4.479935707      | g_Hepatocystis       | 10          |

(6) RP (Red panda group)

| source  | target   | weight    | cor-type | p-value   | connection | source-type | source-abu | source-genus(family)          | source-deg | target-type | target-abundance | target-genus(family)  | target-deg |
|---------|----------|-----------|----------|-----------|------------|-------------|------------|-------------------------------|------------|-------------|------------------|-----------------------|------------|
| virus30 | bac1899  | -0.942857 | negative | 0.016667  | External   | virus       | 8.2318864  | f_Myoviridae                  | 4          | bac         | 3.82091598       | q_Hoeflea             | 4          |
| virus34 | bac428   | -0.942857 | negative | 0.016667  | External   | virus       | 6.4627892  | f_Schoviridae                 | 4          | bac         | 1.792592456      | q_Adlercreutzia       | 3          |
| virus34 | bac1390  | -0.942857 | negative | 0.016667  | External   | virus       | 6.4627892  | f_Schoviridae                 | 4          | bac         | 3.662227423      | q_Faecalimonas        | 3          |
| virus35 | bac76    | -0.942857 | negative | 0.016667  | External   | virus       | 8.6570158  | f_Siphoviridae                | 5          | bac         | 5.684919006      | q_Mycobacterium       | 2          |
| arc51   | bac94    | -0.942857 | negative | 0.016667  | External   | arc         | 5.5535059  | q_Methanobrevibacter          | 10         | bac         | 3.33829308       | q_Blastococcus        | 4          |
| arc51   | bac222   | -0.942857 | negative | 0.016667  | External   | arc         | 5.5535059  | q_Methanobrevibacter          | 10         | bac         | 2.831447079      | q_Schumannella        | 1          |
| virus35 | fungi199 | -0.942857 | negative | 0.016667  | External   | virus       | 8.6570158  | f_Siphoviridae                | 5          | fungi       | 3.610431308      | q_Antarctomyces       | 2          |
| virus51 | fungi202 | -0.942857 | negative | 0.016667  | External   | arc         | 5.5535059  | q_Methanobrevibacter          | 10         | fungi       | 5.481009688      | q_Pseudogymnoascus    | 11         |
| arc51   | fungi343 | -0.942857 | negative | 0.016667  | External   | arc         | 5.5535059  | q_Methanobrevibacter          | 10         | fungi       | 3.590384207      | q_Phaeoacremonium     | 5          |
| arc51   | fungi505 | -0.942857 | negative | 0.016667  | External   | arc         | 5.5535059  | q_Methanobrevibacter          | 10         | fungi       | 1.707471653      | q_Ceraceosorus        | 5          |
| arc51   | fungi515 | -0.942857 | negative | 0.016667  | External   | arc         | 5.5535059  | q_Methanobrevibacter          | 10         | fungi       | 4.592621783      | q_Microbortum         | 5          |
| arc51   | fungi601 | -0.942857 | negative | 0.016667  | External   | arc         | 5.5535059  | q_Methanobrevibacter          | 10         | fungi       | 4.502783023      | q_Thamnidium          | 5          |
| bac588  | fungi202 | -0.942857 | negative | 0.016667  | External   | bac         | 3.8528036  | q-Taibaella                   | 6          | fungi       | 5.481009688      | q_Pseudogymnoascus    | 11         |
| bac588  | fungi343 | -0.942857 | negative | 0.016667  | External   | bac         | 3.8528036  | q-Taibaella                   | 6          | fungi       | 3.590384207      | q_Phaeoacremonium     | 5          |
| bac588  | fungi505 | -0.942857 | negative | 0.016667  | External   | bac         | 3.8528036  | q-Taibaella                   | 6          | fungi       | 1.707471653      | q_Ceraceosorus        | 5          |
| bac588  | fungi515 | -0.942857 | negative | 0.016667  | External   | bac         | 3.8528036  | q-Taibaella                   | 6          | fungi       | 4.592621783      | q_Microbortum         | 5          |
| bac588  | fungi601 | -0.942857 | negative | 0.016667  | External   | bac         | 3.8528036  | q-Taibaella                   | 6          | fungi       | 4.502783023      | q_Thamnidium          | 5          |
| bac661  | fungi514 | -0.942857 | negative | 0.016667  | External   | bac         | 2.8258925  | q_Emticicia                   | 2          | fungi       | 5.297687168      | q_Leucosporidium      | 4          |
| bac739  | fungi113 | -0.942857 | negative | 0.016667  | External   | bac         | 3.6848714  | q_Lutibacter                  | 2          | fungi       | 2.768580701      | q_Gladophialophora    | 52         |
| bac739  | fungi359 | -0.942857 | negative | 0.016667  | External   | bac         | 3.6848714  | q_Lutibacter                  | 2          | fungi       | 3.210722678      | q_Phaelomonopsis      | 52         |
| bac807  | fungi195 | -0.942857 | negative | 0.016667  | External   | bac         | 4.2145986  | q_Empedobacter                | 2          | fungi       | 1.453719337      | q_Chalara             | 24         |
| bac807  | fungi280 | -0.942857 | negative | 0.016667  | External   | bac         | 4.2145986  | q_Empedobacter                | 2          | fungi       | 2.74970385       | q_Verticillium        | 24         |
| bac1418 | fungi128 | -0.942857 | negative | 0.016667  | External   | bac         | 4.3317066  | q_Roseburia                   | 6          | fungi       | 2.618927506      | q_Rasamsonia          | 33         |
| bac1418 | fungi202 | -0.942857 | negative | 0.016667  | External   | bac         | 4.3317066  | q_Roseburia                   | 6          | fungi       | 5.481009688      | q_Pseudogymnoascus    | 11         |
| bac1418 | fungi330 | -0.942857 | negative | 0.016667  | External   | bac         | 4.3317066  | q_Roseburia                   | 6          | fungi       | 4.362996709      | q_Chaetomium          | 33         |
| bac1418 | fungi464 | -0.942857 | negative | 0.016667  | External   | bac         | 4.3317066  | q_Roseburia                   | 6          | fungi       | 3.881790576      | q_Hysterangium        | 33         |
| bac1418 | fungi516 | -0.942857 | negative | 0.016667  | External   | bac         | 4.3317066  | q_Roseburia                   | 6          | fungi       | 5.101347038      | q_Rhodotulula         | 33         |
| bac1418 | fungi523 | -0.942857 | negative | 0.016667  | External   | bac         | 4.3317066  | q_Roseburia                   | 6          | fungi       | 5.735294062      | q_Puccinia            | 33         |
| bac1634 | fungi199 | -0.942857 | negative | 0.016667  | External   | bac         | 2.460187   | q_Megamonas                   | 2          | fungi       | 3.610431308      | q_Antarctomyces       | 2          |
| bac1786 | fungi335 | -0.942857 | negative | 0.016667  | External   | bac         | 5.5822135  | q_Proteobacteria_Unclassified | 1          | fungi       | 4.879835406      | q_Podospora           | 5          |
| bac1937 | fungi600 | -0.942857 | negative | 0.016667  | External   | bac         | 3.8047273  | q_Sinorhizobium               | 1          | fungi       | 1.616016228      | q_Parastella          | 7          |
| bac2321 | fungi57  | -0.942857 | negative | 0.016667  | External   | bac         | 2.5559086  | q_Castellaniella              | 8          | fungi       | 2.400981415      | q_Ascochyta           | 41         |
| bac2321 | fungi195 | -1        | negative | 0.0027778 | External   | bac         | 2.5559086  | q_Castellaniella              | 8          | fungi       | 1.453719337      | q_Chalara             | 24         |
| bac2321 | fungi212 | -0.942857 | negative | 0.016667  | External   | bac         | 2.5559086  | q_Castellaniella              | 8          | fungi       | 5.614594184      | q_Ascodermis          | 41         |
| bac2321 | fungi277 | -0.942857 | negative | 0.016667  | External   | bac         | 2.5559086  | q_Castellaniella              | 8          | fungi       | 4.265661344      | q_Collectorichium     | 41         |
| bac2321 | fungi280 | -1        | negative | 0.0027778 | External   | bac         | 2.5559086  | q_Castellaniella              | 8          | fungi       | 2.74970385       | q_Verticillium        | 24         |
| bac2321 | fungi305 | -0.942857 | negative | 0.016667  | External   | bac         | 2.5559086  | q_Castellaniella              | 8          | fungi       | 2.434577802      | q_Styloectria         | 14         |
| bac2321 | fungi322 | -0.942857 | negative | 0.016667  | External   | bac         | 2.5559086  | q_Castellaniella              | 8          | fungi       | 2.021150133      | q_Grosmannia          | 14         |
| bac2321 | fungi357 | -0.942857 | negative | 0.016667  | External   | bac         | 2.5559086  | q_Castellaniella              | 8          | fungi       | 3.715935126      | q_Xylaria             | 18         |
| bac2329 | fungi181 | -0.942857 | negative | 0.016667  | External   | bac         | 3.2356149  | q_Paracandidimonas            | 10         | fungi       | 3.915058394      | q_Lachnellula         | 34         |
| bac2329 | fungi188 | -0.942857 | negative | 0.016667  | External   | bac         | 3.2356149  | q_Paracandidimonas            | 10         | fungi       | 3.46213568       | q_Botrytis            | 34         |
| bac2329 | fungi305 | -0.942857 | negative | 0.016667  | External   | bac         | 3.2356149  | q_Paracandidimonas            | 10         | fungi       | 2.434577802      | q_Styloectria         | 14         |
| bac2329 | fungi343 | -1        | negative | 0.0027778 | External   | bac         | 3.2356149  | q_Paracandidimonas            | 10         | fungi       | 3.590384207      | q_Phaeoacremonium     | 5          |
| bac2329 | fungi357 | -0.942857 | negative | 0.016667  | External   | bac         | 3.2356149  | q_Paracandidimonas            | 10         | fungi       | 3.715935126      | q_Xylaria             | 14         |
| bac2329 | fungi505 | -1        | negative | 0.0027778 | External   | bac         | 3.2356149  | q_Paracandidimonas            | 10         | fungi       | 1.707471653      | q_Ceraceosorus        | 5          |
| bac2329 | fungi514 | -0.942857 | negative | 0.016667  | External   | bac         | 3.2356149  | q_Paracandidimonas            | 10         | fungi       | 5.297687168      | q_Leucosporidium      | 4          |
| bac2329 | fungi515 | -1        | negative | 0.0027778 | External   | bac         | 3.2356149  | q_Paracandidimonas            | 10         | fungi       | 4.592621783      | q_Microbortum         | 5          |
| bac2329 | fungi601 | -1        | negative | 0.0027778 | External   | bac         | 3.2356149  | q_Paracandidimonas            | 10         | fungi       | 4.502783023      | q_Thamnidium          | 5          |
| bac2386 | fungi600 | -0.942857 | negative | 0.016667  | External   | bac         | 5.0086467  | q_Ottowia                     | 1          | fungi       | 1.616016228      | q_Parastella          | 7          |
| bac2408 | fungi195 | -0.942857 | negative | 0.016667  | External   | bac         | 12.970603  | q_Janthinobacterium           | 2          | fungi       | 1.453719337      | q_Chalara             | 24         |
| bac2408 | fungi280 | -0.942857 | negative | 0.016667  | External   | bac         | 12.970603  | q_Janthinobacterium           | 2          | fungi       | 2.74970385       | q_Verticillium        | 24         |
| bac2456 | fungi335 | -0.942857 | negative | 0.016667  | External   | bac         | 3.282639   | q_Chromobacterium             | 1          | fungi       | 4.879835406      | q_Podospora           | 5          |
| bac2464 | fungi134 | -1        | negative | 0.0027778 | External   | bac         | 0.7866375  | q_Microvirgula                | 5          | fungi       | 3.214064268      | q_Emmosia             | 3          |
| bac2464 | fungi514 | -0.942857 | negative | 0.016667  | External   | bac         | 0.7866375  | q_Microvirgula                | 5          | fungi       | 5.297687168      | q_Leucosporidium      | 4          |
| bac2464 | fungi526 | -0.942857 | negative | 0.016667  | External   | bac         | 0.7866375  | q_Microvirgula                | 5          | fungi       | 9.289104509      | q_Phaia               | 10         |
| bac2464 | fungi538 | -0.942857 | negative | 0.016667  | External   | bac         | 0.7866375  | q_Microvirgula                | 5          | fungi       | 4.446936181      | q_Tremellales_norank  | 10         |
| bac2477 | fungi195 | -0.942857 | negative | 0.016667  | External   | bac         | 2.2416667  | q_Crenobacter                 | 4          | fungi       | 1.453719337      | q_Chalara             | 24         |
| bac2477 | fungi220 | -0.942857 | negative | 0.016667  | External   | bac         | 2.2416667  | q_Crenobacter                 | 4          | fungi       | 8.179143712      | q_Sphaerospora        | 13         |
| bac2477 | fungi280 | -0.942857 | negative | 0.016667  | External   | bac         | 2.2416667  | q_Crenobacter                 | 4          | fungi       | 2.74970385       | q_Verticillium        | 24         |
| bac2477 | fungi300 | -0.942857 | negative | 0.016667  | External   | bac         | 2.2416667  | q_Crenobacter                 | 4          | fungi       | 4.37938565       | q_Fusarium            | 13         |
| bac2727 | fungi305 | -0.942857 | negative | 0.016667  | External   | bac         | 7.4340264  | q_Shewanella                  | 3          | fungi       | 2.434577802      | q_Styloectria         | 14         |
| bac2727 | fungi357 | -0.942857 | negative | 0.016667  | External   | bac         | 7.4340264  | q_Shewanella                  | 3          | fungi       | 3.715935126      | q_Xylaria             | 14         |
| bac2849 | fungi335 | -0.942857 | negative | 0.016667  | External   | bac         | 3.071906   | q_Leclercia                   | 1          | fungi       | 4.879835406      | q_Podospora           | 5          |
| bac2857 | fungi128 | -0.942857 | negative | 0.016667  | External   | bac         | 3.6971452  | q_Raoultella                  | 6          | fungi       | 2.618927506      | q_Rasamsonia          | 33         |
| bac2857 | fungi202 | -0.942857 | negative | 0.016667  | External   | bac         | 3.6971452  | q_Raoultella                  | 6          | fungi       | 5.481009688      | q_Pseudogymnoascus    | 11         |
| bac2857 | fungi330 | -0.942857 | negative | 0.016667  | External   | bac         | 3.6971452  | q_Raoultella                  | 6          | fungi       | 4.362996709      | q_Chaetomium          | 33         |
| bac2857 | fungi464 | -0.942857 | negative | 0.016667  | External   | bac         | 3.6971452  | q_Raoultella                  | 6          | fungi       | 3.881790576      | q_Hysterangium        | 33         |
| bac2857 | fungi516 | -0.942857 | negative | 0.016667  | External   | bac         | 3.6971452  | q_Raoultella                  | 6          | fungi       | 5.101347038      | q_Rhodotulula         | 33         |
| bac2857 | fungi523 | -0.942857 | negative | 0.016667  | External   | bac         | 3.6971452  | q_Raoultella                  | 6          | fungi       | 5.735294062      | q_Puccinia            | 33         |
| bac2868 | fungi335 | -0.942857 | negative | 0.016667  | External   | bac         | 6.8661079  | q_Erwinia                     | 1          | fungi       | 4.879835406      | q_Podospora           | 5          |
| bac2888 | fungi113 | -0.942857 | negative | 0.016667  | External   | bac         | 4.2211975  | q_Xenorhabdus                 | 12         | fungi       | 2.768580701      | q_Gladophialophora    | 52         |
| bac2888 | fungi128 | -0.942857 | negative | 0.016667  | External   | bac         | 4.2211975  | q_Xenorhabdus                 | 12         | fungi       | 2.618927506      | q_Rasamsonia          | 33         |
| bac2888 | fungi168 | -0.942857 | negative | 0.016667  | External   | bac         | 4.2211975  | q_Xenorhabdus                 | 12         | fungi       | 2.89353421       | q_Golovinomyces       | 23         |
| bac2888 | fungi172 | -1        | negative | 0.0027778 | External   | bac         | 4.2211975  | q_Xenorhabdus                 | 12         | fungi       | 3.218715812      | q_Coleophoma          | 58         |
| bac2888 | fungi222 | -1        | negative | 0.0027778 | External   | bac         | 4.2211975  | q_Xenorhabdus                 | 12         | fungi       | 8.573166259      | q_Wilcoxina           | 58         |
| bac2888 | fungi330 | -0.942857 | negative | 0.016667  | External   | bac         | 4.2211975  | q_Xenorhabdus                 | 12         | fungi       | 4.362996709      | q_Chaetomium          | 33         |
| bac2888 | fungi337 | -1        | negative | 0.0027778 | External   | bac         | 4.2211975  | q_Xenorhabdus                 | 12         | fungi       | 3.953337679      | q_Thermotheliavioidea | 58         |
| bac2888 | fungi358 | -0.942857 | negative | 0.016667  | External   | bac         | 4.2211975  | q_Xenorhabdus                 | 12         | fungi       | 2.494774469      | q_Monosporascus       | 23         |
| bac2888 | fungi359 | -0.942857 | negative | 0.016667  | External   | bac         | 4.2211975  | q_Xenorhabdus                 | 12         | fungi       | 2.107227678      | q_Phaelomonopsis      | 52         |
| bac2888 | fungi464 | -0.942857 | negative | 0.016667  | External   | bac         | 4.2211975  | q_Xenorhabdus                 | 12         | fungi       | 3.881790576      | q_Hysterangium        | 33         |
| bac2888 | fungi516 | -0.942857 | negative | 0.016667  | External   | bac         | 4.2211975  | q_Xenorhabdus                 | 12         | fungi       | 5.101347038      | q_Rhodotulula         | 33         |
| bac2888 | fungi523 | -0.942857 | negative | 0.016667  | External   | bac         | 4.2211975  | q_Xenorhabdus                 | 12         | fungi       | 5.735294062      | q_Puccinia            | 33         |
| bac2893 | fungi168 | -0.942857 | negative | 0.016667  | External   | bac         | 4.0609601  | q_Dickeya                     | 3          | fungi       | 2.89353421       | q_Golovinomyces       | 23         |
| bac2893 | fungi358 | -0.942857 | negative | 0.016667  | External   | bac         | 7.1060224  | q_Yersiniaceae_Unclassified   | 15         | fungi       | 2.494774469      | q_Monosporascus       | 23         |
| bac2899 | fungi54  | -0.942857 | negative | 0.016667  | External   | bac         | 7.1060224  | q_Yersiniaceae_Unclassified   | 15         | fungi       | 2.012232792      | q_Pyrenochaeta        | 11         |
| bac2899 | fungi128 | -1        | negative | 0.0027778 | External   | bac         | 7.1060224  | q_Yersiniaceae_Unclassified   | 15         | fungi       | 2.618927506      | q_Rasamsonia          | 33         |
| bac2899 | fungi172 | -0.942857 | negative | 0.016667  | External   | bac         | 7.1060224  | q_Yersiniaceae_Unclassified   | 15         | fungi       | 3.218715812      | q_Coleophoma          | 58         |
| bac2899 | fungi181 | -0.942857 | negative | 0.016667  | External   | bac         | 7.1060224  | q_Yersiniaceae_Unclassified   | 15         | fungi       | 3.915058394      | q_Lachnellula         | 34         |
| bac2899 | fungi188 | -0.942857 | negative | 0.016     |            |             |            |                               |            |             |                  |                       |            |

|         |          |           |          |           |          |       |           |                        |    |       |             |                      |    |
|---------|----------|-----------|----------|-----------|----------|-------|-----------|------------------------|----|-------|-------------|----------------------|----|
| bac2985 | fungi300 | -0.942857 | negative | 0.0166667 | External | bac   | 3.7449998 | g_Halotalea            | 4  | fungi | 4.37938565  | g_Fusarium           | 13 |
| bac3057 | fungi335 | -0.942857 | negative | 0.0166667 | External | bac   | 3.8726999 | g_Marinobacter         | 1  | fungi | 4.879835406 | g_Podospora          | 5  |
| pro155  | fungi128 | -0.942857 | negative | 0.0166667 | External | pro   | 4.55661   | g_Onchocerca           | 20 | fungi | 2.618927506 | g_Rasamsonia         | 33 |
| pro155  | fungi134 | -0.942857 | negative | 0.0166667 | External | pro   | 4.55661   | g_Onchocerca           | 20 | fungi | 3.214064268 | g_Emmonsia           | 3  |
| pro155  | fungi330 | -0.942857 | negative | 0.0166667 | External | pro   | 4.55661   | g_Onchocerca           | 20 | fungi | 4.362996709 | g_Chaetomium         | 33 |
| pro155  | fungi464 | -0.942857 | negative | 0.0166667 | External | pro   | 4.55661   | g_Onchocerca           | 20 | fungi | 3.881790576 | g_Hysterangium       | 33 |
| pro155  | fungi472 | -0.942857 | negative | 0.0166667 | External | pro   | 4.55661   | g_Onchocerca           | 20 | fungi | 4.799642621 | g_Grifolia           | 2  |
| pro155  | fungi516 | -0.942857 | negative | 0.0166667 | External | pro   | 4.55661   | g_Onchocerca           | 20 | fungi | 5.101347038 | g_Rhodotorula        | 33 |
| pro155  | fungi523 | -0.942857 | negative | 0.0166667 | External | pro   | 4.55661   | g_Onchocerca           | 20 | fungi | 5.735294062 | g_Puccinia           | 33 |
| pro155  | fungi526 | -1        | negative | 0.0027778 | External | pro   | 4.55661   | g_Onchocerca           | 20 | fungi | 9.289104509 | g_Phaffia            | 10 |
| pro155  | fungi528 | -0.942857 | negative | 0.0166667 | External | pro   | 4.55661   | g_Onchocerca           | 20 | fungi | 5.191116269 | g_Naganishia         | 2  |
| pro155  | fungi532 | -0.942857 | negative | 0.0166667 | External | pro   | 4.55661   | g_Onchocerca           | 20 | fungi | 5.783314283 | g_Kwonilella         | 2  |
| pro155  | fungi538 | -1        | negative | 0.0027778 | External | pro   | 4.55661   | g_Onchocerca           | 20 | fungi | 4.446936181 | g_Tremellales_norank | 10 |
| virus30 | pro141   | -0.942857 | negative | 0.0166667 | External | virus | 8.2318864 | f_Myoviridae           | 4  | pro   | 3.427027558 | g_Emiliaia           | 5  |
| virus34 | pro2     | -0.942857 | negative | 0.0166667 | External | virus | 6.4627892 | f_Schitoviridae        | 4  | pro   | 4.58450819  | g_Plasmodium         | 11 |
| bac68   | pro153   | -1        | negative | 0.0027778 | External | bac   | 2.3785271 | g_Dietzia              | 1  | pro   | 6.078485924 | g_Brugia             | 12 |
| bac108  | pro155   | -1        | negative | 0.0027778 | External | bac   | 0.585562  | g_Pseudokineococcus    | 12 | pro   | 4.556609995 | g_Onchocerca         | 20 |
| bac172  | pro155   | -0.942857 | negative | 0.0166667 | External | bac   | 2.4223218 | g_Alpinimonas          | 15 | pro   | 4.556609995 | g_Onchocerca         | 20 |
| bac194  | pro153   | -0.927634 | negative | 0.0076658 | External | bac   | 2.4508327 | g_Gulosibacter         | 2  | pro   | 6.078485924 | g_Brugia             | 12 |
| bac202  | pro155   | -0.942857 | negative | 0.0166667 | External | bac   | 8.2918427 | g_Leifsonia            | 15 | pro   | 4.556609995 | g_Onchocerca         | 20 |
| bac210  | pro155   | -0.942857 | negative | 0.0166667 | External | bac   | 6.3490883 | g_Mycetocola           | 15 | pro   | 4.556609995 | g_Onchocerca         | 20 |
| bac806  | pro2     | -0.942857 | negative | 0.0166667 | External | bac   | 4.7640354 | g_Elizabethkingia      | 2  | pro   | 4.58450819  | g_Plasmodium         | 11 |
| bac806  | pro178   | -1        | negative | 0.0027778 | External | bac   | 4.7640354 | g_Elizabethkingia      | 2  | pro   | 3.14402296  | g_Trichuris          | 17 |
| bac834  | pro178   | -0.942857 | negative | 0.0166667 | External | bac   | 11.532559 | g_Pedobacter           | 1  | pro   | 3.14402296  | g_Trichuris          | 17 |
| bac1164 | pro155   | -0.942857 | negative | 0.0166667 | External | bac   | 4.1749563 | g_Filibacter           | 15 | pro   | 4.556609995 | g_Onchocerca         | 20 |
| bac1175 | pro155   | -0.942857 | negative | 0.0166667 | External | bac   | 8.1578089 | g_Sporosarcina         | 15 | pro   | 4.556609995 | g_Onchocerca         | 20 |
| bac2320 | pro2     | -0.942857 | negative | 0.0166667 | External | bac   | 3.8689276 | g_Candidimonas         | 2  | pro   | 4.58450819  | g_Plasmodium         | 11 |
| bac2320 | pro178   | -1        | negative | 0.0027778 | External | bac   | 3.8689276 | g_Candidimonas         | 2  | pro   | 3.14402296  | g_Trichuris          | 17 |
| bac2334 | pro178   | -0.942857 | negative | 0.0166667 | External | bac   | 7.0433843 | g_Pigmentiphaga        | 1  | pro   | 3.14402296  | g_Trichuris          | 17 |
| bac2352 | pro2     | -0.942857 | negative | 0.0166667 | External | bac   | 4.9096356 | g_Pandoraea            | 2  | pro   | 4.58450819  | g_Plasmodium         | 11 |
| bac2352 | pro178   | -1        | negative | 0.0027778 | External | bac   | 4.9096356 | g_Pandoraea            | 2  | pro   | 3.14402296  | g_Trichuris          | 17 |
| bac2488 | pro178   | -0.942857 | negative | 0.0166667 | External | bac   | 4.1961939 | g_Candidatus Nitrotoga | 1  | pro   | 3.14402296  | g_Trichuris          | 17 |
| bac2727 | pro178   | -0.942857 | negative | 0.0166667 | External | bac   | 7.4340264 | g_Shewanella           | 3  | pro   | 3.14402296  | g_Trichuris          | 17 |
| bac2824 | pro2     | -1        | negative | 0.0027778 | External | bac   | 4.2634402 | g_Sodalis              | 3  | pro   | 4.58450819  | g_Plasmodium         | 11 |
| bac2824 | pro178   | -0.942857 | negative | 0.0166667 | External | bac   | 4.2634402 | g_Sodalis              | 3  | pro   | 3.14402296  | g_Trichuris          | 17 |
| bac2887 | pro2     | -0.942857 | negative | 0.0166667 | External | bac   | 6.4197995 | g_Providencia          | 1  | pro   | 4.58450819  | g_Plasmodium         | 11 |
| bac2893 | pro125   | -0.942857 | negative | 0.0166667 | External | bac   | 4.0609601 | g_Dickeya              | 3  | pro   | 1.222598268 | g_Bodo               | 2  |
| bac2936 | pro178   | -0.942857 | negative | 0.0166667 | External | bac   | 2.3622681 | g_Methylomonas         | 3  | pro   | 3.14402296  | g_Trichuris          | 17 |
| bac2984 | pro2     | -0.942857 | negative | 0.0166667 | External | bac   | 4.4012654 | g_Halomonas            | 3  | pro   | 4.58450819  | g_Plasmodium         | 11 |
| bac2985 | pro159   | -0.942857 | negative | 0.0166667 | External | bac   | 3.7449998 | g_Halotalea            | 4  | pro   | 3.51820975  | g_Diploscapter       | 4  |

```

library(psych)
data1 <- read.table(Args[3],header=T,sep="\t",check.names = FALSE,row.names = 1)
data2 <- read.table(Args[4],header=T,sep="\t",check.names = FALSE,row.names = 1)
data1 <- data.frame(t(data1))
data2 <- data.frame(t(data2))
cordata <- corr.test(data1,data2,method = "spearman",adjust="none")
#cordata <- corr.test(data1,data2,method = "spearman")
write.table(data.frame(cordata$r),file                                     =
paste(Args[3],".",Args[4],".cor.txt",sep=""),sep="\t",quote=F,row.names = T)
write.table(data.frame(cordata$p),file                                     =
paste(Args[3],".",Args[4],".p.txt",sep=""),sep="\t",quote=F,row.names = T)

R --no-save < psych.cor.r data1.txt data2.txt

```