

*Supplementary Information*

**Breathing can be dangerous: Opportunistic fungal pathogens and the diverse community of the lung mycobiome**

Paris S. Salazar-Hamm, Kyana N. Montoya, Liliam Montoya, Kel Cook, Schuyler Liphardt, John W. Taylor, Joseph A. Cook, and Donald O. Natvig

**Correspondence:**

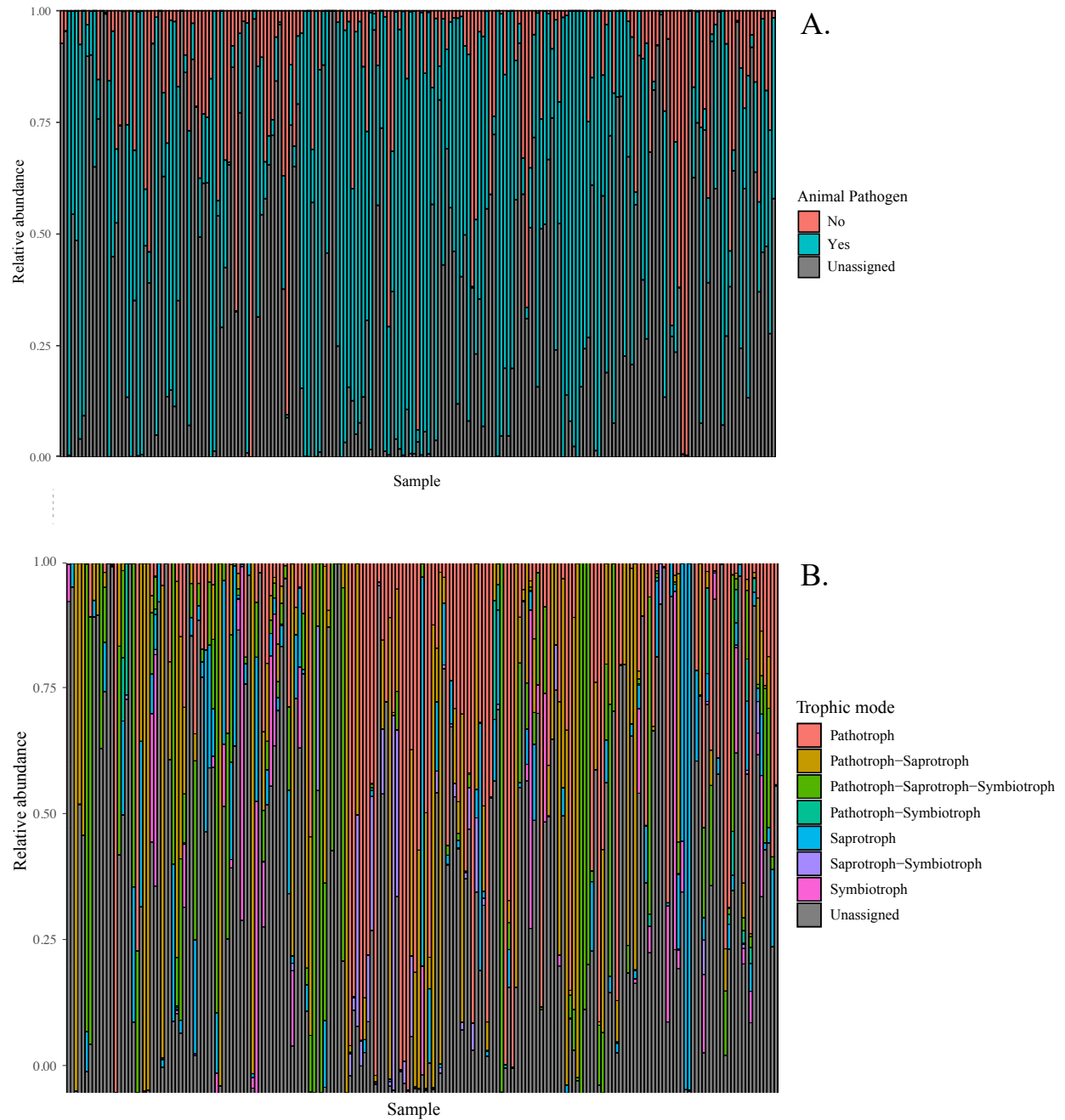
Paris S. Salazar-Hamm  
Email: psh102@unm.edu

**Table of Contents**

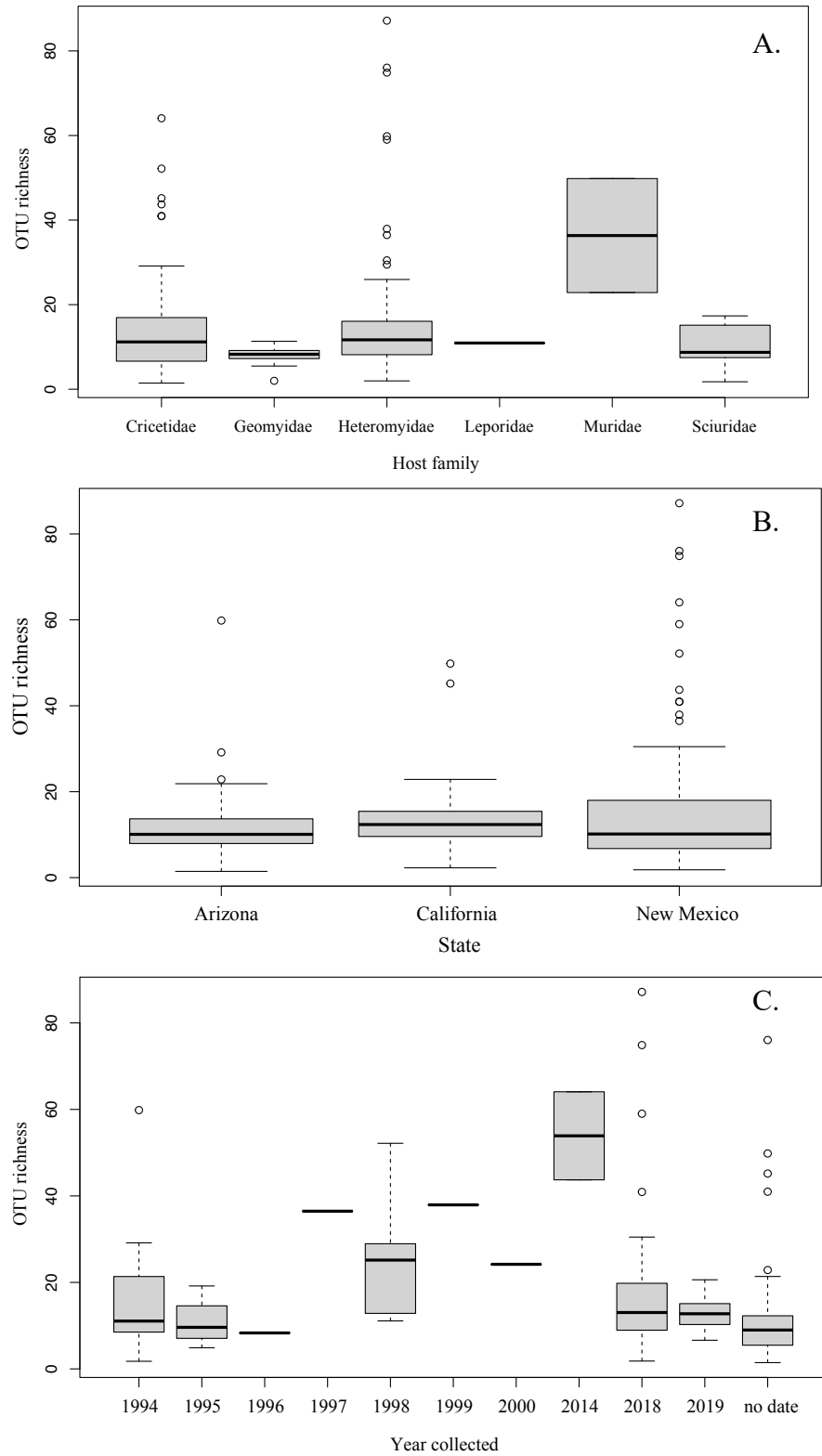
|                              |      |
|------------------------------|------|
| Supplementary Figures 1 to 5 | 2-6  |
| Supplementary Tables 1 to 5  | 7-16 |

**Not included in this PDF:**

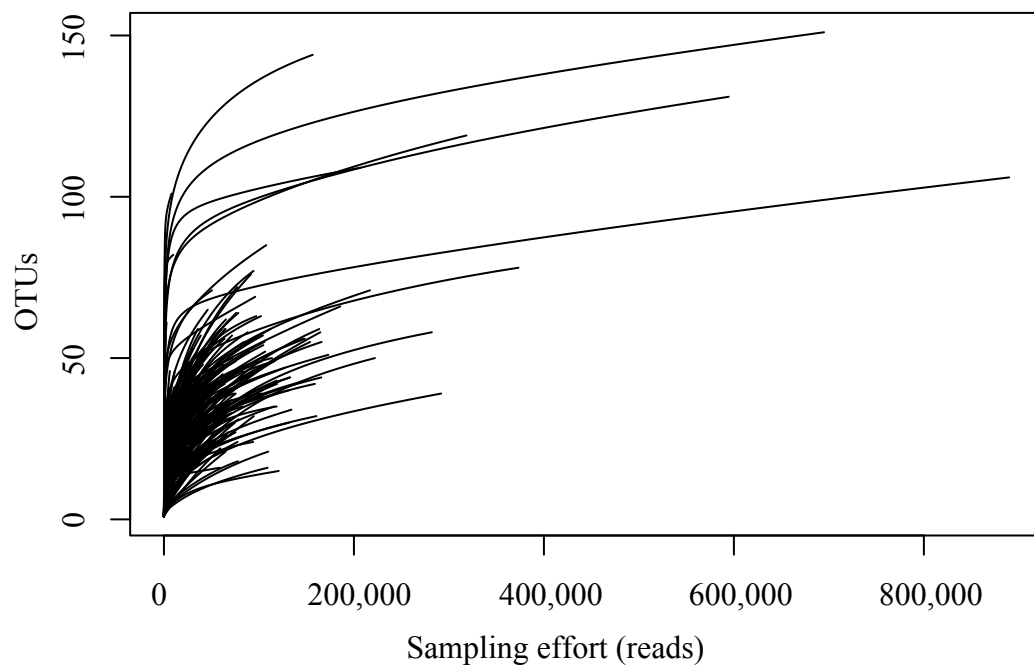
Supplementary Datasets 1 to 3



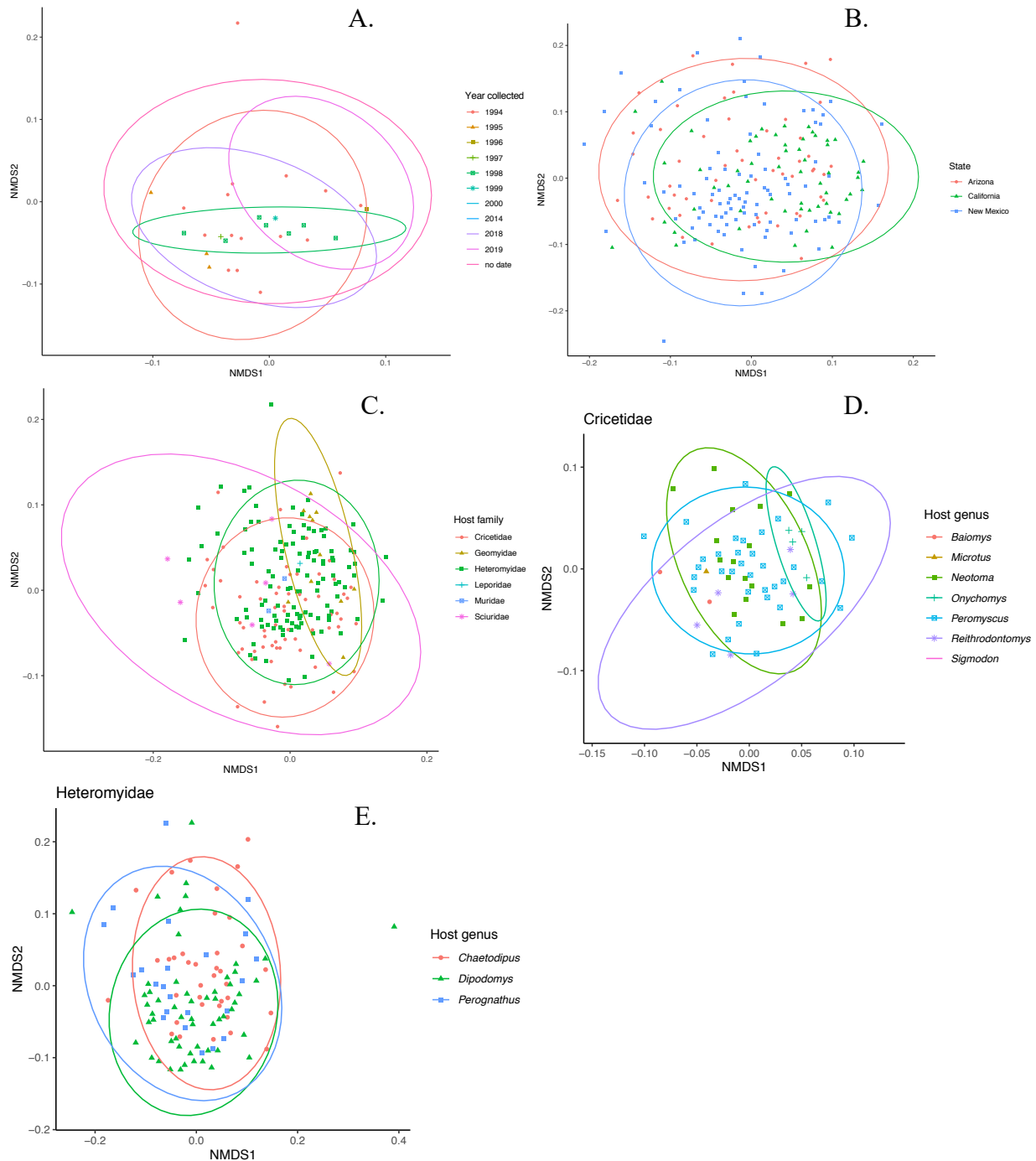
**Supplementary Figure 1. Relative abundance of fungal trophic modes (A) and pooled animal pathogen fungal guilds (B) using FUNGuild (Nguyen et al. 2016) for fungal OTU assignments. Each bar along the x-axis represents one sample.**



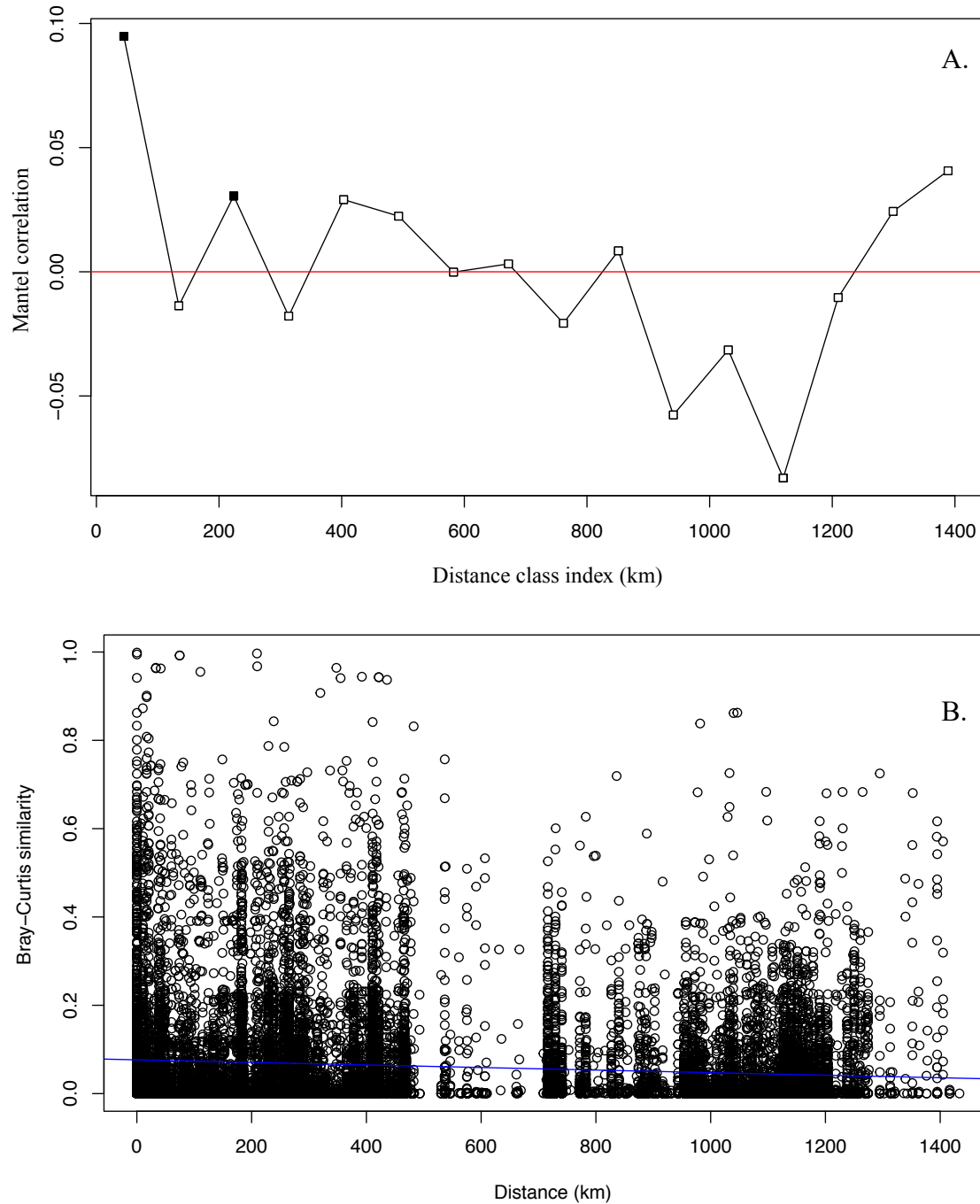
**Supplementary Figure 2. Alpha diversity calculated by OTU richness showed no statistically significant differences among host family (A), state (B), or collection year (C). We note, however, that sample sizes differed by family, state, and collection year.**



**Supplementary Figure 3. Rarefaction curves for fungal OTU richness given sampling effort for 199 small mammalian lung tissues.**



**Supplementary Figure 4. NMDS ordinations of small-mammal samples were utilized to visualize lung mycobiome composition among small mammals across time (year collected, A), space (state, B), and host family (C). Examination of deeply sampled host families failed to demonstrate differences in fungal community by host genus within either the Cricetidae (D) or Heteromyidae (E).**



**Supplementary Figure 5. Spatial structure was assessed using a Mantel correlogram (A) and distance decay plot (B).** (A) The Mantel test revealed significant positive correlation between geographic distance and fungal community dissimilarity ( $r=0.1132$ ,  $p=0.001$ ). Positive spatial autocorrelation was seen at two distance classes, less than 44.8 km and between 135 km and 224 km (solid black boxes). (B) While fungal communities in general exhibited low similarity among samples, distance decay analysis indicated decreasing similarity along a geographical scale ( $p<0.001$ ). The line of best fit is shown in blue.

**Supplementary Table 1. Samples from which frozen tissues were obtained for Illumina ITS2 sequencing.** Host identification of museum specimens was confirmed by cyt b mitochondrial sequencing and examination of voucher specimens.

| <b>Voucher</b>  | <b>Host ID</b>                | <b>Locality</b> | <b>Cyt b GenBank Accession Num.</b> |
|-----------------|-------------------------------|-----------------|-------------------------------------|
| MVZ:Mamm:239384 | <i>Dipodomys heermanni</i>    | Kern Co. CA     | OK135085                            |
| MVZ:Mamm:239385 | <i>Dipodomys heermanni</i>    | Kern Co. CA     | OK135058                            |
| MVZ:Mamm:239386 | <i>Dipodomys heermanni</i>    | Kern Co. CA     | OK135089                            |
| MVZ:Mamm:239387 | <i>Dipodomys heermanni</i>    | Kern Co. CA     | OK135087                            |
| MVZ:Mamm:239388 | <i>Dipodomys heermanni</i>    | Kern Co. CA     | OK135057                            |
| MVZ:Mamm:239389 | <i>Dipodomys heermanni</i>    | Kern Co. CA     | OK135054                            |
| MVZ:Mamm:239390 | <i>Dipodomys heermanni</i>    | Kern Co. CA     | OK135059                            |
| MVZ:Mamm:239391 | <i>Dipodomys heermanni</i>    | Kern Co. CA     | OK135082                            |
| MVZ:Mamm:239392 | <i>Dipodomys heermanni</i>    | Kern Co. CA     | OK135065                            |
| MVZ:Mamm:239393 | <i>Dipodomys heermanni</i>    | Kern Co. CA     | OK135060                            |
| MVZ:Mamm:239394 | <i>Dipodomys heermanni</i>    | Kern Co. CA     | OK135104                            |
| MVZ:Mamm:239395 | <i>Dipodomys heermanni</i>    | Kern Co. CA     | OK135119                            |
| MVZ:Mamm:239396 | <i>Dipodomys heermanni</i>    | Kern Co. CA     | OK135105                            |
| MVZ:Mamm:239397 | <i>Dipodomys heermanni</i>    | Kern Co. CA     | OK135072                            |
| MVZ:Mamm:239409 | <i>Dipodomys nitratooides</i> | Kern Co. CA     | -                                   |
| MVZ:Mamm:239410 | <i>Dipodomys nitratooides</i> | Kern Co. CA     | -                                   |
| MVZ:Mamm:239411 | <i>Dipodomys nitratooides</i> | Kern Co. CA     | -                                   |
| MVZ:Mamm:239412 | <i>Dipodomys nitratooides</i> | Kern Co. CA     | -                                   |
| MVZ:Mamm:239413 | <i>Dipodomys nitratooides</i> | Kern Co. CA     | -                                   |
| MVZ:Mamm:239414 | <i>Dipodomys nitratooides</i> | Kern Co. CA     | OK135078                            |
| MVZ:Mamm:239415 | <i>Dipodomys nitratooides</i> | Kern Co. CA     | -                                   |
| MVZ:Mamm:239416 | <i>Dipodomys nitratooides</i> | Kern Co. CA     | -                                   |
| MVZ:Mamm:239418 | <i>Dipodomys nitratooides</i> | Kern Co. CA     | -                                   |
| MVZ:Mamm:239419 | <i>Dipodomys nitratooides</i> | Kern Co. CA     | -                                   |
| MVZ:Mamm:239505 | <i>Perognathus inornatus</i>  | Kern Co. CA     | OK135093                            |
| MVZ:Mamm:239506 | <i>Perognathus inornatus</i>  | Kern Co. CA     | OK135066                            |
| MVZ:Mamm:239507 | <i>Perognathus inornatus</i>  | Kern Co. CA     | -                                   |
| MVZ:Mamm:239508 | <i>Perognathus inornatus</i>  | Kern Co. CA     | -                                   |
| MVZ:Mamm:239509 | <i>Perognathus inornatus</i>  | Kern Co. CA     | OK135074                            |
| MVZ:Mamm:239510 | <i>Perognathus inornatus</i>  | Kern Co. CA     | OK135083                            |
| MVZ:Mamm:239511 | <i>Perognathus inornatus</i>  | Kern Co. CA     | -                                   |
| MVZ:Mamm:239512 | <i>Perognathus inornatus</i>  | Kern Co. CA     | OK135079                            |
| MVZ:Mamm:239597 | <i>Onychomys torridus</i>     | Kern Co. CA     | OK134994                            |
| MVZ:Mamm:239598 | <i>Onychomys torridus</i>     | Kern Co. CA     | OK135090                            |
| MVZ:Mamm:239599 | <i>Onychomys torridus</i>     | Kern Co. CA     | OK135012                            |

|                    |                                  |                 |          |
|--------------------|----------------------------------|-----------------|----------|
| MVZ:Mamm:239619    | <i>Peromyscus maniculatus</i>    | Kern Co. CA     | OK134996 |
| MVZ:Mamm:239621    | <i>Peromyscus maniculatus</i>    | Kern Co. CA     | OK134997 |
| MVZ:Mamm:239622    | <i>Peromyscus maniculatus</i>    | Kern Co. CA     | OK134998 |
| MVZ:Mamm:239623    | <i>Peromyscus maniculatus</i>    | Kern Co. CA     | OK134999 |
| MVZ:Mamm:239641    | <i>Reithrodontomys megalotis</i> | Kern Co. CA     | OK135000 |
| MSB:Mamm:72326     | <i>Perognathus flavescens</i>    | Socorro Co. NM  | OK135028 |
| MSB:Mamm:72516     | <i>Dipodomys merriami</i>        | Socorro Co. NM  | OK135120 |
| MSB:Mamm:72525     | <i>Dipodomys merriami</i>        | Socorro Co. NM  | OK135029 |
| MSB:Mamm:72555     | <i>Peromyscus eremicus</i>       | Socorro Co. NM  | OK135001 |
| MSB:Mamm:73101     | <i>Chaetodipus baileyi</i>       | Maricopa Co. AZ | OK135115 |
| MSB:Mamm:73109     | <i>Chaetodipus baileyi</i>       | Maricopa Co. AZ | OK135113 |
| MSB:Mamm:73113     | <i>Chaetodipus baileyi</i>       | Maricopa Co. AZ | OK135073 |
| MSB:Mamm:73114     | <i>Sigmodon arizonae</i>         | Maricopa Co. AZ | OK135052 |
| MSB:Mamm:75330     | <i>Onychomys torridus</i>        | Maricopa Co. AZ | OK135062 |
| MSB:Mamm:75338     | <i>Peromyscus eremicus</i>       | Maricopa Co. AZ | OK135002 |
| MSB:Mamm:75343     | <i>Neotoma albigula</i>          | Maricopa Co. AZ | OK135003 |
| 77240 (no voucher) | <i>Dipodomys merriami</i>        | Maricopa Co. AZ | OK135098 |
| MSB:Mamm:77241     | <i>Ammospermophilus harrisi</i>  | Maricopa Co. AZ | OK135018 |
| MSB:Mamm:77244     | <i>Dipodomys merriami</i>        | Maricopa Co. AZ | OK135041 |
| MSB:Mamm:77246     | <i>Dipodomys merriami</i>        | Maricopa Co. AZ | OK135053 |
| MSB:Mamm:77247     | <i>Dipodomys merriami</i>        | Maricopa Co. AZ | OK135108 |
| MSB:Mamm:77250     | <i>Dipodomys merriami</i>        | Maricopa Co. AZ | OK135112 |
| 77253 (no voucher) | <i>Dipodomys heermanni</i>       | Maricopa Co. AZ | OK135135 |
| 77314 (no voucher) | <i>Sigmodon arizonae</i>         | Maricopa Co. AZ | OK135100 |
| MSB:Mamm:77316     | <i>Perognathus amplus</i>        | Maricopa Co. AZ | OK135136 |
| MSB:Mamm:77317     | <i>Perognathus amplus</i>        | Maricopa Co. AZ | OK135081 |
| MSB:Mamm:77318     | <i>Perognathus amplus</i>        | Maricopa Co. AZ | -        |
| MSB:Mamm:77325     | <i>Chaetodipus penicillatus</i>  | Maricopa Co. AZ | OK135086 |
| MSB:Mamm:77339     | <i>Neotoma albigula</i>          | Maricopa Co. AZ | OK135013 |
| MSB:Mamm:77340     | <i>Neotoma albigula</i>          | Maricopa Co. AZ | OK135006 |
| MSB:Mamm:77680     | <i>Reithrodontomys megalotis</i> | Cochise Co. AZ  | OK135016 |
| MSB:Mamm:77687     | <i>Baiomys taylori</i>           | Cochise Co. AZ  | OK135004 |
| MSB:Mamm:77688     | <i>Reithrodontomys megalotis</i> | Cochise Co. AZ  | OK135020 |
| MSB:Mamm:77712     | <i>Chaetodipus penicillatus</i>  | Cochise Co. AZ  | OK135069 |
| MSB:Mamm:77713     | <i>Chaetodipus penicillatus</i>  | Cochise Co. AZ  | OK135042 |
| MSB:Mamm:77717     | <i>Chaetodipus penicillatus</i>  | Cochise Co. AZ  | OK135070 |
| MSB:Mamm:77719     | <i>Chaetodipus penicillatus</i>  | Cochise Co. AZ  | OK135043 |
| MSB:Mamm:77721     | <i>Chaetodipus penicillatus</i>  | Cochise Co. AZ  | OK135051 |
| MSB:Mamm:77725     | <i>Dipodomys merriami</i>        | Cochise Co. AZ  | -        |



|                    |                                   |                       |          |
|--------------------|-----------------------------------|-----------------------|----------|
| MSB:Mamm:77726     | <i>Dipodomys merriami</i>         | Cochise Co. AZ        | -        |
| MSB:Mamm:77727     | <i>Dipodomys ordii</i>            | Cochise Co. AZ        | OK135025 |
| MSB:Mamm:77728     | <i>Dipodomys ordii</i>            | Cochise Co. AZ        | OK135122 |
| MSB:Mamm:78077     | <i>Sylvilagus audubonii</i>       | Cochise Co. AZ        | OK135033 |
| MSB:Mamm:78084     | <i>Peromyscus leucopus</i>        | Cochise Co. AZ        | OK135005 |
| MSB:Mamm:78106     | <i>Chaetodipus penicillatus</i>   | Cochise Co. AZ        | OK135023 |
| MSB:Mamm:78110     | <i>Dipodomys merriami</i>         | Cochise Co. AZ        | OK135030 |
| MSB:Mamm:78111     | <i>Dipodomys merriami</i>         | Cochise Co. AZ        | OK135133 |
| MSB:Mamm:78112     | <i>Dipodomys merriami</i>         | Cochise Co. AZ        | -        |
| 78118 (no voucher) | <i>Ammospermophilus harrisi</i>   | Cochise Co. AZ        | OK135099 |
| MSB:Mamm:78136     | <i>Neotoma albigula</i>           | Cochise Co. AZ        | OK135132 |
| MSB:Mamm:78217     | <i>Chaetodipus baileyi</i>        | Pima Co. AZ           | OK135061 |
| MSB:Mamm:79466     | <i>Dipodomys merriami</i>         | Socorro Co. NM        | OK135071 |
| MSB:Mamm:79868     | <i>Neotoma albigula</i>           | Socorro Co. NM        | OK135019 |
| MSB:Mamm:81689     | <i>Peromyscus maniculatus</i>     | Kings Co. CA          | OK135128 |
| MSB:Mamm:81700     | <i>Peromyscus maniculatus</i>     | Kings Co. CA          | -        |
| MSB:Mamm:81704     | <i>Peromyscus maniculatus</i>     | Kings Co. CA          | OK135007 |
| MSB:Mamm:81711     | <i>Mus musculus</i>               | Kings Co. CA          | OK135123 |
| MSB:Mamm:81715     | <i>Mus musculus</i>               | Kings Co. CA          | OK135114 |
| MSB:Mamm:83441     | <i>Chaetodipus baileyi</i>        | Pima Co. AZ           | OK135044 |
| MSB:Mamm:84453     | <i>Peromyscus maniculatus</i>     | Tulare Co. CA         | OK135141 |
| MSB:Mamm:84466     | <i>Perognathus parvus</i>         | Mono Co. CA           | OK135126 |
| MSB:Mamm:86216     | <i>Peromyscus maniculatus</i>     | Lassen Co. CA         | OK135008 |
| MSB:Mamm:87435     | <i>Peromyscus crinitus</i>        | San Bernardino Co. CA | OK135015 |
| MSB:Mamm:87516     | <i>Perognathus longimembris</i>   | San Bernardino Co. CA | OK135134 |
| MSB:Mamm:87605     | <i>Reithrodontomys fulvescens</i> | Cochise Co. AZ        | -        |
| MSB:Mamm:87794     | <i>Neotoma albigula</i>           | Socorro Co. NM        | OK135129 |
| MSB:Mamm:87863     | <i>Dipodomys ordii</i>            | Catron Co. NM         | OK135055 |
| MSB:Mamm:87873     | <i>Microtus mogollonensis</i>     | Cibola Co. NM         | OK135031 |
| MSB:Mamm:87948     | <i>Dipodomys ordii</i>            | Cibola Co. NM         | OK135124 |
| MSB:Mamm:87949     | <i>Dipodomys ordii</i>            | Cibola Co. NM         | OK135138 |
| MSB:Mamm:88099     | <i>Perognathus flavus</i>         | Catron Co. NM         | OK135088 |
| MSB:Mamm:89733     | <i>Dipodomys ordii</i>            | Socorro Co. NM        | OK135045 |
| MSB:Mamm:89748     | <i>Dipodomys ordii</i>            | Socorro Co. NM        | OK135121 |
| MSB:Mamm:89752     | <i>Neotoma albigula</i>           | Socorro Co. NM        | OK135009 |
| 89766 (no voucher) | <i>Perognathus flavus</i>         | Socorro Co. NM        | OK135142 |
| MSB:Mamm:89796     | <i>Dipodomys ordii</i>            | Socorro Co. NM        | OK135106 |
| MSB:Mamm:90911     | <i>Dipodomys merriami</i>         | Socorro Co. NM        | OK135116 |
| MSB:Mamm:90965     | <i>Perognathus flavus</i>         | Socorro Co. NM        | OK135022 |

|                     |                                 |                       |          |
|---------------------|---------------------------------|-----------------------|----------|
| 91253 (no voucher)  | <i>Perognathus flavus</i>       | Socorro Co. NM        | OK135137 |
| MSB:Mamm:91260      | <i>Peromyscus californicus</i>  | Monterey Co. CA       | -        |
| MSB:Mamm:91271      | <i>Peromyscus californicus</i>  | Monterey Co. CA       | -        |
| MSB:Mamm:91400      | <i>Chaetodipus californicus</i> | Obispo Co. CA         | OK135021 |
| MSB:Mamm:91401      | <i>Chaetodipus californicus</i> | Obispo Co. CA         | OK135046 |
| MSB:Mamm:93037      | <i>Perognathus flavus</i>       | McKinley Co. NM       | OK135047 |
| MSB:Mamm:96300      | <i>Dipodomys ordii</i>          | McKinley Co. NM       | -        |
| MSB:Mamm:139034     | <i>Dipodomys ordii</i>          | McKinley Co. NM       | OK135118 |
| MSB:Mamm:146153     | <i>Perognathus flavus</i>       | Cochise Co. AZ        | OK135101 |
| MSB:Mamm:146226     | <i>Chaetodipus baileyi</i>      | Cochise Co. AZ        | OK135102 |
| MSB:Mamm:150582     | <i>Thomomys bottae</i>          | San Juan Co. NM       | -        |
| MSB:Mamm:150583     | <i>Thomomys bottae</i>          | San Juan Co. NM       | -        |
| MSB:Mamm:150584     | <i>Thomomys bottae</i>          | San Juan Co. NM       | -        |
| MSB:Mamm:156712     | <i>Dipodomys merriami</i>       | Grant Co. NM          | OK135107 |
| MSB:Mamm:199648     | <i>Chaetodipus intermedius</i>  | Catron Co. NM         | OK135130 |
| MSB:Mamm:231069     | <i>Thomomys bottae</i>          | San Juan Co. NM       | -        |
| MSB:Mamm:239509     | <i>Peromyscus leucopus</i>      | Cochise Co. AZ        | OK134972 |
| MSB:Mamm:244556     | <i>Peromyscus boylii</i>        | Pima Co. AZ           | OK134973 |
| MSB:Mamm:244564     | <i>Peromyscus boylii</i>        | Pima Co. AZ           | OK134974 |
| MSB:Mamm:244584     | <i>Chaetodipus baileyi</i>      | Pima Co. AZ           | OK135131 |
| MSB:Mamm:244630     | <i>Chaetodipus baileyi</i>      | Pima Co. AZ           | OK135103 |
| 244631 (no voucher) | <i>Peromyscus boylii</i>        | Pima Co. AZ           | OK135096 |
| MSB:Mamm:253299     | <i>Reithrodontomys montanus</i> | Socorro Co. NM        | OK134975 |
| MSB:Mamm:259869     | <i>Sigmodon hispidus</i>        | Socorro Co. NM        | OK135048 |
| MSB:Mamm:262655     | <i>Chaetodipus intermedius</i>  | Grant Co. NM          | OK135034 |
| MSB:Mamm:263654     | <i>Dipodomys merriami</i>       | Sierra Co. NM         | -        |
| MSB:Mamm:263880     | <i>Dipodomys ordii</i>          | Grant Co. NM          | -        |
| MSB:Mamm:269016     | <i>Perognathus merriami</i>     | Hidalgo Co. NM        | OK135035 |
| MSB:Mamm:269115     | <i>Thomomys bottae</i>          | Sierra Co. NM         | -        |
| MSB:Mamm:269217     | <i>Thomomys bottae</i>          | Sierra Co. NM         | -        |
| MSB:Mamm:270443     | <i>Peromyscus boylii</i>        | Sierra Co. NM         | OK134976 |
| MSB:Mamm:270470     | <i>Neotoma albigula</i>         | Sierra Co. NM         | OK257677 |
| MSB:Mamm:279264     | <i>Thomomys bottae</i>          | Sierra Co. NM         | -        |
| MSB:Mamm:281843     | <i>Chaetodipus formosus</i>     | San Bernardino Co. CA | OK135084 |
| MSB:Mamm:282890     | <i>Peromyscus maniculatus</i>   | Cochise Co. AZ        | OK134977 |
| MSB:Mamm:284485     | <i>Thomomys bottae</i>          | Catron Co. NM         | -        |
| MSB:Mamm:291392     | <i>Dipodomys merriami</i>       | Grant Co. NM          | -        |
| MSB:Mamm:291445     | <i>Peromyscus boylii</i>        | Grant Co. NM          | OK135011 |
| MSB:Mamm:303043     | <i>Neotoma stephensi</i>        | Sierra Co. NM         | -        |

|                     |                                   |               |          |
|---------------------|-----------------------------------|---------------|----------|
| MSB:Mamm:303044     | <i>Neotoma albigula</i>           | Sierra Co. NM | OK135067 |
| MSB:Mamm:303045     | <i>Neotoma albigula</i>           | Sierra Co. NM | OK135127 |
| MSB:Mamm:303046     | <i>Otospermophilus variegatus</i> | Sierra Co. NM | OK135032 |
| MSB:Mamm:303047     | <i>Neotoma stephensi</i>          | Sierra Co. NM | OK134978 |
| MSB:Mamm:303049     | <i>Chaetodipus intermedius</i>    | Sierra Co. NM | OK135068 |
| MSB:Mamm:304173     | <i>Chaetodipus intermedius</i>    | Sierra Co. NM | OK135036 |
| MSB:Mamm:304174     | <i>Chaetodipus intermedius</i>    | Sierra Co. NM | OK135037 |
| MSB:Mamm:304175     | <i>Chaetodipus intermedius</i>    | Sierra Co. NM | OK135038 |
| MSB:Mamm:304176     | <i>Chaetodipus intermedius</i>    | Sierra Co. NM | OK135024 |
| MSB:Mamm:304177     | <i>Tamias dorsalis</i>            | Sierra Co. NM | OK135125 |
| MSB:Mamm:304178     | <i>Neotoma albigula</i>           | Sierra Co. NM | -        |
| MSB:Mamm:304180     | <i>Peromyscus boylii</i>          | Sierra Co. NM | OK134980 |
| MSB:Mamm:304181     | <i>Peromyscus boylii</i>          | Sierra Co. NM | OK134981 |
| MSB:Mamm:304183     | <i>Peromyscus boylii</i>          | Sierra Co. NM | OK134983 |
| MSB:Mamm:304184     | <i>Peromyscus boylii</i>          | Sierra Co. NM | OK134984 |
| MSB:Mamm:304185     | <i>Peromyscus boylii</i>          | Sierra Co. NM | -        |
| MSB:Mamm:304186     | <i>Peromyscus boylii</i>          | Sierra Co. NM | OK134985 |
| MSB:Mamm:304190     | <i>Peromyscus boylii</i>          | Sierra Co. NM | OK134989 |
| MSB:Mamm:304191     | <i>Peromyscus boylii</i>          | Sierra Co. NM | OK134990 |
| MSB:Mamm:304192     | <i>Peromyscus boylii</i>          | Sierra Co. NM | OK134991 |
| MSB:Mamm:305233     | <i>Thomomys bottae</i>            | Sierra Co. NM | -        |
| MSB:Mamm:305235     | <i>Neotoma albigula</i>           | Sierra Co. NM | -        |
| MSB:Mamm:305236     | <i>Neotoma albigula</i>           | Sierra Co. NM | -        |
| MSB:Mamm:305237     | <i>Otospermophilus variegatus</i> | Sierra Co. NM | OK135139 |
| MSB:Mamm:305238     | <i>Neotoma albigula</i>           | Sierra Co. NM | -        |
| MSB:Mamm:305240     | <i>Chaetodipus intermedius</i>    | Sierra Co. NM | OK135026 |
| MSB:Mamm:305241     | <i>Dipodomys merriami</i>         | Sierra Co. NM | OK135027 |
| MSB:Mamm:305242     | <i>Chaetodipus intermedius</i>    | Sierra Co. NM | OK135094 |
| MSB:Mamm:305243     | <i>Neotoma albigula</i>           | Sierra Co. NM | OK135017 |
| MSB:Mamm:305244     | <i>Dipodomys merriami</i>         | Sierra Co. NM | -        |
| MSB:Mamm:305245     | <i>Chaetodipus intermedius</i>    | Sierra Co. NM | OK135039 |
| 305246 (no voucher) | <i>Otospermophilus variegatus</i> | Sierra Co. NM | OK135097 |
| MSB:Mamm:305247     | <i>Chaetodipus intermedius</i>    | Sierra Co. NM | OK135056 |
| MSB:Mamm:305257     | <i>Peromyscus boylii</i>          | Sierra Co. NM | OK135014 |
| MSB:Mamm:305258     | <i>Peromyscus boylii</i>          | Sierra Co. NM | OK134992 |
| MSB:Mamm:305259     | <i>Peromyscus boylii</i>          | Sierra Co. NM | OK134993 |
| MSB:Mamm:323706     | <i>Dipodomys merriami</i>         | Luna Co. NM   | OK135092 |
| MSB:Mamm:323714     | <i>Chaetodipus intermedius</i>    | Luna Co. NM   | OK135140 |
| MSB:Mamm:323716     | <i>Chaetodipus intermedius</i>    | Luna Co. NM   | OK135040 |

|                 |                                |               |          |
|-----------------|--------------------------------|---------------|----------|
| MSB:Mamm:323717 | <i>Chaetodipus intermedius</i> | Luna Co. NM   | OK135080 |
| MSB:Mamm:323718 | <i>Chaetodipus intermedius</i> | Luna Co. NM   | OK135049 |
| MSB:Mamm:323732 | <i>Dipodomys merriami</i>      | Luna Co. NM   | OK135110 |
| MSB:Mamm:323735 | <i>Chaetodipus intermedius</i> | Luna Co. NM   | OK135064 |
| MSB:Mamm:324781 | <i>Perognathus flavus</i>      | Catron Co. NM | OK135050 |
| MSB:Mamm:325306 | <i>Thomomys bottae</i>         | Catron Co. NM | -        |
| MSB:Mamm:325312 | <i>Peromyscus truei</i>        | Catron Co. NM | -        |
| MSB:Mamm:325314 | <i>Thomomys bottae</i>         | Catron Co. NM | -        |

**Supplementary Table 2. *Coccidioides* positive samples based on Illumina sequencing of the fungal ribosomal ITS2 region.**

| Host Voucher        | Host ID                           | County   | State | OTU<br>136 | OTU<br>899 | Total reads<br>(Rel. abundance) |
|---------------------|-----------------------------------|----------|-------|------------|------------|---------------------------------|
| 78118 (no voucher)  | <i>Ammospermophilus harrisii</i>  | Cochise  | AZ    | 49         | 4          | 53 (<1%)                        |
| MSB:Mamm:78106      | <i>Chaetodipus penicillatus</i>   | Cochise  | AZ    | 36         | 0          | 36 (<1%)                        |
| MSB:Mamm:78110      | <i>Dipodomys merriami</i>         | Cochise  | AZ    | 1692       | 182        | 1874 (<1%)                      |
| MSB:Mamm:78077      | <i>Sylvilagus audubonii</i>       | Cochise  | AZ    | 855        | 128        | 983 (1.6%)                      |
| MSB:Mamm:77713      | <i>Chaetodipus penicillatus</i>   | Maricopa | AZ    | 186        | 15         | 102 (<1%)                       |
| MSB:Mamm:77719      | <i>Chaetodipus penicillatus</i>   | Maricopa | AZ    | 1974       | 2154       | 4128 (6.3%)                     |
| 77240 (no voucher)  | <i>Dipodomys merriami</i>         | Maricopa | AZ    | 2137       | 0          | 2137 (2.8%)                     |
| 77253 (no voucher)  | <i>Dipodomys heermanni</i>        | Maricopa | AZ    | 1          | 0          | 1 (<1%)                         |
| MSB:Mamm:77316      | <i>Perognathus amplus</i>         | Maricopa | AZ    | 0          | 1          | 1 (<1%)                         |
| MVZ:Mamm:239395     | <i>Dipodomys heermanni</i>        | Kern     | CA    | 0          | 1          | 1 (<1%)                         |
| MVZ:Mamm:239414     | <i>Dipodomys nitratoideus</i>     | Kern     | CA    | 6          | 0          | 6 (<1%)                         |
| MVZ:Mamm:239597     | <i>Onychomys torridus</i>         | Kern     | CA    | 19         | 8          | 27 (<1%)                        |
| MVZ:Mamm:239619     | <i>Peromyscus maniculatus</i>     | Kern     | CA    | 2          | 0          | 2 (<1%)                         |
| MSB:Mamm:284485     | <i>Thomomys bottae</i>            | Catron   | NM    | 1          | 1          | 2 (<1%)                         |
| MSB:Mamm:304176     | <i>Chaetodipus intermedius</i>    | Sierra   | NM    | 1          | 0          | 1 (<1%)                         |
| MSB:Mamm:305240     | <i>Chaetodipus intermedius</i>    | Sierra   | NM    | 4410       | 21         | 4431 (1.4%)                     |
| MSB:Mamm:305241     | <i>Dipodomys merriami</i>         | Sierra   | NM    | 2972       | 2          | 2974 (<1%)                      |
| MSB:Mamm:305238     | <i>Neotoma albigula</i>           | Sierra   | NM    | 129        | 0          | 129 (10.6%)                     |
| MSB:Mamm:305243     | <i>Neotoma albigula</i>           | Sierra   | NM    | 765        | 239        | 1004 (1%)                       |
| MSB:Mamm:303043     | <i>Neotoma stephensi</i>          | Sierra   | NM    | 130        | 0          | 130 (<1%)                       |
| 305246 (no voucher) | <i>Otospermophilus variegatus</i> | Sierra   | NM    | 3          | 0          | 3 (<1%)                         |
| MSB:Mamm:270443     | <i>Peromyscus boylii</i>          | Sierra   | NM    | 123        | 74         | 197 (<1%)                       |
| MSB:Mamm:304190     | <i>Peromyscus boylii</i>          | Sierra   | NM    | 1          | 0          | 1 (<1%)                         |
| MSB:Mamm:89752      | <i>Neotoma albigula</i>           | Socorro  | NM    | 25         | 36         | 61 (<1%)                        |

**Supplementary Table 3. Spearman correlations at different rarefaction depths of Illumina ITS2 sequences demonstrate no significant correlation between *Blastomyces parvus* OTUs and *Coccidioides* OTUs.**

| Rarefied Depth | Samples | Rarefied OTUs | Spearman correlation | p-value |
|----------------|---------|---------------|----------------------|---------|
| 1000           | 199     | 642           | 0.01773099           | 0.387   |
| 5000           | 189     | 577           | -0.008329599         | 0.5438  |
| 10000          | 182     | 531           | -0.0257075           | 0.6351  |

**Supplementary Table 4. Fungi isolated from small rodent lungs in Kern County California.**

| <b>Organism</b>                 | <b>GenBank</b> | <b>Host ID</b>                | <b>Voucher</b>  |
|---------------------------------|----------------|-------------------------------|-----------------|
| <i>Blastomyces parvus</i>       | MW652389       | <i>Dipodomys heermanni</i>    | MVZ:Mamm:239395 |
| <i>Blastomyces parvus</i>       | MW652390       | <i>Perognathus inornatus</i>  | MVZ:Mamm:239512 |
| <i>Aspergillus fumigatus</i>    | MW652391       | <i>Dipodomys heermanni</i>    | MVZ:Mamm:239386 |
| <i>Aspergillus</i> sp.          | MW652392       | <i>Perognathus inornatus</i>  | MVZ:Mamm:239508 |
| <i>Circinella</i> sp.           | MW652393       | <i>Dipodomys nitratooides</i> | MVZ:Mamm:239418 |
| <i>Circinella</i> sp.           | MW652394       | <i>Dipodomys nitratooides</i> | MVZ:Mamm:239418 |
| <i>Circinella</i> sp.           | MW652395       | <i>Onychomys torridus</i>     | MVZ:Mamm:239598 |
| <i>Circinella</i> sp.           | MW652396       | <i>Perognathus inornatus</i>  | MVZ:Mamm:239505 |
| <i>Circinella</i> sp.           | MW652397       | <i>Perognathus inornatus</i>  | MVZ:Mamm:239506 |
| <i>Subramaniula cuniculorum</i> | MW652398       | <i>Peromyscus maniculatus</i> | MVZ:Mamm:239618 |
| <i>Chaetomium</i> sp.           | MW652399       | <i>Peromyscus maniculatus</i> | MVZ:Mamm:239622 |
| <i>Blastomyces parvus</i>       | MW652400       | <i>Dipodomys nitratooides</i> | MVZ:Mamm:239411 |
| <i>Blastomyces parvus</i>       | MW652401       | <i>Dipodomys nitratooides</i> | MVZ:Mamm:239416 |
| <i>Blastomyces parvus</i>       | MW652402       | <i>Dipodomys heermanni</i>    | MVZ:Mamm:239414 |
| <i>Blastomyces parvus</i>       | MW652403       | <i>Dipodomys nitratooides</i> | MVZ:Mamm:239413 |
| <i>Blastomyces parvus</i>       | MW652404       | <i>Dipodomys heermanni</i>    | MVZ:Mamm:239396 |
| <i>Blastomyces parvus</i>       | MW652405       | <i>Dipodomys heermanni</i>    | MVZ:Mamm:239394 |
| <i>Blastomyces parvus</i>       | MW652406       | <i>Dipodomys nitratooides</i> | MVZ:Mamm:239414 |
| <i>Lichtheimia ramosa</i>       | MW652407       | <i>Dipodomys nitratooides</i> | MVZ:Mamm:239412 |
| <i>Penicillium</i> sp.          | MW652408       | <i>Peromyscus maniculatus</i> | MVZ:Mamm:239620 |
| <i>Penicillium</i> sp.          | MW652409       | <i>Onychomys torridus</i>     | MVZ:Mamm:239599 |
| <i>Penicillium</i> sp.          | MW652410       | <i>Dipodomys nitratooides</i> | MVZ:Mamm:239419 |
| <i>Penicillium</i> sp.          | MW652411       | <i>Dipodomys nitratooides</i> | MVZ:Mamm:239419 |
| <i>Penicillium</i> sp.          | MW652412       | <i>Dipodomys heermanni</i>    | MVZ:Mamm:239388 |
| <i>Penicillium</i> sp.          | MW652413       | <i>Perognathus inornatus</i>  | MVZ:Mamm:239505 |
| <i>Penicillium</i> sp.          | MW652414       | <i>Perognathus inornatus</i>  | MVZ:Mamm:239512 |
| <i>Penicillium</i> sp.          | MW652415       | <i>Dipodomys heermanni</i>    | MVZ:Mamm:239387 |
| <i>Blastomyces parvus</i>       | MW652416       | <i>Dipodomys heermanni</i>    | MVZ:Mamm:239391 |
| <i>Emmonsiiellopsis</i> sp.     | MW652417       | <i>Dipodomys heermanni</i>    | MVZ:Mamm:239397 |

**Supplementary Table 5. BLAST searches of Eurotiomycetes OTUs demonstrate the lung environment is enriched for Onygenales over outdoor environments.** Unlike OTUs from other Eurotiomycetes, OTUs from the Onygenales typically do not have close relatives among sequences from environmental samples in GenBank. Results are shown for the eight most frequent OTUs from the Onygenales and Eurotiales and their hits against the full nucleotide collection (nr/nt database) versus sequences limited to environmental surveys (uncultured fungi).

| Order      | OTU     | Top nr/nt hit<br>(E value, % identity, organism) | Top hit limited to uncultured fungi<br>(E value, % identity) |
|------------|---------|--------------------------------------------------|--------------------------------------------------------------|
| Onygenales | OTU20   | 0.0, 97.28,<br><i>Blastomyces parvus</i>         | 2e-121, 94.43                                                |
|            | OTU106  | 0.0, 99.00,<br><i>Blastomyces parvus</i>         | 2e-131, 90.91                                                |
|            | OTU58   | 0.0, 96.29,<br><i>Blastomyces parvus</i>         | 1e-123, 89.59                                                |
|            | OTU1155 | 0.0, 96.80,<br><i>Blastomyces parvus</i>         | 1e-122, 89.37                                                |
|            | OTU15   | 0.0, 98.98<br><i>Emmonsia crescens</i>           | 4e-128, 90.65                                                |
|            | OTU59   | 0.0, 99.17,<br><i>Auxarthron umbrinum</i>        | 1e-157, 97.83                                                |
|            | OTU85   | 0.0, 97.87,<br><i>Emmonsiiellopsis</i> sp.       | 2e-151, 94.78                                                |
|            | OTU136  | 0.0, 99.21,<br><i>Coccidioides posadasii</i>     | 2e-131, 91.45                                                |
| Eurotiales | OTU7    | 0.0, 99.21,<br><i>Penicillium mononematosum</i>  | 0.0, 98.68                                                   |
|            | OTU3    | 0.0, 99.48,<br><i>Aspergillus</i> sp.            | 0.0, 99.48                                                   |
|            | OTU11   | 0.0, 98.94,<br><i>Penicillium</i> sp.            | 0.0, 98.15                                                   |
|            | OTU1118 | 0.0, 97.38,<br><i>Penicillium</i> sp.            | 0.0, 97.11                                                   |
|            | OTU44   | 0.0, 99.22,<br><i>Thermomyces lanuginosus</i>    | 0.0, 99.22                                                   |
|            | OTU75   | 0.0, 98.95,<br><i>Penicillium</i> sp.            | 0.0, 98.95                                                   |
|            | OTU36   | 0.0, 99.48,<br><i>Aspergillus tubingensis</i>    | 0.0, 99.48                                                   |
|            | OTU411  | 0.0, 99.47,<br><i>Penicillium</i> sp.            | 0.0, 98.94                                                   |