**Table S1.** **Measured (blue shading) and predicted development time (days) for *Graneledone boreopacifica* using published models.** Hatching mass used in some models comes from Voight and Drazen, 2004. Egg length (15 mm) and temperature (3°C) were measured in situ.

|  |  |  |  |
| --- | --- | --- | --- |
| **Reference** | **Model**  **Duration (D, days), Temperature (T,°C)** | **Duration (in days, at 3°C)** | **Notes** |
| **This manuscript** | **In situ measurement** | **1590** | **Based on in situ observations with MBARI remotely operated vehicles.** |
| This manuscript | D=10794T-1.79 | 1510 | Octopodidae only, each species represented by one point. Where more than one measurement was available, the measurement at the lowest temperature was used. Temperature range = 5-29°C.  **Data in Table S2**. |
| …including *Graneledone boreopacifica* | D=10087T-1.76 | 1458 | As above, but including the present data for *G. boreopacifica* at 3°C. |
| Temperature coefficient, Q10 = 2 - 3 | R2 = R1\*Q10(T2-T1/10)  Rate (R) = 1/D | 552, 650 | Calculated using a starting development time of 419 days (R1 = 1/419) at 7°C from *Bathypolypus arcticus* (Wood, 1998). |
| Laptikhovsky, 1991 | D=277.6\**d*0.0291T+0.263e-0.22T  d = (L + W/2) x 10 = 100  L = 15, W = 5 | 743 | For Octopodidae. Nesis (1999) used this formula to estimate *G. boreopacifica* embryonic development at 826 days (2.2°C, L = 16, W = 7). An error in Nesis’ formula resulted in 798 days. The formula presented here is correct. |
| Laptikhovsky, 1999 | D=(3163.1T-1.62)L0.499 | 2057 | For Octopodidae. The author uses “ripe egg length”, which is 35 mm in *G. boreopacifica*. This results in over-estimated embryonic development duration. |
| Seibel et al., 2000 | D=70.67L-0.86 | 725 (5-7°C) | Data from varied squids and octopods measured between 5-7°C (n=7). |
| Katsanevakis and Verriopoulos, 2006 | D=532.2/(T-8.76), re-plotted with power function to extrapolate <9°C, D=22391T-2.023 | 2425 | Effect of temperature on *Octopus vulgaris,* range 11-31°C |
| Hamasaki and Morioka, 2002 | D=62798T-2.477 | 4131 | Effect of temperature on *Octopus vulgaris*, range 16.5-25.5°C- |
| Kubodera, 1991 | 2300 - 2700 deg-days | 760 - 900 | Effect of temperature on *Octopus dofleini,* range 7-16°C |
| Gillooly et al., 2002 | Loge D/m0.25=-0.12{T/(1+T/273)}+6.06 | 362 | Based on Metabolic Theory of Ecology, using data for “aquatic ectotherms”. Prediction using 2.5 g, hatchling mass. |
| Hirst and Lopez-Urrutia, 2006 | Loge D/m0.25=-0.11{T/(1+T/273)}+6.49 | 572 | Based on Metabolic Theory of Ecology as above, using data for Teuthoidea (squids), 2.5 g hatchling mass. |

**Table S2.** **Egg development and morphometric data for species of the family Octopodidae.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Species** | **Egg length (mm)** | **T (°C)** | **Development Duration (days)** | **Reference** |
| *Graneledone boreopacifica* | 15 | 3 | 1590 | This study |
| *Octopus dofleini* | 7 | 5 | 547 | Kubodera, 1991 |
| *Octopus bimaculoides* | 2 | 18 | 82 | Forsythe and Hanlon, 1988 |
| *Octopus joubini* | 3.3 | 22 | 42 | Forsythe and Toll, 1991 |
| *Octopus tetricus* | 2 | 17.3 | 53 | Joll, 1978 |
| *Octopus aegina* | 3.18 | 28 | 19 | Ignatius and Srinivasan, 2005 |
| *Octopus laqueus* | 2.6 | 24 | 25 | Kaneko et al., 2006 |
| *Octopus digueti* | 6 | 15 | 60 | Hochberg (in Mangold et al., 1971) |
| *Octopus rubescens* | 3.0 | 14.5 | 91 | Osborn, 1995 |
| *Octopus maorum* | 6 | 15 | 80 | Anderson, 1999 |
| *Octopus micropyrsus* | 9 | 15 | 75 | Hochberg (in Mangold et al. 1971) |
| *Octopus briareus* | 12 | 23 | 65 | Hanlon, 1977 |
| *Octopus vulgaris* | 2 | 17 | 83 | Caveriviere et al., 1999 |
| *Octopus tehuelchus* | 11 | 19 | 112 | Iribarne, 2009 |
| *Hapalochlaena lunulata* | 3.5 | 23.5 | 35 | Overath and Boletzky, 1974 |
| *Hapalochlaena maculosa* | 6.5 | 22 | 60 | Overath and Boletzky, 1974 |
| *Robsonella fontanianus* | 4.77 | 14 | 93 | Gonzalez et al., 2008 |
| *Robsonella australis* | 2.9 | 13 | 81 | Brought, 1965 (in Mangold et al., 1971) |
| *Eledone cirrhosa* | 7.55 | 16 | 105 | Mangold et al., 1971 |
| *Bathypolypus arcticus* | 11 | 7 | 419 | Wood, 1998 |
| *Enteroctopus megalocyathus* | 10.05 | 11 | 168 | Uriarte et al., 2014 |
| *Paroctopus conispadiceus* | 15 | 6.5 | 307 | Ito, 1983 |
| *Megaledone setebos* | 18.5 | 0 |  | Collins and Rodhouse, 2006 |
| *Pareledone harissoni* | 13.5 | 0 |  | Collins and Rodhouse, 2006 |

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