Appendix C. Plots of: (a) fitted model with maximum-likelihood parameter estimates (see Appendix A), (b) relationship of observed to predicted age with one-to-one line, (c) quantile residuals of the fitted model plotted as a function of the D/L, and (d) absolute values of quantile residuals plotted as a function of D/L. Lines depicted in the figures were fitted by lowess with a smoother span of 0.9 (Model 1 from Appendix A).

\[ \hat{t} = e^{4.5 \left[ \left(1 + R_t \right) / \left(1 - R_t \right) \right]^{7.7}} \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi e^{4.6}}} e^{-\left(\log(t) - \log(t)\right)^2/(2e^{4.6})} \]
Appendix C. Continued: Model 2 (see Appendix A); Taxon: Fulvia tenuicostata

\[ TDK0: \quad t = e^{12.7 \left[ \text{atanh} \left( R_t \right) \right]^{3.1}} \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi e}^{3.7}} e^{-\left( \log(t) - \log(t) \right)^2/(2e^{3.7})} \]

Graphs showing:
- Graph a) plots age vs. Asp D/L with a fitted curve and quantile residuals.
- Graph b) shows a linear relationship between observed age and predicted age.
- Graph c) displays quantile residuals for Asp D/L.
- Graph d) shows absolute quantile residuals against Asp D/L.
Appendix C. Continued: Model 3 (see Appendix A); Taxon: Fulvia tenuicostata

SPK0: $t^\wedge = e^{12.8 R_f^{3.2}}$

$p_L(t) = \frac{1}{\sqrt{2\pi e^{3.7}}} e^{-\frac{(\log(t) - \log(f))^2}{2e^{3.7}}}$
Appendix C. Continued: Model 4 (see Appendix A); Taxon: Fulvia tenuicostata

\[ \hat{t} = e^{5.1} \left( \frac{1 + R_t}{1 - R_t} \right)^{6.5} - \left( \frac{1 + e^{-3.1}}{1 - e^{-3.1}} \right)^{6.5} \]

\[ p_L(t) = \frac{1}{\sqrt{2\pi}e^{3.7}} e^{-\left(\log(t) - \log(T)\right)^2/(2e^{3.7})} \]
Appendix C. Continued: Model 5 (see Appendix A); Taxon: Fulvia tenuicostata

TDK1: $t = e^{12.5 \cdot \text{atanh} \left[ \frac{R_t - e^{-4.7}}{1 - e^{-4.7} R_t} \right]^{2.9}}$

$p_L(t) = \frac{1}{t \sqrt{2 \pi e^{3.7}}} e^{-\left(\log(t) - \log(T)\right)^2/(2e^{3.7})}$

b) Observed Age (yr) vs. Predicted Age (yr)

c) Quantile Residual vs. Asp D/L

d) Absolute Quantile Residual vs. Asp D/L
Appendix C. Continued: Model 6 (see Appendix A); Taxon: Fulvia tenuicostata

\[ SPK1: \ t = e^{12.8} \left( R_t^{3.2} - (e^{-3.3})^{3.2} \right) \]

\[ p_L(t) = \frac{1}{t\sqrt{2\pi}e^{3.6}} e^{-\left(\log(t) - \log(t)\right)^2/(2e^{3.6})} \]

(a) Graph showing the relationship between Asp D/L and age (yr).
(b) Graph showing the predicted age (yr) against observed age (yr).
(c) Graph showing quantile residuals against Asp D/L.
(d) Graph showing absolute quantile residuals against Asp D/L.
Appendix C. Continued: Model 7 (see Appendix A); Taxon: Fulvia tenuicostata

a) CPK0: 
\[ \hat{t} = e^{2.1 \left[ \frac{(1 + R_t)}{(1 - R_t)} \right]^{13.3}} \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi e^{0.1}}} e^{-\left(\log(t) - \log(t)^2 / (2e^{0.1})\right)^2} \]

b) Observed Age (yr) vs. Predicted Age (yr)

c) Quantile Residual vs. Asp D/L

d) Absolute Quantile Residual vs. Asp D/L
Appendix C. Continued: Model 8 (see Appendix A); Taxon: Fulvia tenuicostata

\[ TDK0: \hat{t} = e^{14.4 \cdot \text{atanh}(R_t)}^{4.2} \]

\[ p_L(t) = \frac{1}{t\sqrt{2\pi e^{-0.7}}} e^{-(\log(t) - \log(\hat{t}))^2/(2e^{-0.7})} \]
Appendix C. Continued: Model 9 (see Appendix A); Taxon: Fulvia tenuicostata

\[ \text{SPK0: } \ell = e^{14.6} R_t^{4.3} \]

\[ p_L(t) = \frac{1}{t \sqrt{2 \pi e^{-0.7}}} e^{-\left(\log(t) - \log(t)^2\right)^2/(2e^{-0.7})} \]

---

**Graphs:**

- **Graph a:**
  - Title: SPK0: \( \ell = e^{14.6} R_t^{4.3} \)
  - Equation: \( p_L(t) = \frac{1}{t \sqrt{2 \pi e^{-0.7}}} e^{-\left(\log(t) - \log(t)^2\right)^2/(2e^{-0.7})} \)

- **Graph b:**
  - Predicted Age vs. Observed Age (yr)

- **Graph c:**
  - Quantile Residual vs. Asp D/L

- **Graph d:**
  - Absolute Quantile Residual vs. Asp D/L
Appendix C. Continued: Model 10 (see Appendix A); Taxon: Fulvia tenuicostata

\[ \hat{t} = e^{4.8} \left[ \frac{1 + R_t}{1 - R_t} \right]^{7.1} - \left( \frac{1 + e^{-3.1}}{1 - e^{-3.1}} \right)^{7.1} \]

\[ p_L(t) = \frac{1}{\sqrt{2\pi}e^{-2.7}} e^{-\left(\log(t) - \log(\bar{t})\right)^2/(2e^{-2.7})} \]
Appendix C. Continued: Model 11 (see Appendix A); Taxon: Fulvia tenuicostata

\[ TDK1 \colon \hat{t} = e^{11.2 \ \text{atanh} \left[ R_t - e^{-3.1} \ \frac{R_t - e^{-3.1}}{1 - e^{-3.1} R_t} \right]^{1.9}} \]

\[ p_L(t) = \frac{1}{\sqrt{2\pi}e^{-2.5}} e^{-\left( \frac{\text{log}(t) - \text{log}(\hat{t})}{2} \right)^2/(2e^{-2.5})} \]
Appendix C. Continued: Model 12 (see Appendix A); Taxon: Fulvia tenuicostata

\[ \hat{t} = e^{12.3} \left( R_t^{2.9} - (e^{-3.1})^{2.9} \right) \]

\[ p_L(t) = \frac{1}{t\sqrt{2\pi}e^{-2.7}} e^{-\left(\log(t) - \log(t)\right)^2/(2e^{-2.7})} \]

- a) SPK1
- b) Predicted Age vs. Observed Age
- c) Quantile Residual
- d) Absolute Quantile Residual
Appendix C. Continued: Model 13 (see Appendix A); Taxon: Fulvia tenuicostata

**Graphs (a), (b), (c), and (d):**

(a) CPK0: \( \hat{t} = e^{5.0 \left[ \frac{(1 + R_t)}{(1 - R_t)} \right]^{11.7}} \)
\[
p_L(t) = \frac{1}{\sqrt{2\pi e^{4.8}}} e^{-\left(\frac{\log(t) - \log(t_0)}{2 e^{4.8}}\right)^2}
\]

(b) Graph showing observed vs. predicted age with a linear trend line.

(c) Quantile residual plot showing Glu D/L vs. residual with a linear fit.

(d) Absolute quantile residual plot showing Glu D/L vs. residual with a curve fit.
Appendix C. Continued: Model 14 (see Appendix A); Taxon: Fulvia tenuicostata

\begin{align*}
TDK0: \quad & t = e^{13.7 \left[ \text{atanh}(R_t) \right]}^{2.8} \\
\rho_L(t) = \frac{1}{t\sqrt{2\pi}e^{4.1}} \quad & e^{-\left(\log(t) - \log(\bar{t})\right)^2/(2e^{4.1})}
\end{align*}
Appendix C. Continued: Model 15 (see Appendix A); Taxon: Fulvia tenuicostata

\[
\theta = e^{13.7} R_t^{2.8} \\
p_L(t) = \frac{1}{t\sqrt{2\pi} e^{4.1}} e^{-\left(\log(t) - \log(\theta)\right)^2 / (2e^{4.1})}
\]
Appendix C. Continued: Model 16 (see Appendix A); Taxon: Fulvia tenuicostata

CPK1: $\hat{t} = e^{5.5 \left[ \frac{\left(1 + R_t\right)}{1 - R_t} \right]^{10.1}} - \left(\frac{1 + e^{-4.0}}{1 - e^{-4.0}}\right)^{10.1}$

$p_L(t) = \frac{1}{t\sqrt{2\pi e^{4.3}}} e^{-\frac{(\log(t) - \log(F))^2}{2(2e^{4.3})}}$

a) Predicted Age (yr) vs. Age (yr) for Glu D/L

b) Observed Age (yr) vs. Predicted Age (yr) for Glu D/L

c) Quantile Residual vs. Glu D/L

d) Absolute Quantile Residual vs. Glu D/L
Appendix C. Continued: Model 17 (see Appendix A); Taxon: Fulvia tenuicostata

TDK1: \[ t = e^{13.5 \cdot \text{atanh} \left( \frac{R_t - e^{-5.4}}{1 - e^{-5.4}R_t} \right)^{2.6}} \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi e^{4.1}}} e^{-\left(\log(t) \cdot \log(t)\right)^2/(2e^{4.1})} \]
Appendix C. Continued: Model 18 (see Appendix A); Taxon: Fulvia tenuicostata

\[
SPK1: \quad \hat{t} = e^{13.7} \left( R_t^{2.8} - (e^{-4.4})^{2.8} \right)
\]

\[
\rho_t(t) = \frac{1}{t\sqrt{2\pi}e^{4.1}} e^{-(\log(t) - \log(t))^2/(2e^{4.1})}
\]
Appendix C. Continued: Model 19 (see Appendix A); Taxon: Fulvia tenuicostata

\[
\hat{t} = e^{2.6 \left[ \frac{(1 + R_t)}{(1 - R_t)} \right]^{21.0}} \\
\rho_L(t) = \frac{1}{t \sqrt{2\pi} e^{0.2}} e^{-\left(\log(t) - \log(t)\right)^2/(2e^{0.2})}
\]
Appendix C. Continued: Model 20 (see Appendix A); Taxon: Fulvia tenuicostata

(a) TDK0: \[ t = e^{16.1 \left[ \text{atanh}(R_t) \right]^{3.9}} \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi e^{-0.8}}} e^{-\left(\log(t) - \log(t)\right)^2/(2e^{-0.8})} \]

(b) Predicted Age (yr) vs. Observed Age (yr)

(c) Quantile Residual vs. Glu D/L

(d) Absolute Quantile Residual vs. Glu D/L
Appendix C. Continued: Model 21 (see Appendix A); Taxon: Fulvia tenuicostata
Appendix C. Continued: Model 22 (see Appendix A); Taxon: Fulvia tenuicostata

\[ \hat{t} = e^{4.0} \left[ \frac{(1 + R_t)^{15.5}}{1 - R_t} \right] - \left( \frac{1 + e^{-3.9}}{1 - e^{-3.9}} \right)^{15.5} \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi e^{-0.6}}} e^{-\left( \log(t) - \log(t) \right)^2 / (2e^{-0.6})} \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi e^{-0.6}}} e^{-\left( \log(t) - \log(t) \right)^2 / (2e^{-0.6})} \]

\[ \text{Quantile Residual} \]

\[ \text{Absolute Quantile Residual} \]
Appendix C. Continued: Model 23 (see Appendix A); Taxon: Fulvia tenuicostata

\[ TDK1: \hat{t} = e^{13.7 - 4.2 \text{atanh} \left( \frac{R_t - e^{-4.2}}{1 - e^{-4.2} R_t} \right)^{2.6}} \]

\[ p_L(t) = \frac{1}{\sqrt{2\pi}e^{-1.3}} e^{-\frac{-(\log(t) - \bar{\log}(t))^2}{2(2e^{-1.3})}} \]

b) Predicted Age (yr) vs. Observed Age (yr)

c) Quantile Residual vs. Glu D/L

d) Absolute Quantile Residual vs. Glu D/L
Appendix C. Continued: Model 24 (see Appendix A); Taxon: Fulvia tenuicostata

\[ t = e^{15.1} \left( R_t^{3.4} - (e^{-4.0})^{3.4} \right) \]

\[ p_L(t) = \frac{1}{\sqrt{2\pi}t} e^{-\left(\log(t) - \log(\bar{t})\right)^2/(2e^{-1.1})} \]
Appendix C. Continued: Model 25 (see Appendix A); Taxon: Fulvia tenuicostata

\[ \hat{t} = e^{6.0 \left[ \frac{1 + R_t}{1 - R_t} \right]^{3.6}} \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi} e^{5.4}} e^{-\left( \log(t) - \log(\hat{t}) \right)^2/(2e^{5.4})} \]

b) Predicted Age (yr) vs Observed Age (yr)

c) Quantile Residual vs Ala D/L

d) Absolute Quantile Residual vs Ala D/L
Appendix C. Continued: Model 26 (see Appendix A); Taxon: Fulvia tenuicostata

\[ TDK_0: \hat{t} = e^{10.7 \left( \frac{\text{atanh} \left( R_t \right)}{1000} \right)^{2.2}} \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi} e^{4.8}} e^{-\left( \frac{\log(t) - \log(\hat{t})}{2e^{4.8}} \right)^2} \]

b) Observed Age (yr) vs. Predicted Age (yr)

d) Absolute Quantile Residual
Appendix C. Continued: Model 27 (see Appendix A); Taxon: Fulvia tenuicostata

\[ SPK0: \alpha = e^{10.9} R_t^{2.3} \]

\[ p_L(t) = \frac{1}{\sqrt{2\pi}e^{4.7}} e^{-(\log(t)-\log(t))^2/(2e^{4.7})} \]

![Graphs a, b, c, d showing age predictions and residuals for model 27 with taxon Fulvia tenuicostata.](image)
Appendix C. Continued: Model 28 (see Appendix A); Taxon: Fulvia tenuicostata

\[ \hat{t} = e^{6.4 \left[ \left( \frac{1 + R_t}{1 - R_t} \right)^{3.1} - \left( \frac{1 + e^{-3.6}}{1 - e^{-3.8}} \right)^{3.1} \right]} \]

\[ p_L(t) = \frac{1}{\sqrt{2\pi}e^{5.1}} e^{-\left(\log(t) - \log(T)\right)^2/(2e^{5.1})} \]

---

**Figure a)**

Ala D/L vs. Age (yr)

**Figure b)**

Observed Age (yr) vs. Predicted Age (yr)

**Figure c)**

Ala D/L vs. Quantile Residual

**Figure d)**

Ala D/L vs. Absolute Quantile Residual
Appendix C. Continued: Model 29 (see Appendix A); Taxon: Fulvia tenuicostata

\[ TDK1: \quad t = e^{10.7 \cdot \text{atanh} \left( \frac{R_t - e^{-4.4}}{1 - e^{-4.4} R_t} \right)}^{2.1} \]

\[ p_L(t) = \frac{1}{\sqrt{2\pi e^{4.7}}} e^{-\left(\log(t) - \log(\hat{t})\right)^2/\left(2(2e^{4.7})\right)} \]

(a)  
(observed age vs. predicted age)  
(b)  
(c)  
(d)  
(quantile residual vs. ala d/l)  
(absolute quantile residual vs. ala d/l)
Appendix C. Continued: Model 30 (see Appendix A); Taxon: Fulvia tenuicostata

\[
\text{SPK1: } \hat{t} = e^{10.9} \left( R_t^{2.3} - (e^{-941.2})^{2.3} \right)
\]

\[
\rho_\ell(t) = \frac{1}{t\sqrt{2\pi}e^{\frac{1}{4}}} e^{-\frac{(\log(t) - \log(\ell))^2}{(2e^{4.7})}}
\]
Appendix C. Continued: Model 31 (see Appendix A); Taxon: Fulvia tenuicostata

\[
\hat{t} = e^{3.9 \left( \frac{1 + R_t}{1 - R_t} \right)^{6.9}}
\]

\[
\rho_L(t) = \frac{1}{t \sqrt{2 \pi e^{0.6}}} e^{-\left(\log(t) - \log(t^*)\right)^2/(2e^{0.6})}
\]
Appendix C. Continued: Model 32 (see Appendix A); Taxon: Fulvia tenuicostata

\[
\hat{t} = e^{11.8 \left[ \text{atanh}(R_t) \right]^{3.0}}
\]

\[
p_L(t) = \frac{1}{t\sqrt{2\pi}e^{0.3}} e^{-\left(\log(t) - \log(t_0)\right)^2/(2e^{0.3})}
\]

Ala D/L

a)

Graph showing the relationship between Ala D/L and age in years, with a fitted curve and quantile residuals.

b)

Graph showing the predicted age vs. observed age for various ages.

c)

Quantile Residual graph.

d)

Absolute Quantile Residual graph.
Appendix C. Continued: Model 33 (see Appendix A); Taxon: Fulvia tenuicostata

\[ \hat{t} = e^{12.0} R_t^{3.1} \]

\[ p_L(t) = \frac{1}{t \sqrt{2 \pi} e^{0.2}} e^{-(\log(t) - \log(t))^2/(2e^{0.2})} \]

a) SPK0

b) Predicted Age (yr) vs. Observed Age (yr)

c) Quantile Residual vs. Ala D/L

d) Absolute Quantile Residual vs. Ala D/L
Appendix C. Continued: Model 34 (see Appendix A); Taxon: *Fulvia tenuicostata*

\[
\hat{t} = e^{5.1 \left[ \frac{1 + R_t}{1 - R_t} \right]^{4.9}} - \left( \frac{1 + e^{-3.5}}{1 - e^{-3.5}} \right)^{4.9}
\]

\[
p_L(t) = \frac{1}{\sqrt{2\pi}e^{0.3}} e^{-\left(\log(t) - \log(\hat{t})\right)^2/(2e^{0.3})}
\]
Appendix C. Continued: Model 35 (see Appendix A); Taxon: Fulvia tenuicostata

a) TDK1: \( ^{\wedge}t = e^{10.9 \text{atanh} \left( \frac{R_t - e^{-3.8}}{1 - e^{-3.8} R_t} \right)^{2/2}} \)

\[ p_L(t) = \frac{1}{t \sqrt{2\pi} e^{0.2}} e^{-\frac{(\log(t) - \log(\bar{t}))^2}{(2e^{0.2})}} \]

b) Predicted Age (yr) vs. Observed Age (yr)

c) Quantile Residual vs. Ala D/L

d) Absolute Quantile Residual vs. Ala D/L
Appendix C. Continued: Model 36 (see Appendix A); Taxon: Fulvia tenuicostata

\[ SPK1: \hat{t} = e^{11.5} (R_t^{2.7} - (e^{-3.5})^{2.7}) \]

\[ p_L(t) = \frac{1}{t\sqrt{2\pi e^{0.2}}} e^{-(\log(t) - \log(\tilde{t}))^2/(2e^{0.2})} \]

(a) Predicted Age (yr)

(b) Observed Age (yr)

(c) Absolute Quantile Residual

(d) Quantile Residual
Appendix C. Continued: Model 37 (see Appendix A); Taxon: Fulvia tenuicostata

\[
\hat{t} = e^{7.8 \left[ \frac{1 + R_t}{1 - R_t} \right]^{5.6}}
\]

\[
p_L(t) = \frac{1}{\sqrt{2\pi}e^{6.3}} e^{-\left(\log(t) - \log(t)\right)^2/(2e^{6.3})}
\]

![Graph a) showing CPK0 model](image)

![Graph b) showing predicted age vs. observed age](image)

![Graph c) showing quantile residuals](image)

![Graph d) showing absolute quantile residuals](image)
Appendix C. Continued: Model 38 (see Appendix A); Taxon: Fulvia tenuicostata

(a) TDK0: $t = e^{12.1 \cdot \text{atanh}(R_t)}^{1.5}$

$p(t) = \frac{1}{\sqrt{2\pi}e^{5.9}} e^{-\left(\frac{\log(t) - \log(T)}{\sqrt{2e^{5.9}}}\right)^2}$

(b) Predicted Age (yr) vs. Observed Age (yr)

(c) Quantile Residual vs. Val D/L

(d) Absolute Quantile Residual vs. Val D/L
Appendix C. Continued: Model 39 (see Appendix A); Taxon: Fulvia tenuicostata

\[ \text{SPK0: } t = e^{12.0} R_t^{1.5} \]

\[ p_L(t) = \frac{1}{t\sqrt{2\pi e^{6.0}}} e^{-\frac{(\log(t) - \log(\hat{t}))^2}{2(2e^{6.0})}} \]

(a) Observed Age (yr) vs. Predicted Age (yr)

(b) Absolute Quantile Residual vs. Val D/L

(c) Quantile Residual vs. Val D/L

(d) Absolute Quantile Residual vs. Val D/L
Appendix C. Continued: Model 40 (see Appendix A); Taxon: Fulvia tenuicostata

\[
\hat{t} = e^{40.1 \left[ \left( \frac{1 + R_t}{1 - R_t} \right)^{0.0} - \left( \frac{1 + e^{-4.5}}{1 - e^{-4.5}} \right)^{0.0} \right]}
\]

\[
p_L(t) = \frac{1}{\sqrt{2\pi}e^{5.7}} e^{-\frac{(\log(t) - \log(T))^2}{(2e^{5.7})^2}}
\]
Appendix C. Continued: Model 41 (see Appendix A); Taxon: Fulvia tenuicostata

\[ \hat{t} = e^{11.0 \cdot \text{atanh} \left( \frac{R_t - e^{-4.5}}{1 - e^{-4.5}R_t} \right)^{1.0}} \]

\[ p_L(t) = \frac{1}{\sqrt{2\pi t^{5.5}}} e^{-\frac{\left((\log(t) - \log(T))^2\right)}{(2e^{5.5})}} \]

\[ p_L(t) = \frac{1}{\sqrt{2\pi t^{5.5}}} e^{-\frac{\left((\log(t) - \log(T))^2\right)}{(2e^{5.5})}} \]
Appendix C. Continued: Model 42 (see Appendix A); Taxon: Fulvia tenuicostata

\[ SPK1: \hat{t} = e^{11.0} \left( R_t^{1.0} - (e^{-4.5})^{1.0} \right) \]

\[ p_L(t) = \frac{1}{t\sqrt{2\pi e^{5.5}}} e^{-\left((\log(t) - \log(t))^2/(2e^{5.5})\right)} \]
Appendix C. Continued: Model 43 (see Appendix A); Taxon: Fulvia tenuicostata

\[
\hat{t} = e^{5.1 \left[ \frac{(1 + R_t)(1 - R_t)}{(1 - R_t)} \right]^{19.5}}
\]

\[
\rho_L(t) = \frac{1}{t \sqrt{2 \pi e^{0.9}}} e^{-\left(\frac{\text{log}(t) - \text{log}(\text{log}(t))}{2e^{0.9}}\right)^2}
\]

\[\text{Val D/L} \quad \text{Age (yr)}\]

\[\text{Val D/L} \quad \text{Predicted Age (yr)}\]

\[\text{Val D/L} \quad \text{Quantile Residual}\]

\[\text{Val D/L} \quad \text{Absolute Quantile Residual}\]
Appendix C. Continued: Model 44 (see Appendix A); Taxon: Fulvia tenuicostata

\[ TDK0: \hat{\alpha} = e^{15.6 \left[ \text{atanh}(R_t)^{2.7} \right]_t} \]

\[ \rho_L(t) = \frac{1}{t \sqrt{2\pi e^{0.5}}} e^{-(\log(t) - \log(T))^2/(2e^{0.5})} \]

Graphs showing:

- Graph a) showing the relationship between Val D/L and Age (yr) with a model equation overlay.
- Graph b) showing the predicted age vs. observed age with a trend line.
- Graph c) showing quantile residuals vs. Val D/L with a fitted line.
- Graph d) showing absolute quantile residuals vs. Val D/L with a fitted line.
Appendix C. Continued: Model 45 (see Appendix A); Taxon: Fulvia tenuicostata

\[ SPK0: \quad \hat{\theta} = e^{15.5} \quad R_t^{2.7} \]

\[ p_L(t) = \frac{1}{\sqrt{2\pi e^{0.5}}} e^{-\frac{(\log(t) - \log(t))^2}{2e^{0.5}}} \]

![Graph a) SPK0 model](image1)

![Graph b) Predicted vs observed age](image2)

![Graph c) Quantile residual chart](image3)

![Graph d) Absolute quantile residual chart](image4)
Appendix C. Continued: Model 46 (see Appendix A); Taxon: Fulvia tenuicostata

\[ CPK1: \hat{t} = e^{7.5} \left[ \left( \frac{1 + R_t}{1 - R_t} \right)^{7.3} - \left( \frac{1 + e^{-4.5}}{1 - e^{-4.5}} \right)^{7.3} \right] \]

\[ p_L(t) = \frac{1}{t\sqrt{2\pi e^{-0.0}}} e^{-((\log(t) - \log(\bar{t}))^2)/(2e^{-0.0})} \]
Appendix C. Continued: Model 47 (see Appendix A); Taxon: Fulvia tenuicostata

TDK1: $t = e^{12.2} \text{atanh} \left[ \frac{R_t - e^{-4.5}}{1 - e^{-4.5}R_t} \right]^{1.4}$

$p_L(t) = \frac{1}{t \sqrt{2\pi} e^{-0.3}} e^{-(\log(t) - \log(T))^2/(2e^{-0.3})}$

(c) Absolute Quantile Residual

(d) Absolute Quantile Residual
Appendix C. Continued: Model 48 (see Appendix A); Taxon: Fulvia tenuicostata

\[ SPK1 : \hat{t} = e^{12.6} (R_t^{1.7} - (e^{-4.5})^{1.7}) \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi e^{-0.1}}} e^{-(\log(t) - \log(t)^2)/(2e^{-0.1})} \]
Appendix C. Continued: Model 49 (see Appendix A); Taxon: Fulvia tenuicostata

\[
\begin{align*}
\hat{t} &= e^{7.3 \left[ \frac{(1 + R_t)}{(1 - R_t)} \right]^{3.3}} \\
\rho_L(t) &= \frac{1}{t \sqrt{2\pi e^{5.7}}} e^{-\left(\log(t) - \log(t)\right)^2 / \left(2e^{5.7}\right)}
\end{align*}
\]
Appendix C. Continued: Model 50 (see Appendix A); Taxon: Fulvia tenuicostata

\[ T_{DK0} = e^{11.1 \left[ \text{atanh}(R_t) \right]^{1.7}} \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi} e^{5.1}} e^{-\left(\log(t) - \log(T)\right)^2 / (2e^{5.1})} \]
Appendix C. Continued: Model 51 (see Appendix A); Taxon: Fulvia tenuicostata

\[ \text{SPK0: } t = e^{11.2} R_t^{1.7} \]

\[ p_L(t) = \frac{1}{t^{1/2} \pi e^{5.1}} e^{-\left(\log(t) - \log(t_0)\right)^2 / \left(2e^{5.1}\right)} \]

- **a)**
- **b)**
- **c)**
- **d)**
Appendix C. Continued: Model 52 (see Appendix A); Taxon: Fulvia tenuicostata

\[ \hat{t} = e^{7.9} \left( \frac{1 + R_t}{1 - R_t} \right)^{2.4} - \left( \frac{1 + e^{-4.2}}{1 - e^{-4.2}} \right)^{2.4} \]

\[ p_L(t) = \frac{1}{\sqrt{2\pi}e^{5.1}} e^{-\left(\log(t) - \log(\hat{t})\right)^2/(2e^{5.1})} \]

- a) Graph showing the equation for CPK1 and age prediction.
- b) Scatter plot showing observed and predicted ages.
- c) Scatter plot showing quantile residuals.
- d) Scatter plot showing absolute quantile residuals.
Appendix C. Continued: Model 53 (see Appendix A); Taxon: Fulvia tenuicostata

\[ TDK1: \quad \hat{t} = e^{10.8 \cdot \text{atanh} \left( \frac{R_t - e^{-4.5}}{1 - e^{-4.5} R_t} \right)^{1.5}} \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi e^{4.9}}} e^{-\left( \log(t) - \log(T) \right)^2/(2e^{4.9})} \]

(a) Age (yr) vs. Phe D/L

(b) Predicted Age (yr) vs. Observed Age (yr)

(c) Quantile Residual vs. Phe D/L

(d) Absolute Quantile Residual vs. Phe D/L
Appendix C. Continued: Model 54 (see Appendix A); Taxon: Fulvia tenuicostata

**a)**
SPK1: \[ t = e^{11.0} \left( R_t^{1.6} \left( e^{-4.3} \right)^{1.6} \right) \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi} e^{4.9}} e^{-\left( \log(t) - \log(f) \right)^2 / \left( 2e^{4.9} \right)} \]

**b)**

**c)**

**d)**

Quantile Residual

Absolute Quantile Residual
Appendix C. Continued: Model 55 (see Appendix A); Taxon: Fulvia tenuicostata

**Figure a)**

\[
CPK_0^\wedge = e^{4.6 \left(1 + R_t \right) / \left(1 - R_t \right)^{10.2}}
\]

\[
p_L(t) = \frac{1}{t \sqrt{2\pi} e^{0.5}} e^{-\left(\log(t) - \log(t_0)\right)^2 / \left(2 e^{0.5}\right)}
\]

**Figure b)**

- Predicted Age (yr) vs. Observed Age (yr)

**Figure c)**

- Quantile Residual vs. Phe D/L

**Figure d)**

- Absolute Quantile Residual vs. Phe D/L
Appendix C. Continued: Model 56 (see Appendix A); Taxon: Fulvia tenuicostata

\[ TDK0: \hat{t} = e^{13.5 \left[ \text{atanh} \left( R_t \right) \right]^{2.9}} \]

\[ p_L(t) = \frac{1}{t\sqrt{2\pi e^{-0.3}}} e^{-\left(\log(t) - \log(\bar{t})\right)^2/(2e^{-0.3})} \]

(a) Graph showing relationship between Phe D/L and age (yr).
(b) Graph showing predicted age vs. observed age.
(c) Graph showing quantile residuals vs. Phe D/L.
(d) Graph showing absolute quantile residuals vs. Phe D/L.
Appendix C. Continued: Model 57 (see Appendix A); Taxon: Fulvia tenuicostata

SPK0: $t = e^{13.6} R_t^{2.9}$

$P_L(t) = \frac{1}{t^{\frac{1}{2}} 2\pi e^{-0.4}} e^{-(\log(t) - \log(\bar{t}))^2/(2e^{-0.4})}$
Appendix C. Continued: Model 58 (see Appendix A); Taxon: Fulvia tenuicostata

![Graphs and equations related to age estimation and model calculations.](image-url)
Appendix C. Continued: Model 59 (see Appendix A); Taxon: Fulvia tenuicostata

\[ TDK1: \hat{t} = e^{11.0} \text{atanh} \left( \frac{R_t - e^{-4.1}}{1 - e^{-4.1} R_t} \right)^{1.5} \]

\[ p_L(t) = \frac{1}{t\sqrt{2\pi e^{-2.0}}} e^{-\frac{(\log(t) - \log(\overline{t}))^2}{2(2e^{-2.0})}} \]

Graph a) shows the relationship between age (yr) and Phe D/L, graph b) shows the predicted age (yr) vs. observed age (yr), graph c) shows the quantile residual vs. Phe D/L, and graph d) shows the absolute quantile residual vs. Phe D/L.
Appendix C. Continued: Model 60 (see Appendix A); Taxon: Fulvia tenuicostata

\[ SPK1 : \hat{t} = e^{11.6} \left( R_t^{1.9} - (e^{-4.1})^{1.9} \right) \]

\[ p_L(t) = \frac{1}{t\sqrt{2\pi}e^{-1.7}} e^{-\left(\log(t) - \log(\hat{t})\right)^2/(2e^{-1.7})} \]
Appendix C. Continued: Model 61 (see Appendix A); Taxon: Fulvia tenuicostata

\[ \hat{t} = e^{7.2 \left[ \frac{(1 + R_t)}{(1 - R_t)} \right]^{4.6}} \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi e^{7.0}}} e^{-(\log(t) - \log(t))^2/(2e^{7.0})} \]

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Part of the text is obscured or not visible in the image.
Appendix C. Continued: Model 62 (see Appendix A); Taxon: Fulvia tenuicostata

TDK0: \[ t = e^{11.8 \left( \tanh(R_t) \right)^{1.8}} \]

\[ \rho_L(t) = \frac{1}{\sqrt{2\pi}e^{6.8}} e^{-\left(\log(t) - \log(T)\right)^2/(2e^{6.8})} \]
Appendix C. Continued: Model 63 (see Appendix A); Taxon: Fulvia tenuicostata

\[ \hat{t} = e^{11.8} R_t^{1.8} \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi e^{6.8}}} e^{-\frac{(\log(t) - \log(\hat{t}))^2}{2(2e^{6.8})}} \]

(a) SPK0

(b) Predicted Age (yr) vs. Observed Age (yr)

(c) Quantile Residual vs. Leu D/L

(d) Absolute Quantile Residual vs. Leu D/L
Appendix C. Continued: Model 64 (see Appendix A); Taxon: Fulvia tenuicostata

\[ t = e^{42.3} \left( \frac{(1 + R_t)^{0.0}}{(1 - R_t)^{0.0}} - \frac{1 + e^{-4.4}}{1 - e^{-4.4}} \right) \]

\[ p_L(t) = \frac{1}{\sqrt{2\pi} e^{6.9}} \left( \frac{\log(t) - \log(T)}{2e^{6.9}} \right)^2 \]
Appendix C. Continued: Model 65 (see Appendix A); Taxon: Fulvia tenuicostata

\[ TDK1: \quad t = \frac{1}{\sqrt{2\pi e^{6.7}}} \left[ \frac{R_t e^{-4.4}}{1 - e^{-4.4 R_t}} \right]^{1.5} \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi e^{6.7}}} e^{-\frac{(\log(t) - \log(\hat{t}))^2}{2(6.7)^2}} \]

- **Figure a)**
  - Graph showing the relationship between Leu D/L and age (yr) with a fitted curve and residuals.

- **Figure b)**
  - Graph showing the comparison between observed and predicted age (yr) with data points and a trend line.

- **Figure c)**
  - Graph showing quantile residual vs. Leu D/L with a trend line.

- **Figure d)**
  - Graph showing absolute quantile residual vs. Leu D/L with a trend line.

Appendix C. Continued: Model 65 (see Appendix A); Taxon: Fulvia tenuicostata
Appendix C. Continued: Model 66 (see Appendix A); Taxon: Fulvia tenuicostata

\[ \text{SPK1: } t = e^{11.8 \left( R_t^{1.8} - (e^{-198.4})^{1.8} \right)} \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi e^{6.8}}} e^{-\left(\log(t) - \log(t)\right)^2/(2e^{6.8})} \]
Appendix C. Continued: Model 67 (see Appendix A); Taxon: Fulvia tenuicostata

\[
\hat{t} = e^{4.8 \left[ \left(1 + R_t \right)/\left(1 - R_t \right) \right]^{11.9}} \\
p_L(t) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\left(\log(t) - \log(t^*)\right)^2/(2\sigma^2)}
\]
Appendix C. Continued: Model 68 (see Appendix A); Taxon: Fulvia tenuicostata

\begin{align*}
T_{DK0} : & \quad T = e^{13.4 \left[ \text{atanh}(R_t) \right]^{2.7}} \\
\rho_L(t) = & \frac{1}{t \sqrt{2\pi e^{1.2}}} e^{-\left( (\log(t) - \log(t))^2 \right) / \left( 2e^{1.2} \right)}
\end{align*}
Appendix C. Continued: Model 69 (see Appendix A); Taxon: Fulvia tenuicostata

\[ t = e^{13.6} R_t^{2.7} \]

\[ p(t) = \frac{1}{t \sqrt{2\pi e^{1.2}}} e^{-\left(\log(t) - \log(t_0)\right)^2 / (2e^{1.2})} \]

\[ \text{Leu D/L} \]

\[ \text{Predicted Age (yr)} \]

\[ \text{Observed Age (yr)} \]

\[ \text{Quantile Residual} \]

\[ \text{Absolute Quantile Residual} \]
Appendix C. Continued: Model 70 (see Appendix A); Taxon: Fulvia tenuicostata

\[ \hat{t} = e^{4.8} \left[ \left( \frac{1 + R_t}{1 - R_t} \right)^{11.7} - \left( \frac{1 + e^{-983.4}}{1 - e^{-983.4}} \right)^{11.7} \right] \]

\[ p_L(t) = \frac{1}{\sqrt{2\pi}e^{1.2}} e^{-\left(\log(t) - \log(t)^2/(2e^{1.2})\right)} \]
Appendix C. Continued: Model 71 (see Appendix A); Taxon: Fulvia tenuicostata

\[ TDK1: \hat{t} = e^{13.4 \cdot \text{atanh} \left( \frac{R_t - e^{-16.5 R_t}}{1 - e^{-16.5 R_t}} \right)^{2.7}} \]

\[ p_L(t) = \frac{1}{t \sqrt{2\pi e^{1.2}}} \cdot e^{-\frac{(\log(t) - \log(T))^2}{2(e^{1.2})}} \]
Appendix C. Continued: Model 72 (see Appendix A); Taxon: Fulvia tenuicostata

\[ t = e^{13.4} \left( R_t^{2.7} - (e^{-1083.2})^{2.7} \right) \]

\[ p_L(t) = \frac{1}{t\sqrt{2\pi e^{1.2}}} e^{-\frac{(\log(t) - \log(1))}{2}(2e^{1.2})} \]

\[ \text{Leu D/L} \]

\[ \text{Observed Age (yr)} \]

\[ \text{Predicted Age (yr)} \]

\[ \text{Quantile Residual} \]

\[ \text{Absolute Quantile Residual} \]