**Additional File 7 Genomes investigated for presence of laforin.**

## I. Eukaryotes

### A. Amoebozoa

1. **Tubulinea**
2. **Flabellinea**
3. **Stereomyxida**
4. **Acanthamoebidae**
5. **Entamoebida**

| | |
|---|---|
| *Entamoeba dispar* | lacks mitochondrion, non-red algal descent |
| *Entamoeba histolytica* | lacks mitochondrion, non-red algal descent |
| *Entamoeba invadens* | lacks mitochondrion, non-red algal descent |
| *Entamoeba moshkovskii* | lacks mitochondrion, non-red algal descent |
| *Entamoeba terrapinae* | lacks mitochondrion, non-red algal descent |

6. **Mastigamoebidae**
7. ***Pelomyxa***
8. **Eumycetozoa**

| | |
|---|---|
| *Dictyostelium discoideum* | non-red algal descent, fast evolving genome |

### B. Opisthokonta

1. **Fungi**

| | |
|---|---|
| *Ajellomyces capsulatus* | non-red algal descent, fast evolving genome |
| *Ascosphaera apis* | non-red algal descent, fast evolving genome |
| *Ashbya gossypii* | non-red algal descent, fast evolving genome |
| *Aspergillus clavatus* | non-red algal descent, fast evolving genome |
| *Aspergillus flavus* | non-red algal descent, fast evolving genome |
| *Aspergillus fumigatus* | non-red algal descent, fast evolving genome |
| *Aspergillus nidulans* | non-red algal descent, fast evolving genome |
| *Aspergillus terreus* | non-red algal descent, fast evolving genome |
| *Batrachochytrium dendrobatidis* | non-red algal descent, fast evolving genome |
| *Botryotinia fuckelinana* | non-red algal descent, fast evolving genome |
| *Candida albicans* | non-red algal descent, fast evolving genome |
| *Candida glbrata* | non-red algal descent, fast evolving genome |
| *Candida tropicalis* | non-red algal descent, fast evolving genome |
| *Chaetomium globosum* | non-red algal descent, fast evolving genome |
| *Clavispora lusitaniae* | non-red algal descent, fast evolving genome |
| *Coccidioides immitis* | non-red algal descent, fast evolving genome |
| *Coccidioides posadasii* | non-red algal descent, fast evolving genome |
| *Coprinopsis cinerea okayama* | non-red algal descent, fast evolving genome |
| *Cryptococcus neoformans* sp. | non-red algal descent, fast evolving genome |
| *Debaryomyces hansenii* | non-red algal descent, fast evolving genome |
| *Encephalitozoon cuniculi* | non-red algal descent, fast evolving genome |

| | |
|---|---|
| *Eremothecium gossypii* | non-red algal descent, fast evolving genome |
| *Fusarium oxysporum* | non-red algal descent, fast evolving genome |
| *Gibberella monoiliformis* | non-red algal descent, fast evolving genome |
| *Gibberella zeae* | non-red algal descent, fast evolving genome |
| *Kluyveromyces lactis* | non-red algal descent, fast evolving genome |
| *Kluyveromyces waltii* | non-red algal descent, fast evolving genome |
| *Laccaria bicolor* | non-red algal descent, fast evolving genome |
| *Lodderomyces elongisporus* | non-red algal descent, fast evolving genome |
| *Magnaporthe grisea* | non-red algal descent, fast evolving genome |
| *Malassezia furfur* | non-red algal descent, fast evolving genome |
| *Mycosphaerella graminocola* | non-red algal descent, fast evolving genome |
| *Neosartorya fischeri* | non-red algal descent, fast evolving genome |
| *Nectria haematococca* | non-red algal descent, fast evolving genome |
| *Neurospora crassa* | non-red algal descent, fast evolving genome |
| *Phaeosphaeria nodorum* | non-red algal descent, fast evolving genome |
| *Phanerochaete chrysosporium* | non-red algal descent, fast evolving genome |
| *Pichia guilliermondii* | non-red algal descent, fast evolving genome |
| *Pichia stipitis* | non-red algal descent, fast evolving genome |
| *Penicillium marneffei* | non-red algal descent, fast evolving genome |
| *Pneumocystis carnii* | non-red algal descent, fast evolving genome |
| *Podospora anserina* | non-red algal descent, fast evolving genome |
| *Puccinia graminis* | non-red algal descent, fast evolving genome |
| *Pyrenophora tritici-repentis* | non-red algal descent, fast evolving genome |
| *Rhizopus oryzae* | non-red algal descent, fast evolving genome |
| *Saccharomyces bayanus* | non-red algal descent, fast evolving genome |
| *Saccharomyces castellii* | non-red algal descent, fast evolving genome |
| *Saccharomyces cerevisiae* | non-red algal descent, fast evolving genome |
| *Saccharomyces kluyveri* | non-red algal descent, fast evolving genome |
| *Saccharomyces kudriavzevii* | non-red algal descent, fast evolving genome |
| *Saccharomyces mikatae* | non-red algal descent, fast evolving genome |
| *Saccharomyces paradoxus* | non-red algal descent, fast evolving genome |
| *Schizosaccharomyces japonicus* | non-red algal descent, fast evolving genome |
| *Schizosaccharomyces pombe* | non-red algal descent, fast evolving genome |
| *Sclerotinia sclerotiorum* | non-red algal descent, fast evolving genome |
| *Sporobolomyces roseus* | non-red algal descent, fast evolving genome |
| *Talaromyces stipitatus* | non-red algal descent, fast evolving genome |
| *Trichoderma atroviride* | non-red algal descent, fast evolving genome |
| *Trichoderma reesei* | non-red algal descent, fast evolving genome |
| *Trichoderma virens* | non-red algal descent, fast evolving genome |
| *Uncinocarpus reesii* | non-red algal descent, fast evolving genome |
| *Ustilago maydis* | non-red algal descent, fast evolving genome |
| *Vanderwaltozyma polyspora* | non-red algal descent, fast evolving genome |
| *Yarrowia lipolytica* | non-red algal descent, fast evolving genome |

**2. Mesomycetozoa**

**3. Choanomonada**

| | |
|---|---|
| *Monosiga brevicollis* | fast evolving genome |

**4. Metazoa**

| | |
|---|---|
| *Capitella sp.* | annelid, fast evolving genome |
| *Helobdella robusta* | annelid, fast evolving genome |
| | |
| *Aedes aegypti* | arthropod, fast evolving genome |
| *Anopheles gambiae* | arthropod, fast evolving genome |
| *Apis mellifera* | arthropod, fast evolving genome |
| *Bombyx mori* | arthropod, fast evolving genome |
| *Culex pipens* | arthropod, fast evolving genome |
| *Daphnia pulex* | arthropod, fast evolving genome |
| *Drosophila ananassae* | arthropod, fast evolving genome |
| *Drosophila erecta* | arthropod, fast evolving genome |
| *Drosophila grimshawi* | arthropod, fast evolving genome |
| *Drosophila mojavensis* | arthropod, fast evolving genome |
| *Drosophila persimilis* | arthropod, fast evolving genome |
| *Drosophila pseudoobscura* | arthropod, fast evolving genome |
| *Drosophila sechellia* | arthropod, fast evolving genome |
| *Drosophila simulans* | arthropod, fast evolving genome |
| *Drosophila virilis* | arthropod, fast evolving genome |
| *Drosophila willistoni* | arthropod, fast evolving genome |
| *Drosophila yakuba* | arthropod, fast evolving genome |
| *Glossina morsitans* | arthropod, fast evolving genome |
| *Nasonia vitripennis* | arthropod, fast evolving genome |
| *Pediculus humanus corporis* | arthropod, fast evolving genome |
| *Tribolium castaneum* | arthropod, fast evolving genome |
| | |
| ***Branchiostoma floridea*** | **cephlachordate, has laforin** |
| | |
| *Hydra sp.* | cnidarian, fast evolving genome |
| ***Nematostella vectensis*** | **cnidarian, has laforin** |
| | |
| *Lottia gigantea* | mollusk, fast evolving genome |
| | |
| *Ascaris lumbicoides* | nematode, fast evolving genome |
| *Brugia malayi* | nematode, fast evolving genome |
| *Caenorhabditis briggsae* | nematode, fast evolving genome |
| *Caenorhabditis brenneri* | nematode, fast evolving genome |
| *Caenorhabditis elegans* | nematode, fast evolving genome |
| *Caenorhabditis remanei* | nematode, fast evolving genome |
| *Haemonchus contortus* | nematode, fast evolving genome |
| | |
| *Trichoplax sp.* | placozoa, fast evolving genome |

| | |
|---|---|
| *Fasciola hepatica* | platyhelminthes, fast evolving genome |
| *Schistosoma mansoni* | platyhelminthes, fast evolving genome |
| | |
| *Aplysia californica* | urochordate, fast evolving genome |
| *Ciona intestinalis* | urochordate, fast evolving genome |
| *Ciona savignyi* | urochordate, fast evolving genome |
| *Strongylocentrotus purpuratus* | urochordate, fast evolving genome |

**vertebrates**

| | |
|---|---|
| ***Anolis carolinensis*** | **reptile, incomplete genome, has laforin** |
| ***Bos taurus*** | **mammal, has laforin** |
| ***Canis familiaris*** | **mammal, has laforin** |
| ***Cavia porcellus*** | **mammal, incomplete genome, has laforin** |
| ***Danio rerio*** | **osteichthyes, has laforin** |
| ***Dasypus novemcinctus*** | **mammal, incomplete genome, has laforin** |
| ***Echinops telfairi*** | **mammal, incomplete genome, has laforin** |
| ***Equus caballus*** | **mammal, incomplete genome, has laforin** |
| ***Erinaceus eruopaeus*** | **mammal, incomplete genome, has laforin** |
| ***Felis catus*** | **mammal, has laforin** |
| ***Gallus gallus*** | **aves, has laforin** |
| ***Gasterosteus aculeatus*** | **osteichthyes, has laforin** |
| ***Gorilla gorilla*** | **mammal, incomplete genome, has laforin** |
| ***Homo sapiens*** | **mammal, has laforin** |
| ***Loxodonta africana*** | **mammal, has laforin** |
| ***Macaca mulatta*** | **mammal, has laforin** |
| ***Microcebus murinus*** | **mammal, incomplete genome, has laforin** |
| ***Monodelphis domestica*** | **mammal, has laforin** |
| ***Mus musculus*** | **mammal, has laforin** |
| ***Myotis lucifugus*** | **mammal, incomplete genome, has laforin** |
| ***Ornithorhynchus anatinus*** | **mammal, has laforin** |
| ***Oryctolagus cuniculus*** | **mammal, incomplete genome, has laforin** |
| ***Oryzias latipes*** | **osteichthyes, has laforin** |
| ***Otolemur garnettii*** | **mammal, incomplete genome, has laforin** |
| ***Pan troglodytes*** | **mammal, has laforin** |
| ***Pongo pygmaeus*** | **mammal, incomplete genome, has laforin** |
| ***Rattus norvegicus*** | **mammal, has laforin** |
| ***Sorex araneus*** | **mammal, incomplete genome, has laforin** |
| ***Sus scrofa*** | **mammal, has laforin** |
| ***Takifugu rubripes*** | **osteichthyes, has laforin** |
| ***Tetraodon nigroviridis*** | **osteichthyes, has laforin** |
| ***Xenopus laevis*** | **amphibian, has laforin** |

**C. Rhizaria**

**1. Cercozoa**

| | |
|---|---|
| *Bigelowiella natans* | plant pathogen, lacks floridean starch |
| *Phytophthora infestans* | plant pathogen, fast evolving genome |
| *Phytophthora ramorum* | plant pathogen, fast evolving genome |
| *Phytophthora sojae* | plant pathogen, fast evolving genome |

**2. Haplosporidia**

**3. Foraminifera**

**4. *Gromia***

**5. Radiolaria**

**D. Archaeplastida**

**1. Glaucophyta**

| | |
|---|---|
| *Cyanophora paradoxa* | algae, not of red algal descent |

**2. Rhodophyceae**

| | |
|---|---|
| ***Cyanidioschyzon merolae*** | **has laforin** |
| ***Galdieria sulphuraria*** | **incomplete genome, likely has laforin** |

**3. Chloroplastida**

| | |
|---|---|
| *Arabidopsis thaliana* | land plant, has SEX4 |
| *Aquilegia sp.* | land plant, has SEX4 |
| *Chlamydomonas reinhardtii* | green alga, has SEX4 |
| *Citrus sinensis* | land plant, has SEX4 |
| *Medicago truncatula* | land plant, has SEX4 |
| *Micromonas sp.* | phytoplankton, has SEX4 |
| *Oryza sativa* | land plant, has SEX4 |
| *Osterococcus lucimarinus* | green alga, has SEX4 |
| *Ostreococcus tauri* | green alga, has SEX4 |
| *Phaseolus vulgaris* | land plant, has SEX4 |
| *Physcomitrella patens* | moss, has SEX4 |
| *Selaginella moellendorffii* | land plant, has SEX4 |
| *Solanum lycopersicum* | land plant, has SEX4 |
| *Solanum tuberosum* | land plant, has SEX4 |
| *Sorghum bicolor* | land plant, has SEX4 |
| *Triticum aestivum* | land plant, has SEX4 |
| *Vitis vinifera* | land plant, incomplete genome, has SEX4 |
| *Volvox carteri* | green alga, has SEX4 |
| *Zea mays* | land plant, has SEX4 |

**E. Chromalveolata**

**1.Cryptophyceae**

| | |
|---|---|
| ***Guillardia theta*** | **nucleomorph sequenced, nuclear genome not sequenced, likely has laforin** |
| ***Hemiselmis andersenii*** | **nucleomorph sequenced, nuclear genome not sequenced, likely has laforin** |

**2. Haptophyta**

| | |
|---|---|
| *Emiliania huxleyi* | phytoplankton, fast evolving genome |

**3. Stramenopiles**

| | |
|---|---|
| *Hyaloperonospora parasitica* | water mold, lacks floridean starch |
| *Thalassiosira pseudonana* | diatom, fast evolving genome |
| *Phaeodactylum tricornutum* | diatom, fast evolving genome |

**4. Alveolata**

| | |
|---|---|
| *Babesia bovis* | lacks floridean starch |
| *Babesia bigemina* | lacks floridean starch |
| *Babesia malayi* | lacks floridean starch |
| *Cryptosporidium parvum* | lacks mitochondrion |
| *Cryptosporidium hominis* | lacks mitochondrion |
| ***Eimeria tenella*** | **has laforin** |
| ***Neospora caninum*** | **has laforin** |
| ***Paramecium tetraurelia*** | **has laforin** |
| *Perkinsus marinus* | lacks floridean starch |
| *Plasmodium berghei* | lacks floridean starch |
| *Plasmodium chabaudi* | lacks floridean starch |
| *Plasmodium falciparum* | lacks floridean starch |
| *Plasmodium gallinaceum* | lacks floridean starch |
| *Plasmodium knowlesi* | lacks floridean starch |
| *Plasmodium reichenowi* | lacks floridean starch |
| *Plasmodium vivax* | lacks floridean starch |
| *Plasmodium yhoelii yoelii* | lacks floridean starch |
| ***Sarcocystis neurona*** | **incomplete genome, likely has laforin** |
| *Theileria annulata* | lacks floridean starch |
| *Theileria parva* | lacks floridean starch |
| ***Tetrahymena thermophila*** | **has laforin** |
| ***Toxoplasma gondii*** | **has laforin** |

**F. Excavata**

**1. Fornicata**

| | |
|---|---|
| *Giardia lamblia* | lacks mitochondrion, non-red algal descent |

**2. *Malawimonas***

**3. Parabasalia**

| | |
|---|---|
| *Trichomonas vaginalis* | lacks mitochondrion, non-red algal descent |

**4. Preaxostyla**

**5. Jakobida**

**6. Heterolobosea**

| | |
|---|---|
| *Naegleria gruberi* | non-red algal descent |

**7. Euglenozoa**

| | |
|---|---|
| *Crithidia deanei* | non-red algal descent |

| | |
|---|---|
| *Leishmania braziliensis* | non-red algal descent |
| *Leishmania infantum* | non-red algal descent |
| *Leishmania major* | non-red algal descent |
| *Leptomonas seymouri* | non-red algal descent |
| *Trypanosoma brucei* | non-red algal descent |
| *Trypanosoma congolense* | non-red algal descent |
| *Trypanosoma cruzi* | non-red algal descent |
| *Trypanosoma gambiense* | non-red algal descent |

**II. Prokaryotes--Archaea and Eubacteria**

| | |
|---|---|
| All 940 microbial genomes in NCBI | lack mitochondrion, no floridean starch, non-red algal descent, and fast evolving genome |