

Supplementary

# Molecular Characterization of Dengue Type 2 Outbreak in Pacific Islands Countries and Territories, 2017–2020

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**Abstract:** Dengue virus (DENV) serotype-2 was detected in the South Pacific region in 2014 for the first time in 15 years. In 2016–2020, DENV-2 re-emerged in French Polynesia, Vanuatu, Wallis and Futuna, and New Caledonia, co-circulating with and later replacing DENV-1. In this context, epidemiological and molecular evolution data are paramount to decipher the diffusion route of this DENV-2 in the South Pacific region. In the current work, the E gene from 23 DENV-2 serum samples collected in Vanuatu, Fiji, Wallis and Futuna, and New Caledonia was sequenced. Both maximum likelihood and Bayesian phylogenetic analyses were performed. While all DENV-2 strains sequenced belong to the Cosmopolitan genotype, phylogenetic analysis suggests at least three different DENV-2 introductions in the South Pacific between 2017 and 2020. Strains retrieved in these Pacific Islands Countries and Territories (PICTs) in 2017–2020 are phylogenetically related, with strong phylogenetic links between strains retrieved from French PICTs. These phylogenetic data substantiate epidemiological data of the DENV-2 diffusion pattern between these countries.

**Keywords:** dengue; phylogeny; molecular evolution; Pacific

**Table S1.** Path Sampling and Stepping Stone Sampling Marginal Likelihood Estimates of tested Bayesian models.

| Population Size | Strict clock             | Relaxed clock - lognormal relaxed distribution | Relaxed clock - exponential relaxed distribution |
|-----------------|--------------------------|------------------------------------------------|--------------------------------------------------|
| Constant        | PS <sup>1</sup> -2869.47 | PS -2879.79                                    | PS -2869.06                                      |
|                 | SS <sup>2</sup> -2869.47 | SS -2880.47                                    | SS -2869.32                                      |
| Bayesian        | PS -2865.73              | PS -2871.37                                    | PS -2864.95                                      |
| Skygrid         | SS -2865.90              | SS -2871.65                                    | SS -2865.18                                      |

<sup>1</sup> PS = Path Sampling, <sup>2</sup> SS = Stepping Stone Sampling

&gt;Ancestral state DENV-2 Pacific

ATGCGTTGTATAGGAATATCAAATAGAGACTTTGTGGAAGGGGTTTCAGGAGGAAGCTGG  
 GTTGACATAGTCTTAGAACATGGAAGCTGTGTGACGACGATGGCGAAAAATAAACCAACA  
 TTGGACTTTGAACTGATAAAAACGGAAGCCAAACATCCCGCCACTTTAAGGAAGTATTGT  
 ATAGAGGCAAAGCTGACCAACACAACACTACAGCATCTCGTTGCCCAACACAAGGAGAACCC  
 AGCCTAAATGAAGAACAGGACAAAAGGTTTGTCTGCAAACACTCCATGGTAGACAGAGGA  
 TGGGGAAATGGATGCGGATTGTTTGGAAAGGGAGGCATCGTGACCTGTGCAATGTTTACA  
 TGCAAAAAGAACATGGAAGGAAAAGTCGTGCAACCAGAAAACCTTGGAGTATACCATTGTG  
 ATAACACCTCACTCAGGGGAAGAGAATGCAGTCGGAAATGACACAGGAAAACACGGCACG  
 GAAATTAAAGTAACGCCACAGAGTCCATCACAGAAGCGGAACTGACAGGCTATGGCACT  
 GTCACGATGGAATGCTCTCCGAGAACGGGCCTCGACTTTAATGAGATGGTGTGCTGCAA  
 ATGGAAGACAAGGCTTGGCTGGTGCACAGGCAATGGTTCTTAGACCTGCCGTTACCATGG  
 CTGCCCCGAGCAGACAAACAAGGATCAAATTGGATACAGAAGGAGACATTGGTCACTTTC  
 AAAAATCCCCATGCGAAGAAACAGGATGTTGTTGTTTATAGGATCCCAAGAAGGGGCCATG  
 CATAAGCACTCACAGGGGCCACGGAAATCCAGATGTCATCAGGAACTTACTGTTTACA  
 GGACATCTCAAGTGCAGGCTGAGAATGGACAAACTACAGCTCAAAGGAATGTCATATTCT  
 ATGTGTACAGGAAAGTTTAAAGTTGTGAAGGAAATAGCAGAAACACAACATGGAACAATA  
 GTTATCAGAGTACAATATGAAGGGGACGGTTCTCCGTGCAAGATCCCTTTTGAAATAATG  
 GATTTGGAAAAAAGACATGTCTTAGGCCGCTTGATCACAGTCAACCCAATTGTTACAGAA  
 AAAGACAGCCCAGTCAACATAGAAGCAGAACCTCCATTTGGAGACAGTTACATCGTTATA

GGAGTAGAACCGGGACAACCTGAAGCTCAGCTGGTTCAAGAAAGGGAGTTCTATTGGCCAA  
ATGTTTGAGACAACAATGAGAGGAGCGAAGAGAATGGCCATTTTAGGTGACACAGCTTGG  
GATTTTGGATCCCTGGGAGGAGTGTTACATCTATAGGAAAGGCCCTCCACCAAGTTTTT  
GGAGCAATCTATGGGGCTGCCTTTAGCGGGGTTTCATGGACTATGAAAATCCTTATAGGA  
GTCGTCATCACATGGATAGGAATGAATTCACGCAGCACCTCACTGTCTGTGTCACTAGTA  
TTAGTGGG

**Figure S1.** Ancestral state reconstruction of the sequence of The Most Recent Common Ancestor to all strains retrieved in the South Pacific between 2014 and 2020.