

Supplementary Table 1. List of sample size per location and their source.

| | Jinam et al. (2012) | Purnomo et al. (2021) | Pedro et al. (2020) | Tabbada et al. (2010) | Soares et al. (2011) | Delfin et al. (2013) | Duggan and Stoneking (2013) | Ingman et al. (2000) | Ingman and Gyllensten (2003) | Pierson et al. (2006) | Duggan et al. (2014) | Hartmann et al. (2008) | Macaulay et al. (2005) | Lippold et al. (2014) | Reiff et al. (2011) | Corser et al. (2012) | Behar et al. (2012) | Family Tree DNA | Benton et al. (2012) | Knapp et al. (2012) | Razafindrazaka et al. (2010) | Brucato et al. (2019) | Novel samples | Total number of samples | | |
|-----------------------------------|---------------------|-----------------------|---------------------|-----------------------|----------------------|----------------------|-----------------------------|----------------------|------------------------------|-----------------------|----------------------|------------------------|------------------------|-----------------------|---------------------|----------------------|---------------------|-----------------|----------------------|---------------------|------------------------------|-----------------------|---------------|-------------------------|------|-----|
| Malaysia | 1 | | | | | | | | | | | | | | | | | | | | | | 1 | 2 | | |
| Island Southeast Asia | | 16 | | 1 | 11 | 1 | | | | | | | | | | | | | | | | | | | 29 | |
| West New Guinea | | 4 | | | 1 | | | | | | | | | | | | | | | | | | | | 5 | |
| PNG: North Coast | | 2 | 1 | | 7 | | 1 | | 4 | | | | | | | | | | | | | | | 1 | 16 | |
| PNG: Central Lowlands | | | 5 | | | | | | | | | | | | | | | | | | | | | 74 | 79 | |
| PNG: Southeast Coast | | | 6 | | | | | | | 1 | | | | | | | | | | | | | | 2 | 9 | |
| Bismarck Archipelago: New Britain | | | 3 | | | | | | | | 38 | | | | | | | | | | | | | 1 | 42 | |
| Bismarck Archipelago: New Ireland | | | 2 | | 23 | | | | | | | | | | | | | | | | | | | 1 | 26 | |
| Manus | | | | | | | | | | | | | | | | | | | | | | | | 2 | 2 | |
| Bougainville | | | 5 | | | | | | | | | | 109 | 2 | 1 | 4 | | | | | | | | | | 121 |
| Solomon Islands | | | | | | | 524 | | 12 | | | | | | | | | | | | | | | 19 | 555 | |
| Guam | | | | | | | | | | | | | | | 2 | | | | | | | | | 3 | 5 | |
| Micronesia | | | | | | | | | | 3 | | | | | | 1 | | | | | | | | 24 | 28 | |
| Vanuatu | | | | | 11 | | | | | 1 | | | | | | | | | | | | | | 91 | 103 | |
| Fiji | | | | | | | | | | | 37 | | | | | | | | | | | | | 8 | 45 | |
| Futuna | | | | | | | | | | | 42 | | | | | | | | | | | | | | | 42 |
| Tuvalu | | | | | | | | | | | 43 | | | | | | | | | | | | | | | 43 |
| Samoa | | | | | | | | 1 | 2 | | 42 | | | | | | | | | | | | | | | 45 |
| Tonga | | | | | | | | | 1 | 1 | 45 | | | | | | | | | | | | | | | 47 |
| Niue | | | | | | | | | | | 21 | | | | | | | | | | | | | | | 21 |
| Cook Islands | | | | | | | | | 2 | | 61 | | | | | | | | | | | | | 7 | 70 | |
| Hawai'i | | | | | | | | | | | | | | | | | 2 | 1 | | | | | | | | 3 |
| Aotearoa: Maori | | | | | | | | | | | | | | | | | | | | 20 | 2 | | | | | 22 |
| Africa: Madagascar, Somalia | | | | | | | | | | | | | | | | | | | | | | 3 | 1 | | | 4 |
| | | | | | | | | | | | | | | | | | | | | | | | | 234 | 1364 | |

Supplementary Table 2. List of the 234 novel mitogenomes used in this paper, as well as sample size for each location. The colour code is the same used in Supplementary Table 3.

| Sample ID | GenBank accession number | Location | Total Sample Size | | | | |
|-------------|--------------------------|---------------------------|-------------------|----------------------|----|-------|---|
| BJ119 | PV740919 | Malaysia: Banjar | 1 | | | | |
| p8384 | PV741038 | PNG: North | 1 | | | | |
| p8234 | PV740992 | PNG: Lowlands | 11 | | | | |
| p8276 | PV741001 | | | | | | |
| p8285 | PV741004 | | | | | | |
| p8364 | PV741032 | | | | | | |
| p8385 | PV741039 | | | | | | |
| p8399 | PV741043 | | | | | | |
| p8408 | PV741045 | | | | | | |
| p8414 | PV741046 | | | | | | |
| p8416 | PV741047 | | | | | | |
| p8456 | PV741051 | | | | | | |
| p8471 | PV741055 | PNG: Lowlands, Central | 41 | | | | |
| p8203 | PV740987 | | | | | | |
| p8211 | PV740988 | | | | | | |
| p8212 | PV740989 | | | | | | |
| p8218 | PV740990 | | | | | | |
| p8228 | PV740991 | | | | | | |
| p8235 | PV740993 | | | | | | |
| p8242 | PV740994 | | | | | | |
| p8245 | PV740996 | | | | | | |
| p8266 | PV740998 | | | | | | |
| p8297 | PV741006 | PNG: Lowlands, East Sepik | 1 | | | | |
| p8302 | PV741009 | | | | | | |
| p8309 | PV741012 | | | | | | |
| p8311 | PV741013 | | | | | | |
| p8314 | PV741015 | | | | | | |
| p8315 | PV741016 | | | | | | |
| p8318 | PV741017 | | | | | | |
| p8322 | PV741019 | | | | | | |
| p8324 | PV741020 | | | | | | |
| p8325 | PV741021 | | | | | | |
| p8328 | PV741023 | PNG: Lowlands, Gulf | 9 | | | | |
| p8330 | PV741024 | | | | | | |
| p8331 | PV741025 | | | | | | |
| p8333 | PV741026 | | | | | | |
| p8334 | PV741027 | | | | | | |
| p8348 | PV741030 | | | | | | |
| p8354 | PV741031 | | | | | | |
| p8365 | PV741033 | | | | | | |
| p8376 | PV741034 | | | | | | |
| p8379 | PV741036 | | | | | | |
| p8383 | PV741037 | PNG: Lowlands, Madang | 6 | | | | |
| p8388 | PV741040 | | | | | | |
| p8406 | PV741044 | | | | | | |
| p8424 | PV741048 | | | | | | |
| p8438 | PV741049 | | | | | | |
| p8448 | PV741050 | | | | | | |
| p8462 | PV741052 | | | | | | |
| p8463 | PV741053 | | | | | | |
| p8464 | PV741054 | | | | | | |
| p8479 | PV741056 | | | | | | |
| p8578 | PV741061 | PNG: Lowlands, Morobe | 3 | | | | |
| p8012 | PV740985 | | | | | | |
| p8274 | PV741005 | | | | | | |
| p8292 | PV741000 | | | | | | |
| p8300 | PV741007 | | | | | | |
| p8303 | PV741010 | | | | | | |
| p8319 | PV741018 | | | | | | |
| p8327 | PV741022 | | | | | | |
| p8377 | PV741035 | | | | | | |
| p8390 | PV741041 | | | | | | |
| p8398 | PV741042 | | | | | | |
| p7941 | PV740984 | PNG: Lowlands, Mix | 1 | | | | |
| p8336 | PV741028 | | | | | | |
| p8498 | PV741057 | | | | | | |
| p8529 | PV741058 | | | | | | |
| p8577 | PV741060 | | | | | | |
| p8592 | PV741063 | | | | | | |
| p8537 | PV741059 | | | | | | |
| p7843 | PV740983 | | | PNG: Lowlands, North | 2 | | |
| p8308 | PV741011 | | | | | | |
| p8585 | PV741062 | | | | | | |
| p8284 | PV741003 | | | | | | |
| p8313 | PV741014 | | | | | | |
| p8252 | PV740997 | PNG: Milne Bay | 2 | | | | |
| p8277 | PV741002 | | | | | | |
| p8269 | PV740999 | | | | | | |
| p8067 | PV740986 | | | | | | |
| p8301 | PV741008 | | | | | Manus | 2 |
| p8337 | PV741029 | | | | | | |
| 6615 | PV740830 | | | Solomon Islands | 19 | | |
| 6616 | PV740831 | | | | | | |
| 6619 | PV740832 | | | | | | |
| 6621 | PV740833 | | | | | | |
| 6622 | PV740834 | | | | | | |
| 6623 | PV740835 | | | | | | |
| 6624 | PV740836 | | | | | | |
| 6626 | PV740837 | | | | | | |
| 6627 | PV740838 | | | | | | |
| 6629 | PV740839 | | | | | | |
| 6630 | PV740840 | Guam | 3 | | | | |
| 6631 | PV740841 | | | | | | |
| 6632 | PV740842 | | | | | | |
| 6634 | PV740843 | | | | | | |
| 6636 | PV740844 | | | | | | |
| 6637 | PV740845 | | | | | | |
| 6639 | PV740846 | | | | | | |
| 6641 | PV740847 | | | | | | |
| 6642 | PV740848 | | | | | | |
| GUA105 | PV740921 | | | Kiribati | 6 | | |
| GUA107 | PV740922 | | | | | | |
| Gua74_R1 | PV740923 | | | | | | |
| KB57 | PV740926 | | | | | | |
| KB80 | PV740927 | | | | | | |
| KB95 | PV740929 | | | | | | |
| KB117 | PV740924 | | | | | | |
| KB120 | PV740925 | | | | | | |
| KB86 | PV740928 | | | | | | |
| NAU37 | PV740953 | Micronesia: Nauru | 18 | | | | |
| NAU47 | PV740957 | | | | | | |
| NAU08 | PV740946 | | | | | | |
| NAU10 | PV740947 | | | | | | |
| NAU25 | PV740948 | | | | | | |
| NAU32 | PV740949 | | | | | | |
| NAU34 | PV740950 | | | | | | |
| NAU35 | PV740951 | | | | | | |
| NAU36 | PV740952 | | | | | | |
| NAU38 | PV740954 | | | | | | |
| NAU39 | PV740955 | Vanuatu: Banks and Torres | 1 | | | | |
| NAU42 | PV740956 | | | | | | |
| NAU48 | PV740958 | | | | | | |
| NAU49 | PV740959 | | | | | | |
| NAU51 | PV740960 | | | | | | |
| NAU52 | PV740961 | | | | | | |
| NAU56 | PV740962 | | | | | | |
| NAU62 | PV740963 | | | | | | |
| ATN23 | PV740854 | | | Vanuatu: Aoba | 5 | | |
| ATN26 | PV740855 | | | | | | |
| ATN29 | PV740856 | | | | | | |
| ATN4 | PV740858 | | | | | | |
| B136 | PV740905 | | | | | | |
| B154 | PV740911 | | | | | | |
| AN106 | PV740849 | | | | | | |
| AN155 | PV740850 | | | | | | |
| AN219 | PV740851 | | | | | | |
| AN250 | PV740852 | | | | | | |
| B130 | PV740903 | Vanuatu: Aneityum | 4 | | | | |
| B135 | PV740904 | | | | | | |
| B141 | PV740907 | | | | | | |
| B83 | PV740916 | | | | | | |
| B88 | PV740917 | | | | | | |
| BT1054 | PV740920 | | | | | | |
| B133 | PV740902 | | | | | | |
| B145 | PV740908 | | | | | | |
| B149 | PV740910 | | | | | | |
| B91 | PV740918 | | | | | | |
| LS140 | PV740930 | Vanuatu: Efate | 12 | | | | |
| LS141 | PV740931 | | | | | | |
| LS142 | PV740932 | | | | | | |
| LS145 | PV740933 | | | | | | |
| LS149 | PV740934 | | | | | | |
| LS151 | PV740935 | | | | | | |
| LS153 | PV740936 | | | | | | |
| LS155 | PV740937 | | | | | | |
| ATR115 | PV740860 | | | | | | |
| ATR69 | PV740886 | | | Vanuatu: Emae | 6 | | |
| ATR73 | PV740887 | | | | | | |
| ATR74 | PV740888 | | | | | | |
| ATR76 | PV740889 | | | | | | |
| ATR79 | PV740890 | | | | | | |
| B132 | PV740901 | | | | | | |
| B148 | PV740909 | | | | | | |
| MB50 | PV740938 | | | | | | |
| MB82 | PV740939 | | | | | | |
| MB88 | PV740940 | | | | | | |
| MB91 | PV740941 | Vanuatu: Erromango | 1 | | | | |
| ATR128 | PV740861 | | | | | | |
| ATR129 | PV740862 | | | | | | |
| ATR136 | PV740863 | | | | | | |
| ATR142 | PV740864 | | | | | | |
| ATR143 | PV740865 | | | | | | |
| ATN21 | PV740853 | | | | | | |
| B74Malekula | PV740913 | | | | | | |
| ATN31 | PV740857 | | | Vanuatu: Futuna | 1 | | |
| B104 | PV740898 | | | | | | |
| B122 | PV740899 | | | | | | |
| B138 | PV740906 | | | | | | |
| ATN6 | PV740859 | Vanuatu: Maewo | 4 | | | | |
| ATR231 | PV740875 | | | | | | |
| ATR240 | PV740876 | | | | | | |
| ATR242 | PV740877 | | | | | | |
| ATR252 | PV740878 | | | | | | |
| ATR256 | PV740879 | | | | | | |
| ATR259 | PV740880 | | | | | | |
| ATR263 | PV740881 | | | | | | |
| ATR270 | PV740882 | | | | | | |
| ATR271 | PV740883 | | | Vanuatu: Malekula | 2 | | |
| ATR296 | PV740884 | | | | | | |
| ATR343 | PV740885 | | | | | | |
| B158 | PV740912 | | | | | | |
| ATR158 | PV740866 | | | | | | |
| ATR161 | PV740867 | | | | | | |
| ATR169 | PV740868 | | | | | | |
| ATR186 | PV740869 | | | | | | |
| ATR187 | PV740870 | | | | | | |
| ATR188 | PV740871 | | | | | | |
| ATR200 | PV740872 | Vanuatu: Mota Rava | 1 | | | | |
| ATR201 | PV740873 | | | | | | |
| ATR203 | PV740874 | | | | | | |
| B74Santo | PV740914 | | | | | | |
| B8 | PV740915 | | | | | | |
| N163 | PV740942 | | | | | | |
| N173 | PV740943 | | | | | | |
| N176 | PV740944 | | | | | | |
| N200 | PV740945 | | | | | | |
| NR41 | PV740954 | | | | | | |
| OK11 | PV740965 | Vanuatu: Paama | 3 | | | | |
| OK38 | PV740966 | | | | | | |
| PO110 | PV740967 | | | | | | |
| PO60 | PV740968 | | | | | | |
| SR4 | PV740969 | | | | | | |
| T151 | PV740970 | | | | | | |
| T164 | PV740971 | | | | | | |
| T169 | PV740972 | | | | | | |
| T191 | PV740973 | | | | | | |
| T208 | PV740974 | | | | | | |
| B123 | PV740900 | Vanuatu: Pentecost | 13 | | | | |
| TAV12 | PV740975 | | | | | | |
| TAV13 | PV740976 | | | | | | |
| TAV16B | PV740977 | | | | | | |
| TAV17B | PV740978 | | | | | | |
| TAV24 | PV740979 | | | | | | |
| TAV26 | PV740980 | | | | | | |
| TAV28 | PV740981 | | | | | | |
| TAV30 | PV740982 | | | | | | |
| Ati10 | PV740891 | | | Vanuatu: Santo | 26 | | |
| Ati12 | PV740892 | | | | | | |
| Ati13 | PV740893 | | | | | | |
| Ati17 | PV740894 | | | | | | |
| Ati21 | PV740896 | | | | | | |
| Ati2 | PV740895 | | | | | | |
| Ati6 | PV740897 | | | | | | |
| Ati11 | PV740898 | | | | | | |
| Ati12 | PV740899 | | | | | | |
| Ati13 | PV740900 | | | | | | |
| Ati17 | PV740901 | Vanuatu: Tongariki | 1 | | | | |
| Ati21 | PV740902 | | | | | | |
| Ati2 | PV740903 | | | | | | |
| Ati6 | PV740904 | | | | | | |
| Ati11 | PV740905 | | | | | | |
| Ati12 | PV740906 | | | | | | |
| Ati13 | PV740907 | | | | | | |
| Ati17 | PV740908 | | | | | | |
| Ati21 | PV740909 | | | | | | |
| Ati2 | PV740910 | | | | | | |
| Ati6 | PV740911 | Fiji | 8 | | | | |
| Ati11 | PV740912 | | | | | | |
| Ati12 | PV740913 | | | | | | |
| Ati13 | PV740914 | | | | | | |
| Ati17 | PV740915 | | | | | | |
| Ati21 | PV740916 | | | | | | |
| Ati2 | PV740917 | | | | | | |
| Ati6 | PV740918 | | | | | | |
| Ati11 | PV740919 | | | | | | |
| Ati12 | PV740920 | | | | | | |
| Ati13 | PV740921 | Cook Islands | 7 | | | | |
| Ati17 | PV740922 | | | | | | |
| Ati21 | PV740923 | | | | | | |
| Ati2 | PV740924 | | | | | | |
| Ati6 | PV740925 | | | | | | |
| Ati11 | PV740926 | | | | | | |
| Ati12 | PV740927 | | | | | | |
| Ati13 | PV740928 | | | | | | |
| Ati17 | PV740929 | | | | | | |
| Ati21 | PV740930 | | | | | | |

Supplementary Table 4. Genetic estimates performed in this paper. PNG North Coast and New Ireland were the source regions for the founder analysis, so no founder ages are shown for these regions. We also provide an overall age estimate for the Polynesian motif (PM), based on all Near Oceania data excluding New Britain. Age estimates and founder ages (including confidence intervals) were rounded to the nearest 10 years for improved readability. Sites with fewer than 15 samples and ancient DNA were removed from the analyses.

| Islands | Nucleotide Diversity (π) | | | | | Rho (ρ) | | | | | Founder Analysis | | | | |
|---------------------------|--------------------------------|-----------------------------|----------------------|---------------------|----------------------|-------------------|--------------------|----------|------------------------|------------------------|-------------------|--------------------|-------------|------------------------|------------------------|
| | Number of Sequences | Number of Segregating Sites | Number of Haplotypes | Haplotype Diversity | Nucleotide Diversity | Diversity Measure | Standard Deviation | Age (BP) | Lower Bound (Years BP) | Upper Bound (Years BP) | Diversity Measure | Standard Deviation | Age (BP) | Lower Bound (Years BP) | Upper Bound (Years BP) |
| PM overall (Near Oceania) | 806 | 718 | 706 | 0.994 | 0.00033 | 2.482 | 0.456 | 6500 | 4130 | 8900 | - | - | - | - | - |
| ISEA | 29 | 52 | 26 | 0.990 | 0.00036 | 1.966 | 0.303 | 5120 | 3560 | 6710 | 1.655 | 0.276 | 4300 | 2880 | 5740 |
| PNG: North Coast | 29 | 45 | 29 | 1.000 | 0.00034 | 2.464 | 0.586 | 6450 | 3410 | 9550 | - | - | - | - | - |
| PNG: Central Lowlands | 57 | 70 | 45 | 0.985 | 0.00028 | 2.123 | 0.399 | 5540 | 3480 | 7630 | 1.368 | 0.186 | 3550 | 2600 | 4510 |
| PNG: Southeast Coast | 18 | 32 | 18 | 1.000 | 0.00034 | 2.389 | 0.674 | 6250 | 2760 | 9810 | 1.333 | 0.304 | 3460 | 1900 | 5030 |
| New Britain | 42 | 32 | 27 | 0.974 | 0.00023 | 1.643 | 0.507 | 4270 | 1670 | 6910 | 1.143 | 0.325 | 2960 | 1300 | 4630 |
| New Ireland | 26 | 54 | 25 | 0.997 | 0.00035 | 2.769 | 0.560 | 7270 | 4350 | 10250 | - | - | - | - | - |
| Bougainville | 121 | 92 | 73 | 0.983 | 0.0003 | 2.603 | 0.571 | 6830 | 3850 | 9850 | 1.851 | 0.327 | 4820 | 3130 | 6530 |
| Solomon Islands | 555 | 298 | 244 | 1 | 0.00026 | 2.268 | 0.443 | 5930 | 3630 | 8260 | 1.427 | 0.145 | 3700 | 2960 | 4450 |
| Micronesia | 28 | 35 | 24 | 0.989 | 0.00033 | 2.250 | 0.607 | 5880 | 2740 | 9080 | 1.500 | 0.449 | 3900 | 1600 | 6230 |
| Vanuatu | 103 | 99 | 73 | 0.988 | 0.00025 | 1.854 | 0.300 | 4830 | 3280 | 6390 | 1.330 | 0.187 | 3450 | 2490 | 4410 |
| Fiji | 45 | 44 | 31 | 0.974 | 0.00022 | 1.933 | 0.477 | 5040 | 2580 | 7540 | 1.000 | 0.192 | 2590 | 1610 | 3570 |
| Futuna | 42 | 41 | 18 | 0.919 | 0.00028 | 2.286 | 0.490 | 5980 | 3430 | 8560 | 1.262 | 0.322 | 3270 | 1630 | 4930 |
| Tuvalu | 43 | 37 | 26 | 0.958 | 0.00025 | 2.256 | 0.604 | 5900 | 2770 | 9080 | 0.953 | 0.227 | 2460 | 1310 | 3630 |
| Samoa | 45 | 68 | 38 | 0.987 | 0.00031 | 2.333 | 0.369 | 6100 | 4190 | 8040 | 1.111 | 0.175 | 2880 | 1980 | 3770 |
| Tonga | 47 | 73 | 43 | 0.995 | 0.00031 | 2.596 | 0.454 | 6800 | 4440 | 9210 | 0.979 | 0.166 | 2530 | 1680 | 3380 |
| Niue | 21 | 15 | 12 | 0.905 | 0.00019 | 1.524 | 0.551 | 3960 | 1140 | 6830 | 0.238 | 0.126 | 610 | 0 | 1250 |
| Cook Islands | 70 | 47 | 38 | 0.953 | 0.00031 | 1.214 | 0.303 | 3150 | 1600 | 4710 | 0.586 | 0.130 | 1510 | 850 | 2170 |
| New Zealand | 20 | 21 | 13 | 0.911 | 0.00026 | 2.650 | 0.743 | 6950 | 3090 | 10900 | 0.800 | 0.255 | 2070 | 770 | 3370 |
| Remote Oceania | 467 | 304 | 271 | 0.987 | 0.0003 | 2.055 | 0.322 | 5360 | 3700 | 7050 | 1.244 | 0.098 | 3220 | 2720 | 3730 |