Supplement

Table S1. Summary of the tetrapod-bearing formations, geological ages, and broad locations. Ages are clarified further in Table S2. The formations are listed in rank order of approximate age through geological time, from oldest (1) to youngest (47).

Age rank	Formation	Abbreviation	Geologic age	Location
1	*Lystrosaurus* Assemblage Zone	LAZ	Induan	South Africa
2	Fremouw		Induan	Antarctica
3	Panchet		Induan	India
4	Kopanskaya		Induan	Russia
5	Staritskaya		Olenekian (l)	Russia
6	Kzylsaiskaya		Olenekian (l/m)	Russia
7	*Cynognathus* Assemblage zone (A Zone)	CAZ A	Olenekian (u)	South Africa
8	Gostevskaya		Olenekian (u)	Russia
9	Petropavlovskaya		Olenekian (u)	Russia
10	*Cynognathus* Assemblage Zone (B zone)	CAZ B	Anisian (l)	South Africa
11	Moenkopi (Holbrook member)		Anisian (l)	North America
12	N'tawere		Anisian (l/u)	Zambia
13	Puesto Viejo (Rio seca de la quebrada)		Anisian (l/u)	Argentina
14	*Cynognathus* Assemblage Zone (C zone)	CAZ C	Anisian (u)	South Africa
15	Manda		Anisian (u)	Tanzania
16	Yerrapalli		Anisian (u)	India
17	Donguz		Anisian (u)	Russia
18	Chañares		Ladinian (l)	Argentina
19	Lettenkeuper		Ladinian (u)	Germany
20	Bukobay		Ladinian (u)	Russia
21	Santa Maria lower	SM (l)	Ladinian (u) - Carnian (l)	Brazil
22	Schilfsandstein		Carnian (l)	Germany
23	Maleri (lower)		Carnian (u)	India
24	Lossiemouth sandstone		Carnian (u)	Scotland
25	Popo Agie		Carnian (u)	North America
26	Santa Maria upper	SM (u)	Carnian (u) - Norian (l)	Brazil
27	Ischigualasto		Carnian (u) - Norian (m)	Argentina
28	Stubensandstein lower		Norian (l)	Germany
29	Maleri (upper)		Norian (l)	India
30	Dockum (Tecovas)	Dockum (1)	Norian (l)	North America
31	Chinle (Bluewater, Blue mesa, Hayden quarry)	Chinle (1)	Norian (l)	North America

32	Stubensandstein middle		Norian (m)	Germany
33	Chinle (Sonsela (lower, upper))	Chinle (2)	Norian (m)	North America
34	Elliot lower		Norian (m/u)	South Africa/Lesotho
35	Stubensandstein upper		Norian (u)	Germany
36	Los Colorados upper		Norian (u)	Argentina
37	Chinle (upper petrified forest)	Chinle (3)	Norian (u)	North America
38	Dockum (Cooper canyon (Otis Chalk, Post Quarry))	Dockum (2)	Norian (u)	North America
39	Knollenmergel		Rhaetian (l)	Germany
40	Lufeng lower (Dull purple beds)		Hettangian	China
41	Portland		Hettangian	North America
42	Glen canyon (Moenave, Wingate)	Glen (1)	Hettangian - Sinemurian (l)	North America
43	Lufeng upper (Dark red beds)		Sinemurian (l/u)	China
44	Elliot upper		Sinemurian (u) - Pliensbachian (l)	South Africa/Lesotho
45	Forest Sandstone	FSS	Sinemurian (u) - Pliensbachian (l)	Zimbabwe
46	Glen Canyon (Kayenta, Navajo)	Glen (2)	Sinemurian (u) - Pliensbachian (l/u)	North America
47	Clarens		Pliensbachian (u)	South Africa

Table S2. Summary of the key time divisions used in the study, indicating their substage equivalences and age ranges, according to the Geologic Time Scale 2012 (Gradstein et al., 2012). The ages within stages are taken from Gradstein et al. (2012), except for those within the Anisian, Ladinian, Sinemurian, and Pliensbachian, which are selected as midpoints, in the absence of more exact information. We select the 'long Norian' and 'long Rhaetian' age options.

Epoch	Time division	Substage	FAD (Ma)	LAD (Ma)	Midpoint (Ma)	Duration (Myr)
Early Triassic	Induan		252.2	250	251.1	2.2
Early Triassic	Olenekian (lower)	Smithian	250	248.5	249.7	1.5
Early Triassic	Olenekian (upper)	Spathian	248.5	247.1	247.8	1.4
Middle Triassic	Anisian (lower)	Aegean/ Bithynian	247.1	244.3	245.7	2.8
Middle Triassic	Anisian (upper)	Pelsonian/ Illyrian	244.3	241.5	242.9	2.8
Middle Triassic	Ladinian (lower)	Longobardian	241.5	239.3	240.4	2.2
Middle Triassic	Ladinian (upper)	Fassanian	239.3	237	238.1	2.3
Late Triassic	Carnian (lower)	Julian	237	233.5	235.8	3.5
Late Triassic	Carnian (upper)	Tuvalian	233.5	228.4	230.9	5.1
Late Triassic	Norian (lower)	Lacian	228.4	217.5	222.9	10.9
Late Triassic	Norian (middle)	Alaunian	217.5	214	215.8	3.5
Late Triassic	Norian (upper)	Sevatian	214	209.5	211.7	4.5
Late Triassic	Rhaetian (lower)	*Suessi* Zone	209.5	204	206.8	5.5
Late Triassic	Rhaetian (upper)		204	201.3	202.7	2.7
Early Jurassic	Hettangian		201.3	199.3	200.3	2
Early Jurassic	Sinemurian (lower)		199.3	195	197.1	4.3
Early Jurassic	Sinemurian (upper)		195	190.8	192.9	4.2
Early Jurassic	Pliensbachian (lower)		190.8	186.7	188.7	4.1
Early Jurassic	Pliensbachian (upper)		184.7	182.7	184.7	4

Table S3. Summary of the tetrapod footprint-bearing formations, geological ages, and broad locations. Ages are clarified further in Table S2. The formations are listed in rank order of approximate age through geological time, from oldest (1) to youngest (63).

Age rank	Formation	Geological age	Location
1	Karoo	early Induan	South Africa
2	Detfurth	early Olenekian	Germany
3	Hardegsen	late Olenekian	Germany
4	Solling	basal Anisian	Germany
5	Guanling	early-mid Anisian	China
6	Cerro de las Cabras	late Anisian	Argentina
7	Portezuelo	Ladinian-early Carnian	Argentina
8	Portezuelo	Ladinian-early Carnian	Argentina
9	Cerro de Las Cabras	late Ladinian	Argentina
10	Val Sabbia	early-middle Carnian	Italy
11	Ansbacher Sandstein	middle Carnian	Germany
12	Stockton	late Julian-early Tuvalian	New York
13	Molteno	Carnian	South Africa
14	Molteno	Carnian	South Africa
15	Blasensandstein	early Tuvalian	Germany
16	Popo Agie	late Carnian	Colorado
17	Pekin	late Carnian	
18	Wolfville	late Carnian	Canada
19	Travenanzes	late Carnian	Italy
20	Montemarcello	middle Carnian-Norian	Italy
21	Coburger Sandstein	late Tuvalian	Germany
22	Lockatong	late Tuvalian	Pennsylvania
23	Gettysburg	latest Carnian-Norian	Pennsylvania
24	Dolomia Principale	late Carnian to early Norian	Italy
25	Bluewater Creek	early Norian	New Mexico
26	Monitor Butte	early Norian	Colorado
27	Chinle-Mesa Redondo M	early Norian	Colorado
28	Petrified Forest	early Norian	Arizona
29	Caturrita	early Norian	Brazil
30	Caturrita	early Norian	Brazil
31	Blackstone	early Norian	Australia
32	Chinle-Blue Mesa M.	early Norian	Arizona
33	Passaic (lower)	early-mid mid Norian	New Jersey
34	Passaic (lower)	early-mid mid Norian	Pennsylvania
35	Passaic (lower)	early-mid mid Norian	New Jersey
36	Passaic (lower)	early-mid mid Norian	New Jersey
37	Passaic	Norian	Pennsylvania

38	Löwenstein	middle Norian	Germany
39	Semionotussandstein	middle Norian	Germany
40	Hauptdolomit	top Alaunian	Switzerland
41	Passaic (upper)	mid mid-late Norian	New Jersey
42	Passaic (upper)	mid mid-late Norian	Pennsylvania
43	Bull Run	mid-late Norian	Virginia
44	Fleming Fjord Formation	late Norian-early Rhaetian	Greenland
45	Tomanová	late Norian-Rhaetian	Poland
46	Baoding	late Norian-Rhaetian	China
47	Kössen	Rhaetian	Germany
48	Santo Domingo	latest Triassic	Argentina
49	Owl Rock Formation	Rhaetian	Utah
50	Chinle	Rhaetian	Utah
51	Rock Point	late Rhaetian	Colorado
52	Sloan Canyon	late Rhaetian	New Mexico
53	Sloan Canyon	late Rhaetian	New Mexico
54	Redonda	late Rhaetian	New Mexico
55	Redonda	late Rhaetian	New Mexico
56	Redonda	late Rhaetian	New Mexico
57	Nugget Sandstone	upper Triassic-early Jurassic	Utah
58	Nugget Sandstone	upper Triassic-early Jurassic	Colorado
59	Nugget Sandstone	upper Triassic-early Jurassic	Utah
60	Moenave	upper Triassic-early Jurassic	Utah
61	Moenave	upper Triassic-early Jurassic	Arizona
62	Wingate Sandstone	upper Triassic-early Jurassic	Utah
63	Glen Canyon Sandstone	upper Triassic-Toarcian	Utah

Identifying the breakpoints in Triassic tetrapod evolution

We sought to identify whether the Carnian Humid Episode stood out as a major change in regime by assessing whether it corresponded to a statistically significant break in slope. We used the software 'segmented' (Muggeo 2008) in R, and this code:

```
library("segmented")
trias<-read.csv("Triassic.csv", header=T, row.names = 1)
lin.mod <- lm(Midpoint ~ Ratio_AT_gen, data = trias)
summary(lin.mod)
plot(lin.mod)
segmented.mod <- segmented(lin.mod, seg.Z = ~Midpoint, psi=c(222, 240))
plot(segmented.mod, xlim=c(260,180))
summary(segmented.mod)
```

For the plot of the ratio of archosauromorph genera to total genera, the estimated break point was narrowed down to the temporal range 231.086 ± 0.540 to 230.918 ± 0.055, so maximally 231.626 to 230.863 million years ago. The fit of the line is given with adjusted $R^2 = 0.8074$.

Break point for proportions of archosauromorphs by genera (lm)

```
***Regression Model with Segmented Relationship(s)***

Call:
segmented.lm(obj = lin.mod, seg.Z = ~Midpoint, psi = c(222, 240))

Estimated Break-Point(s):
               Est. St.Err
psi1.Midpoint 230.918  0.055
psi2.Midpoint 231.086  0.540

Meaningful coefficients of the linear terms:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.9540120  0.4146527   2.301   0.0268 *
Midpoint    -0.0009325  0.0019690  -0.474   0.6384
U1.Midpoint -2.5584479  8.7942237  -0.291       NA
U2.Midpoint  2.5546093  8.7942249   0.290       NA
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1244 on 39 degrees of freedom
Multiple R-Squared: 0.8293, Adjusted R-squared: 0.8074

Convergence attained in 2 iterations with relative change -8.321394e-15
```

Break point for proportions of archosauromorphs by genera (glm)

```
> fit.glm<-glm(Ratio_AT_gen ~ Midpoint, data = triassic)
> fit.seg<-segmented(fit.glm, seg.Z = ~Midpoint, psi=c(180, 240))
Error in seg.glm.fit(y, XREG, Z, PSI, w, offs, opz, return.all.sol = TRUE) :
  psi out of the range
> summary(fit.seg)

        ***Regression Model with Segmented Relationship(s)***

Call:
segmented.glm(obj = fit.glm, seg.Z = ~Midpoint, psi = c(220,
```

```
   240))

Estimated Break-Point(s):
              Est.  St.Err
psi1.Midpoint 230.916  0.054
psi2.Midpoint 231.068  0.429

Meaningful coefficients of the linear terms:
                  Estimate     Std. Error   t value   Pr(>|t|)
(Intercept)    0.9368632    0.4139425  2.263  0.0293 *
Midpoint      -0.0008471    0.0019657  -0.431  0.6689
U1.Midpoint   -2.8437935    8.7791596  -0.324     NA
U2.Midpoint    2.8398829    8.7791609   0.323     NA
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
(Dispersion parameter for gaussian family taken to be 0.01541473)

Null     deviance: 3.52473  on 44  degrees of freedom
Residual deviance: 0.60117  on 39  degrees of freedom
AIC: -52.495

Convergence attained in 3 iterations with relative change 8.114546e-15

> plot(Ratio_DT_gen ~ Midpoint, data=triassic, xlim=c(250, 190))
> plot(fit.seg,add=TRUE,link=FALSE,lwd=2,col=2:3)
```

Break point for proportions of archosauromorphs by specimens (lm)

```
        ***Regression Model with Segmented Relationship(s)***

Call:
segmented.lm(obj = lin.mod, seg.Z = ~Midpoint, psi = c(190, 220))

Estimated Break-Point(s):
              Est. St.Err
psi1.Midpoint 209.149  8.407
psi2.Midpoint 229.028 16.405

Meaningful coefficients of the linear terms:
          Estimate Std. Error t value Pr(>|t|)
(Intercept) -1.166232   1.954887  -0.597    0.554
Midpoint     0.009857   0.010032   0.983    0.332
U1.Midpoint -0.023616   0.015761  -1.498       NA
U2.Midpoint -0.010369   0.013257  -0.782       NA

Residual standard error: 0.1935 on 39 degrees of freedom
Multiple R-Squared: 0.6843,  Adjusted R-squared: 0.6438

Convergence attained in 2 iterations with relative change -1.529768e-16
```

Regression Model with Segmented Relationship(s)

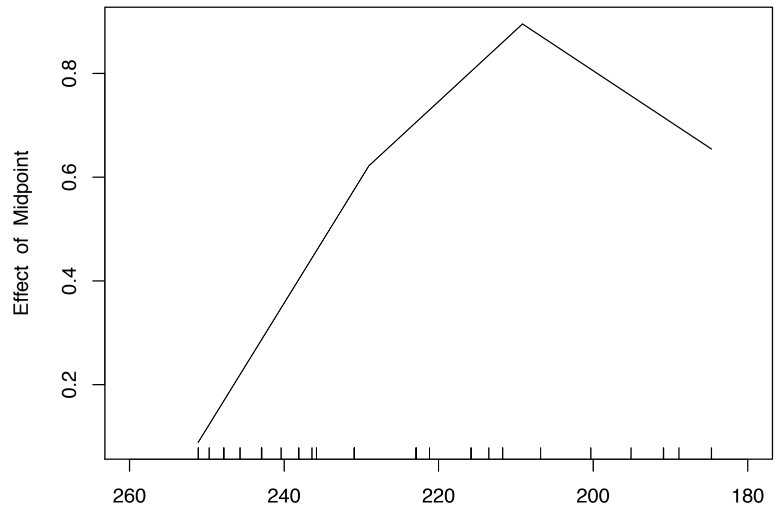
Call:
segmented.lm(obj = lin.mod, seg.Z = ~Midpoint, psi = c(215, 235))

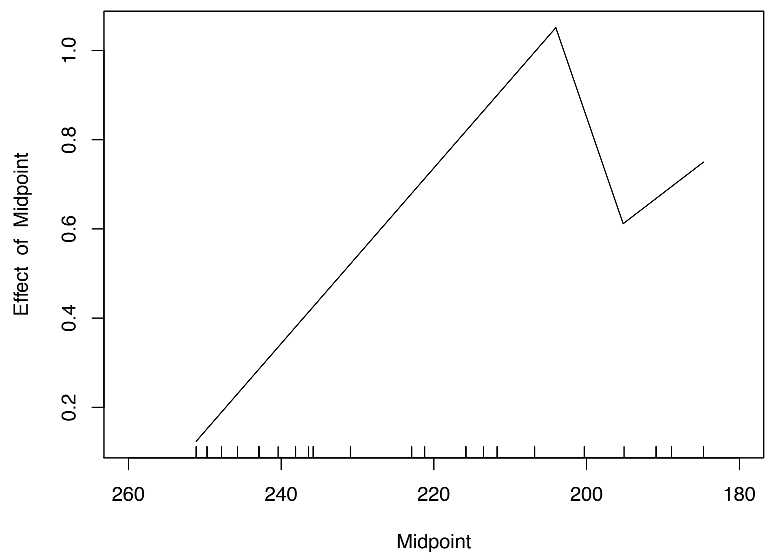
Estimated Break-Point(s):
Est. St.Err
psi1.Midpoint 195.214 2198.290
psi2.Midpoint 204.033 1457.928

Meaningful coefficients of the linear terms:
Estimate Std. Error t value Pr(>|t|)
(Intercept) 3.17561 4.84811 0.655 0.516
Midpoint -0.01313 0.02550 -0.515 0.609
U1.Midpoint 0.06299 27.20029 0.002 NA
U2.Midpoint -0.06956 27.20028 -0.003 NA

Residual standard error: 0.1923 on 39 degrees of freedom
Multiple R-Squared: 0.6879, Adjusted R-squared: 0.6479

Convergence attained in 2 iterations with relative change 6.19041e-16





Break point for proportions of archosauromorphs by specimens (glm)

```
> fit.glm<-glm(Ratio_AT_spec ~ Midpoint, data = triassic)
> fit.seg<-segmented(fit.glm, seg.Z = ~Midpoint, psi=c(190, 240))
> summary(fit.seg)

        ***Regression Model with Segmented Relationship(s)***

Call:
segmented.glm(obj = fit.glm, seg.Z = ~Midpoint, psi = c(190,
   240))

Estimated Break-Point(s):
              Est.        St.Err
psi1.Midpoint 220.066  3.774
psi2.Midpoint 236.939  7.203

Meaningful coefficients of the linear terms:
```

```
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -0.265548   0.978709  -0.271    0.788
Midpoint     0.005199   0.004821   1.078    0.287
U1.Midpoint -0.037546   0.011020  -3.407       NA
U2.Midpoint  0.019692   0.014409   1.367       NA
(Dispersion parameter for gaussian family taken to be 0.03677967)

Null     deviance: 4.6232  on 44  degrees of freedom
Residual deviance: 1.4344  on 39  degrees of freedom
AIC: -13.362

Convergence attained in 3 iterations with relative change 0
> plot(fit.seg, xlim=c(250, 190))
> plot(Ratio_AT_spec ~ Midpoint, data=triassic, xlim=c(250, 190))
> plot(fit.seg,add=TRUE,link=FALSE,lwd=2,col=2:3)
```

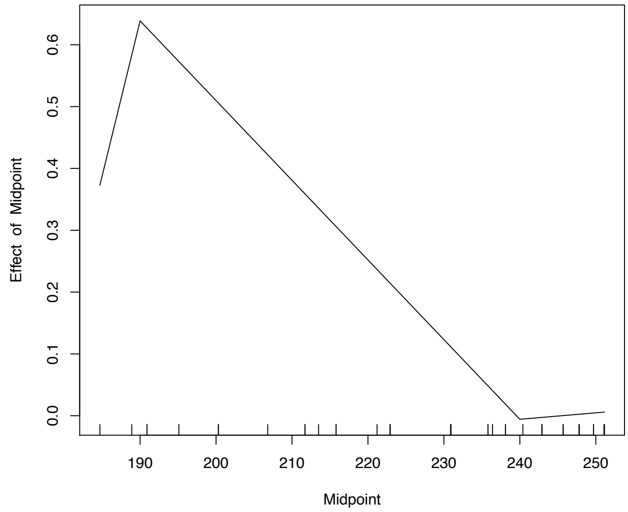
Dinosaur genera proportions (lm)

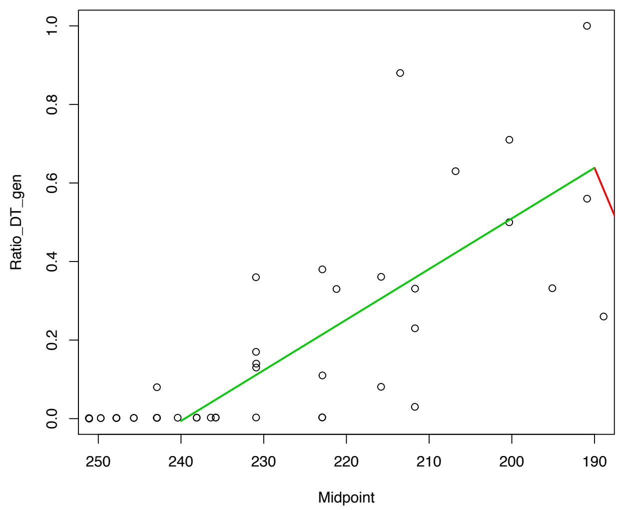
```
> # Fit a line with specified number breakpoint range
> lin.mod <- lm(Ratio_DT_gen ~ Midpoint, data=triassic)
> summary(lin.mod)

Call:
lm(formula = Ratio_DT_gen ~ Midpoint, data = triassic)

Residuals:
     Min       1Q   Median       3Q      Max
-0.30784 -0.09480  0.00283  0.05488  0.55991

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  2.449263   0.295863   8.278 1.92e-10 ***
Midpoint    -0.009973   0.001295  -7.699 1.27e-09 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1691 on 43 degrees of freedom
Multiple R-squared:  0.5795,      Adjusted R-squared:  0.5698
F-statistic: 59.27 on 1 and 43 DF,  p-value: 1.272e-09

> plot(lin.mod)
Hit <Return> to see next plot:
Hit <Return> to see next plot:
Hit <Return> to see next plot:
Hit <Return> to see next plot:

> segmented.mod <- segmented(lin.mod, seg.Z = ~Midpoint, psi=c(220, 240))
> plot(segmented.mod, xlim=c(260,180))
> summary(segmented.mod)

            ***Regression Model with Segmented Relationship(s)***

Call:
segmented.lm(obj = lin.mod, seg.Z = ~Midpoint, psi = c(220, 240))

Estimated Break-Point(s):
                Est. St.Err
psi1.Midpoint 190.735  4.157
psi2.Midpoint 237.041  8.752
```

```
Meaningful coefficients of the linear terms:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -8.690755  10.444320  -0.832    0.410
Midpoint     0.048949   0.055908   0.876    0.387
U1.Midpoint -0.062470   0.055960  -1.116       NA
U2.Midpoint  0.012147   0.009368   1.297       NA

Residual standard error: 0.166 on 39 degrees of freedom
Multiple R-Squared: 0.6322,  Adjusted R-squared: 0.585

Convergence attained in 1 iterations with relative change -0.2089338
```

Dinosaur genera proportions (glm)

```
> fit.glm<-glm(Ratio_DT_gen ~ Midpoint, data = triassic)
> fit.seg<-segmented(fit.glm, seg.Z = ~Midpoint, psi=c(190, 240))
> summary(fit.seg)

        ***Regression Model with Segmented Relationship(s)***

Call:
segmented.glm(obj = fit.glm, seg.Z = ~Midpoint, psi
= c(190,
    240))

Estimated Break-Point(s):
                Est. St.Err
psi1.Midpoint  190  3.623
psi2.Midpoint  240  7.807

Meaningful coefficients of the linear terms:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -8.88616   10.55868  -0.842    0.405
Midpoint     0.05013    0.05652   0.887    0.381
U1.Midpoint -0.06302    0.05657  -1.114       NA
U2.Midpoint  0.01393    0.01214   1.147       NA
(Dispersion parameter for gaussian family taken to
be 0.02817598)

Null     deviance: 2.9231  on 44  degrees of freedom
Residual deviance: 1.0989  on 39  degrees of
freedom
AIC: -25.353

Convergence attained in 1 iterations with relative
change -0.209109
> plot(fit.seg)
> plot(Ratio_DT_gen ~ Midpoint, data=triassic,
xlim=c(250, 190))
> plot(fit.seg,add=TRUE,link=FALSE,lwd=2,col=2:3)
```





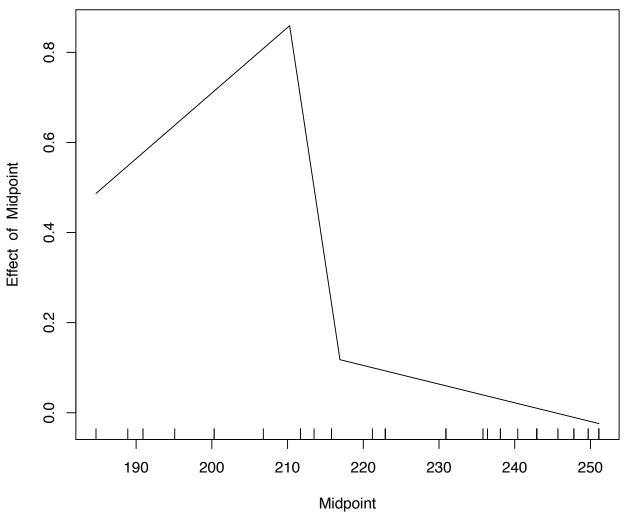
Dinosaur specimen proportions (lm)

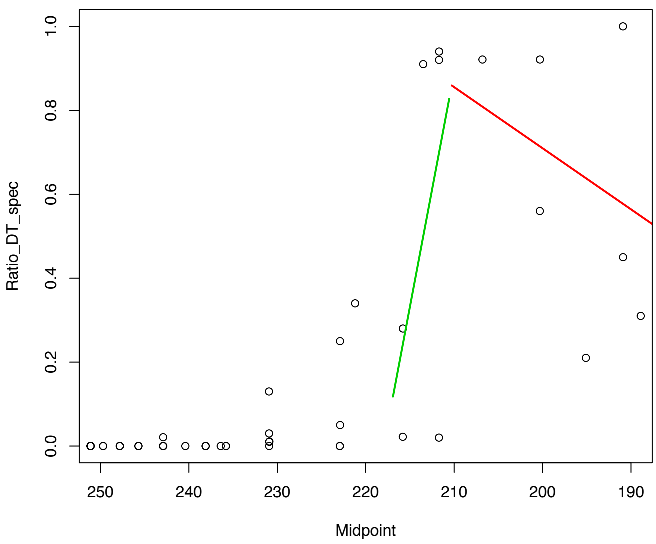
```
> # Fit a line with specified number breakpoint range
> lin.mod <- lm(Ratio_DT_spec ~ Midpoint, data=triassic)
> summary(lin.mod)

Call:
lm(formula = Ratio_DT_spec ~ Midpoint, data = triassic)

Residuals:
     Min       1Q   Median       3Q      Max 
-0.38893 -0.12836 -0.01094  0.07243  0.54519 

Coefficients:
             Estimate Std. Error t value Pr(>|t|)    
(Intercept)  2.997855   0.403151   7.436 3.02e-09 ***
Midpoint    -0.012296   0.001765  -6.966 1.44e-08 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.2304 on 43 degrees of freedom
Multiple R-squared:  0.5302,	Adjusted R-squared:  0.5193 
F-statistic: 48.53 on 1 and 43 DF,  p-value: 1.441e-08

> plot(lin.mod)
Hit <Return> to see next plot: 
Hit <Return> to see next plot: 
Hit <Return> to see next plot: 
Hit <Return> to see next plot: 


> plot(segmented.mod, xlim=c(260,180))
> summary(segmented.mod)

	***Regression Model with Segmented Relationship(s)***

Call: 
segmented.lm(obj = lin.mod, seg.Z = ~Midpoint, psi = c(220, 240))

Estimated Break-Point(s):
                 Est. St.Err
psi1.Midpoint 190.735  4.157
psi2.Midpoint 237.041  8.752

Meaningful coefficients of the linear terms:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -8.690755  10.444320  -0.832    0.410
Midpoint     0.048949   0.055908   0.876    0.387
U1.Midpoint -0.062470   0.055960  -1.116       NA
U2.Midpoint  0.012147   0.009368   1.297       NA

Residual standard error: 0.166 on 39 degrees of freedom
Multiple R-Squared: 0.6322,  Adjusted R-squared: 0.585 

Convergence attained in 1 iterations with relative change -0.2089338
```

Dinosaur specimen proportions (glm)

```
> fit.glm<-glm(Ratio_DT_spec ~ Midpoint, data = triassic)
```

```
> fit.seg<-segmented(fit.glm, seg.Z = ~Midpoint, psi=c(190, 240))
Error in segmented.glm(fit.glm, seg.Z = ~Midpoint, psi = c(190, 240)) :
  only 1 datum in an interval: breakpoint(s) at the boundary or too close each other
> summary(fit.seg)

        ***Regression Model with Segmented Relationship(s)***

Call:
segmented.glm(obj = fit.glm, seg.Z = ~Midpoint, psi = c(190,
    240))

Estimated Break-Point(s):
                Est. St.Err
psi1.Midpoint 210.275  1.828
psi2.Midpoint 216.921  1.792

Meaningful coefficients of the linear terms:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -2.20227    1.95633  -1.126    0.267
Midpoint     0.01456    0.01004   1.450    0.155
U1.Midpoint -0.12611    0.04429  -2.848       NA
U2.Midpoint  0.10741    0.04329   2.481       NA
(Dispersion parameter for gaussian family taken to be 0.03747902)

Null     deviance: 4.8572  on 44  degrees of freedom
Residual deviance: 1.4617  on 39  degrees of freedom
AIC: -12.514

Convergence attained in 2 iterations with relative change 0
> plot(fit.seg)
> plot(Ratio_DT_spec ~ Midpoint, data=triassic, xlim=c(250, 190))
> plot(fit.seg,add=TRUE,link=FALSE,lwd=2,col=2:3)
```



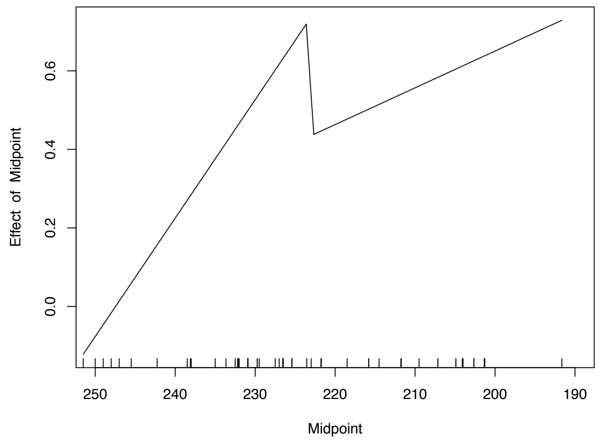


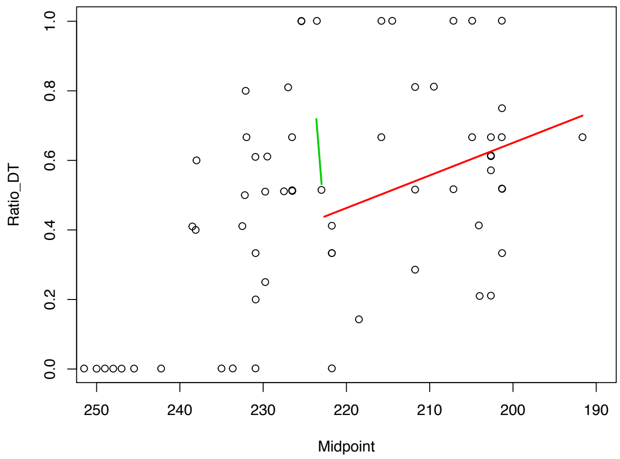
Footprints – breakpoints using lm

```
> library(segmented)
> triassic<-read.csv("footprints.csv", header=T, row.names = 1)
> # Fit a line with specified number breakpoint range
> lin.mod <- lm(Ratio_DT ~ Midpoint, data=triassic)
> summary(lin.mod)

Call:
lm(formula = Ratio_DT ~ Midpoint, data = triassic)

Residuals:
     Min       1Q   Median       3Q      Max 
-0.48089 -0.18890 -0.04079  0.20415  0.55595 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)  2.77051    0.49241   5.626 4.72e-07 ***
Midpoint    -0.01032    0.00222  -4.646 1.81e-05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.2701 on 62 degrees of freedom
Multiple R-squared:  0.2583,	Adjusted R-squared:  0.2463 
F-statistic: 21.59 on 1 and 62 DF,  p-value: 1.811e-05

> plot(lin.mod)
Hit <Return> to see next plot: 
Hit <Return> to see next plot: 
Hit <Return> to see next plot: 
Hit <Return> to see next plot: 

> segmented.mod <- segmented(lin.mod, seg.Z = ~Midpoint, psi=c(200, 240))
> plot(segmented.mod, xlim=c(260,180))
> summary(segmented.mod)

	***Regression Model with Segmented Relationship(s)***

Call: 
segmented.lm(obj = lin.mod, seg.Z = ~Midpoint, psi = c(200, 240))

Estimated Break-Point(s):
                   Est. St.Err
psi1.Midpoint 225.338  4.616
psi2.Midpoint 248.163  9.872

Meaningful coefficients of the linear terms:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.6719427  1.1240359   0.598    0.552
Midpoint    -0.0003065  0.0053789  -0.057    0.955
U1.Midpoint -0.0269395  0.0092852  -2.901       NA
U2.Midpoint  0.0352906  0.1444824   0.244       NA

Residual standard error: 0.2568 on 58 degrees of freedom
Multiple R-Squared: 0.3729,  Adjusted R-squared: 0.3188 

Convergence attained in 16 iterations with relative change -0.02306645
```

Footprints – breakpoints using glm

```
> fit.glm<-glm(Ratio_AT_spec ~ Midpoint, data = triassic)
Error in eval(predvars, data, env) : object 'Ratio_AT_spec' not found
> fit.glm<-glm(Ratio_DT ~ Midpoint, data = triassic)
> fit.seg<-segmented(fit.glm, seg.Z = ~Midpoint, psi=c(210, 240))
> summary(fit.seg)

        ***Regression Model with Segmented Relationship(s)***

Call:
segmented.glm(obj = fit.glm, seg.Z = ~Midpoint, psi
= c(210,
   240))

Estimated Break-Point(s):
              Est. St.Err
psi1.Midpoint 222.666  1.426
psi2.Midpoint 223.613  0.880

Meaningful coefficients of the linear terms:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  2.524831   1.204075   2.097   0.0404 *
Midpoint    -0.009372   0.005788  -1.619   0.1109
U1.Midpoint  0.306048   0.637206   0.480       NA
U2.Midpoint -0.326829   0.637204  -0.513       NA
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '
1
(Dispersion parameter for gaussian family taken to
be 0.06140722)

Null     deviance: 6.0970  on 63  degrees of freedom
Residual deviance: 3.5616  on 58  degrees of
freedom
AIC: 10.749

Convergence attained in 2 iterations with relative
change 6.40874e-16
> plot(fit.seg, xlim=c(250, 190))
> plot(Ratio_DT ~ Midpoint, data=triassic,
xlim=c(250, 190))
> plot(fit.seg,add=TRUE,link=FALSE,lwd=2,col=2:3)
```





For the plot of ichnotaxa (Fig. 5b), we could not find a meaningful result with segmented, so plotted Figure 5b using ggplot, and this code:

```
require(ggplot2)
qplot(Midpoint, Ratio_DT, group = Midpoint > 230, geom = c('point', 'smooth'),
    method = 'lm', se = F, data = triassic, xlim = c(250, 190))
```