7.4 Phenology Models and Life-Table Parameters of Biocontrol Agents

7.4.1 *Copidosoma koehleri* (Canedo et al.)

1. Development Time

Stage: Eggs	Stage: Larvae	Stage: Mummies	Stage: Female	Stage: Male
Model: probit	Model: logit	Model: logit	Model: logit	Model: logit
Slope: 15.8	Slope: 17.45	Slope: 27.97	Slope: 10.34	Slope: 10.34

2. Development Rate

Stage: Eggs

Model 13: SharpeDeMichelle 13

Parameters: p=4.825 Tl=305.039 Ha=-44176.757 Hl=-70226.571

Formula: $y \sim (p^* (x/298.16)*e^{(Ha/1.987)*((1/298.16)-(1/x))})/(1+e^{(Hl/1.987)*((1/Tl)-(1/x))})$

Stage: Larvae

Model 12: SharpeDeMichelle 12

Parameters: p=0.073 Tl=2065239.238 Th=306.289 Ha=416.82 Hl=92560.796 Hh=18048.129

Formula: $y \sim (p*(x/298.16)*e^{(Ha/1.987)*((1/298.16)-(1/x))})/(1+e^{(Hl/1.987)*((1/Tl)-(1/x))}+e^{(Hh/1.987)*((1/Th)-(1/x))})$

Stage: Mummies

Model 12: SharpeDeMichelle 12

Parameters: p=0.084 Tl=681029.702 Th=307.86 Ha=424.504 Hl=77694.145 Hh=15290.146

Formula: $y \sim (p*(x/298.16)*e^{(Ha/1.987)*((1/298.16)-(1/x))})/(1+e^{(Hl/1.987)*((1/Tl)-(1/x))}+e^{(Hh/1.987)*((1/Th)-(1/x))})$

3. Senescence

Stage: Female

Model 56: Hilbert and Logan 3

Parameters: trid=-3999706.355 Tmax=36.283 Tmin=21.655 D=-4098551692.165 Dt=0.005 Smin=0.039

Formula: $y \sim trid*(((x- Tmin)^2)/((x-Tmin)^2+D)-e^{-(Tmax-(x-Tmin))/Dt})+Smin$

Stage: Male

Model 56: Hilbert and Logan 3

Parameters: trid=-4731459.495 Tmax=39.907 Tmin=21.655 D=-4848406709.334 Dt=0.017 Smin=0.039

Formula: $y \sim trid*(((x- Tmin)^2)/((x-Tmin)^2+D)-e^{-(Tmax-(x-Tmin))/Dt})+Smin$

4. Mortality

Stage: Eggs Model 40: Briere 2 Parameters: a=0.003 To=41.775 Tl=41.964 d=6.52 Formula: $y \sim e^{a*x*(x-To)*(Tl-x)^{1/d}}$
Stage: Larvae Model 26: Wang 1 Parameters: Topt=26.072 B=3.047 H=0.053 Formula: $y \sim 1 - 1/(e^{(1+e^{-(x-Topt)/B})*(1+e^{-(Topt-x)/B})*H})$
Stage: Mummies Model 26: Wang 1 Parameters: Topt=24.561 B=1.361 H=0.002 Formula: $y \sim 1 - 1/(e^{(1+e^{-(x-Topt)/B})*(1+e^{-(Topt-x)/B})*H})$

5. Total Oviposition

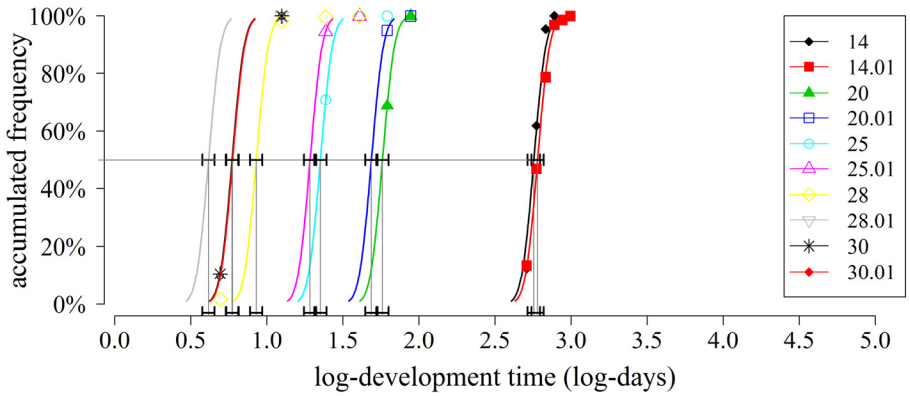
Stage: Female Model 30: Wang 5 Parameters: Topt=19.682 B=3.493 H=-1582.382 Formula: $y \sim 1-H/(e^{(1+e^{-(x-Topt)/B})*(1+e^{-(Topt-x)/B})})$

6. Relative Oviposition

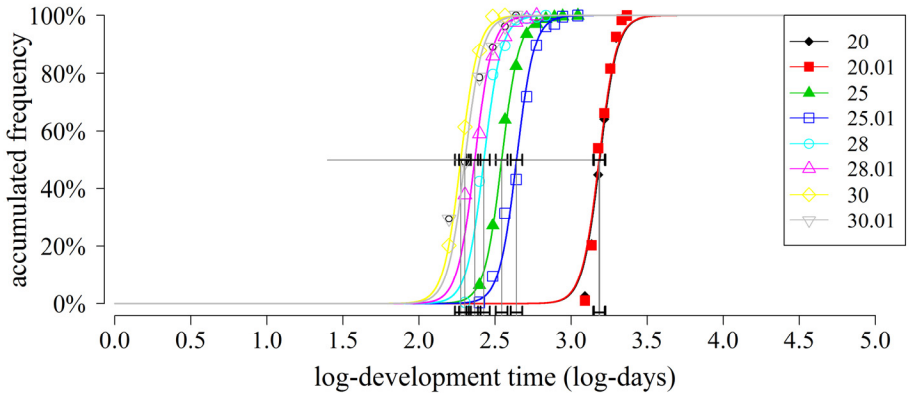
Stage: Female Model 2: Gamma Parameters: a=1.668 b=4.284 Formula: y ~ pgamma(x, a, b)

7. Development Time

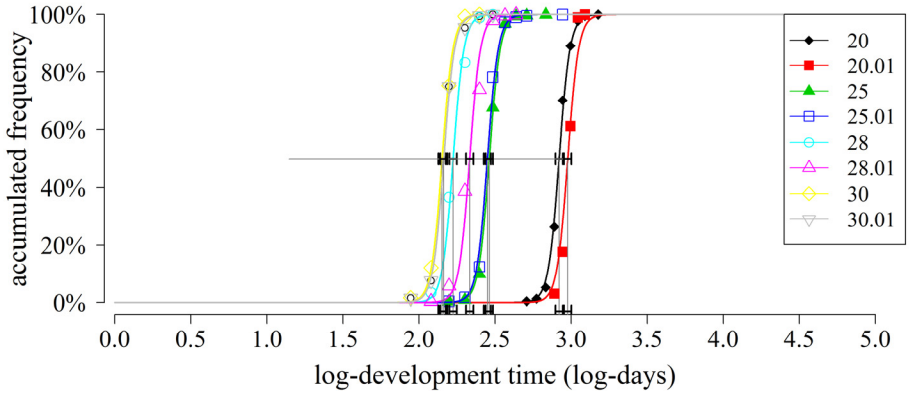
Eggs



Larvae

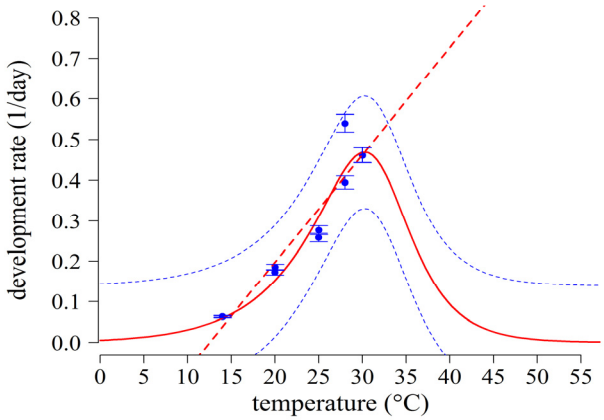


Mummies

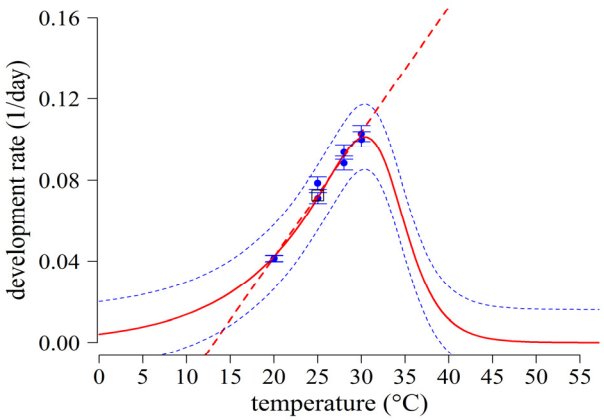


8. Development Rate

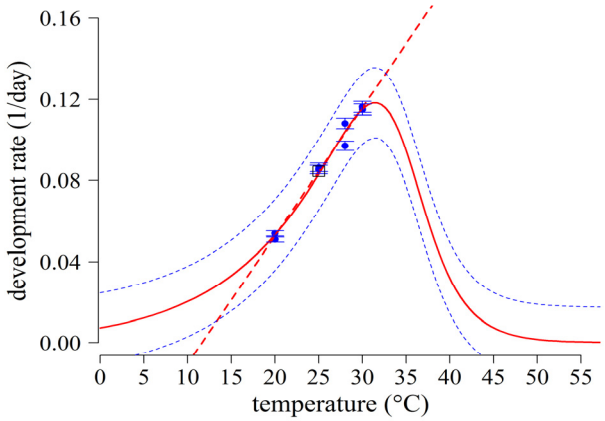
Eggs



Larvae

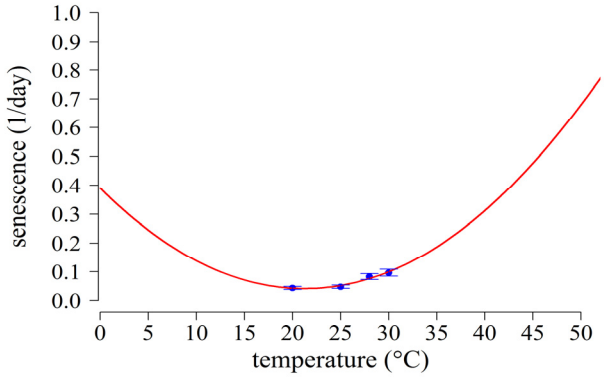


Mummies

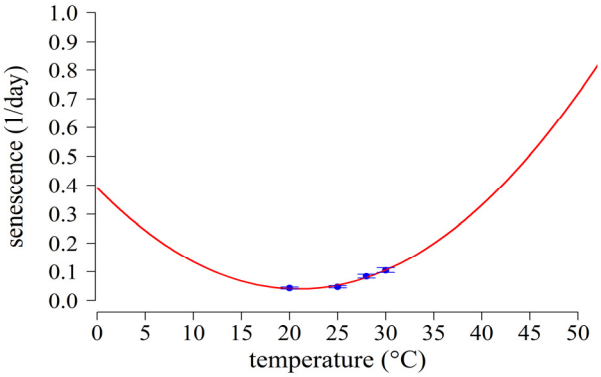


9. Senescence

Female

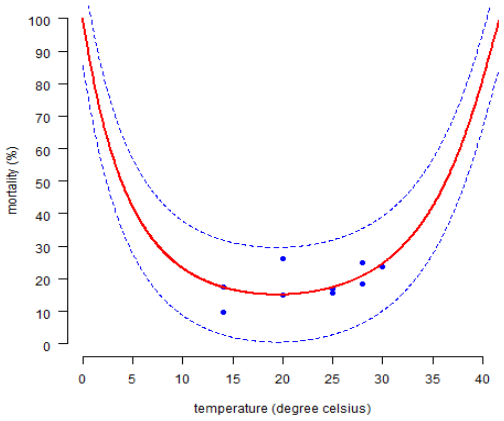


Male

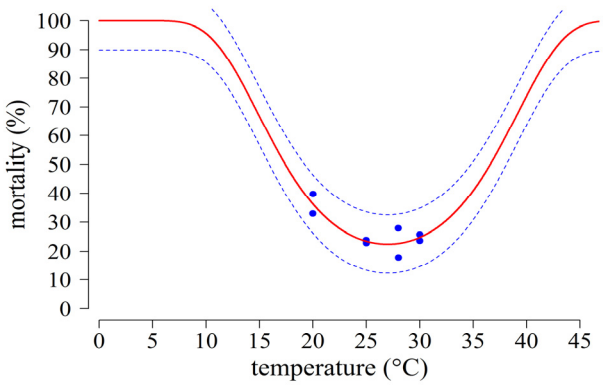


10. Mortality

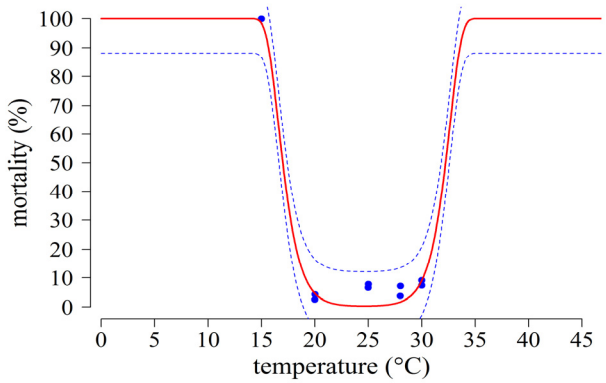
Eggs



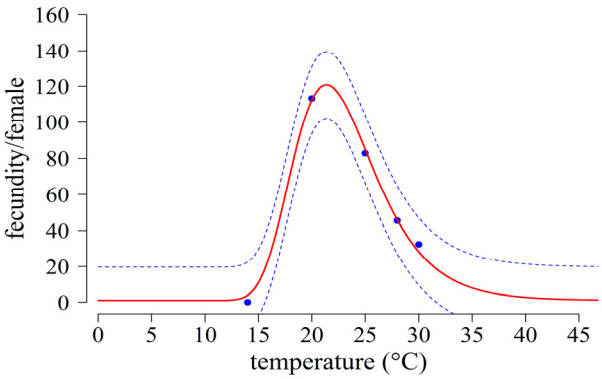
Larvae

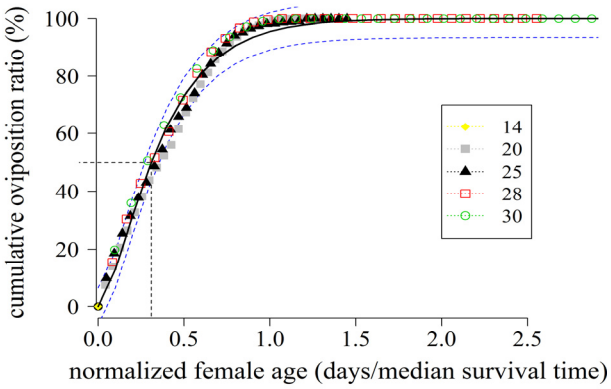
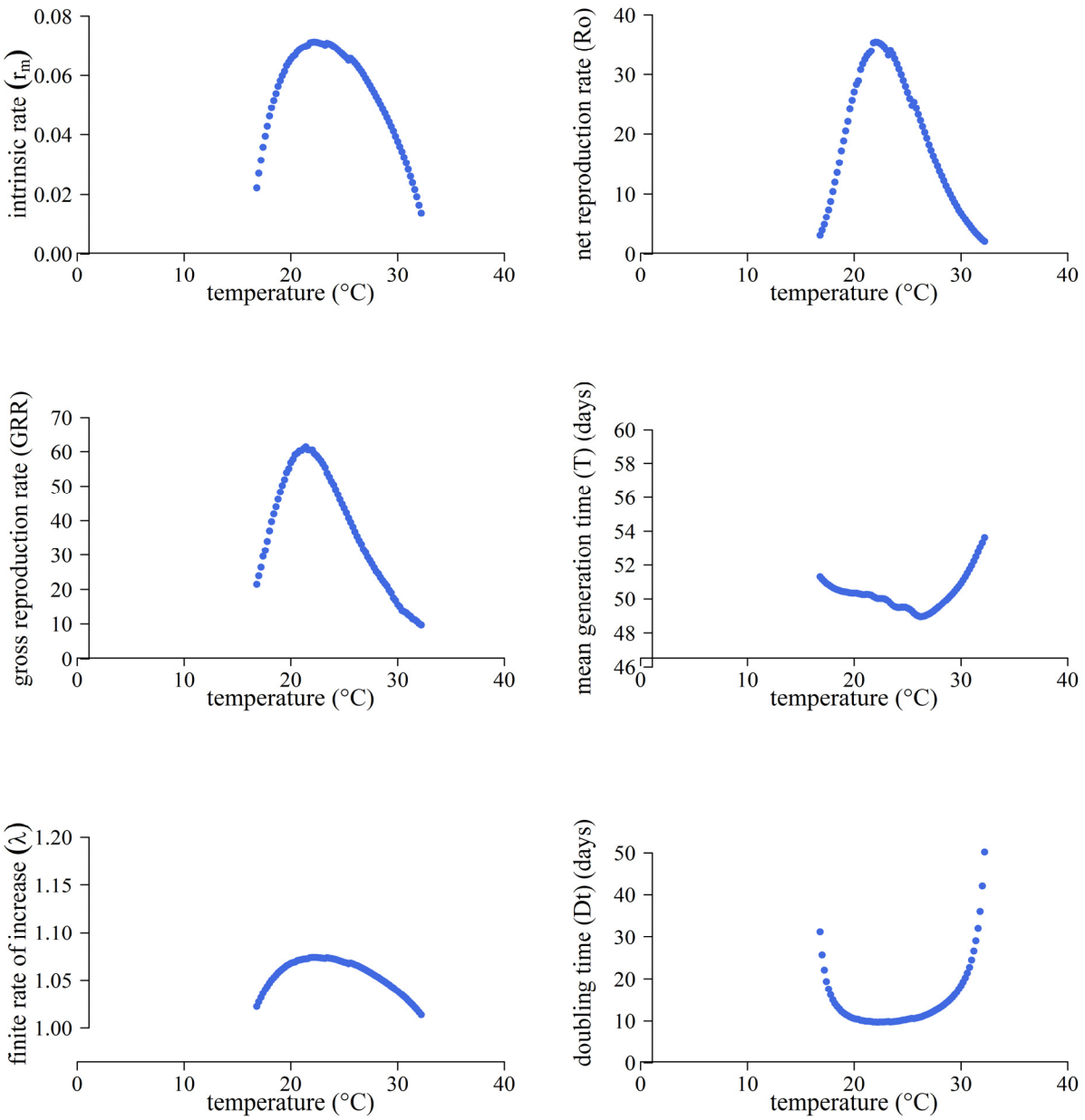


Mummies



11. Total and Relative Oviposition





12. Estimated life table parameters using deterministic simulation