Microbiome analysis and taxonomic identification of microorganisms using the chaperonin-60 universal target

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What is cpn60?

- An alternative taxonomic marker to 16S rRNA is the protein-encoding chaperonin-60 (cpn60) gene
- Cpnn60 is a protein that is required for the formation of tertiary structure of certain essential proteins
- Synonyms: hsp60, groEL
- A set of universal primers amplify cpn60 from all organisms in community
- Chaperonin database: [www.cpndb.ca](http://www.cpndb.ca)
- Amplicon sequencing and hybridization capture methods developed/applied

Why cpn60?

- cpn60 UT sequences meet the criteria for a molecular barcode for bacteria, and show greater sequence diversity and higher resolution vs. 16S

Links MG et al. PLOS One, 7(11), e49755, 2012.

- cpn60 amplicon sequences can identify organisms from multiple Domains simultaneously

![Diagram showing the classification and distribution of cpn60 sequences across different kingdoms](image)


![Pairwise cpn60 UT sequence identities predict pairwise whole-genome sequence identities](image)

![Figure 1: cpn60 UT sequences identity](image)

![Figure 2: Intra- (dark gray) vs. inter- (light gray) species distances in plant pathogenic Xanthomonas spp.](image)

Tian Q et al. PLOS One, 11(11), e0165995, 2016.

Why cpn60?

- Pairwise cpn60 UT sequence identities predict pairwise whole-genome sequence identities.

![Pairwise cpn60 UT sequence identities predict pairwise whole-genome sequence identities](image)

Further information

A copy of this poster, as well as a list of literature related to cpn60, is available here:

Tian Q et al. PLOS One, 11(11), e0165995, 2016.

Cpn60 resources

- Chaperonin database: [www.cpndb.ca](http://www.cpndb.ca)

Cpn60 applications

- Hybridization sequence capture for microbiome profiling

Pan-Domain profiling of microbial communities. Samples from soil, stored pig manure, and a dugout pond were profiled using CaptureSeq.

![CaptureSeq detection of Bacteria, Archaea, and Eukarya within soil, manure, and a freshwater pond.](image)

- Molecular diagnostics with species/sub-species resolution:

![Molecular diagnostics with species/sub-species resolution](image)

Strawberry Green Petal Disease: LAMP


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- High throughput amplicon profiling
- ASV processing using DADA2/Deblur maximizes the phylogenetic resolution of cpn60.
- Crop seed epiphytic microbial communities (canola, wheat)
- Discerning closely related microbial strains:

Intra- (dark gray) vs. inter- (light gray) species distances in plant pathogenic Xanthomonas spp.

- Pairwise cpn60 UT sequence identities predict pairwise whole-genome sequence identities.