

[Supplementary material]

**Mortuary practices of the first Polynesians: formative ethnogenesis in the Kingdom of Tonga**

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**Table S1. Radiocarbon determinations calibrated (95.4%) with Calib7.10 (Stuiver *et al.* 2018). Charcoal ages calculated with the SHCal13 curve (Hogg *et al.* 2013); marine shell ages calibrated with the Marine13 dataset with Delta R set at 11±83 years after Petchey and Clark (2011); human bone results calibrated with mixed Marine and SH Atmosphere curve with %Marine carbon set at 50% to account for a significant marine diet contribution.**

| Lab Number | Unit and depth           | Material and association                     | CRA     | $\Delta^{13}\text{C}$ | Calibrated (95%) |
|------------|--------------------------|--|---------|-----------------------|------------------|
| Wk-28234   | TP.1: 0.55–0.60m         | Carbonised coconut endocarp:<br>shell midden | 2473±31 | -21.3±0.2             | 2353–2701        |
| Wk-28235   | TP.1: 0.70–0.75m         | Carbonised coconut endocarp:<br>shell midden | 2510±30 | -21.3±0.2             | 2379–2715        |
| Wk-33572   | TP.2: Spit 4, 0.15–0.20m | Carbonised coconut endocarp:<br>shell midden | 2533±25 | -22.6±0.2             | 2437–2735        |

|          |                           |  |         |           |           |
|----------|---------------------------|--|---------|-----------|-----------|
| Wk-33573 | TP.2: Spit 11, 0.50–0.55m | Carbonised coconut endocarp:<br>shell midden | 2448±25 | -22.5±0.2 | 2347–2693 |
| Wk-33574 | TP.2: Spit 18, 0.85–0.90m | Carbonised coconut endocarp:<br>shell midden | 2504±25 | -23.0±0.2 | 2376–2710 |
| Wk-22876 | TP.1: 0.91m               | Charcoal from F6: structure                  | 2452±30 | -23.5±0.2 | 2347–2698 |
| Wk-23002 | TP.1: 0.80m               | Charcoal from F5: structure                  | 2562±30 | -25.0±0.2 | 2487–2745 |
| Wk-22999 | TP.1: 0.40m               | modified <i>Tridacna</i> sp.: grave<br>good  | 2767±37 | 2.2±0.2   | 2291–2718 |
| Wk-23000 | TP.1: 0.65m               | modified <i>Tridacna</i> sp.: grave<br>good  | 2726±30 | 2.8±0.2   | 2209–2695 |
| Wk-23001 | TP.1: 0.80m               | modified <i>Conus</i> sp.: grave good        | 2682±30 | 3.5±0.2   | 2148–2657 |
| Wk-25461 | TP.1: bone concentration  | Human bone: humerus (burned)                 | 2499±31 | 12.2±0.2  | 2346–2440 |
| Wk-34949 | TPBG, BG2                 | Human bone: femur                            | 2571±29 | -15.51    | 2327–2647 |
| Wk-34950 | TPBG, BG3                 | Human bone: humerus                          | 2580±25 | -15.89    | 2336–2647 |
| Wk-40023 | TPO, Sk5                  | Human bone: femur                            | 2554±20 | -15.90    | 2331–2469 |
| Wk-41883 | TPA2, Sk10                | Human bone: fibula                           | 2594±20 | -16.44    | 2346–2651 |
| Wk-41885 | TPA2, Sk14                | Human bone: scapula                          | 2606±20 | -16.33    | 2350–2663 |
| Wk-41886 | TPB2, SK17                | Human bone: scapula                          | 2559±20 | -16.37    | 2335–2474 |

**Table S2. Sample descriptions and selected measurement data for three coral files. Grey rows identify duplicate U-Th analyses with age uncertainties at  $2\sigma$ . Analyses were processed in the Radiogenic Isotope Facility at the University of Queensland using protocols described in Burley *et al.* (2012).**

| <b>Analysis/<br/>sample</b> | <b>Context</b> | <b>Description</b>  | <b><math>^{232}\text{Th}</math><br/>(ppm)</b> | <b><math>^{230}\text{Th}/^{232}\text{Th}</math></b> | <b>Uncorrected date<br/>(BP)</b> | <b>Corrected date<br/>BP</b> |
|-----------------------------|----------------|---|---|---|----------------------------------|------------------------------|
| 05WZ16-68<br>TAL-1          | TPD2           | Branch coral file, 72mm in length, 14mm diameter at base, worked tip 10mm.          | 0.590   | 520.17  | 3223±11                          | 3151±11                      |
| 06 WZ16-69<br>TAL-2         | TPE2           | Branch coral file, 75mm in length, 8mm diameter at base, worked tip 5mm.            | 0.537   | 648.66  | 3115±10                          | 3045±10                      |
| FL09-50<br>TAL-2            | TPE2           | As above  | 0.960   | 391.7   | 3497±18                          | 3423±18                      |
| 07 WZ16-70<br>TAL-3         | TPA2           | Branch coral file, 60mm in length (curved), 11mm diameter at base, worked tip 27mm. | 0.131   | 2182  | 2701±10                          | 2635±10                      |
| FL09-51<br>TAL-3            | TPA2           | As above  | 0.165   | 1712.8  | 2730±18                          | 2662±18                      |

**Table S3. Inventory of burials from Talasiu. Age and sex determination used recommendations of Bruzek (2002), Ferembach *et al.* (1979), Scheuer & Black (2000) and Schmitt (2005).**

| Test pit          | Burial context | Number of individuals per context   | Burial ID                        | Age, adult (Schmitt 2005); Age, sub-adult (Ubelaker 1989; Scheuer & Black 2000) | Sex, coxal (Bruzek 2002); Sex, skull (Ferembach <i>et al.</i> 1979) |
|-------------------|----------------|---|----------------------------------|---|---|
| TP1               | Cremains       | Multiple (n=4), three adults, one child   |                                  | Three adults, one child (3–10 years)  | Male (skull)  |
| TPBG              | BG2<br>BG3     | Single (n=1);<br>Single (n=1), scattered remains of one child (1.5–2 years) and one adult | BG2<br>BG3                       | Adult (20–49 years)<br>Adult (>50 years)  | Female<br>Female  |
| TPA               | Sk1            | Single (n=1), scattered remains of one adult  | Sk1                              | Adult (>40 years)   | Female  |
| TPF and extension | Sk2            | Multiple n(=4)  | Sk2.1<br>Sk2.2<br>Sk2.3<br>Sk2.4 | Adult<br>Adult<br>Adult<br>Adolescent (12-16 years)                             | Unknown<br>Male<br>Unknown<br>-                                     |

|                     |  |  |   |   |   |
|---------------------|--|--|---|---|---|
| TPG                 | Sk3  | Multiple (n=2), and scattered remains of at least one other adult and three perinates  | Sk3.1<br>Sk3.2                                  | Adult<br>Adult  | Female<br>Male                            |
| TP M                | Sk4  | Single (n=1)<br>Scattered remains of at least one adult  | Sk4   | Child (2.5 years)   | -   |
| TPO                 | Sk5  | Single (n=1)   | Sk5   | Adult (>30 years)   | Male                                      |
| TPT                 | Sk6  | Single (n=1)   | Sk6   | Adult   | Male (skull)                              |
| TP A2 and extension | Four contexts:<br>Sk14, Sk10,<br>Sk11, Sk7 | Three singles (n=1) (Sk10, Sk11, Sk14);<br>one multiple (n=2) and scattered remains of at least three other adults and one child (Sk7) | Sk10<br>Sk11<br>Sk14<br>Sk7.1<br>Sk7.2          | Adult<br>Child (1.5–2.5 years)<br>Adult<br>Adult<br>Adult                       | Female<br>-<br>Male<br>Unknown<br>Unknown |
| TP B2               | Sk17                                       | Single (n=1)   | Sk17  | Adult   | Unknown                                   |
| TP D2/E2            | 4 contextes,<br>Sk16, Sk12,<br>Sk13, Sk9   | Three single (n=1) and remains of at least two adults and two children (Sk12, Sk13, Sk16);   | Sk16<br>Sk13<br>Sk12<br>Sk9.1<br>Sk9.2<br>Sk9.3 | Adult<br>Child (1.5–2.5 years)<br>Adult<br>Child (7–11 years)<br>Adult<br>Adult | Female<br>-<br>-<br>-<br>-<br>Unknown     |

|       |      |  |      |       |         |
|-------|------|--|------|-------|---------|
|       |      | one multiple (n=3) and remains of at least one other adult (Sk9) |      |       |         |
| TP N2 | Sk15 | Single (n=1)   | Sk15 | Adult | Unknown |

**Table S4. Ornaments and mortuary characteristics of Talasiu burials.**

| <b>Area</b> | <b>Context</b> | <b>Individuals</b>                                 | <b>Ornaments/goods</b>           | <b>Mode of inhumation</b>              | <b>Skeletal representation</b>  | <b>Interpretation</b>   |
|-------------|----------------|--|----------------------------------|--|---|---|
| TP1         | Cremins        | Four individuals, including one male and one child | Four modified shells             | Deposited as bone                      | Over-representation of skull  | Transfer of skull remains   |
| BG          | BG2, BG3       | Two females  | One shell bead<br>One shell bead | Deposited as cadavers supine and prone | Incomplete skeletons, missing skull in one individual and lower half of skeleton in the other | Absence of skull due to removal or disturbance in one individual: no interpretation |
| TPA         | Sk1            | One female   |                                  | Deposited as cadaver,                  | Neurocranium missing  | Absence of skull due to removal   |

|     |     |  |                    |   |  |   |
|-----|-----|--|--------------------|---|--|---|
|     |     |  |                    | prone                                   |  |   |
| TPF | Sk2 | Four+ individuals, including one male and one adolescent | One modified shell | Deposited as cadavers, supine and prone | Under-representation of skull and fibulas, partial articulations                                       | Absence of skull and fibula possibly due to removal               |
| TPG | Sk3 | Two+ individuals, including one male and one female      |                    | Deposited as cadavers, supine           | Sub-complete skeletons in articulation, male neurocranium missing, fibulas missing in both individuals | Absence of male skull and fibulas due to removal                  |
| TPM | Sk4 | One child  | One shell bead     | Deposited as cadaver? disturbed         | Incomplete skeleton, no articulation   | Absence of skull due to removal or disturbance: no interpretation |
| TPO | Sk5 | One male   |                    | Deposited as cadaver, supine            | Incomplete skeleton, in articulation   | Absence of skull and fibula possibly due to removal               |

|         |      |   |                                     |                                     |   |  |
|---------|------|---|-------------------------------------|-------------------------------------|---|--|
| TPT     | Sk6  | One male                                |                                     | Deposited as bone                   | 1 isolated skull and some cervical vertebrae  | Transfer of skull  |
| TPA2    | SK7  | Five individuals, including one child   |                                     | Deposited as cadavers?<br>disturbed | Under-representation of skull and fibulas, very incomplete skeletons, some partial articulations of bones | Absence of skull and fibula due to removal or disturbance: no interpretation |
| TPD2-E2 | Sk9  | Three+ individuals, including one child |                                     | Deposited as cadavers reorganised   | Under-representation of adult skull, incomplete skeletons, some partial articulations                     | Absence of skull possibly due removal  |
| TPA2    | Sk10 | One female                              | One shell bead, one shell long unit | Deposited as cadaver<br>On face     | Incomplete skeleton, skull and fibula present, in articulation  | No absence of skull and fibula   |
| TPA2    | Sk11 | One child                               |                                     | Deposited as cadaver,<br>disturbed  | Incomplete skeleton, skull and fibulas  | No absence of skull and fibula   |



|         |      |                               |                               |                                      |  |   |
|---------|------|-------------------------------|-------------------------------|--------------------------------------|--|---|
|         |      |                               |                               |                                      | present, some articulations  |   |
| TPD2-E2 | Sk12 | One female                    | One shell long unit           | Deposited as cadaver, prone          | Incomplete skeleton, skull and fibulas present, in articulation    | No absence of skull and fibula                                    |
| TPD2-E2 | Sk13 | One child                     |                               | Deposited as cadaver, disturbed      | Incomplete skeleton, skull and fibulas present, some articulations | No absence of skull and fibula                                    |
| TPA2    | Sk14 | One male                      | Two grooved sea urchin spines | Deposited as cadaver, supine         | Incomplete, in articulation  | Absence of skull and fibula due to removal                        |
| TPN2    | Sk15 | One individual of unknown sex |                               | Deposited as bone                    | Isolated skull   | Transfer of skull   |
| TPD2-E2 | Sk16 | One female                    |                               | Deposited as cadaver? undeterminable | Very incomplete, pelvis in articulation                            | Absence of skull due to removal or disturbance: no interpretation |

|      |      |                               |  |                                    |                                    |  |
|------|------|-------------------------------|--|------------------------------------|------------------------------------|--|
| TPB2 | Sk17 | One individual of unknown sex |  | Deposited as cadaver?<br>disturbed | Very incomplete, scattered remains | Absence of neurocranium due to removal or disturbance: no interpretation |
|------|------|-------------------------------|--|------------------------------------|------------------------------------|--|

**Table S5. Funerary behaviour of Ancestral Polynesian Society reconstructed from historical linguistics (lexemes reconstructed for Polynesian language, after Kirch & Green (2001): 196, 239–55; PPN = Proto-Polynesian language).**

| Language stage   | Lexeme                               | Gloss   |
|--|--------------------------------------|---|
| <b>Abstract concepts fundamental to Polynesian culture that structure major life transitions</b> |                                      |   |
| PPN  | <i>*mana</i>                         | Supernatural power, related to human head                   |
| PPN  | <i>*tapu</i>                         | Under ritual restrictions                                   |
| PPN  | <i>*noa</i>                          | Ordinary, related to food remains                           |
| <b>Spatial organisation and funerary activities</b>  |                                      |   |
| PPN  | <i>*tupunga</i> or<br><i>*tupuna</i> | Ancestors   |
| PPN  | <i>*qafu</i>                         | Sacred house base foundation (containing ancestors remains) |
| PPN  | <i>*fale-<math>\{qatua\}</math></i>  | Sacred house, containing remains of ancestors               |

|     |                 |  |
|-----|-----------------|--|
| PPN | * <i>malaqe</i> | Open clear space used as ceremonial or meeting place,<br>located seaward of sacred house |
|-----|-----------------|--|

## References

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