Sampling

|  |  |  |
| --- | --- | --- |
| Formation | N colonies | N zooids (avg per colony) |
| NKLS | 66 | 615 (9) |
| NKBS | 263 | 2934 (11) |
| Tewkesbury | 107 | 1050 (9) |
| Waipuru | 15 | 156 (10) |
| Upper Kai-Iwi | 21 | 170 (8) |
| Tainui | 19 | 155 (8) |
| SHCSBSB | 50 | 400 (8) |

NOTE: rounded down

Normality tests for each trait

* All fail the shapiro test (i.e., significantly different from normal)

|  |  |
| --- | --- |
| Trait | Shapiro p-value |
| LN zooid height (zh) | < 2.2e-16 |
| LN median process width at base (mpw.b) | 1.391e-07 |
| LN cryptocyst width at midline (cw.m) | 0.02664 |
| LN cryptocyst distal width (cw.d) | 1.302e-05 |
| LN operculum width at midline (ow.m) | < 2.2e-16 |
| LN operculum height (oh) | < 2.2e-16 |
| LN cryptocyst side length (c.side) | 0.001001 |
| LN operculum side length (o.side) | < 2.2e-16 |

Q. how well does P reflect G?

P and G correlation within each formation results (correlation.p.g.csv)

NKLS: .96

NKBS: .96

Tewkesbury: .98

Waipuru: .94

Upper Kai-Iwi: .97

Tainui: .98

SHCSBSB: .95

Means that P is an excellent predictor of G

Does G change through time?

Change in G across formations: (angle\_differences\_between\_Gs.csv)

NKLS to NKBS: 5.25˚

NKBS to Tewksbury: 5.47˚

Tewkesbury to Waipuru: 23.74˚

Waipuru to Upper Kai-Iwi: 27.52˚

Upper Kai-Iwi to Tainui: 147.31˚

Tainui to SHCSBSB: 156.97˚

Does P change in direction of above average evolvability? (evolvability\_summary.csv)

Compare mean conditional evolvability and mean evolvability to observed conditional evolvability and observed evolvability

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Formation for Gmax | Transition for observed change | Mean conditional evolvability | Mean evolvability | Observed conditional evolvability | Observed evolvability | In direction of above avg. conditional evolvability? | In direction of above avg. evolvability? |
| NKLS | NKLS to NKBS | 0.00195586 | 0.00698909 | 0.00101734 | 0.00247515 | No (observed < c) | No (observed < e) |
| NKBS | NKBS to Tewkesbury | 0.00092124 | 0.00668103 | 0.00061628 | 0.00537352 | No (observed < c) | No (observed < e) |
| Tewkesbury | Tewkesbury to Waipuru | 0.0013007 | 0.00689669 | 0.00085844 | 0.00771632 | No (observed < c) | **Yes** |
| Waipuru | Waipuru to Upper Kai-Iwi | 0.00173452 | 0.00794014 | 0.00186921 | 0.01240648 | **Yes** | **Yes** |
| Upper Kai-Iwi | Upper Kai-Iwi to Tainui | 0.00188173 | 0.01725039 | 0.00111632 | 0.02909905 | No (observed < c) | **Yes** |
| Tainui | Tainui to SHCSBSB | 0.00201127 | 0.00726688 | 0.00157572 | 0.01028872 | No (observed < c) | **Yes** |
| SHCSBSB |  | 0.00132952 | 0.00540069 |  |  |  |  |

Does P change align with Gmax?

Change relative to G max: (angle\_differences\_between\_Gmax\_G.csv)

NKLS: 93.37˚

NKBS: 67.63˚

Tewkesbury: 118.62˚

Waipuru: 125.73˚

Upper Kai-Iwi: 122.28˚

Tainui: 127.22˚

SHCSBSB: 52.38˚

Three formations with smaller sizes:

NKBS

Waipuru

Upper Kai-Iwi

O’Dea & Okamura 1999, Amui-Vedel et al 2007, and DiMartino & Liow 2021 find zooid size varies with temperature.

Amui-Vedel et al 2007 find longer zooids in July than January (i.e., in warmer than colder) in nature, but in the laboratory had longer and sider zooids in cooler (14˚C) than wamer (18˚C) temperatures

O’Dea & Okamura 1999 found zooid length, width, and area are temperature-dependent, where zooids were longer, wider, and more area in cooler temperatures

DiMartino & Liow 2021 found larger zooids at higher ∂O18 values

Span from 3.4 to 4.7 ∂O and a mean size change from 11.1 to 11.6 mm log zooid size