

Baleen_whale_body_size

James Rule

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```
###PACKAGES and DATA
```

```
library(ggplot2)
require(tidyverse)
```

```
## Loading required package: tidyverse
```

```
## — Attaching packages — tidyverse 1.3.1 —
```

```
## ✓ tibble 3.1.6      ✓ dplyr 1.0.8
## ✓ tidyr 1.2.0       ✓ stringr 1.4.0
## ✓ readr 2.1.2       ✓ forcats 0.5.1
## ✓ purrr 0.3.4
```

```
## — Conflicts — tidyverse_conflicts() —
## ✗ dplyr::filter() masks stats::filter()
## ✗ dplyr::lag() masks stats::lag()
```

```
require(plyr)
```

```
## Loading required package: plyr
```

```
## -----
```

```
## You have loaded plyr after dplyr - this is likely to cause problems.
## If you need functions from both plyr and dplyr, please load plyr first, then dplyr:
## library(plyr); library(dplyr)
```

```
## -----
```

```
##
## Attaching package: 'plyr'
```

```
## The following objects are masked from 'package:dplyr':
##
## arrange, count, desc, failwith, id, mutate, rename, summarise,
## summarize
```

```
## The following object is masked from 'package:purrr':  
##  
## compact
```

```
require(car)
```

```
## Loading required package: car
```

```
## Loading required package: carData
```

```
##  
## Attaching package: 'car'
```

```
## The following object is masked from 'package:dplyr':  
##  
## recode
```

```
## The following object is masked from 'package:purrr':  
##  
## some
```

```
require(geiger)
```

```
## Loading required package: geiger
```

```
## Loading required package: ape
```

```
require(ape)  
require(nlme)
```

```
## Loading required package: nlme
```

```
##  
## Attaching package: 'nlme'
```

```
## The following object is masked from 'package:dplyr':  
##  
## collapse
```

```
require(phytools)
```

```
## Loading required package: phytools
```

```
## Loading required package: maps
```

```
##  
## Attaching package: 'maps'
```

```
## The following object is masked from 'package:plyr':  
##  
## ozone
```

```
## The following object is masked from 'package:purrr':  
##  
## map
```

```
require(grid)
```

```
## Loading required package: grid
```

```
require(gridExtra)
```

```
## Loading required package: gridExtra
```

```
##  
## Attaching package: 'gridExtra'
```

```
## The following object is masked from 'package:dplyr':  
##  
## combine
```

```
require(vegan)
```

```
## Loading required package: vegan
```

```
## Loading required package: permute
```

```
## Loading required package: lattice
```

```
## This is vegan 2.6-2
```

```
##  
## Attaching package: 'vegan'
```

```
## The following object is masked from 'package:phytools':  
##  
## scores
```

```
require(caper)
```

```
## Loading required package: caper
```

```
## Loading required package: MASS
```

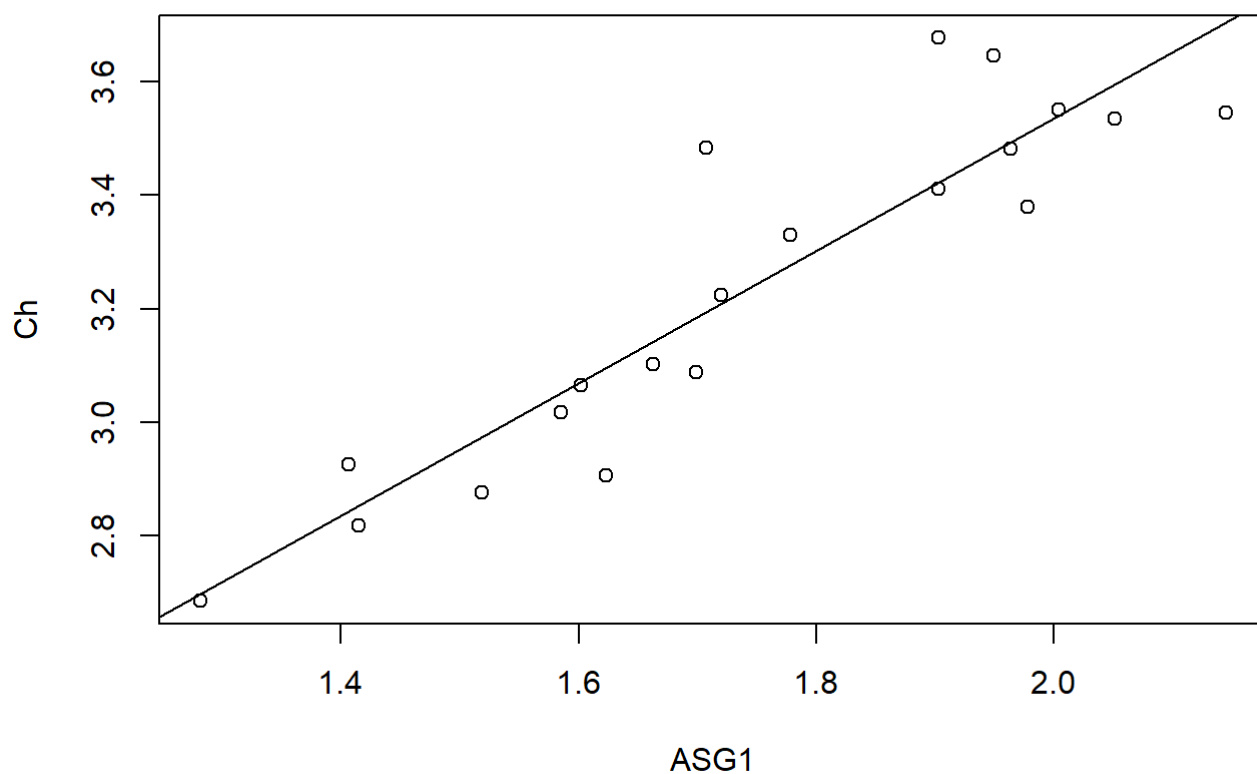
```
##  
## Attaching package: 'MASS'
```

```
## The following object is masked from 'package:dplyr':  
##  
##   select
```

```
## Loading required package: mvtnorm
```

```
MysticeteData2 <- read.csv(file = "MysticeteData2.csv")  
attach(MysticeteData2)
```

```
### CHORD VS ASG1  
## Plot scatterplot  
plot(Ch~ASG1)  
abline(lm(Ch~ASG1))
```



```
## Get summary statistics  
summary(lm(Ch~ASG1))
```

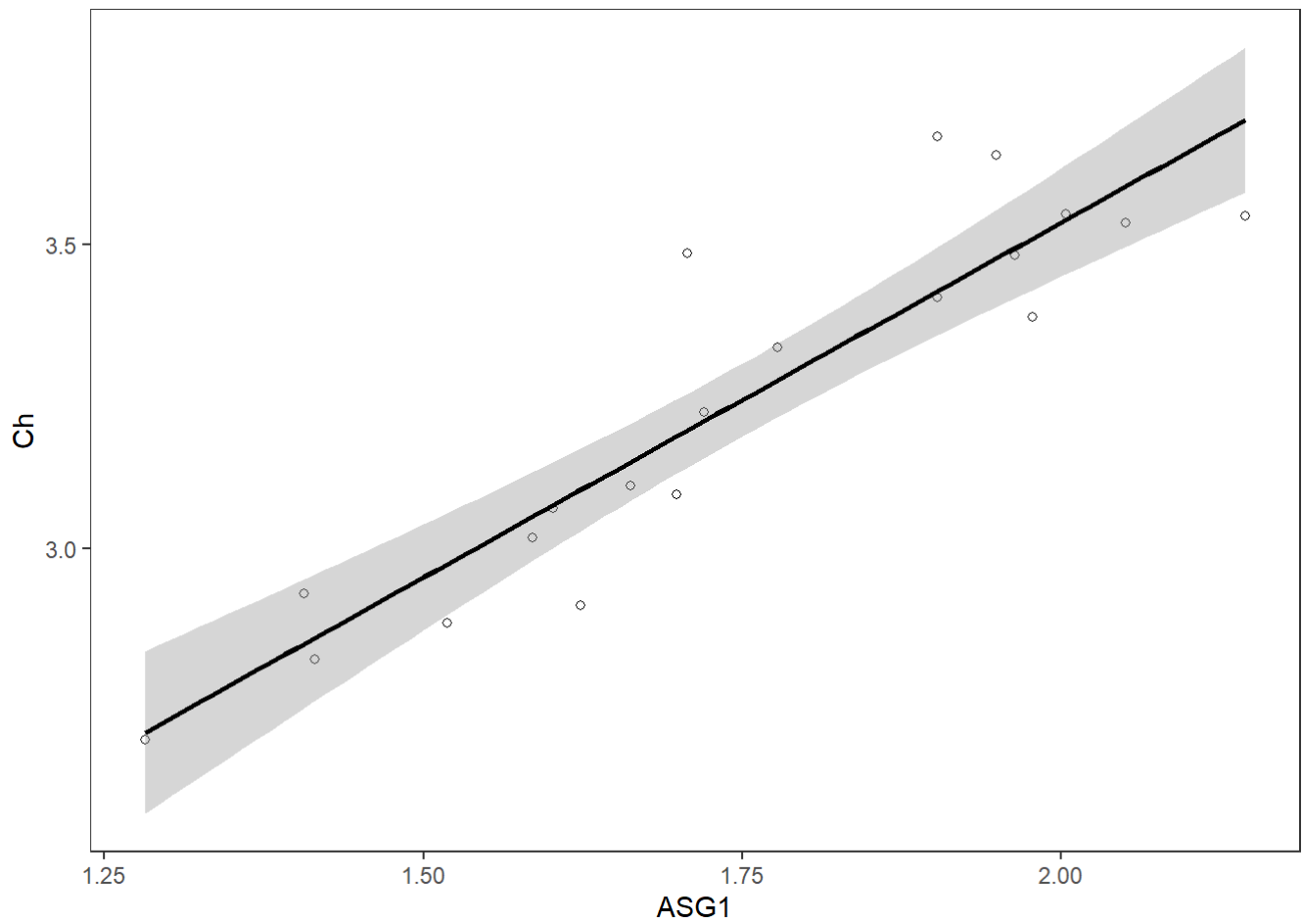
```
##
## Call:
## lm(formula = Ch ~ ASG1)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.18985 -0.06912 -0.01131  0.02476  0.28989
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   1.2025     0.2161   5.566 2.77e-05 ***
## ASG1          1.1664     0.1227   9.503 1.95e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1274 on 18 degrees of freedom
## Multiple R-squared:  0.8338, Adjusted R-squared:  0.8246
## F-statistic: 90.31 on 1 and 18 DF,  p-value: 1.946e-08
```

```
## Get regression equation
lm(Ch~ASG1)
```

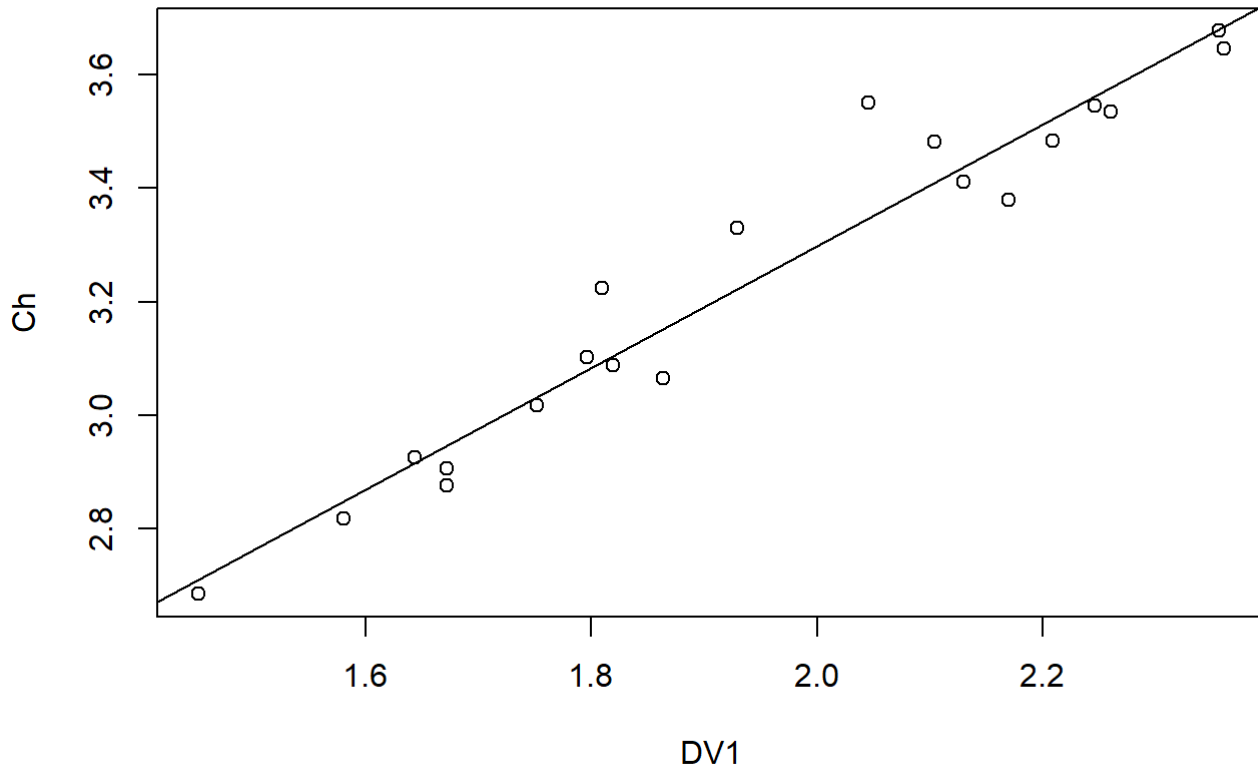
```
##
## Call:
## lm(formula = Ch ~ ASG1)
##
## Coefficients:
## (Intercept)      ASG1
##      1.203      1.166
```

```
## Final plot
ggplot(MysticeteData2, aes(y=Ch, x=ASG1)) + geom_point(shape=1) + geom_smooth(method=lm, col
= "black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element
_blank())
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### CHORD VS DV1
## Plot scatterplot
plot(Ch~DV1)
abline(lm(Ch~DV1))
```



```
## Get summary statistics
summary(lm(Ch~DV1))
```

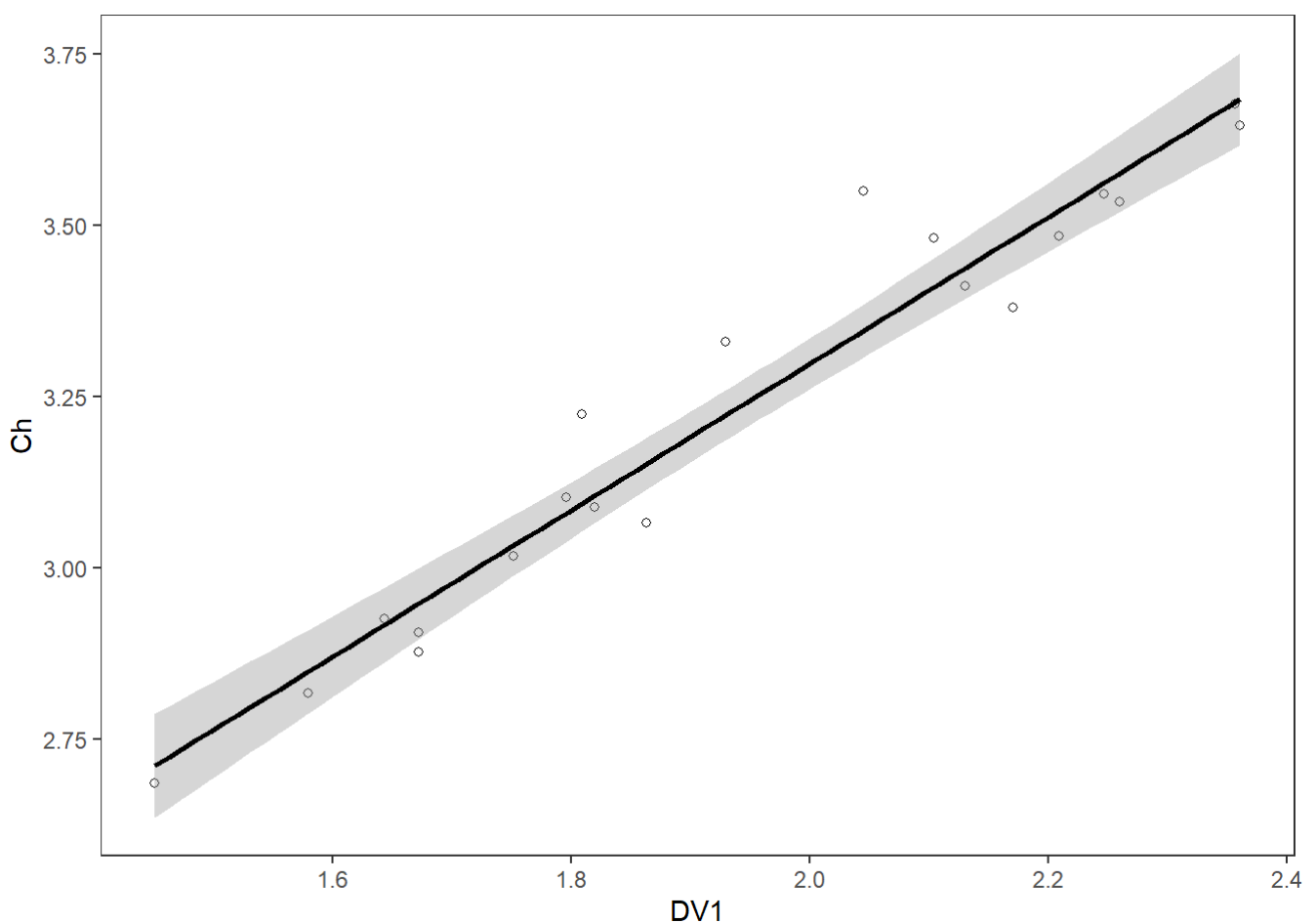
```
##
## Call:
## lm(formula = Ch ~ DV1)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.10024 -0.03921 -0.02085  0.01302  0.20351
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   1.1575     0.1264    9.16 3.38e-08 ***
## DV1           1.0703     0.0644   16.62 2.29e-12 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.07727 on 18 degrees of freedom
## Multiple R-squared:  0.9388, Adjusted R-squared:  0.9354
## F-statistic: 276.2 on 1 and 18 DF, p-value: 2.292e-12
```

```
## Get regression equation
lm(Ch~DV1)
```

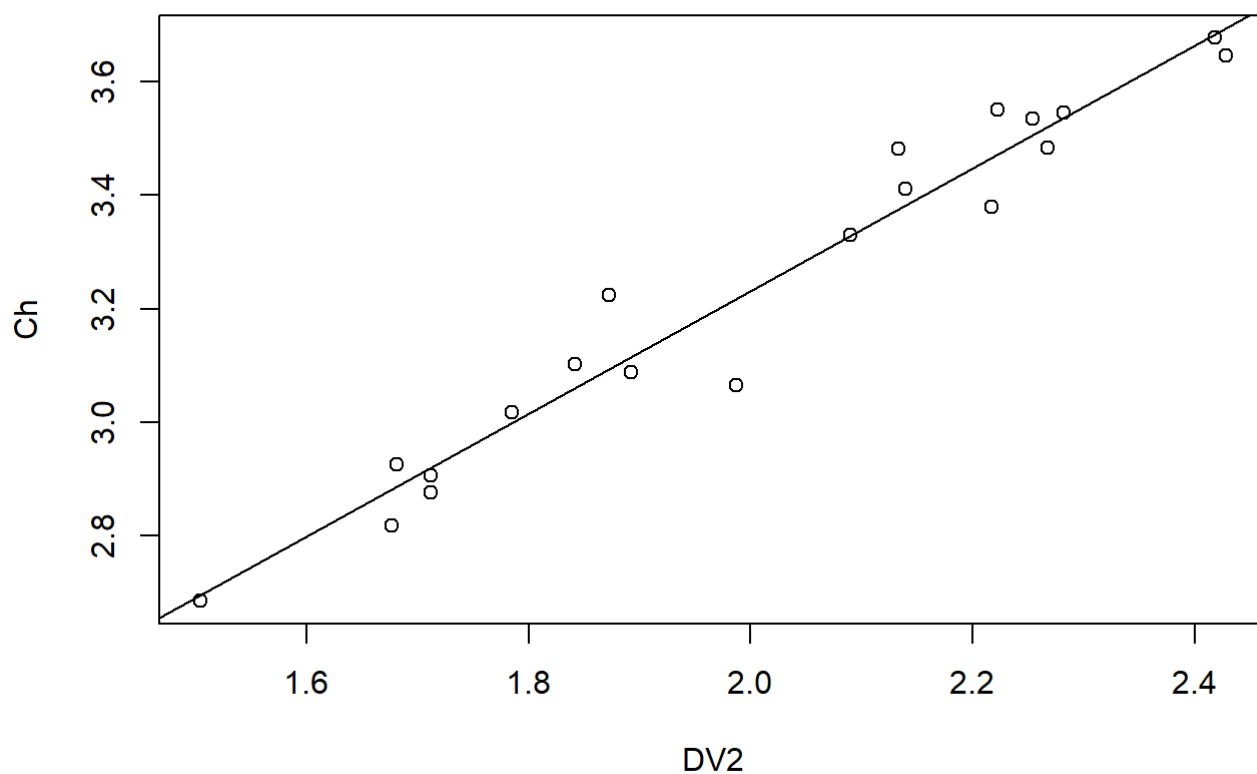
```
##
## Call:
## lm(formula = Ch ~ DV1)
##
## Coefficients:
## (Intercept)      DV1
##      1.158      1.070
```

```
## Final plot
ggplot(MysticeteData2, aes(y=Ch, x=DV1)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### CHORD VS DV2
## Plot scatterplot
plot(Ch~DV2)
abline(lm(Ch~DV2))
```

```
## Get summary statistics
summary(lm(Ch~DV2))
```

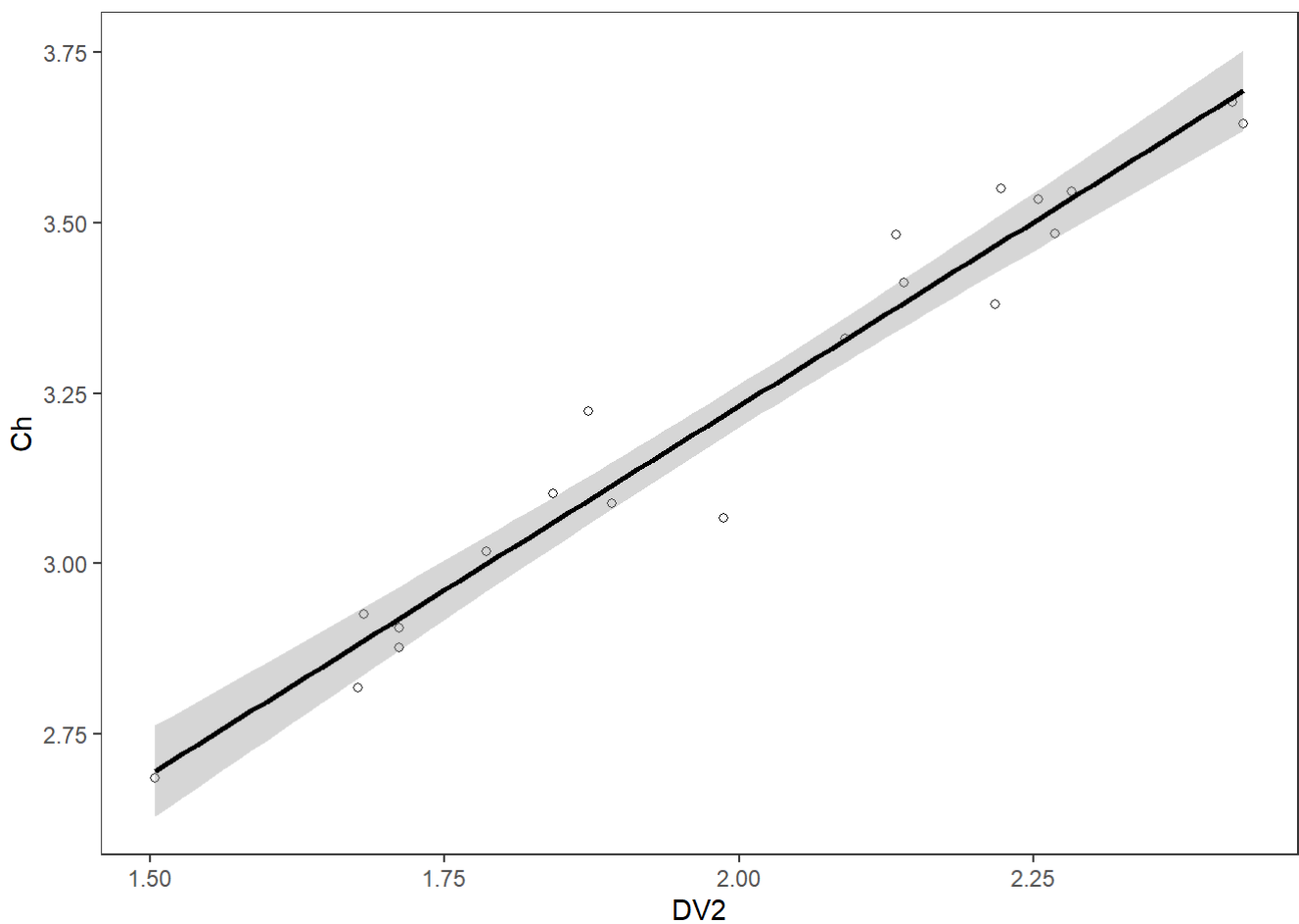
```
##
## Call:
## lm(formula = Ch ~ DV2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.150753 -0.038348 -0.002399  0.031578  0.130885
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   1.0685     0.1133   9.429 2.19e-08 ***
## DV2           1.0814     0.0560  19.312 1.76e-13 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06703 on 18 degrees of freedom
## Multiple R-squared:  0.954, Adjusted R-squared:  0.9514
## F-statistic: 372.9 on 1 and 18 DF, p-value: 1.762e-13
```

```
## Get regression equation
lm(Ch~DV2)
```

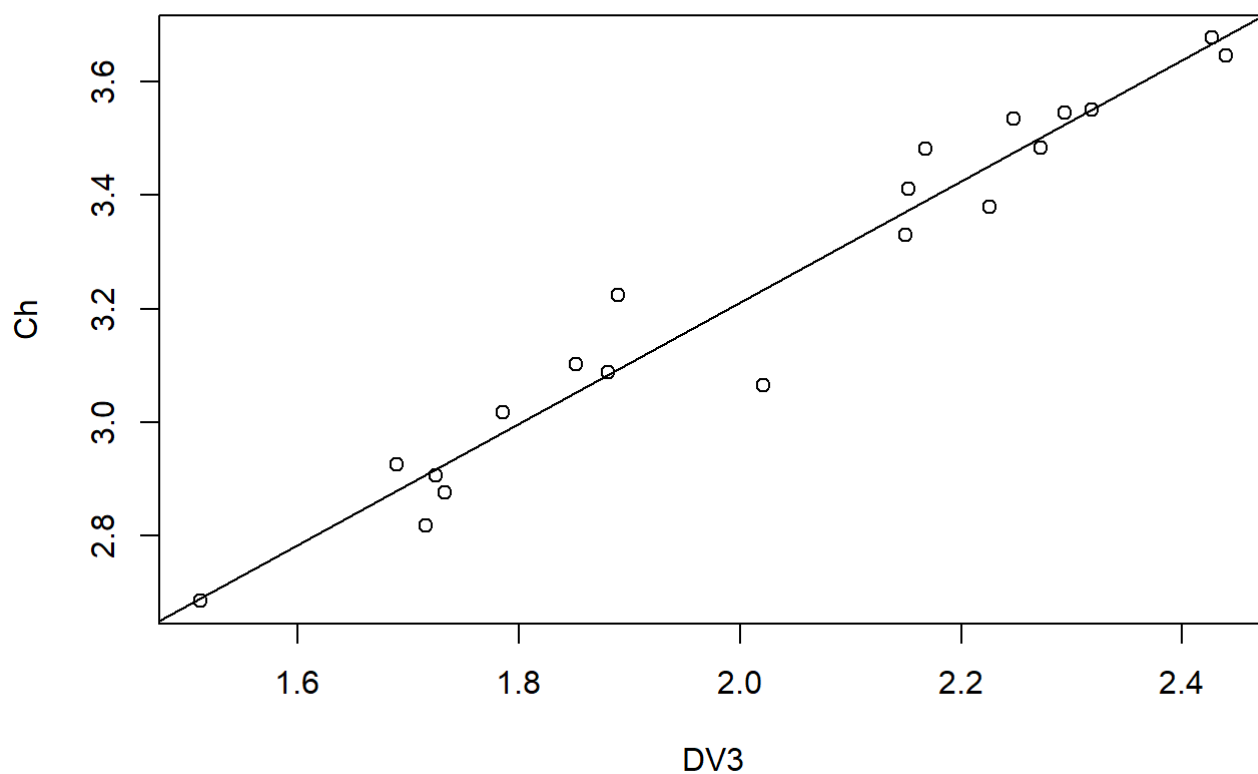
```
##
## Call:
## lm(formula = Ch ~ DV2)
##
## Coefficients:
## (Intercept)      DV2
##      1.069      1.081
```

```
## Final plot
ggplot(MysticeteData2, aes(y=Ch, x=DV2)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### CHORD VS DV3
## Plot scatterplot
plot(Ch~DV3)
abline(lm(Ch~DV3))
```



```
## Get summary statistics
summary(lm(Ch~DV3))
```

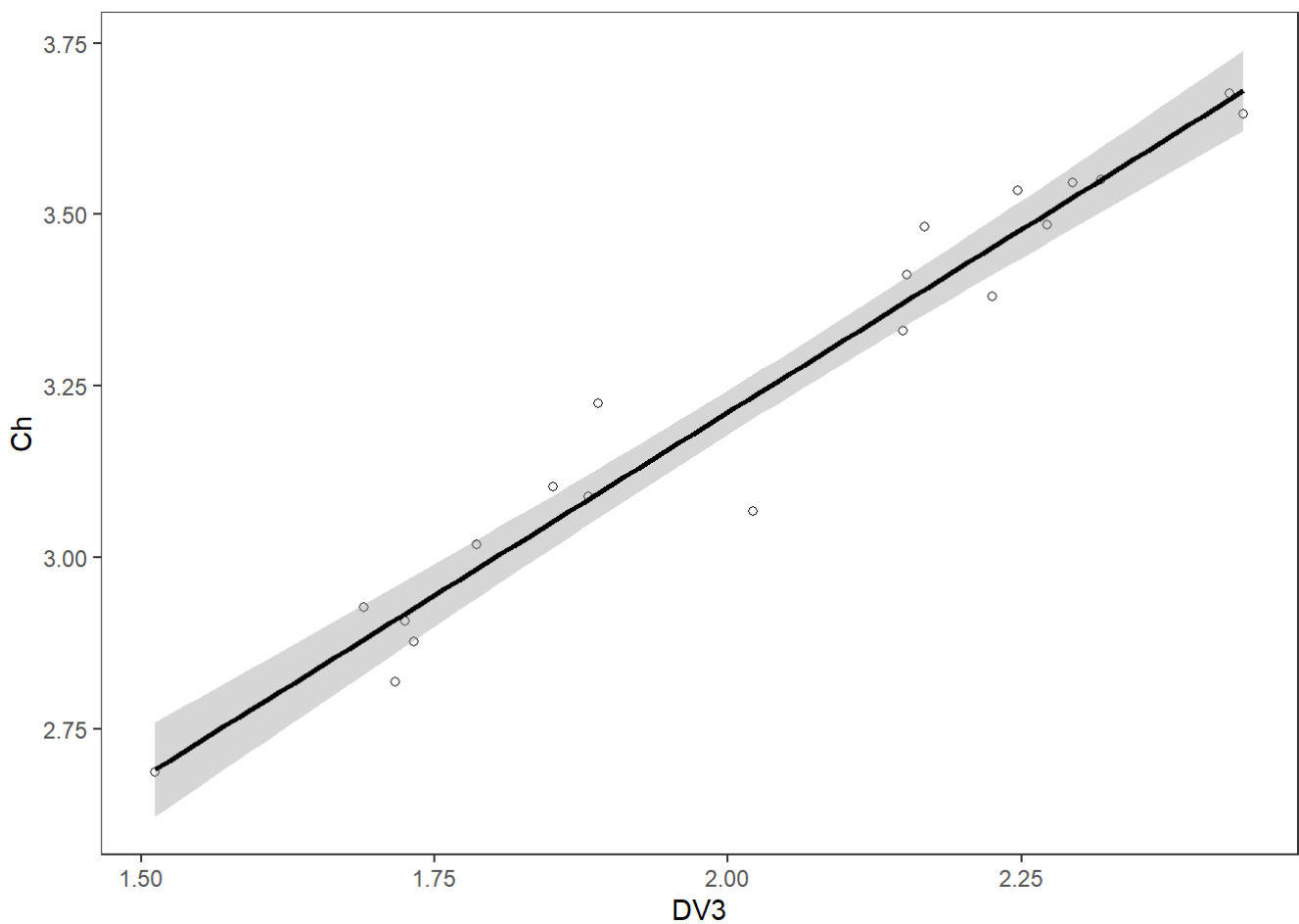
```
##
## Call:
## lm(formula = Ch ~ DV3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.167698 -0.036023  0.002005  0.039708  0.130740
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.07703    0.11527   9.344 2.51e-08 ***
## DV3          1.06719    0.05643  18.913 2.52e-13 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06838 on 18 degrees of freedom
## Multiple R-squared:  0.9521, Adjusted R-squared:  0.9494
## F-statistic: 357.7 on 1 and 18 DF, p-value: 2.522e-13
```

```
## Get regression equation
lm(Ch~DV3)
```

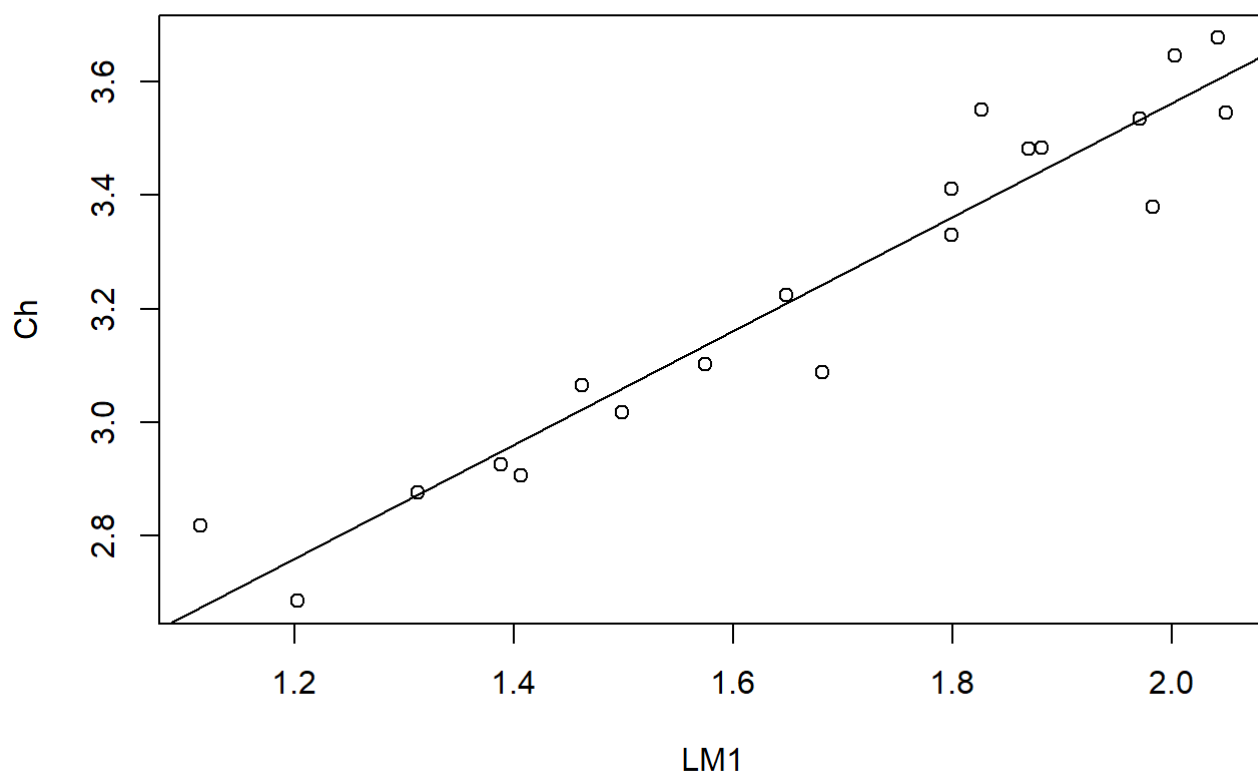
```
##
## Call:
## lm(formula = Ch ~ DV3)
##
## Coefficients:
## (Intercept)      DV3
##      1.077      1.067
```

```
## Final plot
ggplot(MysticeteData2, aes(y=Ch, x=DV3)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### CHORD VS LM1
## Plot scatterplot
plot(Ch~LM1)
abline(lm(Ch~LM1))
```



```
## Get summary statistics
summary(lm(Ch~LM1))
```

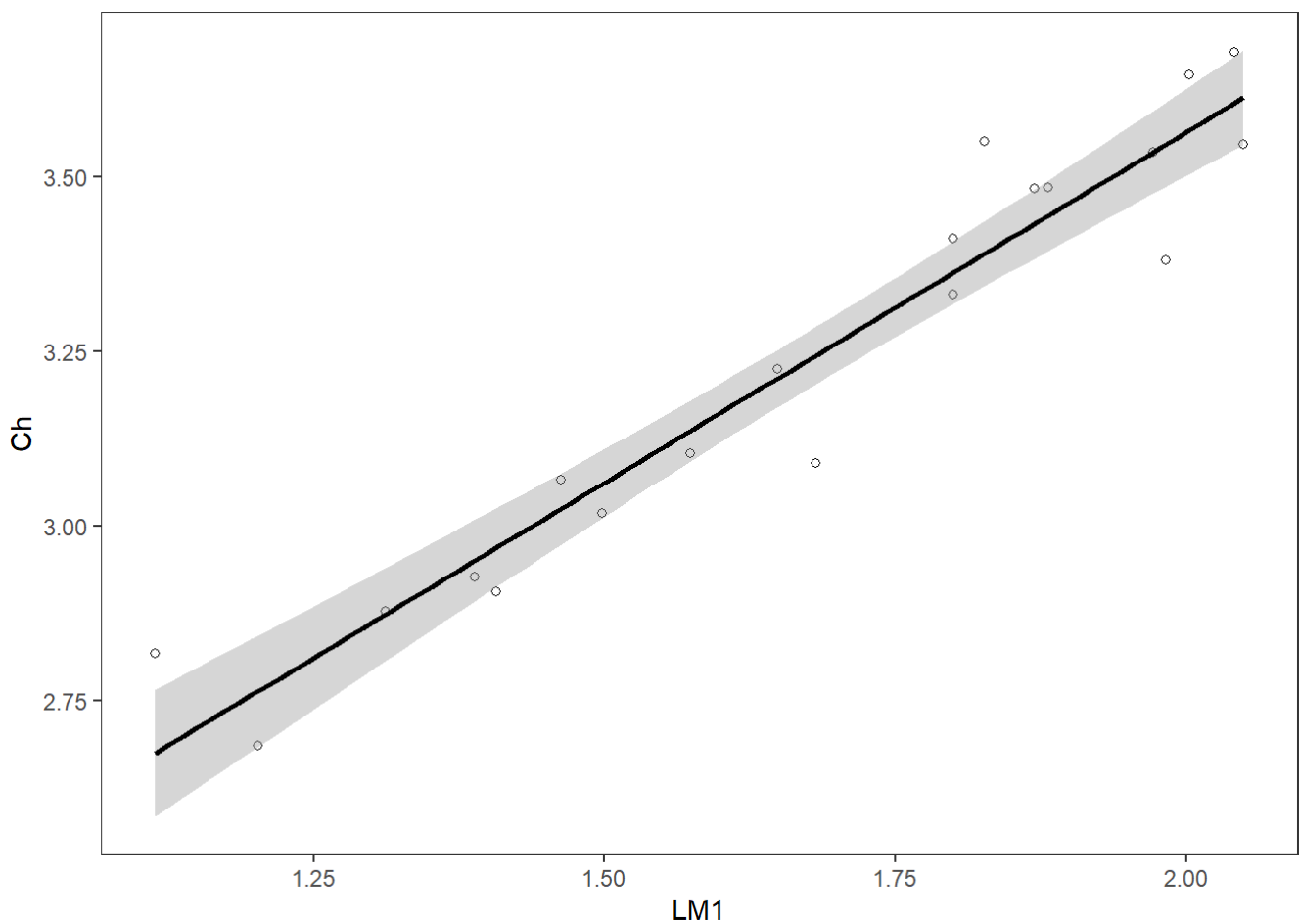
```
##
## Call:
## lm(formula = Ch ~ LM1)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.165465 -0.047101  0.002364  0.049644  0.161289
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.55654    0.11676   13.33 9.12e-11 ***
## LM1          1.00346    0.06871   14.60 2.02e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.08715 on 18 degrees of freedom
## Multiple R-squared:  0.9222, Adjusted R-squared:  0.9178
## F-statistic: 213.3 on 1 and 18 DF, p-value: 2.016e-11
```

```
## Get regression equation
lm(Ch~LM1)
```

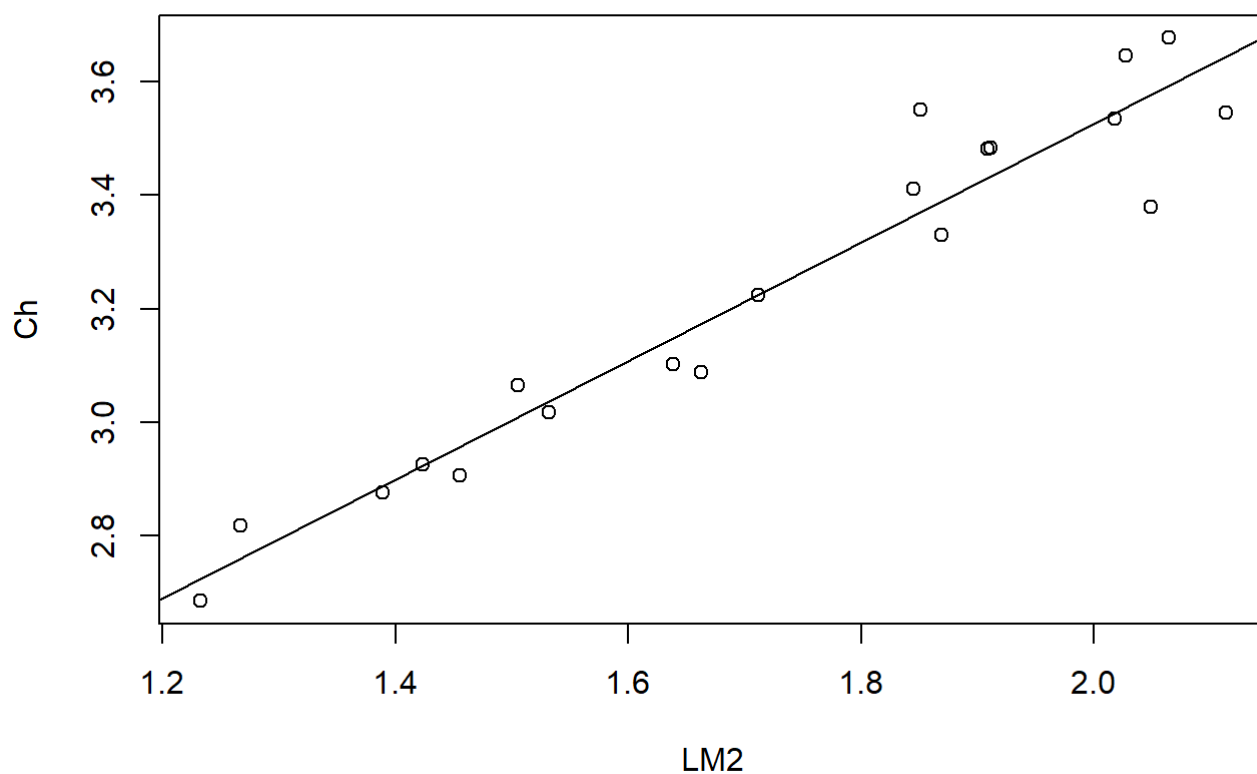
```
##
## Call:
## lm(formula = Ch ~ LM1)
##
## Coefficients:
## (Intercept)      LM1
##      1.557      1.003
```

```
## Final plot
ggplot(MysticeteData2, aes(y=Ch, x=LM1)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### CHORD VS LM2
## Plot scatterplot
plot(Ch~LM2)
abline(lm(Ch~LM2))
```



```
## Get summary statistics
summary(lm(Ch~LM2))
```

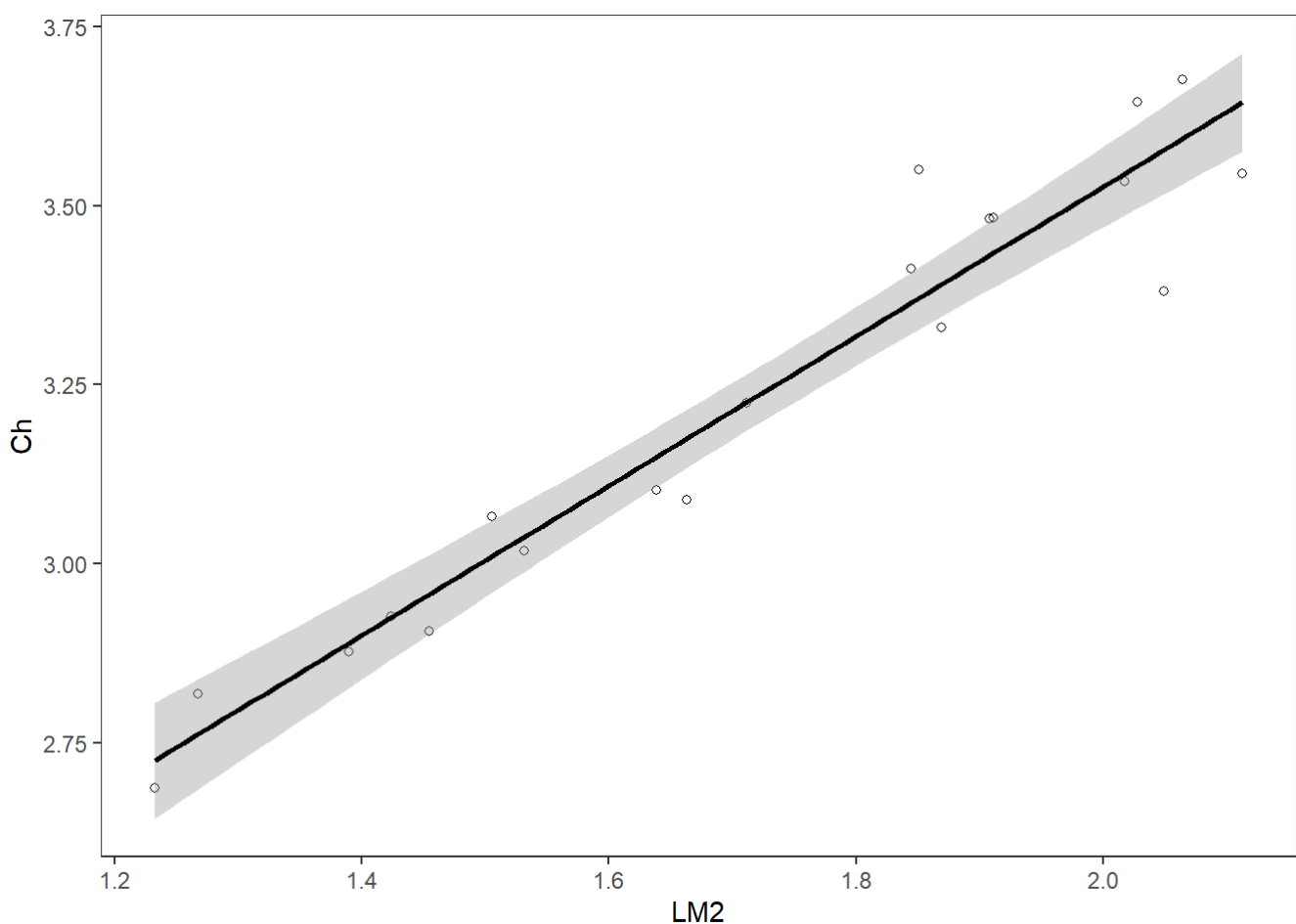
```
##
## Call:
## lm(formula = Ch ~ LM2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.197453 -0.046872 -0.005585  0.052811  0.179267
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.43794    0.12016   11.97 5.28e-10 ***
## LM2          1.04417    0.06885   15.16 1.07e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.08416 on 18 degrees of freedom
## Multiple R-squared:  0.9274, Adjusted R-squared:  0.9234
## F-statistic: 230 on 1 and 18 DF, p-value: 1.073e-11
```

```
## Get regression equation
lm(Ch~LM2)
```

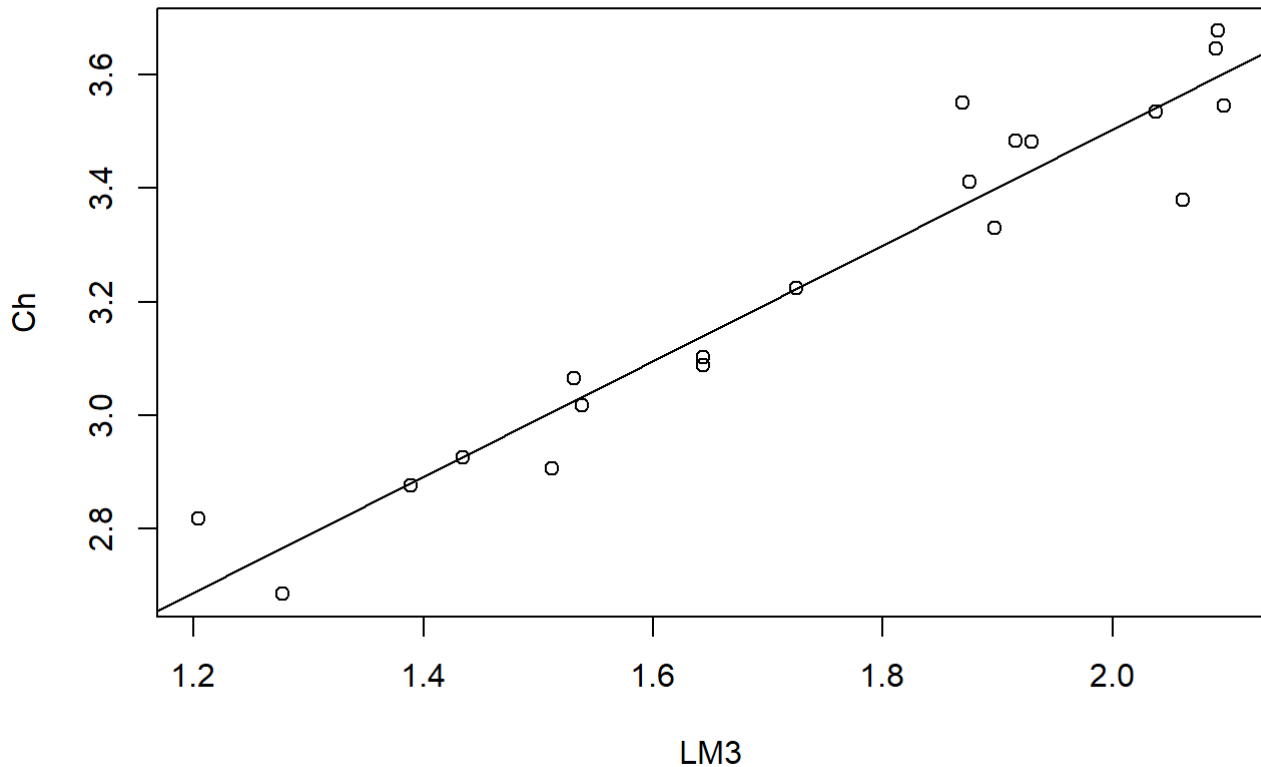
```
##
## Call:
## lm(formula = Ch ~ LM2)
##
## Coefficients:
## (Intercept)      LM2
##      1.438      1.044
```

```
## Final plot
ggplot(MysticeteData2, aes(y=Ch, x=LM2)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### CHORD VS LM3
## Plot scatterplot
plot(Ch~LM3)
abline(lm(Ch~LM3))
```

```
## Get summary statistics
summary(lm(Ch~LM3))
```

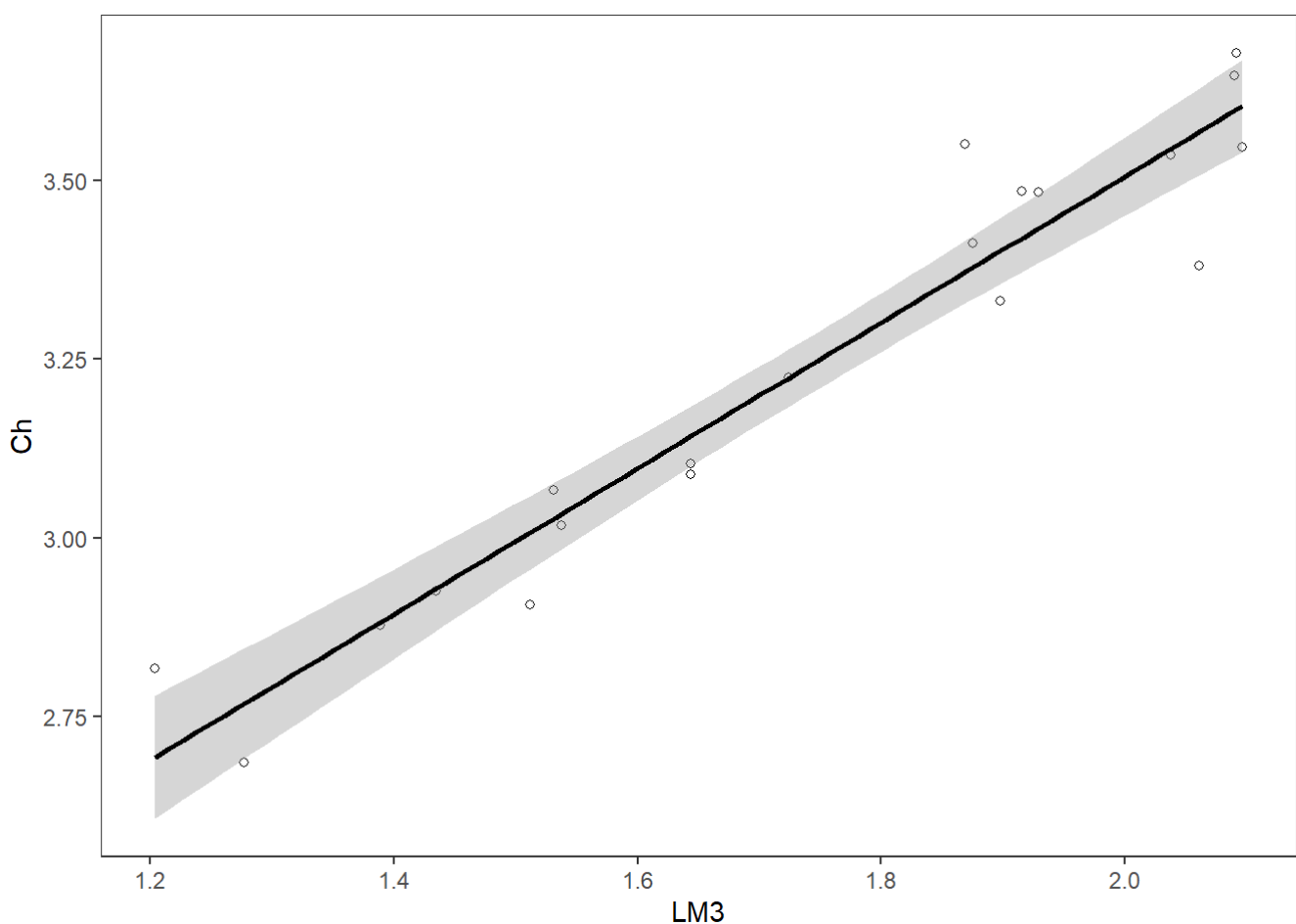
```
##
## Call:
## lm(formula = Ch ~ LM3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.186523 -0.053747 -0.003555  0.049332  0.178727
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.46550    0.11957   12.26 3.59e-10 ***
## LM3          1.01967    0.06792   15.01 1.27e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.08496 on 18 degrees of freedom
## Multiple R-squared:  0.926, Adjusted R-squared:  0.9219
## F-statistic: 225.4 on 1 and 18 DF, p-value: 1.271e-11
```

```
## Get regression equation
lm(Ch~LM3)
```

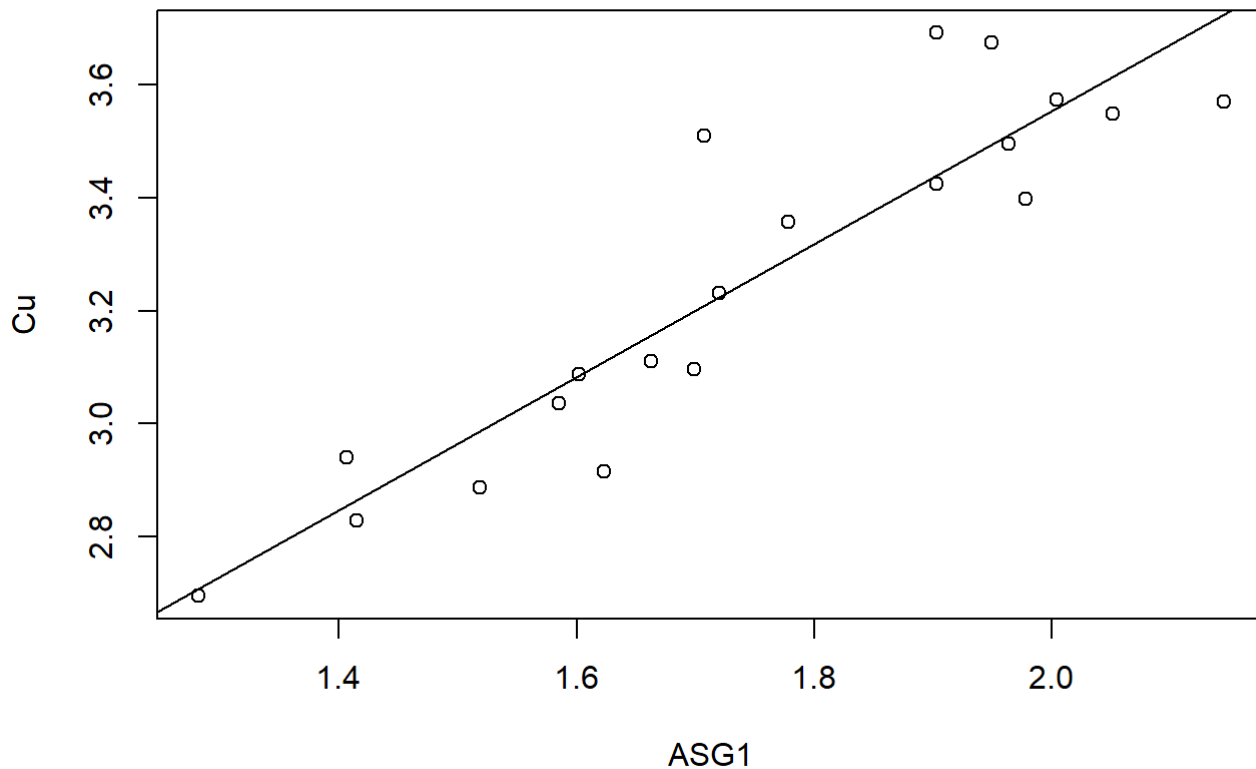
```
##
## Call:
## lm(formula = Ch ~ LM3)
##
## Coefficients:
## (Intercept)      LM3
##      1.465      1.020
```

```
## Final plot
ggplot(MysticeteData2, aes(y=Ch, x=LM3)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### CURVILINEAR LENGTH VS ASG1
## Plot scatterplot
plot(Cu~ASG1)
abline(lm(Cu~ASG1))
```



```
## Get summary statistics
summary(lm(Cu~ASG1))
```

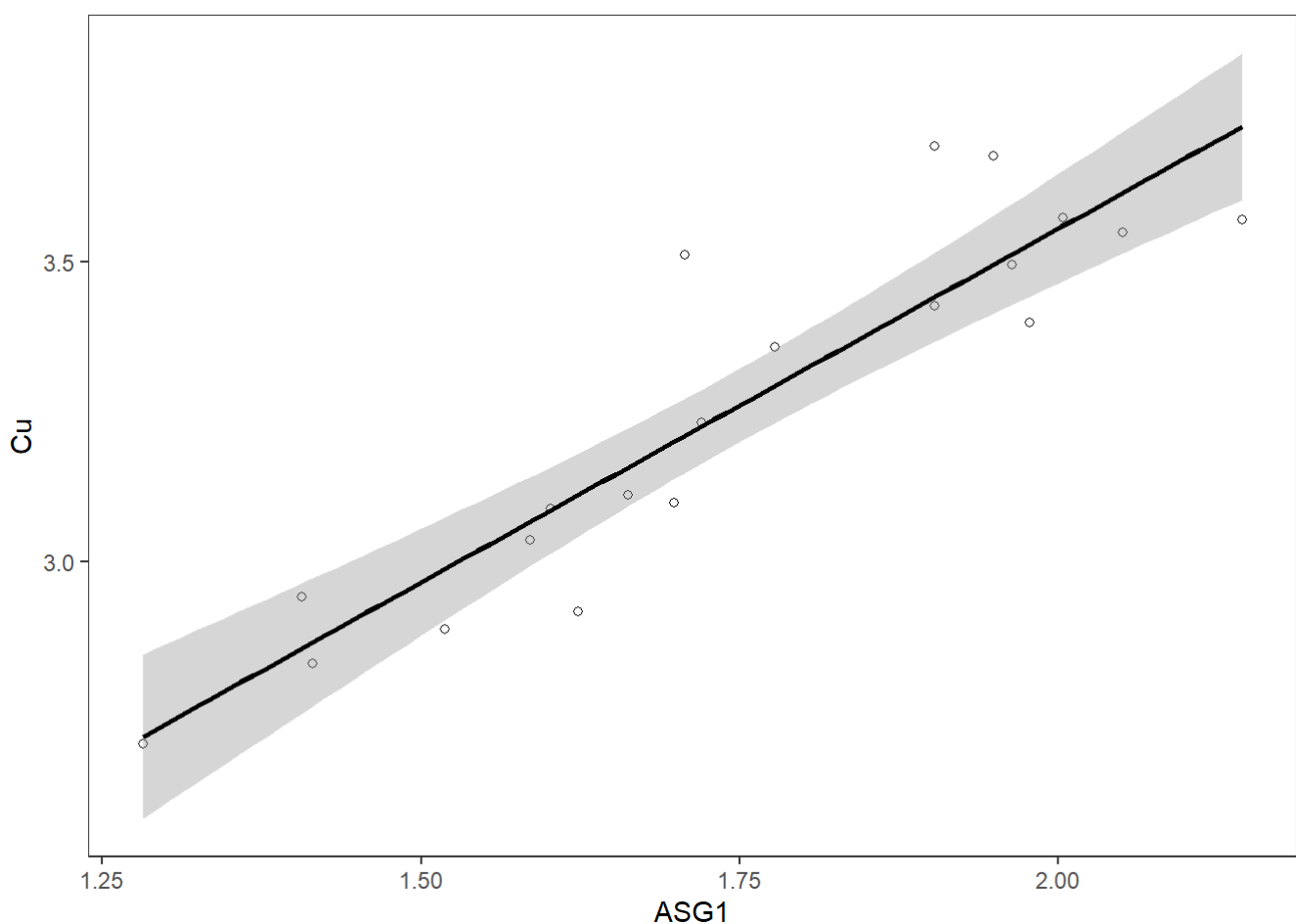
```
##
## Call:
## lm(formula = Cu ~ ASG1)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.19475 -0.07450 -0.01604  0.02616  0.30058
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   1.1965     0.2215   5.403 3.91e-05 ***
## ASG1          1.1789     0.1258   9.370 2.41e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1305 on 18 degrees of freedom
## Multiple R-squared:  0.8299, Adjusted R-squared:  0.8204
## F-statistic: 87.8 on 1 and 18 DF, p-value: 2.407e-08
```

```
## Get regression equation
lm(Cu~ASG1)
```

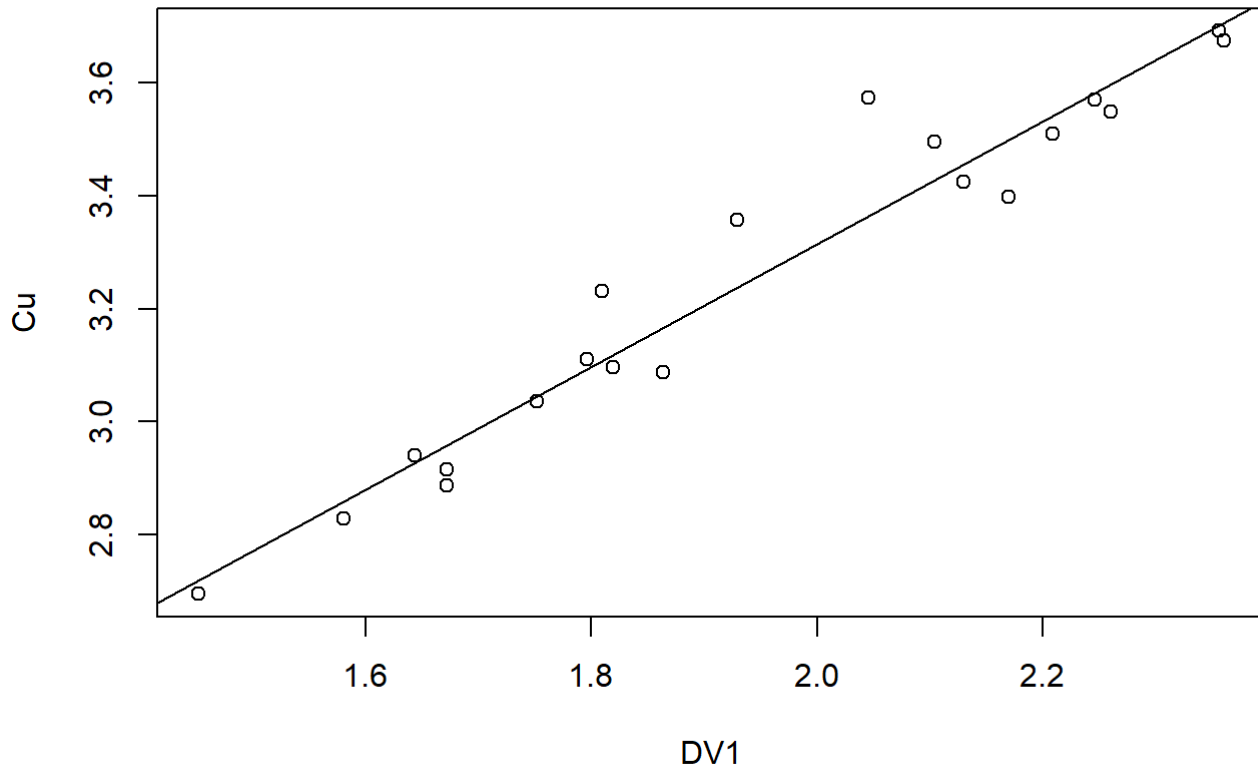
```
##
## Call:
## lm(formula = Cu ~ ASG1)
##
## Coefficients:
## (Intercept)      ASG1
##      1.197      1.179
```

```
## Final plot
ggplot(MysticeteData2, aes(y=Cu, x=ASG1)) + geom_point(shape=1) + geom_smooth(method=lm, col
= "black") + theme_bw() + theme(panel.grid.major = element_blank(), panel.grid.minor = element
_blank())
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### CURVILINEAR LENGTH VS DV1
## Plot scatterplot
plot(Cu~DV1)
abline(lm(Cu~DV1))
```



```
## Get summary statistics
summary(lm(Cu~DV1))
```

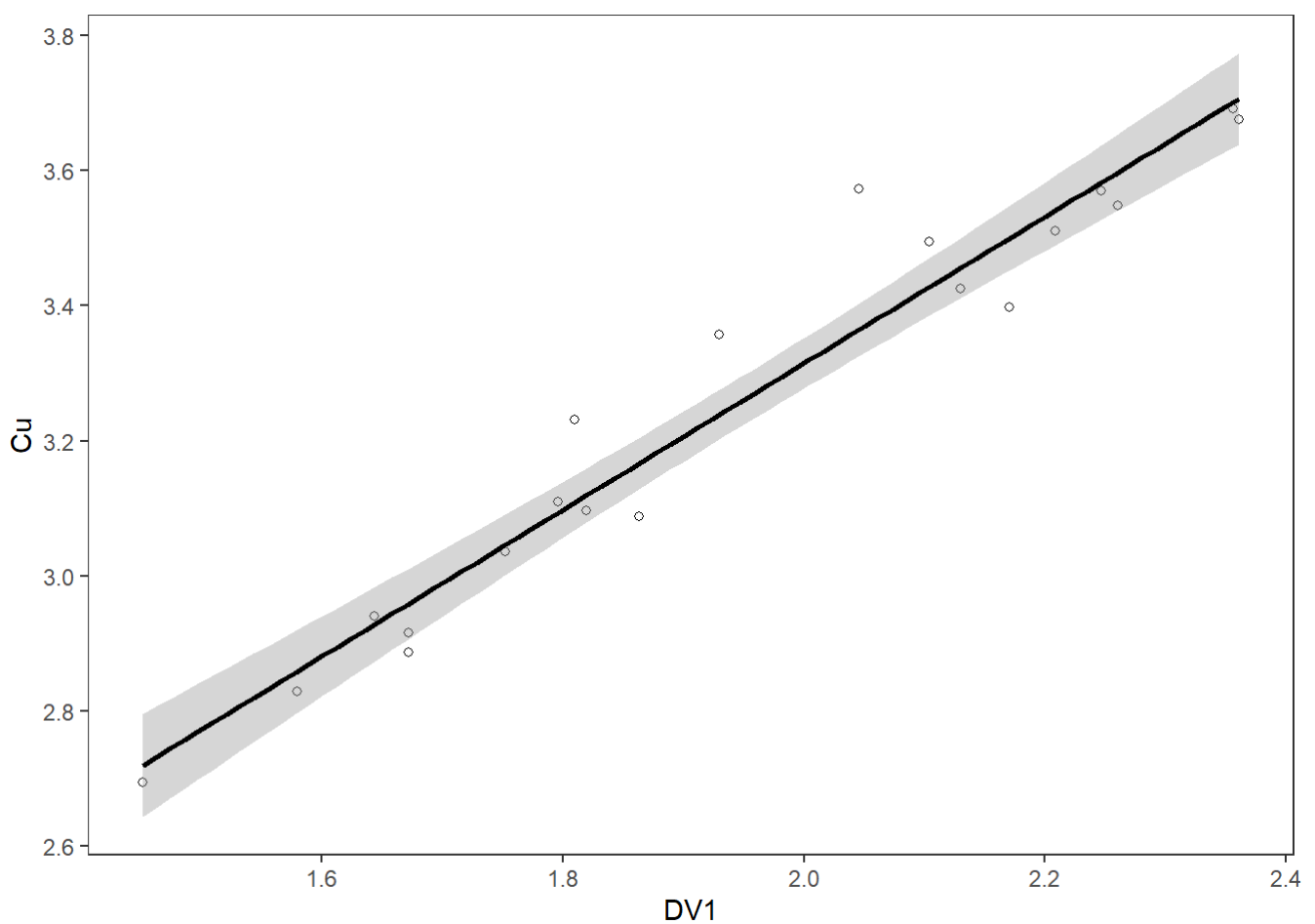
```
##
## Call:
## lm(formula = Cu ~ DV1)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.10155 -0.03438 -0.02331  0.01312  0.20892
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   1.1451     0.1271    9.006 4.36e-08 ***
## DV1           1.0848     0.0648   16.740 2.03e-12 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.07775 on 18 degrees of freedom
## Multiple R-squared:  0.9396, Adjusted R-squared:  0.9363
## F-statistic: 280.2 on 1 and 18 DF, p-value: 2.027e-12
```

```
## Get regression equation
lm(Cu~DV1)
```

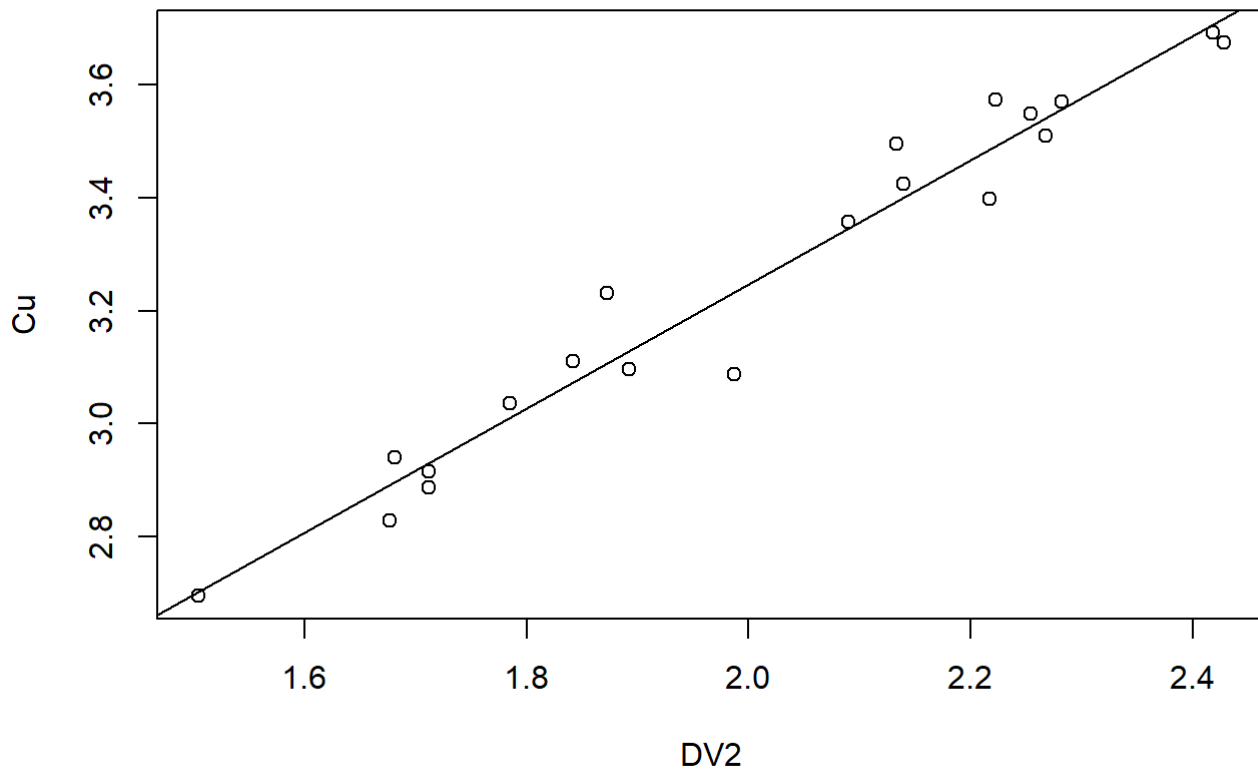
```
##
## Call:
## lm(formula = Cu ~ DV1)
##
## Coefficients:
## (Intercept)      DV1
##      1.145      1.085
```

```
## Final plot
ggplot(MysticeteData2, aes(y=Cu, x=DV1)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### CURVILINEAR LENGTH VS DV2
## Plot scatterplot
plot(Cu~DV2)
abline(lm(Cu~DV2))
```



```
## Get summary statistics
summary(lm(Cu~DV2))
```

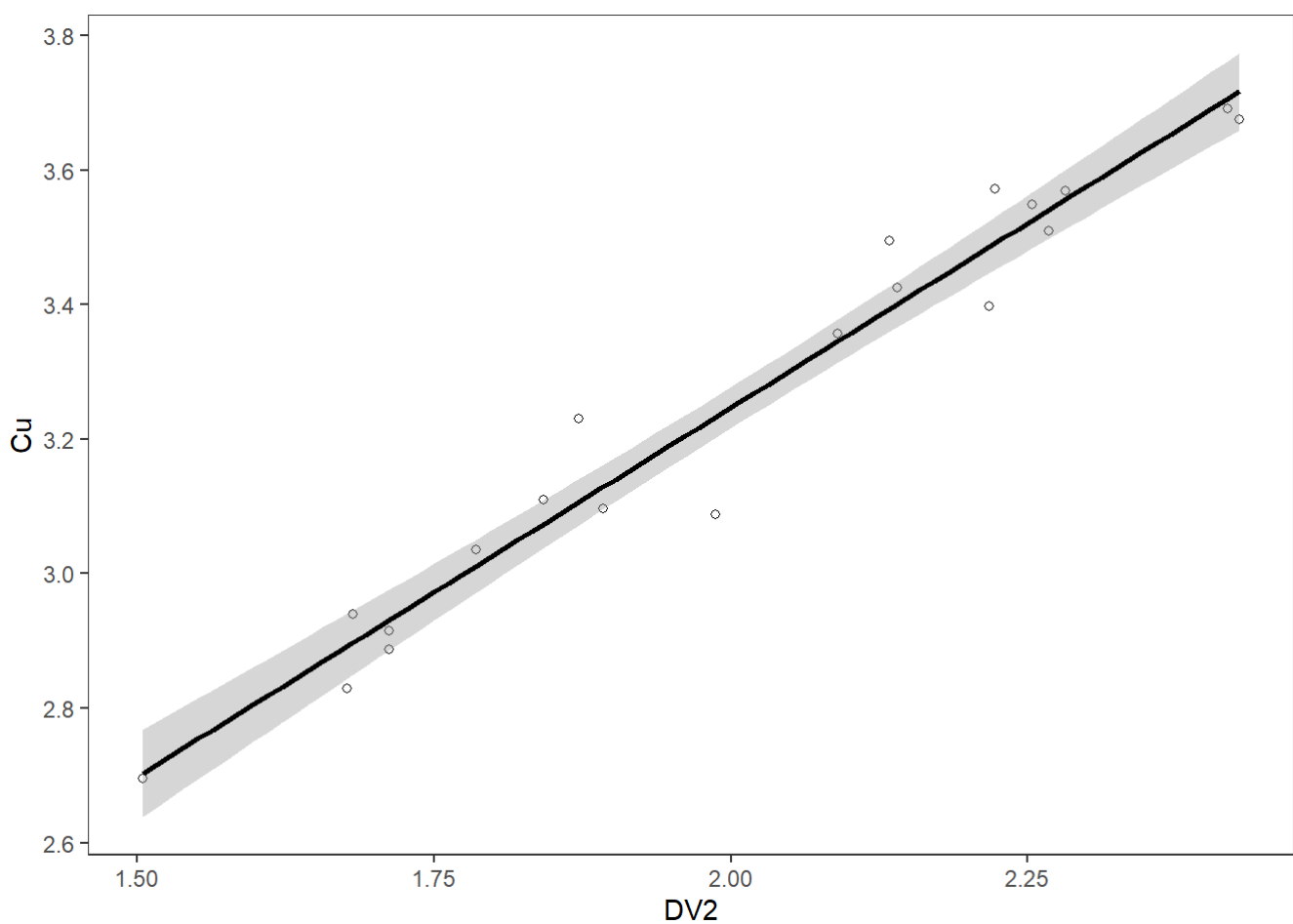
```
##
## Call:
## lm(formula = Cu ~ DV2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.14439 -0.03422  0.00169  0.02738  0.12401
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.05142    0.10985   9.572 1.74e-08 ***
## DV2          1.09782    0.05428  20.225 7.94e-14 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06498 on 18 degrees of freedom
## Multiple R-squared:  0.9578, Adjusted R-squared:  0.9555
## F-statistic:  409 on 1 and 18 DF,  p-value: 7.942e-14
```

```
## Get regression equation
lm(Cu~DV2)
```

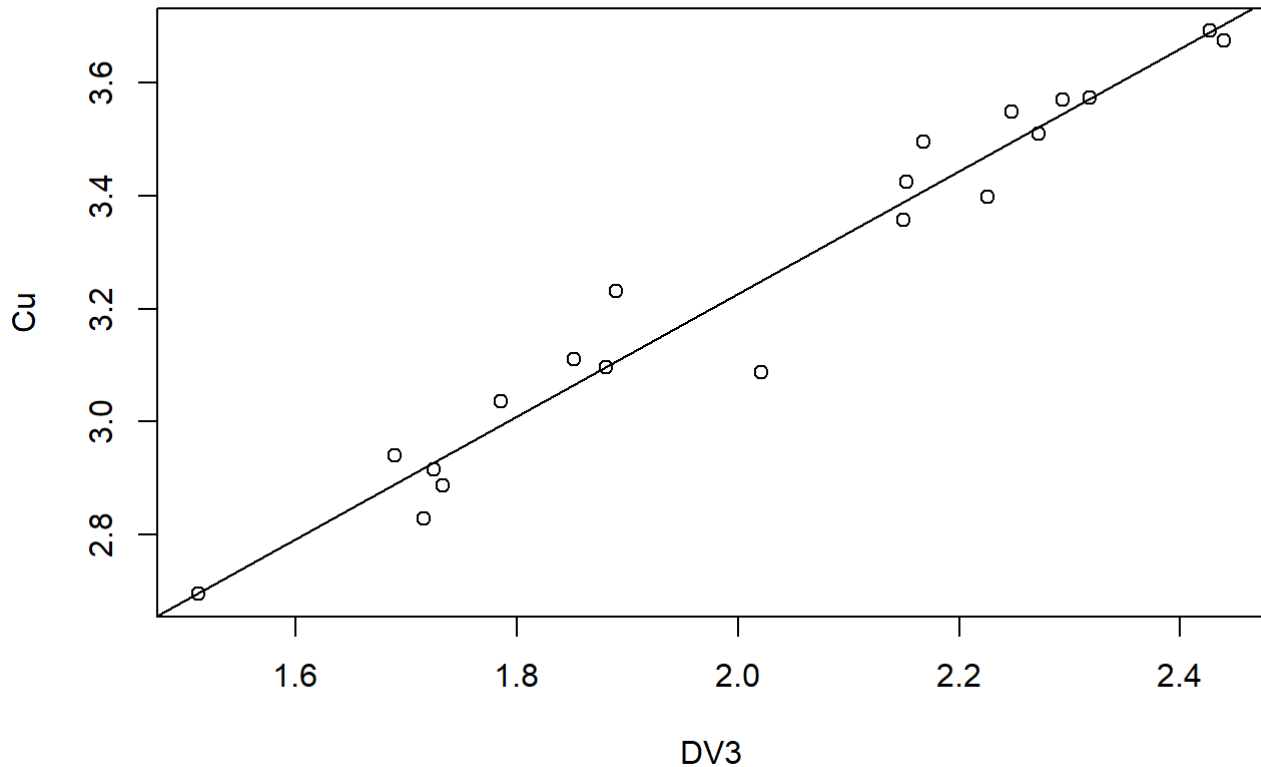
```
##
## Call:
## lm(formula = Cu ~ DV2)
##
## Coefficients:
## (Intercept)      DV2
##      1.051      1.098
```

```
## Final plot
ggplot(MysticeteData2, aes(y=Cu, x=DV2)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### CURVILINEAR LENGTH VS DV3
## Plot scatterplot
plot(Cu~DV3)
abline(lm(Cu~DV3))
```

```
## Get summary statistics
summary(lm(Cu~DV3))
```

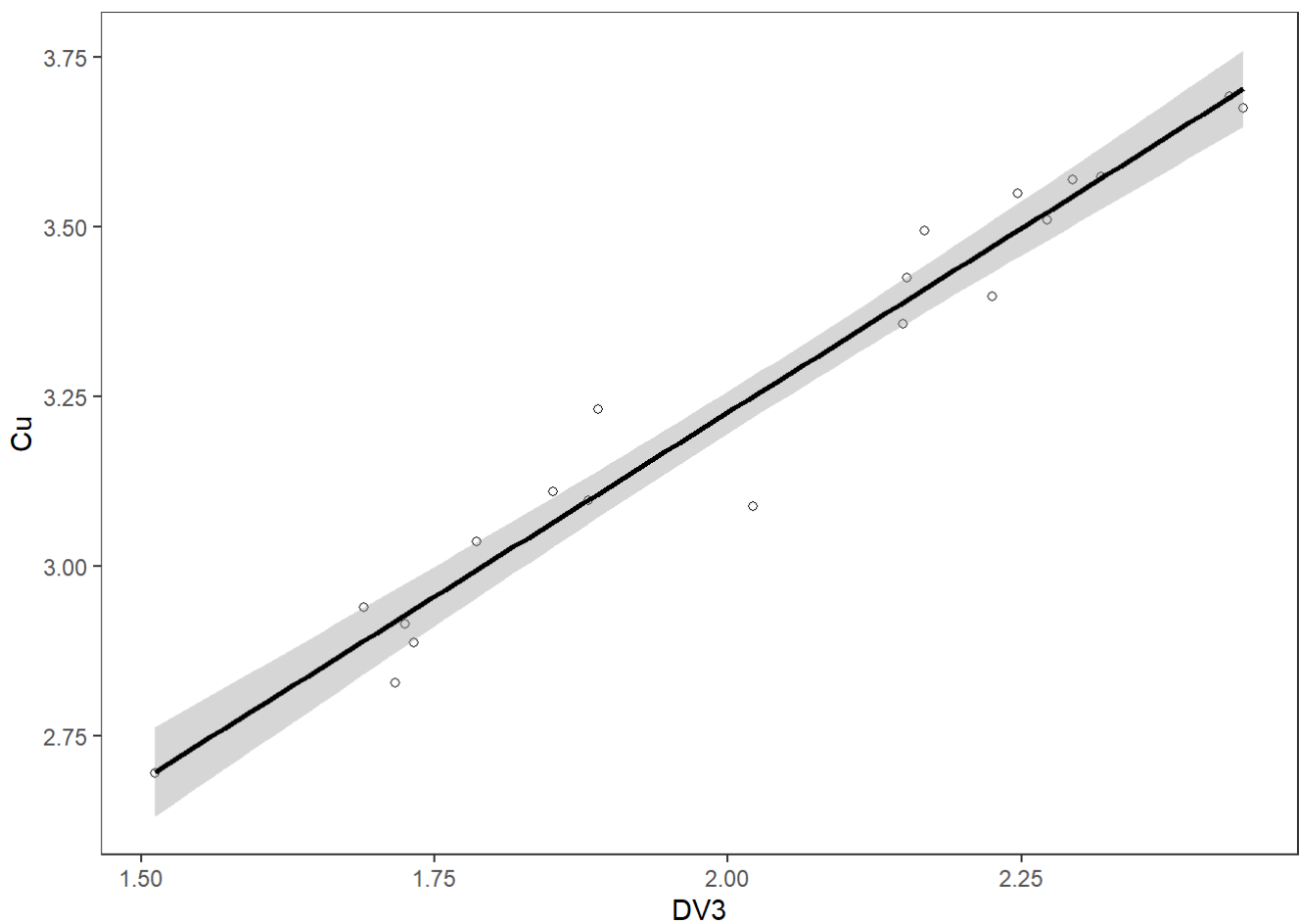
```
##
## Call:
## lm(formula = Cu ~ DV3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.161589 -0.028804  0.000351  0.042371  0.123934
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.05893    0.11068   9.567 1.76e-08 ***
## DV3          1.08391    0.05418  20.005 9.59e-14 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06566 on 18 degrees of freedom
## Multiple R-squared:  0.957, Adjusted R-squared:  0.9546
## F-statistic: 400.2 on 1 and 18 DF, p-value: 9.591e-14
```

```
## Get regression equation
lm(Cu~DV3)
```

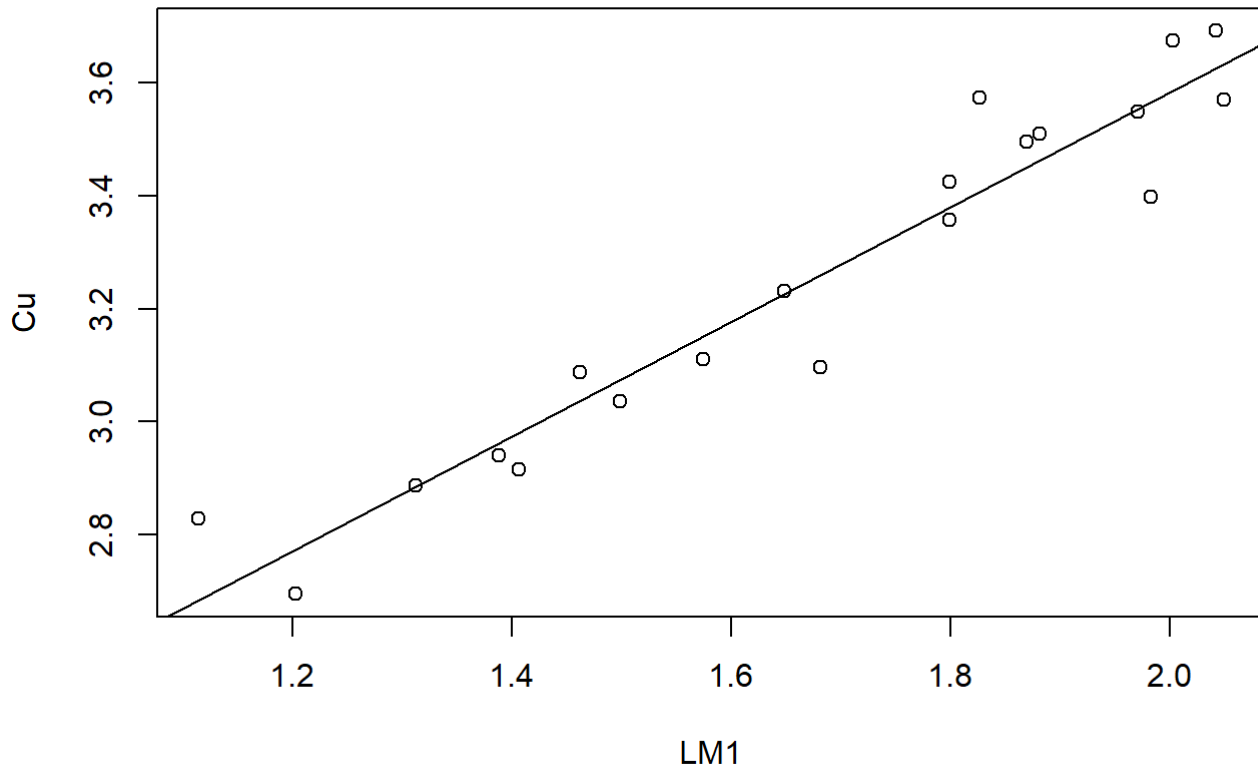
```
##
## Call:
## lm(formula = Cu ~ DV3)
##
## Coefficients:
## (Intercept)      DV3
##      1.059      1.084
```

```
## Final plot
ggplot(MysticeteData2, aes(y=Cu, x=DV3)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### CURVILINEAR LENGTH VS LM1
## Plot scatterplot
plot(Cu~LM1)
abline(lm(Cu~LM1))
```



```
## Get summary statistics
summary(lm(Cu~LM1))
```

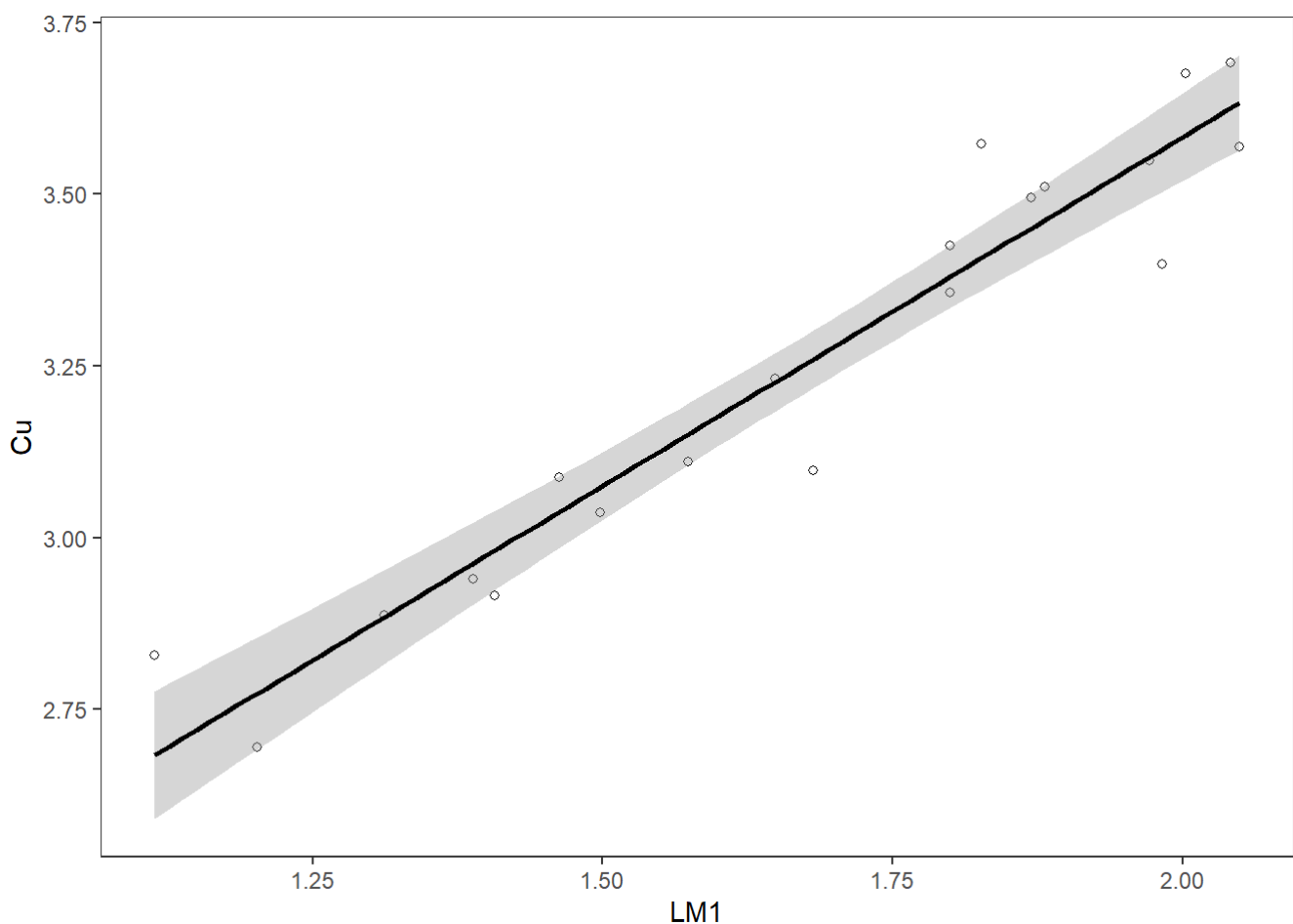
```
##
## Call:
## lm(formula = Cu ~ LM1)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.167256 -0.046486 -0.000986  0.048745  0.166327
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.55177    0.11948   12.99 1.40e-10 ***
## LM1          1.01572    0.07032   14.45 2.42e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.08919 on 18 degrees of freedom
## Multiple R-squared:  0.9206, Adjusted R-squared:  0.9162
## F-statistic: 208.7 on 1 and 18 DF, p-value: 2.418e-11
```

```
## Get regression equation
lm(Cu~LM1)
```

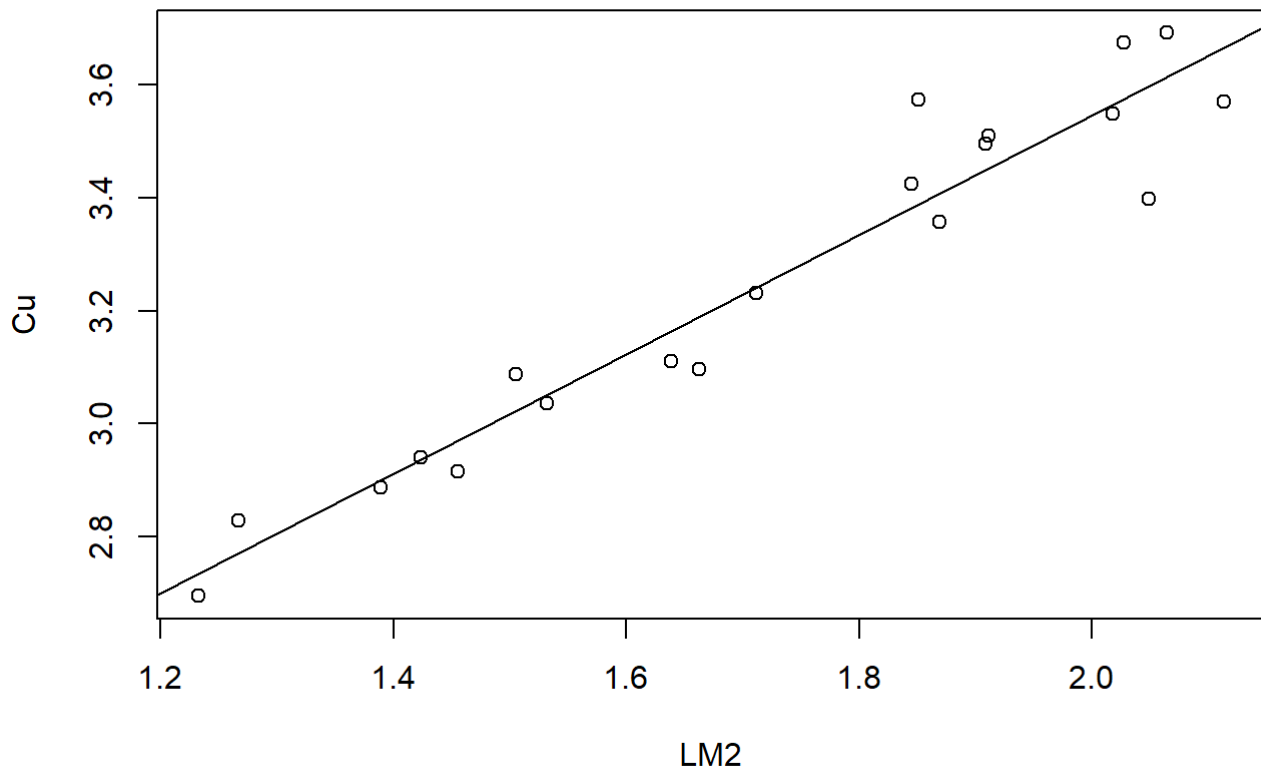
```
##
## Call:
## lm(formula = Cu ~ LM1)
##
## Coefficients:
## (Intercept)      LM1
##      1.552      1.016
```

```
## Final plot
ggplot(MysticeteData2, aes(y=Cu, x=LM1)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### CURVILINEAR LENGTH VS LM2
## Plot scatterplot
plot(Cu~LM2)
abline(lm(Cu~LM2))
```



```
## Get summary statistics
summary(lm(Cu~LM2))
```

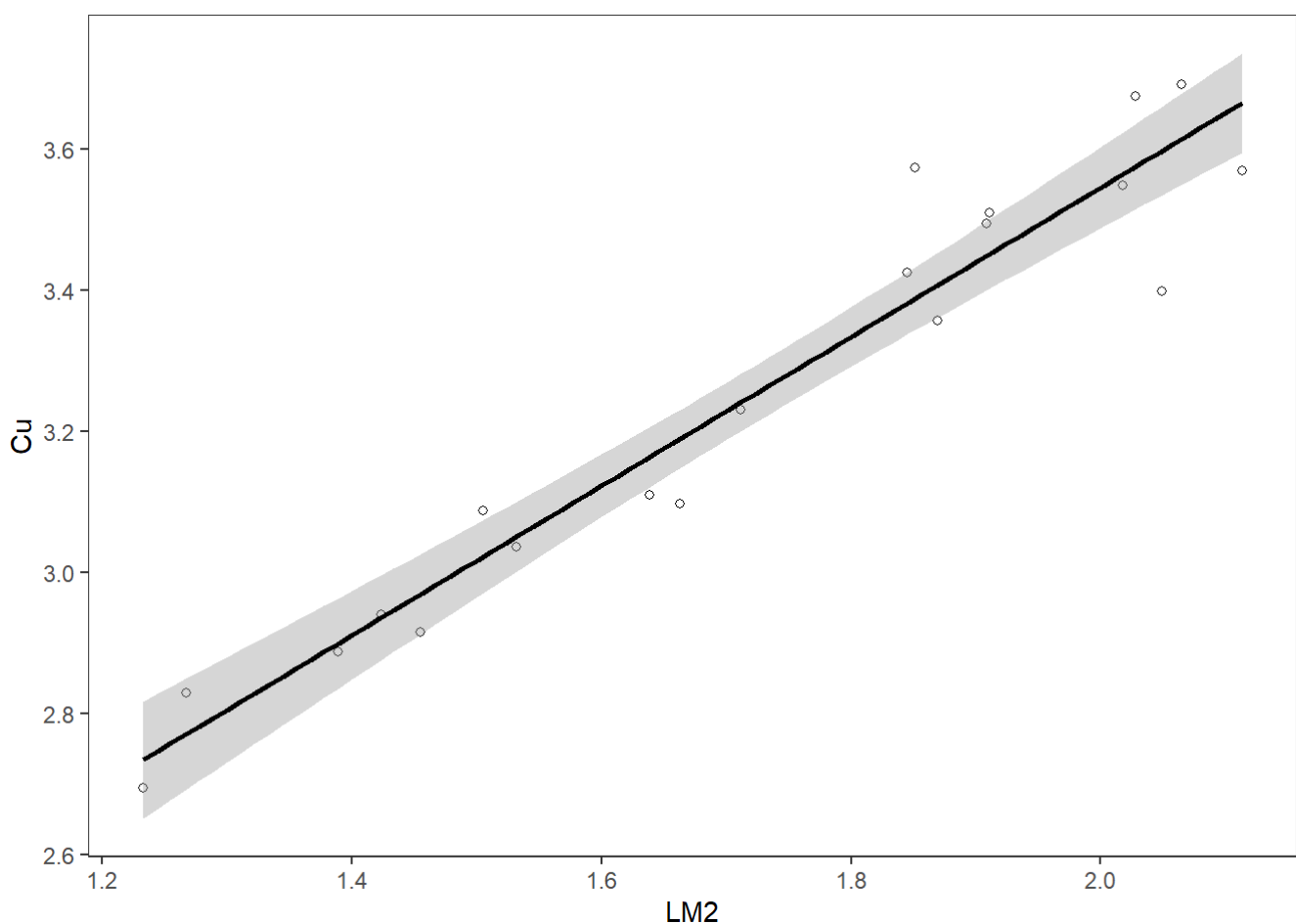
```
##
## Call:
## lm(formula = Cu ~ LM2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.19967 -0.05121 -0.01142  0.05813  0.18451
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.43154    0.12291   11.65 8.15e-10 ***
## LM2          1.05702    0.07043   15.01 1.28e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.08609 on 18 degrees of freedom
## Multiple R-squared:  0.926, Adjusted R-squared:  0.9219
## F-statistic: 225.3 on 1 and 18 DF, p-value: 1.276e-11
```

```
## Get regression equation
lm(Cu~LM2)
```

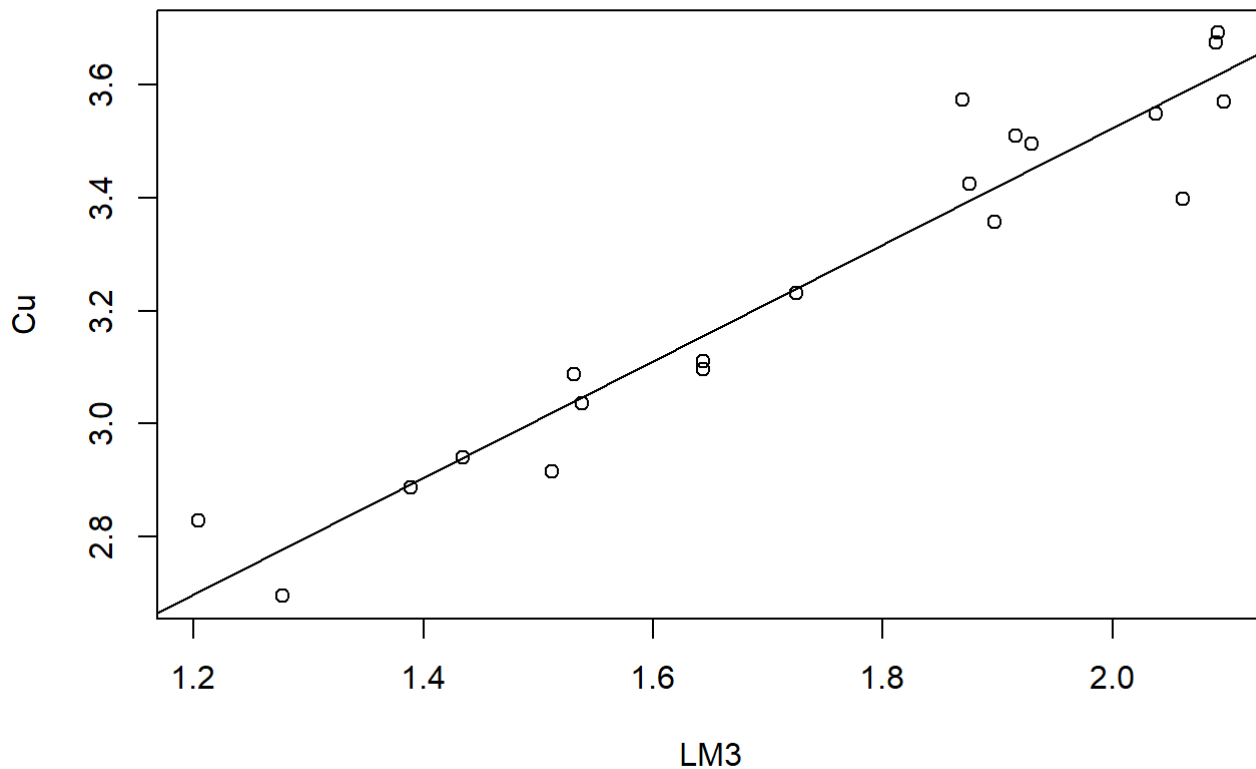
```
##
## Call:
## lm(formula = Cu ~ LM2)
##
## Coefficients:
## (Intercept)      LM2
##      1.432      1.057
```

```
## Final plot
ggplot(MysticeteData2, aes(y=Cu, x=LM2)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### CURVILINEAR LENGTH VS LM3
## Plot scatterplot
plot(Cu~LM3)
abline(lm(Cu~LM3))
```



```
## Get summary statistics
summary(lm(Cu~LM3))
```

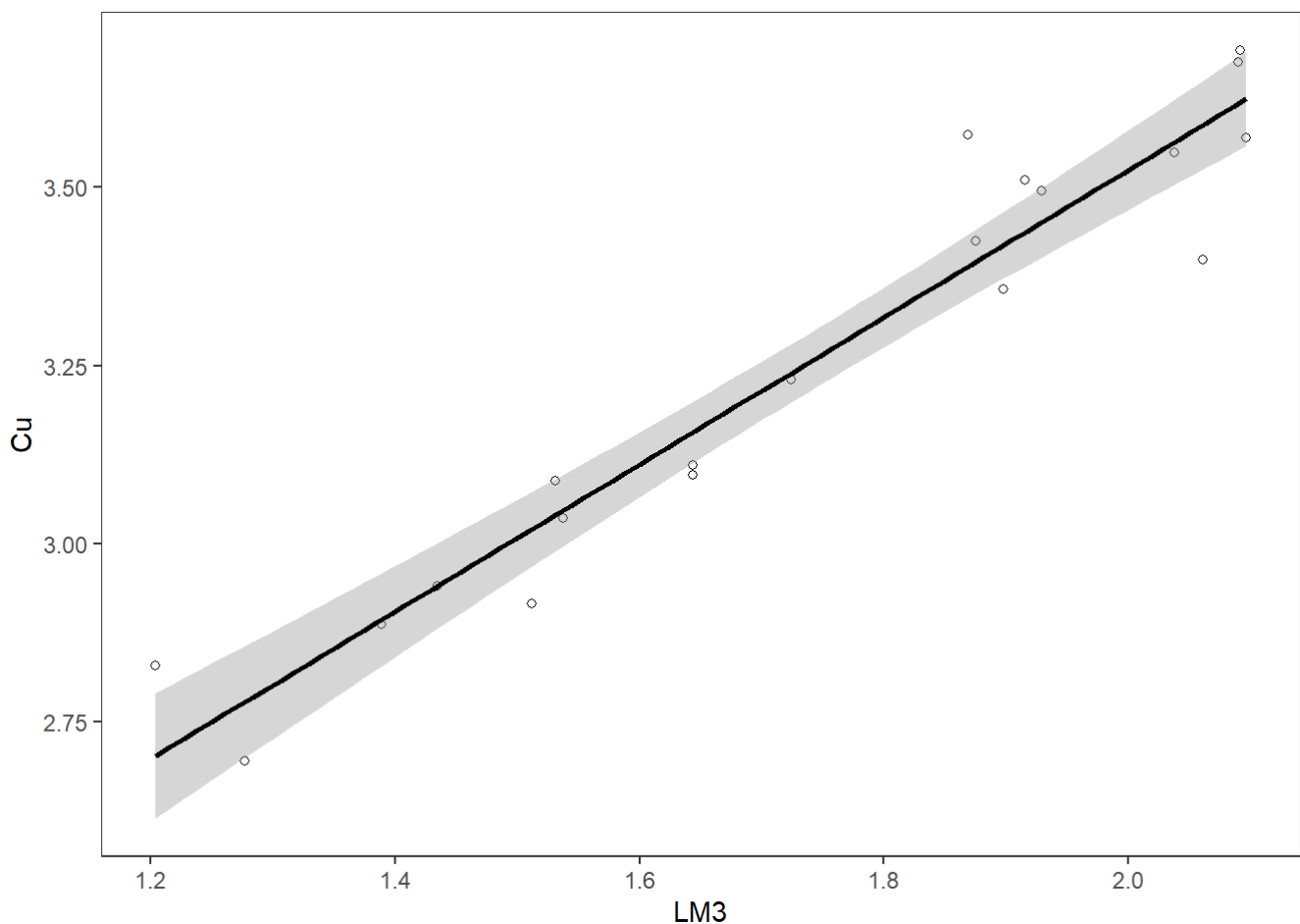
```
##
## Call:
## lm(formula = Cu ~ LM3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.188671 -0.055520 -0.007266  0.050548  0.183937
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.45907     0.12198   11.96 5.31e-10 ***
## LM3          1.03244     0.06929   14.90 1.44e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.08667 on 18 degrees of freedom
## Multiple R-squared:  0.925, Adjusted R-squared:  0.9208
## F-statistic: 222 on 1 and 18 DF, p-value: 1.441e-11
```

```
## Get regression equation
lm(Cu~LM3)
```

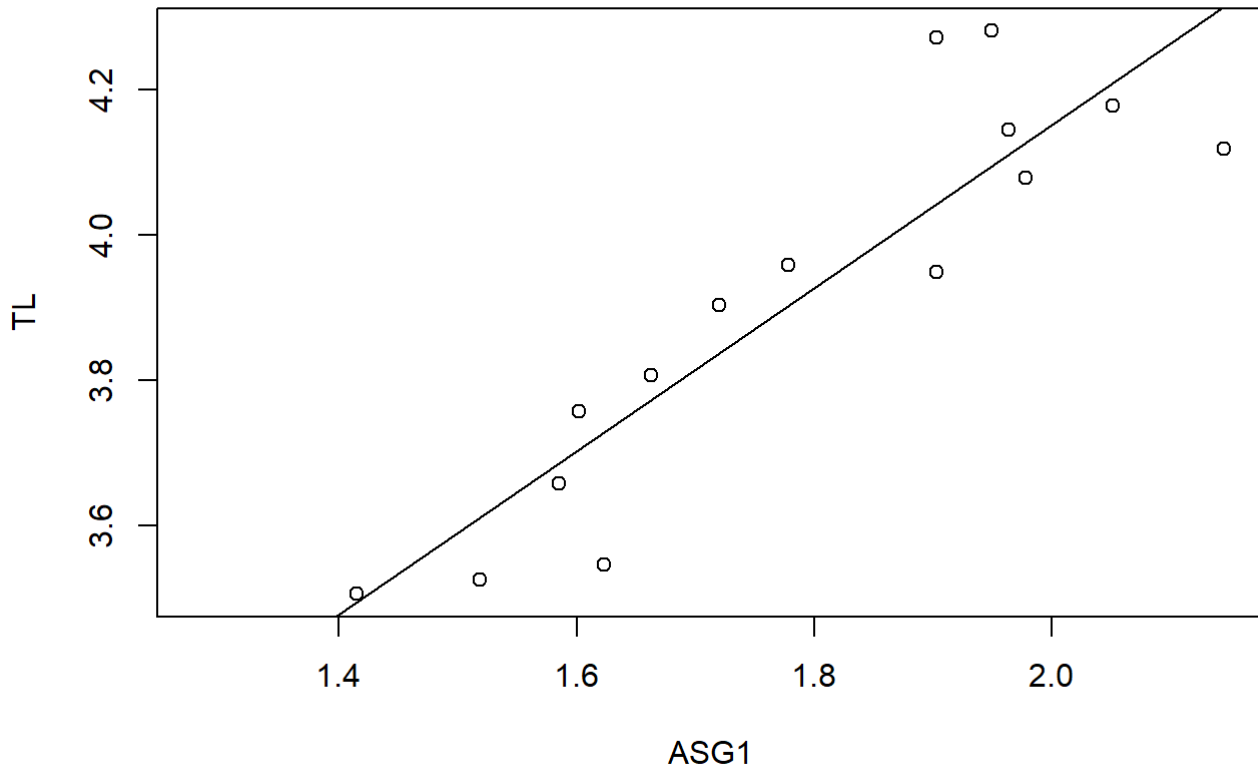
```
##
## Call:
## lm(formula = Cu ~ LM3)
##
## Coefficients:
## (Intercept)      LM3
##      1.459      1.032
```

```
## Final plot
ggplot(MysticeteData2, aes(y=Cu, x=LM3)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### TOTAL LENGTH VS ASG1
## Plot scatterplot
plot(TL~ASG1)
abline(lm(TL~ASG1))
```

```
## Get summary statistics
summary(lm(TL~ASG1))
```

```
##
## Call:
## lm(formula = TL ~ ASG1)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.19617 -0.06676  0.01096  0.05459  0.22867
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   1.9028     0.2708   7.026 8.99e-06 ***
## ASG1          1.1247     0.1506   7.469 4.70e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1215 on 13 degrees of freedom
## (5 observations deleted due to missingness)
## Multiple R-squared:  0.811, Adjusted R-squared:  0.7965
## F-statistic: 55.79 on 1 and 13 DF, p-value: 4.701e-06
```

```
## Get regression equation
lm(TL~ASG1)
```

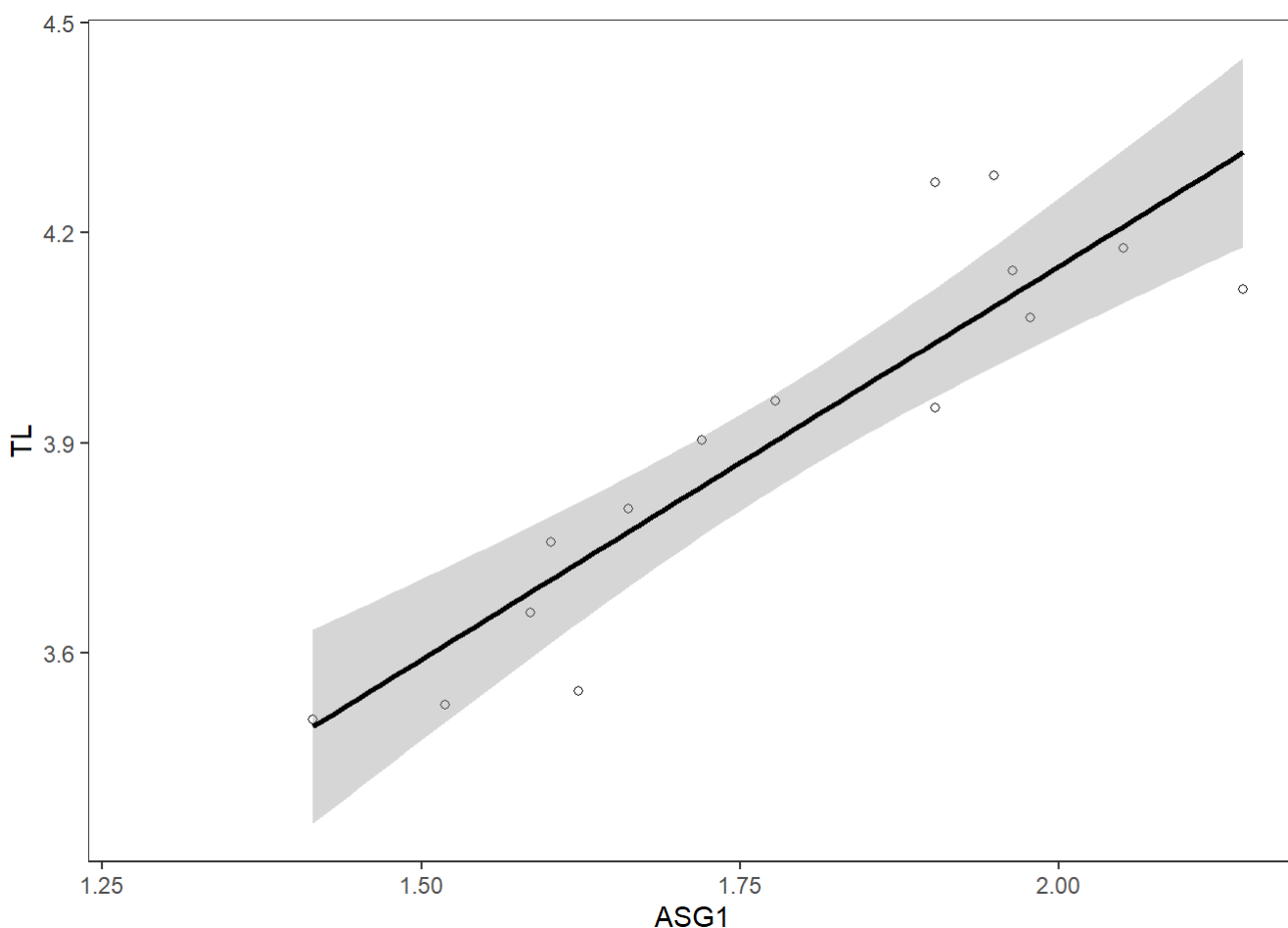
```
##
## Call:
## lm(formula = TL ~ ASG1)
##
## Coefficients:
## (Intercept)      ASG1
##      1.903      1.125
```

```
## Final plot
ggplot(MysticeteData2, aes(y=TL, x=ASG1)) + geom_point(shape=1) + geom_smooth(method=lm, col
= "black") + theme_bw() + theme(panel.grid.major = element_blank(), panel.grid.minor = element
_blank())
```

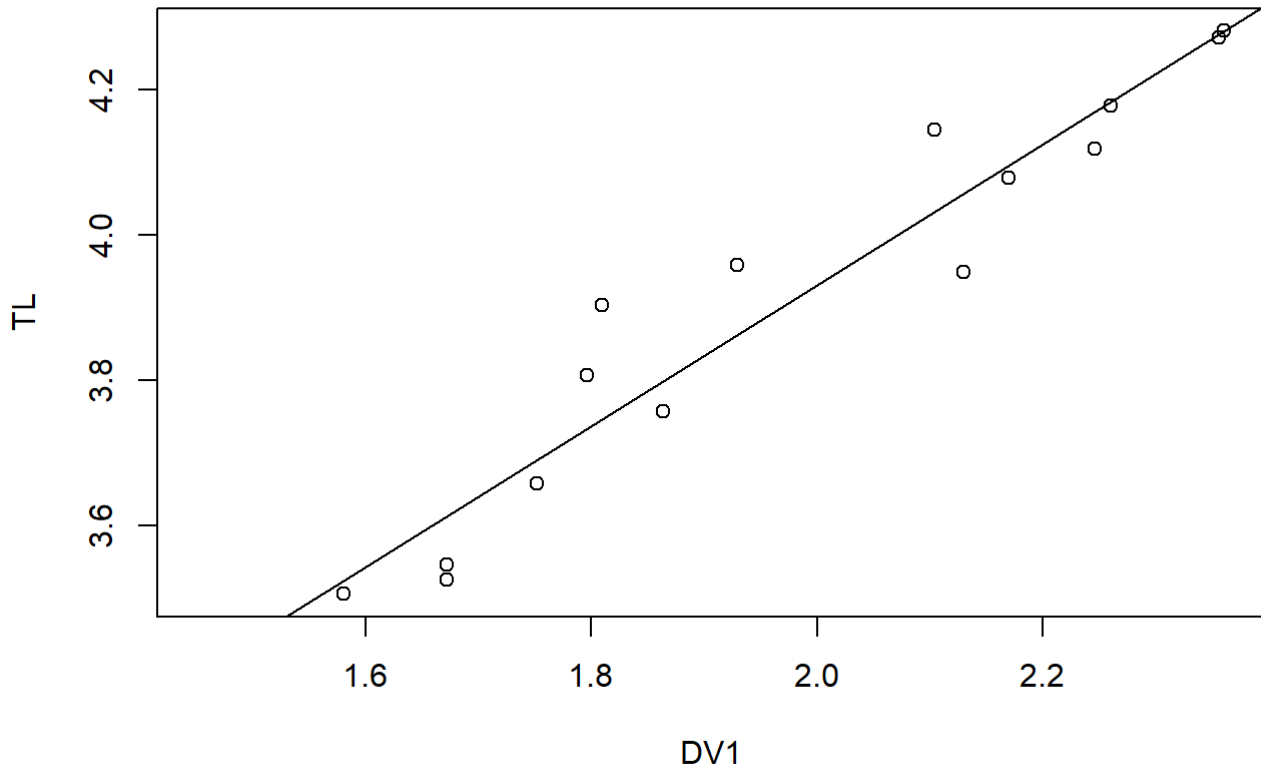
```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning: Removed 5 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 5 rows containing missing values (geom_point).
```



```
### TOTAL LENGTH VS DV1
## Plot scatterplot
plot(TL~DV1)
abline(lm(TL~DV1))
```



```
## Get summary statistics
summary(lm(TL~DV1))
```

```
##
## Call:
## lm(formula = TL ~ DV1)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.10839 -0.04674 -0.01733  0.03627  0.15648
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.99124    0.15963   12.47 1.31e-08 ***
## DV1          0.97006    0.07994   12.13 1.83e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.07958 on 13 degrees of freedom
## (5 observations deleted due to missingness)
## Multiple R-squared:  0.9189, Adjusted R-squared:  0.9126
## F-statistic: 147.2 on 1 and 13 DF,  p-value: 1.829e-08
```

```
## Get regression equation
lm(TL~DV1)
```

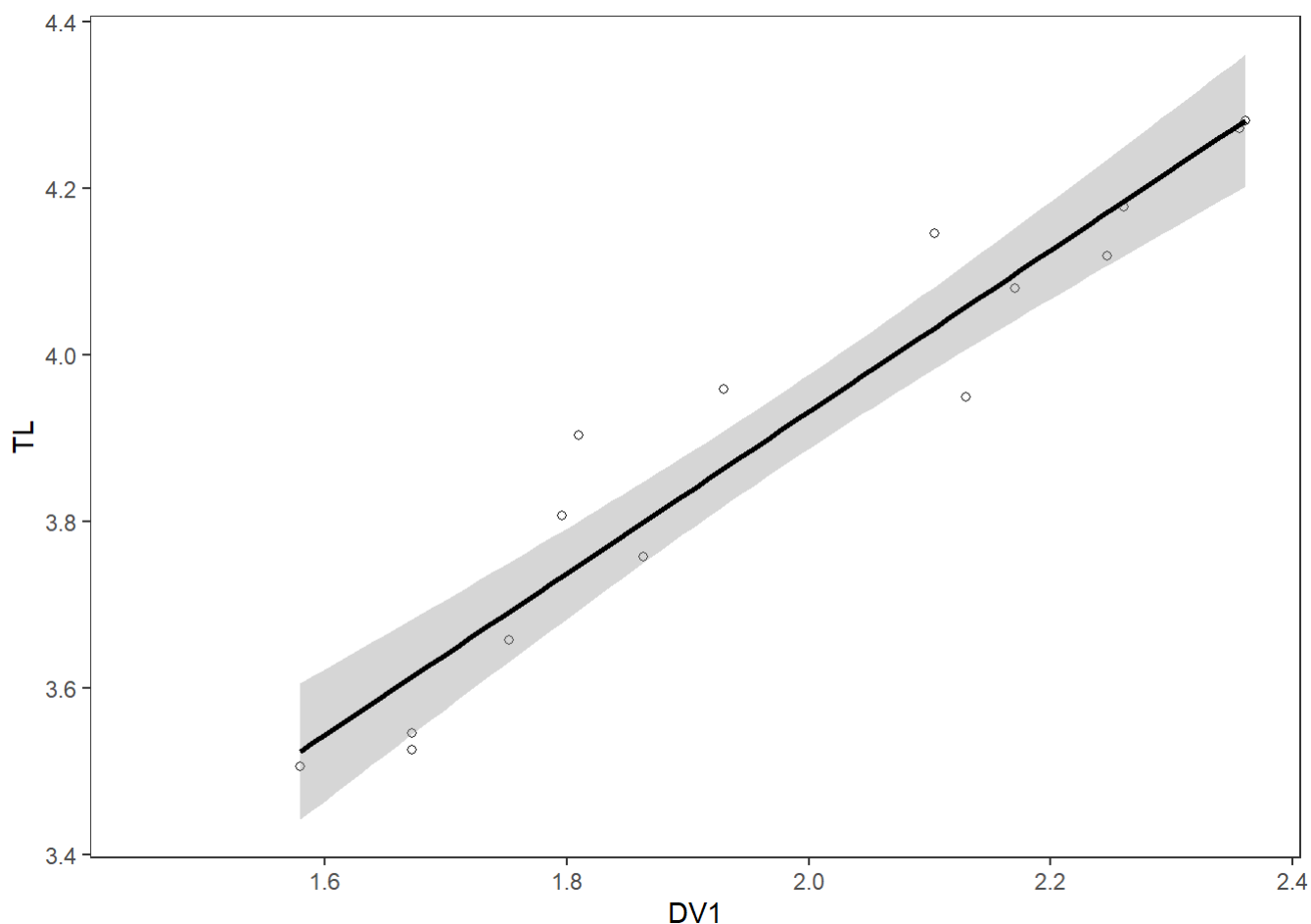
```
##
## Call:
## lm(formula = TL ~ DV1)
##
## Coefficients:
## (Intercept)      DV1
##      1.9912      0.9701
```

```
## Final plot
ggplot(MysticeteData2, aes(y=TL, x=DV1)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

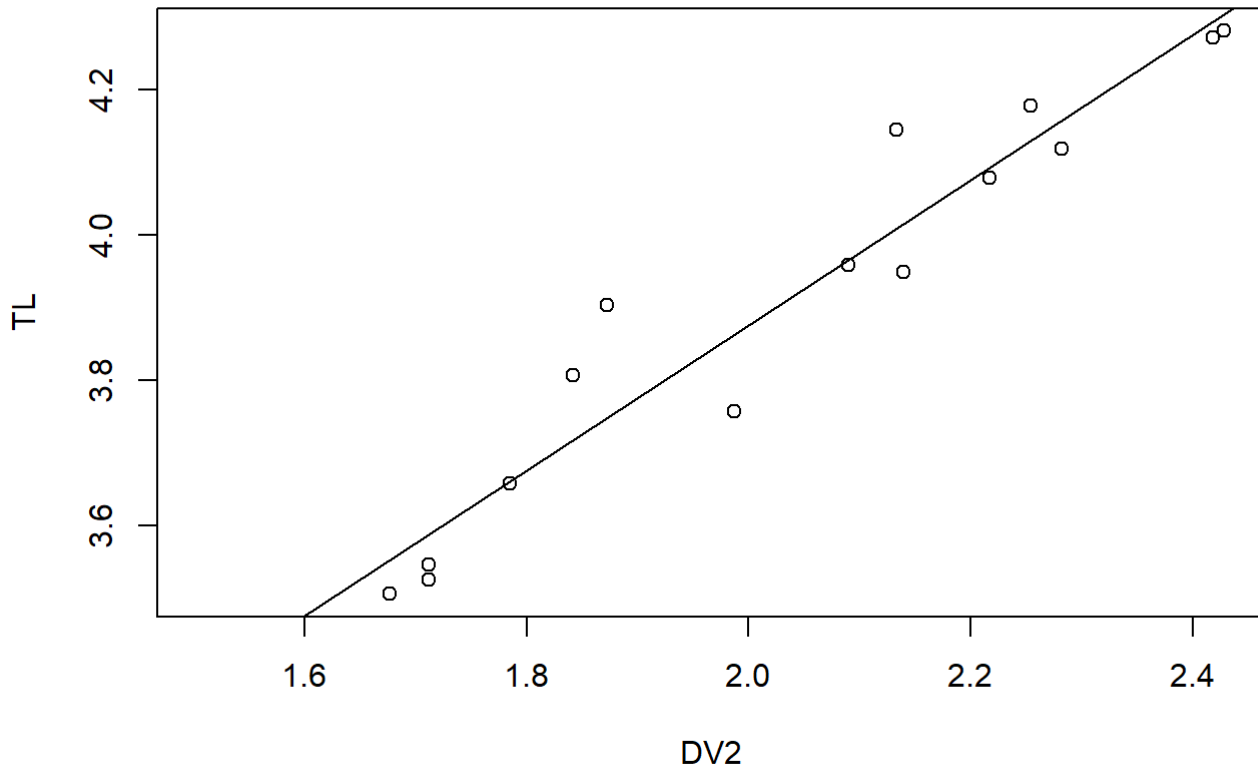
```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning: Removed 5 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 5 rows containing missing values (geom_point).
```



```
### TOTAL LENGTH VS DV2
## Plot scatterplot
plot(TL~DV2)
abline(lm(TL~DV2))
```



```
## Get summary statistics
summary(lm(TL~DV2))
```

```
##
## Call:
## lm(formula = TL ~ DV2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.10475 -0.04395 -0.02248  0.02224  0.15574
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.87235    0.16550   11.31 4.22e-08 ***
## DV2          1.00152    0.08066   12.42 1.39e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.07791 on 13 degrees of freedom
## (5 observations deleted due to missingness)
## Multiple R-squared:  0.9222, Adjusted R-squared:  0.9163
## F-statistic: 154.2 on 1 and 13 DF,  p-value: 1.386e-08
```

```
## Get regression equation
lm(TL~DV2)
```

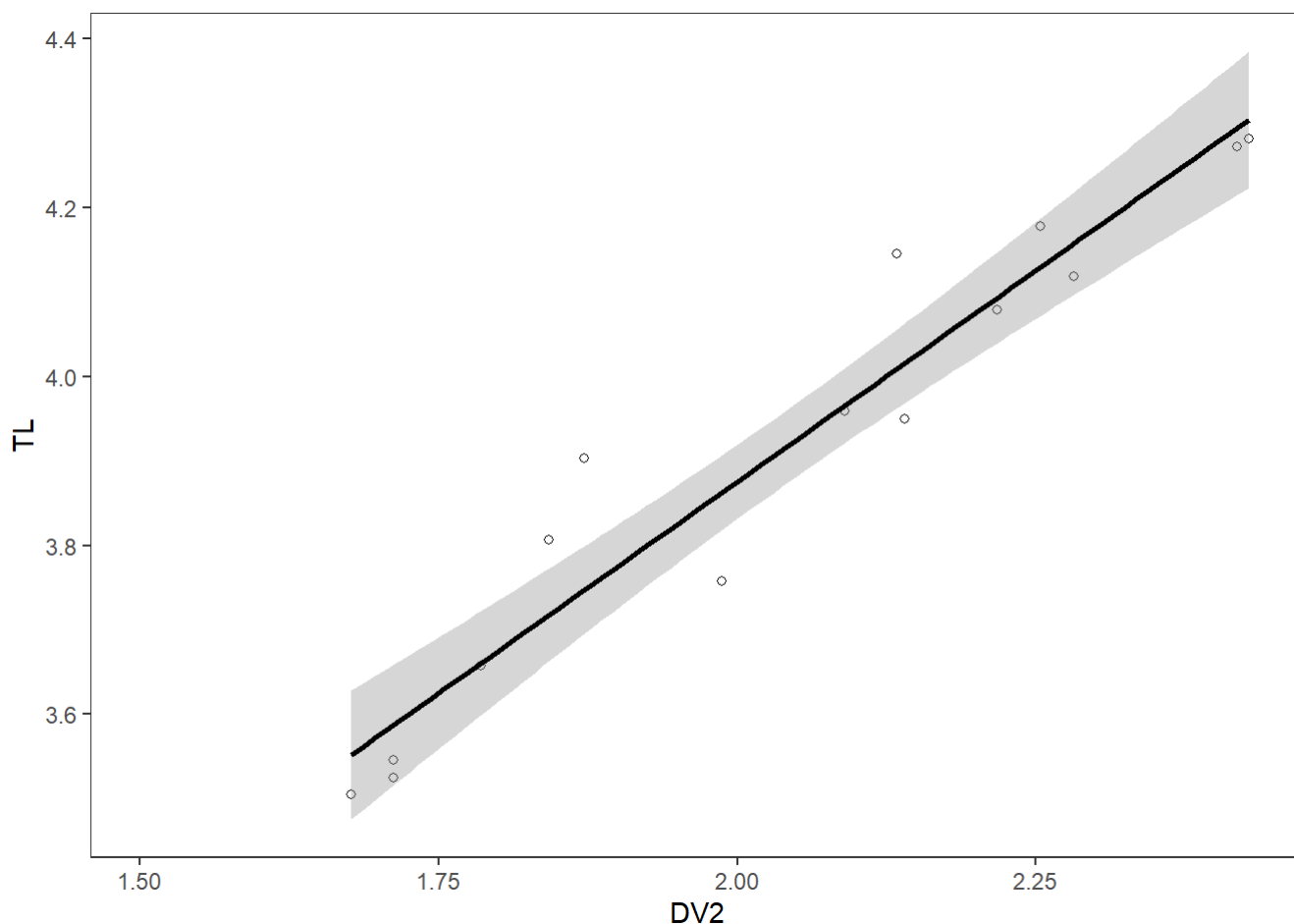
```
##
## Call:
## lm(formula = TL ~ DV2)
##
## Coefficients:
## (Intercept)      DV2
##      1.872      1.002
```

```
## Final plot
ggplot(MysticeteData2, aes(y=TL, x=DV2)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

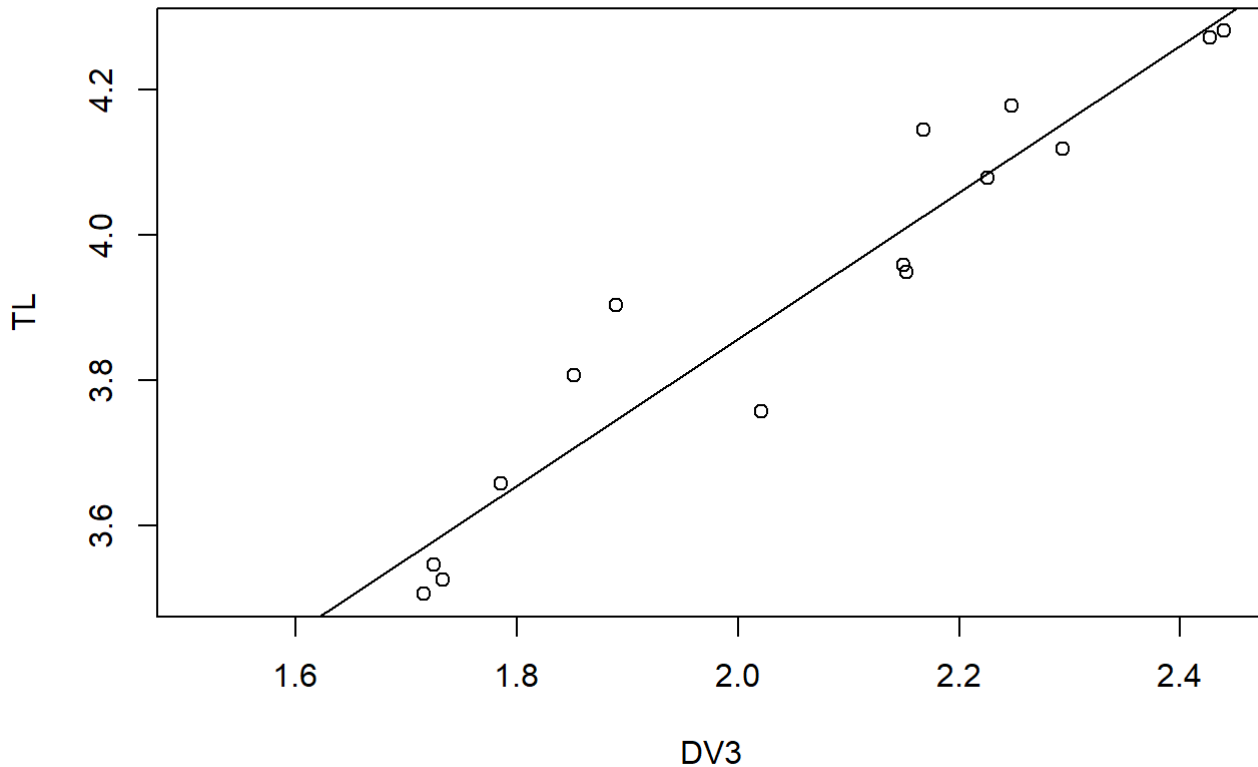
```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning: Removed 5 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 5 rows containing missing values (geom_point).
```



```
### TOTAL LENGTH VS DV3
## Plot scatterplot
plot(TL~DV3)
abline(lm(TL~DV3))
```



```
## Get summary statistics
summary(lm(TL~DV3))
```

```
##
## Call:
## lm(formula = TL ~ DV3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.12079 -0.05474 -0.01934  0.04400  0.15802
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   1.8382     0.1765   10.41 1.12e-07 ***
## DV3           1.0093     0.0853   11.83 2.47e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.08144 on 13 degrees of freedom
## (5 observations deleted due to missingness)
## Multiple R-squared:  0.915, Adjusted R-squared:  0.9085
## F-statistic: 140 on 1 and 13 DF, p-value: 2.474e-08
```

```
## Get regression equation
lm(TL~DV3)
```

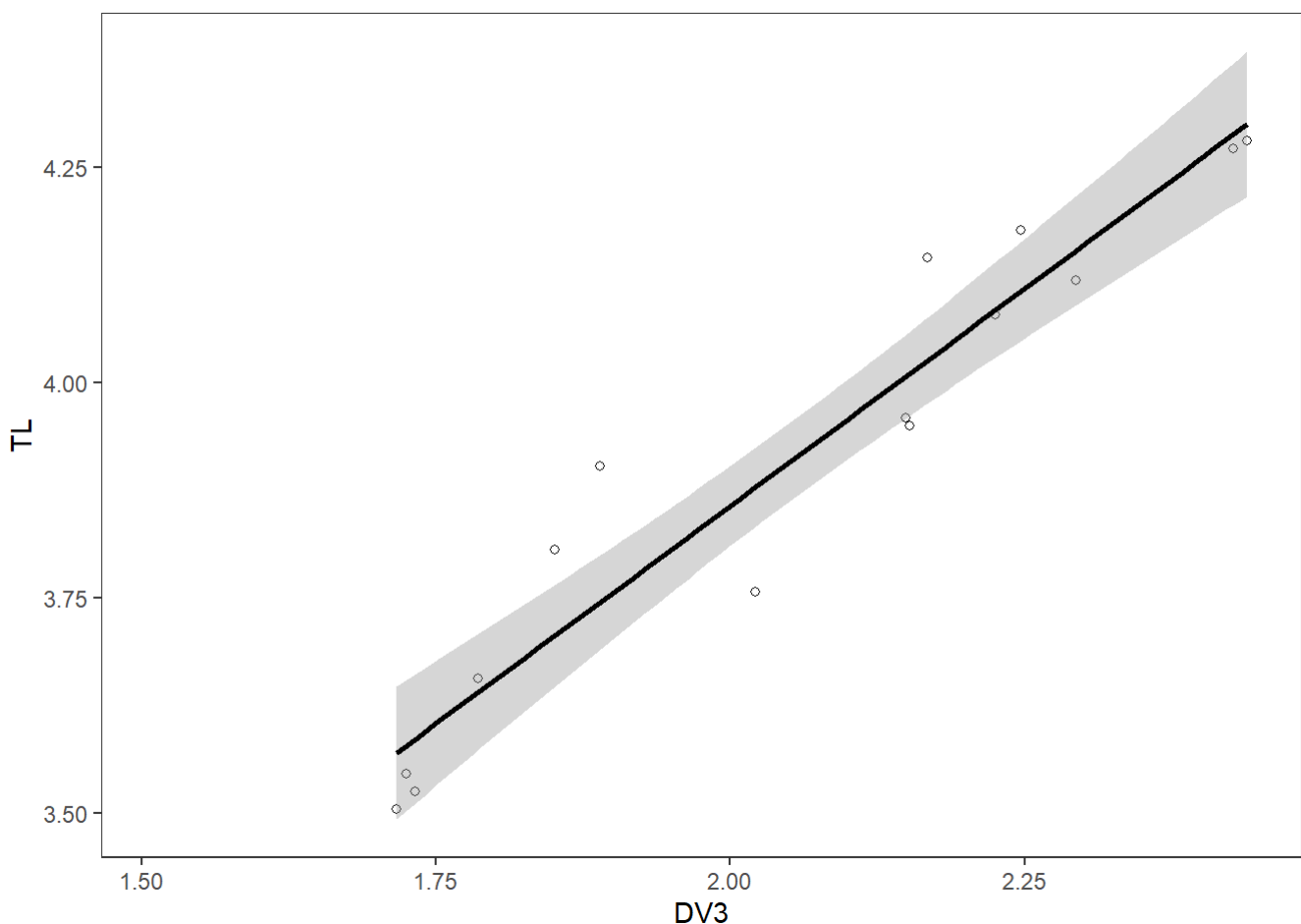
```
##
## Call:
## lm(formula = TL ~ DV3)
##
## Coefficients:
## (Intercept)      DV3
##      1.838      1.009
```

```
## Final plot
ggplot(MysticeteData2, aes(y=TL, x=DV3)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

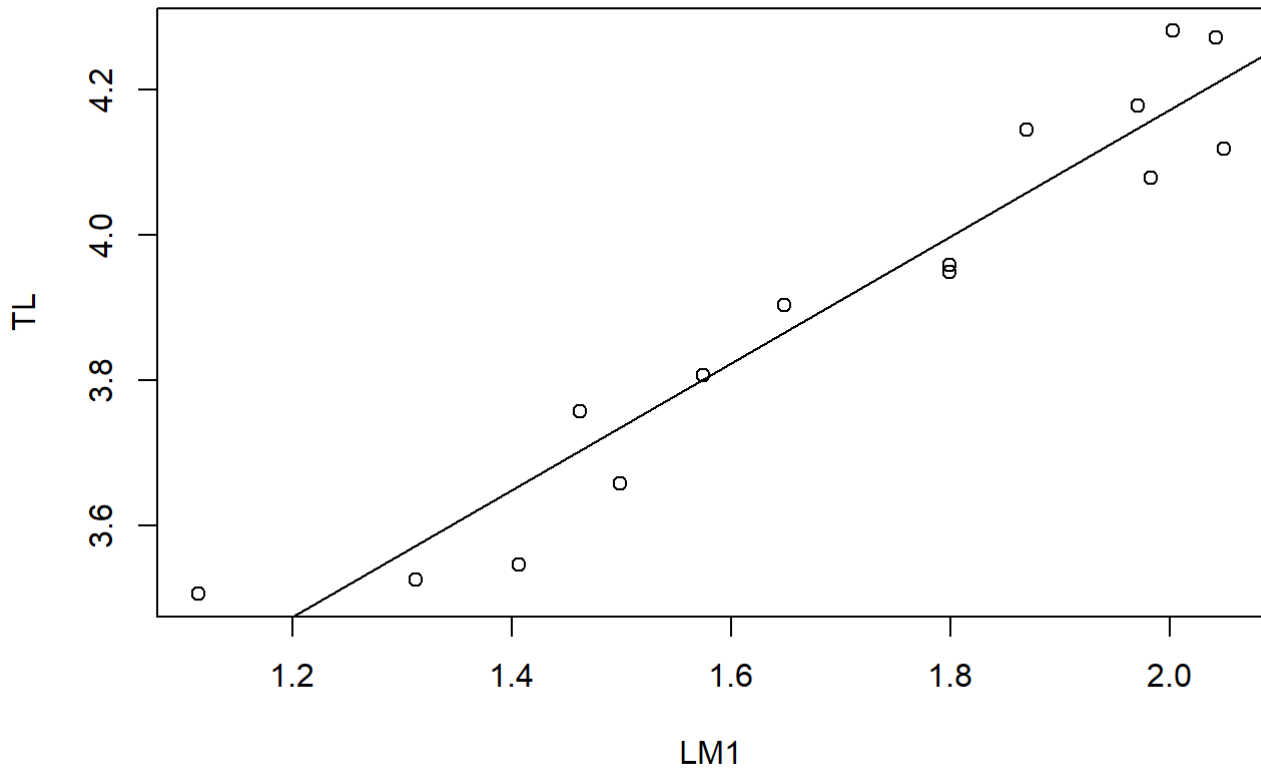
```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning: Removed 5 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 5 rows containing missing values (geom_point).
```



```
### TOTAL LENGTH VS LM1
## Plot scatterplot
plot(TL~LM1)
abline(lm(TL~LM1))
```

```
## Get summary statistics
summary(lm(TL~LM1))
```

```
##
## Call:
## lm(formula = TL ~ LM1)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.108774 -0.062464  0.005817  0.058914  0.106615
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.42565    0.12123   20.01 3.78e-11 ***
## LM1          0.87337    0.07024   12.43 1.36e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.07782 on 13 degrees of freedom
## (5 observations deleted due to missingness)
## Multiple R-squared:  0.9224, Adjusted R-squared:  0.9165
## F-statistic: 154.6 on 1 and 13 DF,  p-value: 1.364e-08
```

```
## Get regression equation
lm(TL~LM1)
```

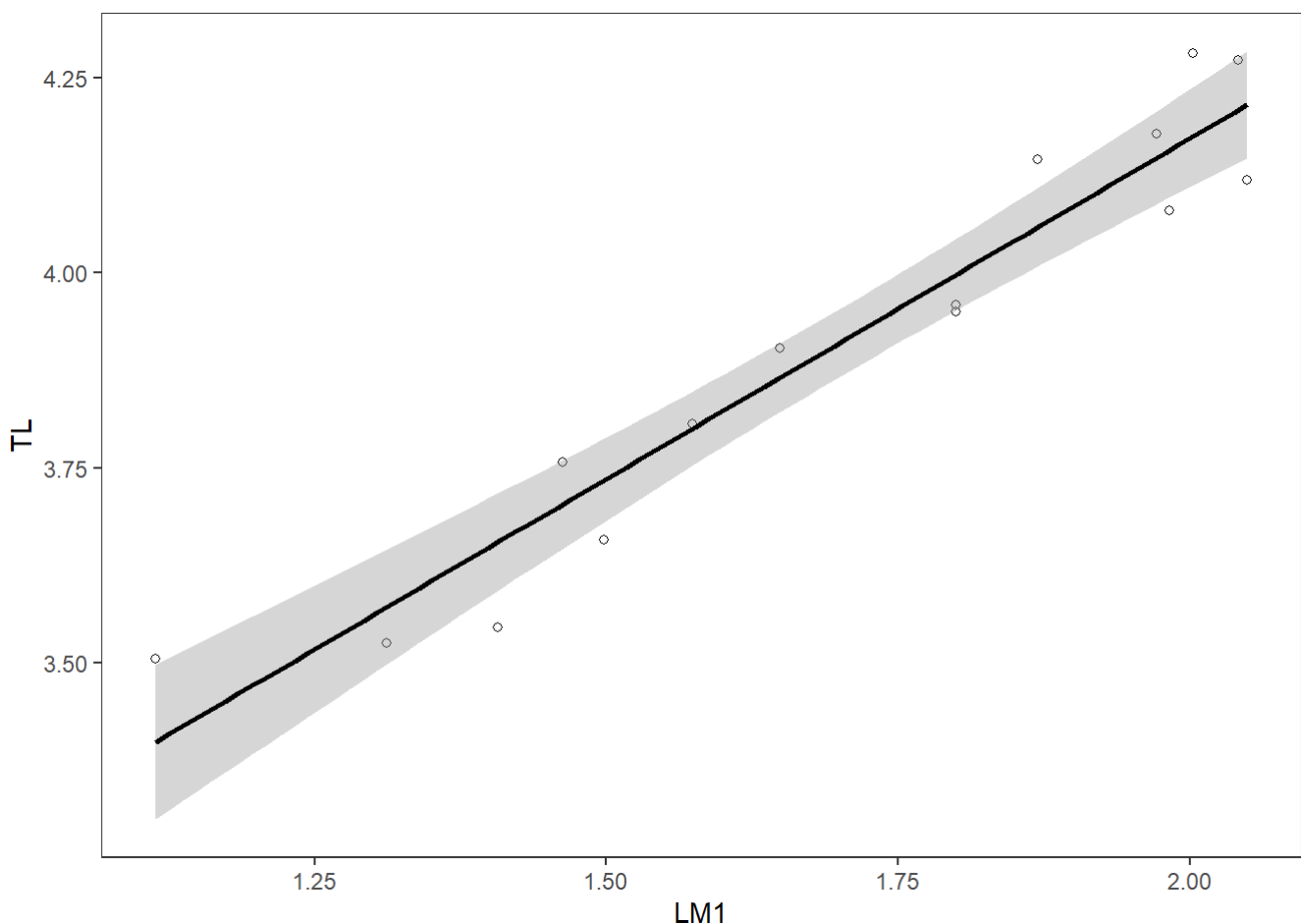
```
##
## Call:
## lm(formula = TL ~ LM1)
##
## Coefficients:
## (Intercept)      LM1
##      2.4256      0.8734
```

```
## Final plot
ggplot(MysticeteData2, aes(y=TL, x=LM1)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

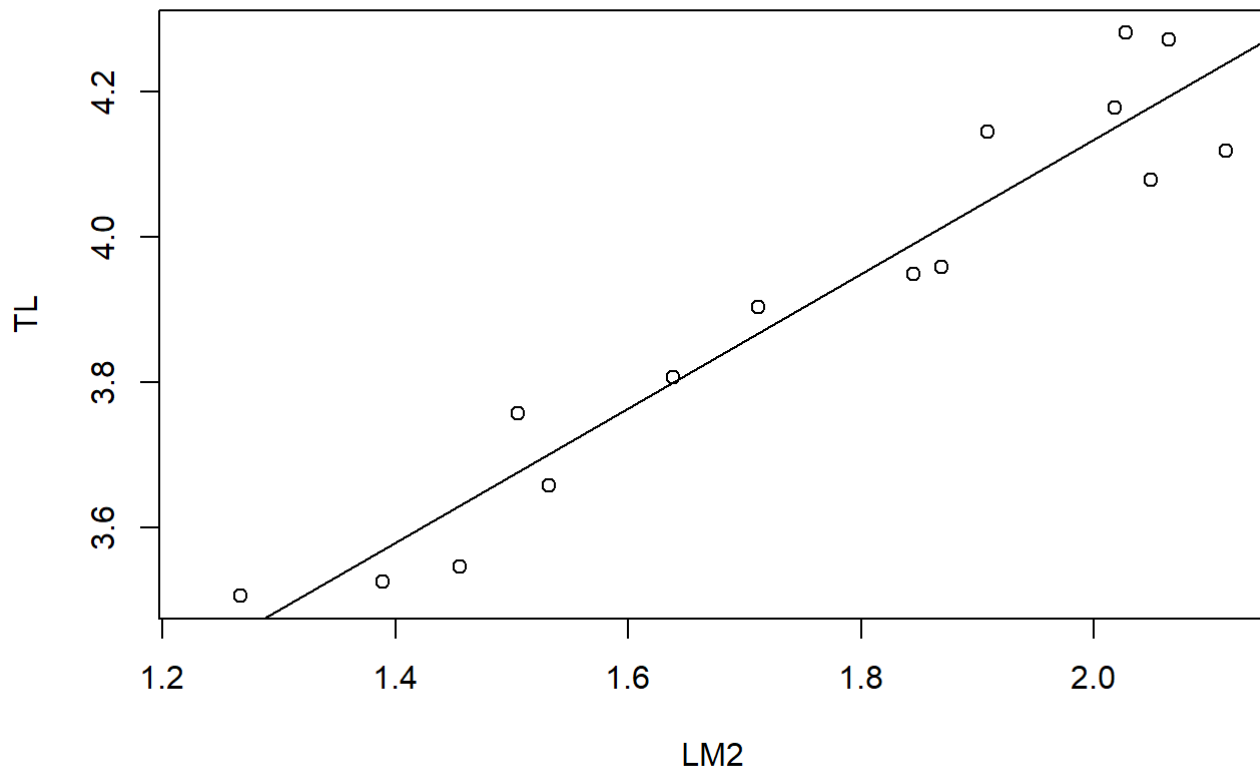
```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning: Removed 5 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 5 rows containing missing values (geom_point).
```



```
### TOTAL LENGTH VS LM2
## Plot scatterplot
plot(TL~LM2)
abline(lm(TL~LM2))
```



```
## Get summary statistics
summary(lm(TL~LM2))
```

```
##
## Call:
## lm(formula = TL ~ LM2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.121158 -0.049314  0.006217  0.063222  0.120495
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.28224    0.13489   16.92 3.10e-10 ***
## LM2          0.92629    0.07578   12.22 1.67e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.07905 on 13 degrees of freedom
## (5 observations deleted due to missingness)
## Multiple R-squared:  0.92, Adjusted R-squared:  0.9138
## F-statistic: 149.4 on 1 and 13 DF, p-value: 1.674e-08
```

```
## Get regression equation
lm(TL~LM2)
```

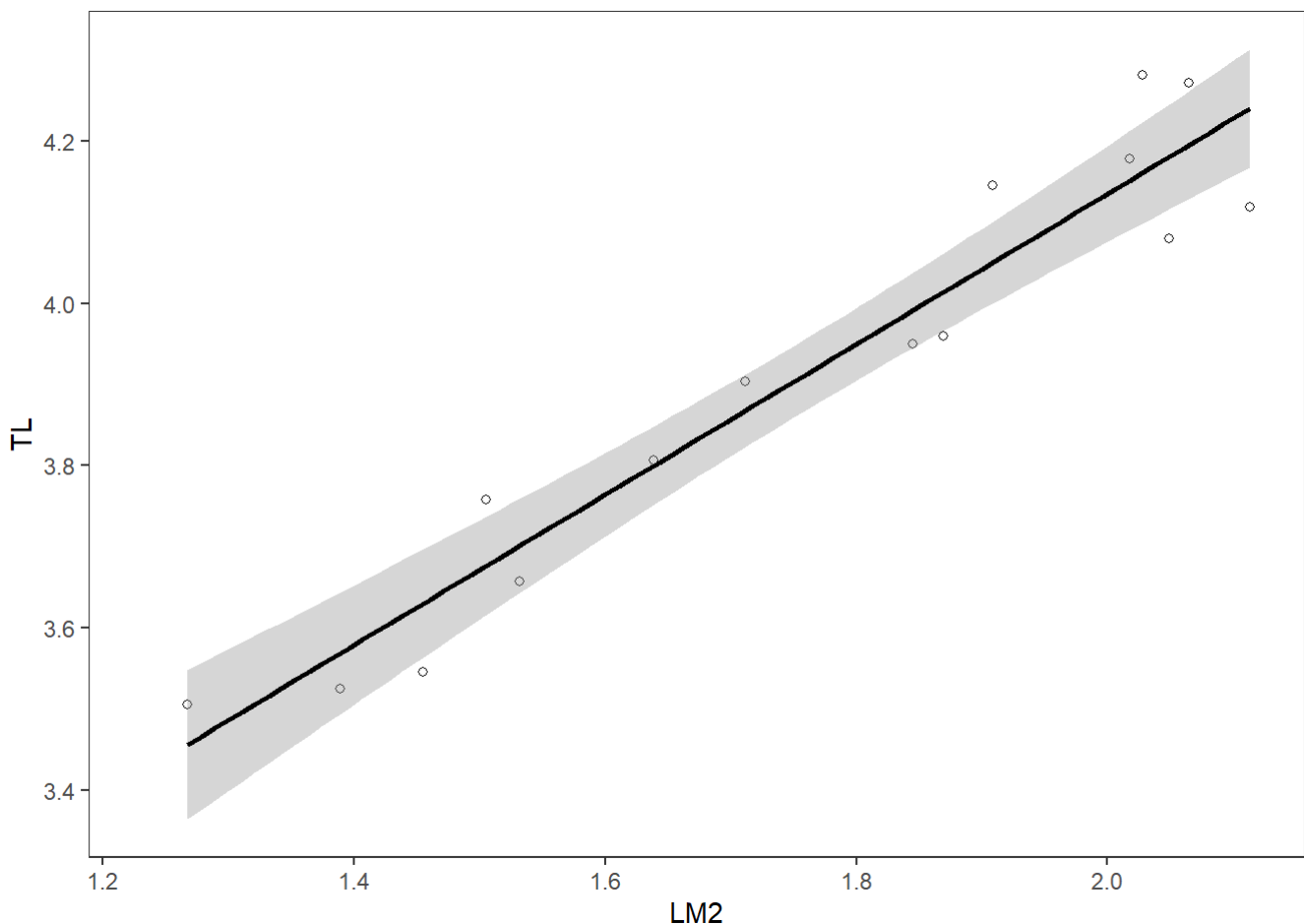
```
##
## Call:
## lm(formula = TL ~ LM2)
##
## Coefficients:
## (Intercept)      LM2
##      2.2822      0.9263
```

```
## Final plot
ggplot(MysticeteData2, aes(y=TL, x=LM2)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

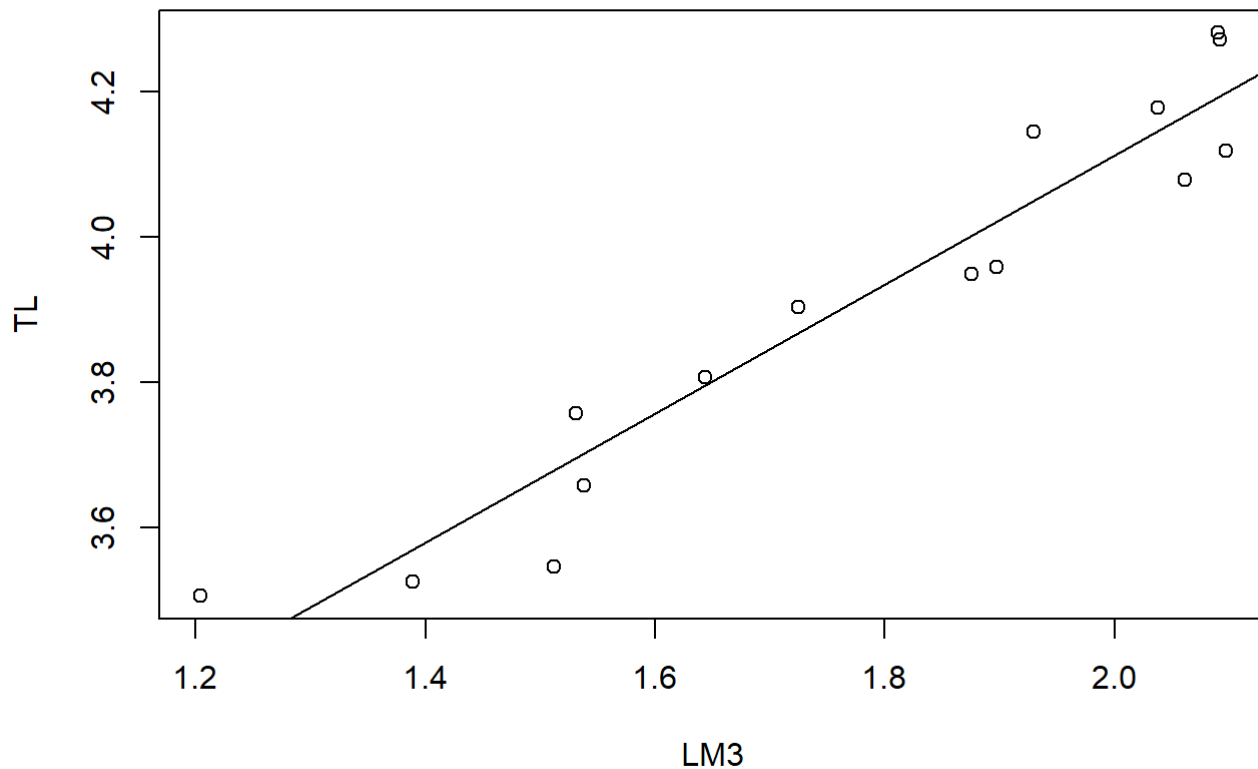
```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning: Removed 5 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 5 rows containing missing values (geom_point).
```



```
### TOTAL LENGTH VS LM3
## Plot scatterplot
plot(TL~LM3)
abline(lm(TL~LM3))
```



```
## Get summary statistics
summary(lm(TL~LM3))
```

```
##
## Call:
## lm(formula = TL ~ LM3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.13321 -0.05704  0.01075  0.06980  0.10010
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.33510     0.13093   17.83 1.60e-10 ***
## LM3          0.88858     0.07287   12.19 1.72e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.07922 on 13 degrees of freedom
## (5 observations deleted due to missingness)
## Multiple R-squared:  0.9196, Adjusted R-squared:  0.9134
## F-statistic: 148.7 on 1 and 13 DF,  p-value: 1.723e-08
```

```
## Get regression equation
lm(TL~LM3)
```

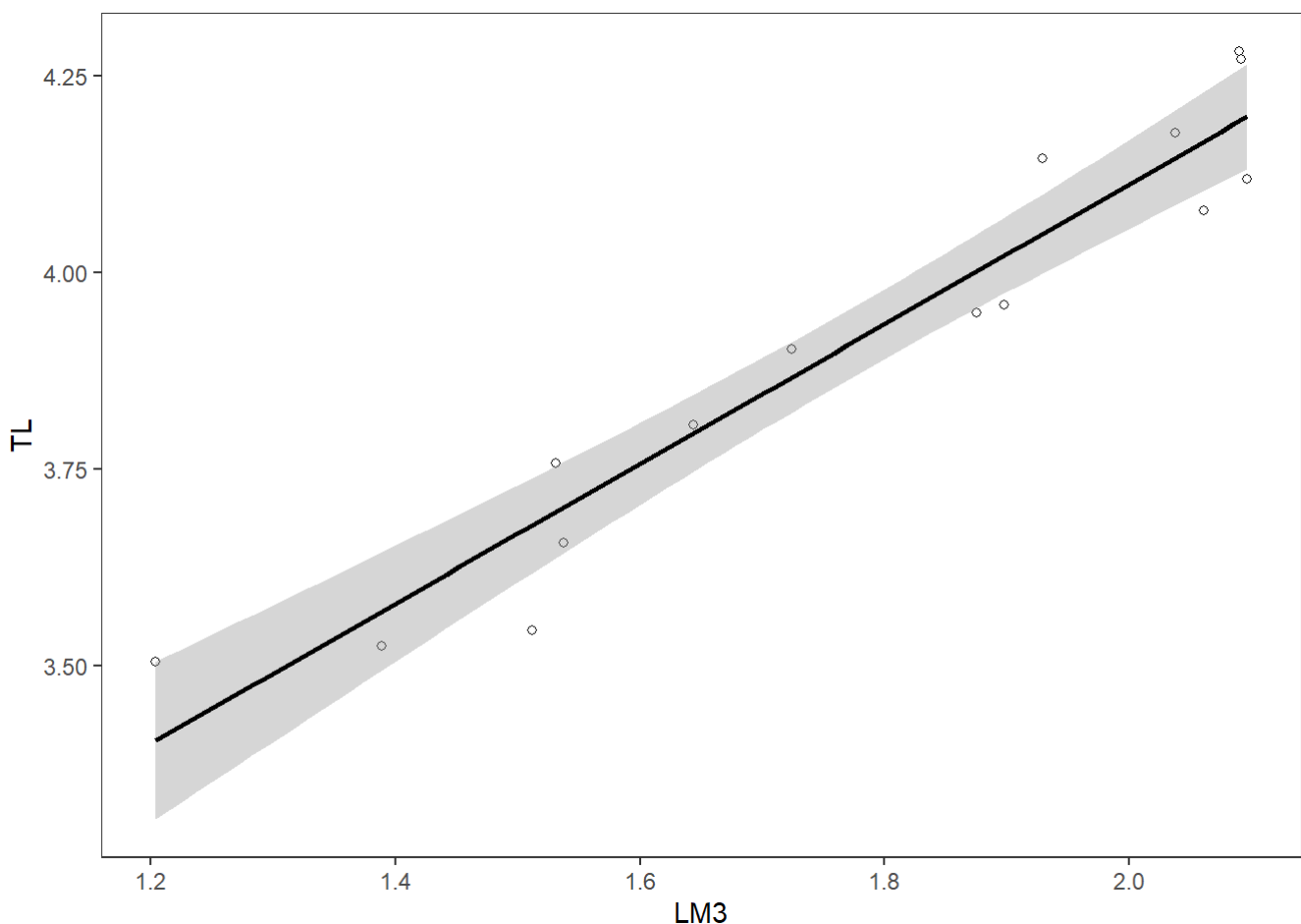
```
##
## Call:
## lm(formula = TL ~ LM3)
##
## Coefficients:
## (Intercept)      LM3
##      2.3351      0.8886
```

```
## Final plot
ggplot(MysticeteData2, aes(y=TL, x=LM3)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

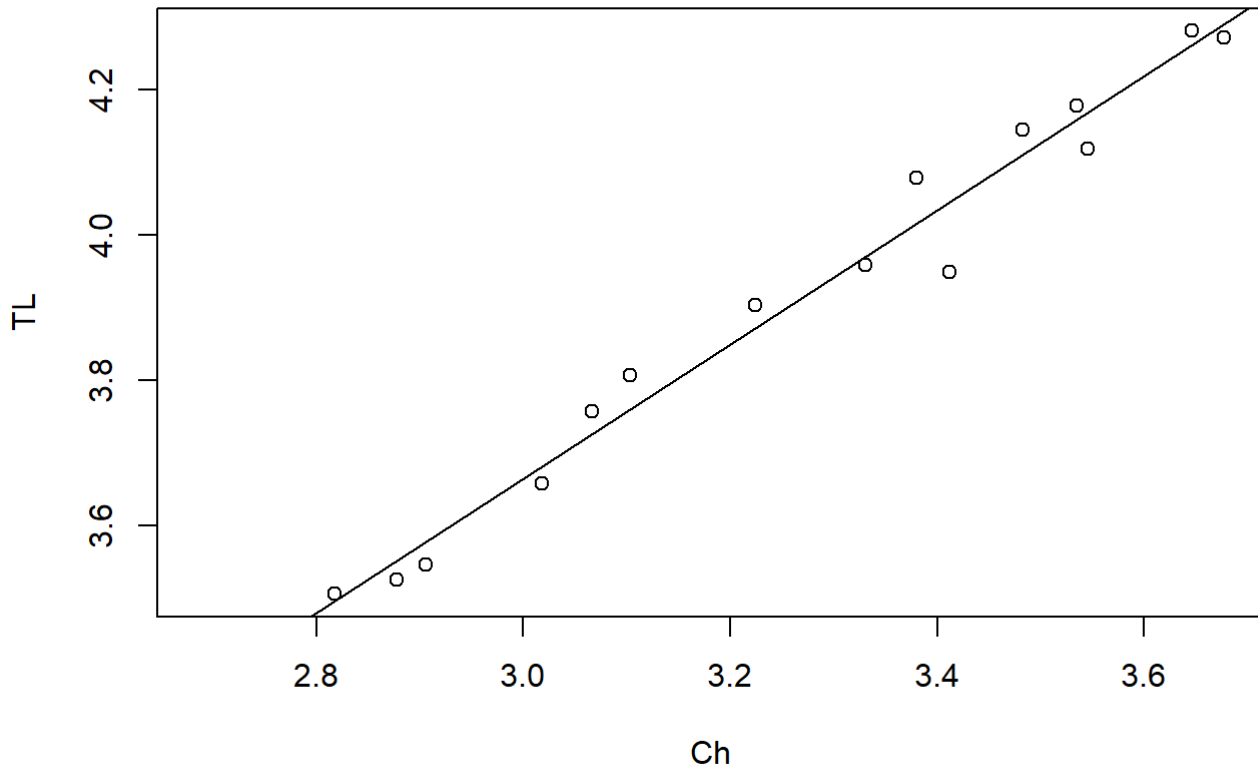
```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning: Removed 5 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 5 rows containing missing values (geom_point).
```



```
### TOTAL LENGTH VS CH
## Plot scatterplot
plot(TL~Ch)
abline(lm(TL~Ch))
```



```
## Get summary statistics
summary(lm(TL~Ch))
```

```
##
## Call:
## lm(formula = TL ~ Ch)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.095356 -0.024946  0.009157  0.031627  0.063449
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   0.8933     0.1325   6.742 1.38e-05 ***
## Ch            0.9237     0.0404  22.867 6.96e-12 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.04352 on 13 degrees of freedom
## (5 observations deleted due to missingness)
## Multiple R-squared:  0.9757, Adjusted R-squared:  0.9739
## F-statistic: 522.9 on 1 and 13 DF,  p-value: 6.963e-12
```

```
## Get regression equation
lm(TL~Ch)
```

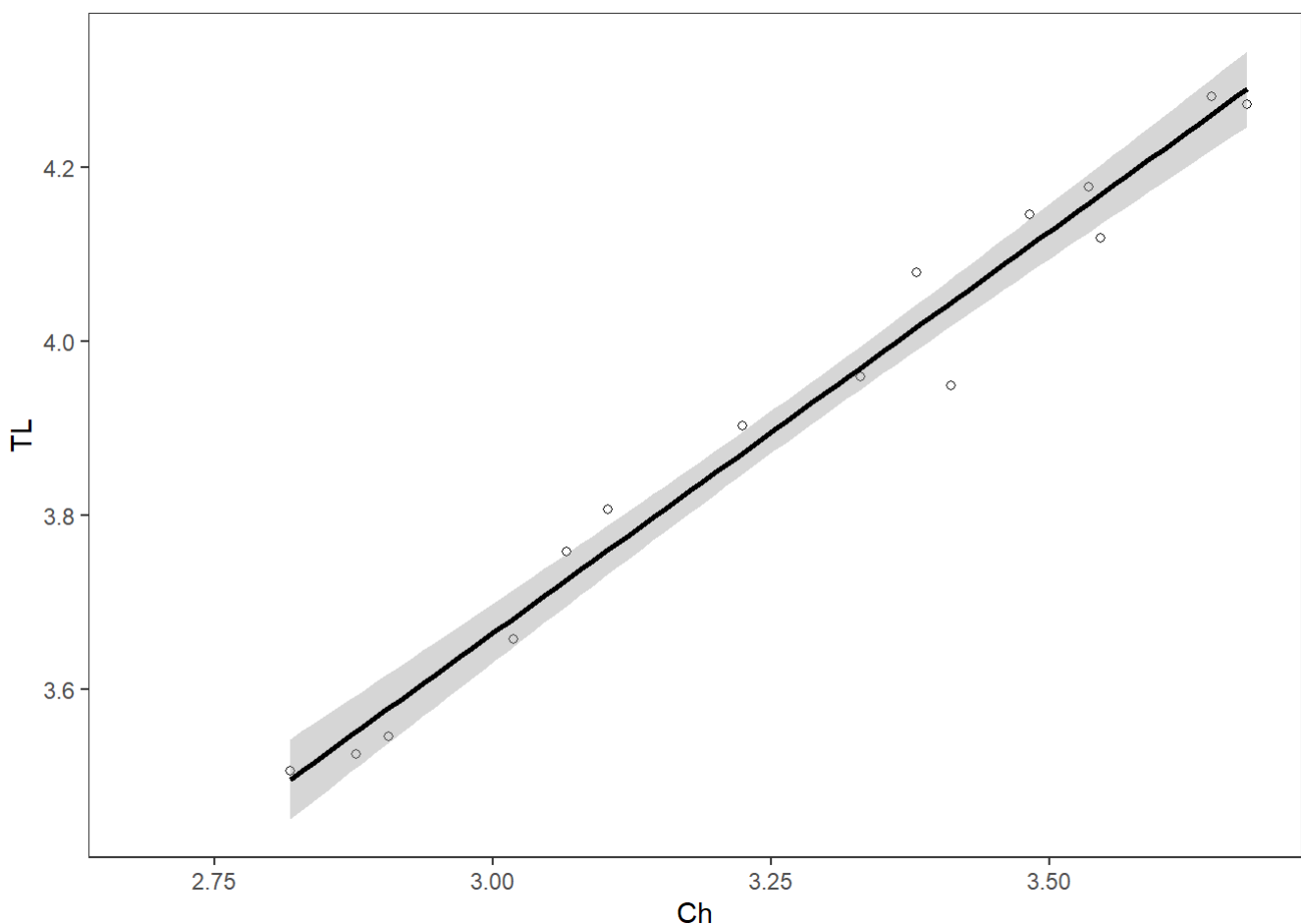
```
##
## Call:
## lm(formula = TL ~ Ch)
##
## Coefficients:
## (Intercept)      Ch
##      0.8933      0.9237
```

```
## Final plot
ggplot(MysticeteData2, aes(y=TL, x=Ch)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k())
```

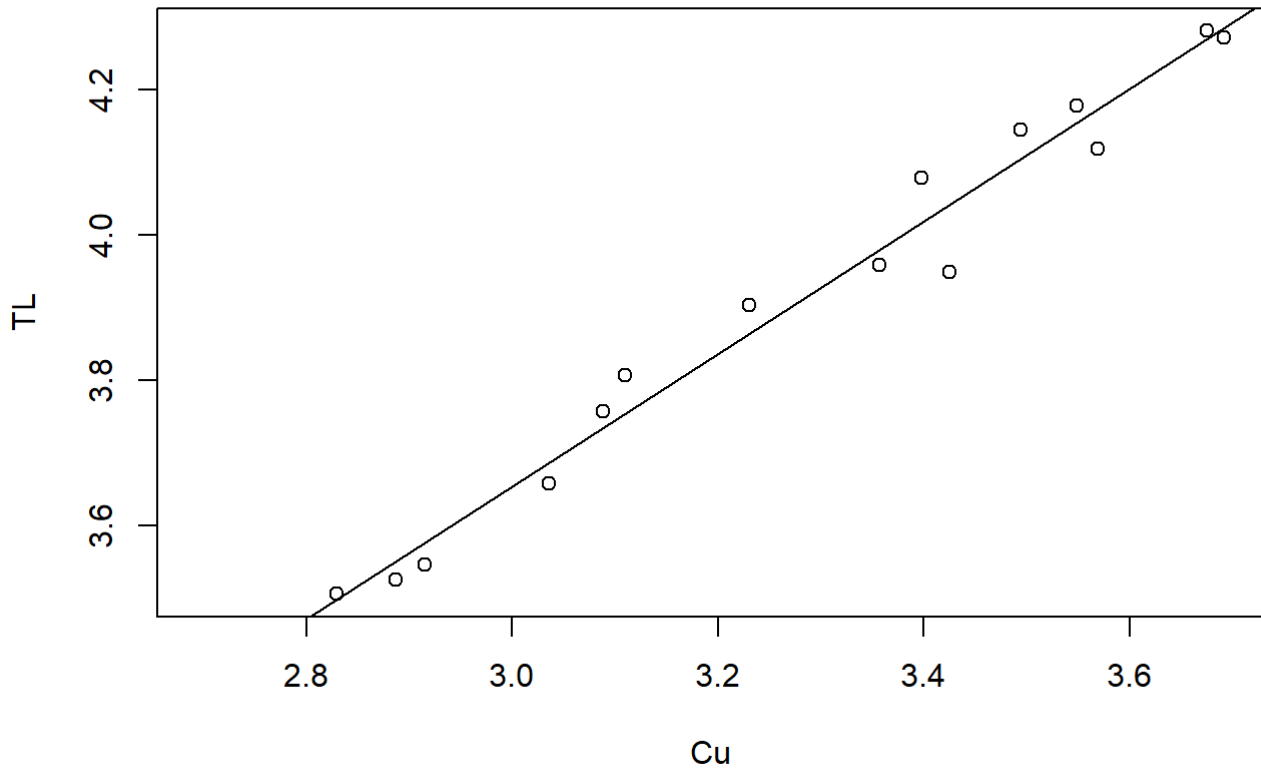
```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning: Removed 5 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 5 rows containing missing values (geom_point).
```



```
### TOTAL LENGTH VS CU
## Plot scatterplot
plot(TL~Cu)
abline(lm(TL~Cu))
```

```
## Get summary statistics
summary(lm(TL~Cu))
```

```
##
## Call:
## lm(formula = TL ~ Cu)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.091609 -0.026934  0.008237  0.031623  0.062781
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.91391    0.13422   6.809 1.25e-05 ***
## Cu           0.91305    0.04073  22.419 8.95e-12 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.04437 on 13 degrees of freedom
## (5 observations deleted due to missingness)
## Multiple R-squared:  0.9748, Adjusted R-squared:  0.9728
## F-statistic: 502.6 on 1 and 13 DF,  p-value: 8.953e-12
```

```
## Get regression equation
lm(TL~Cu)
```

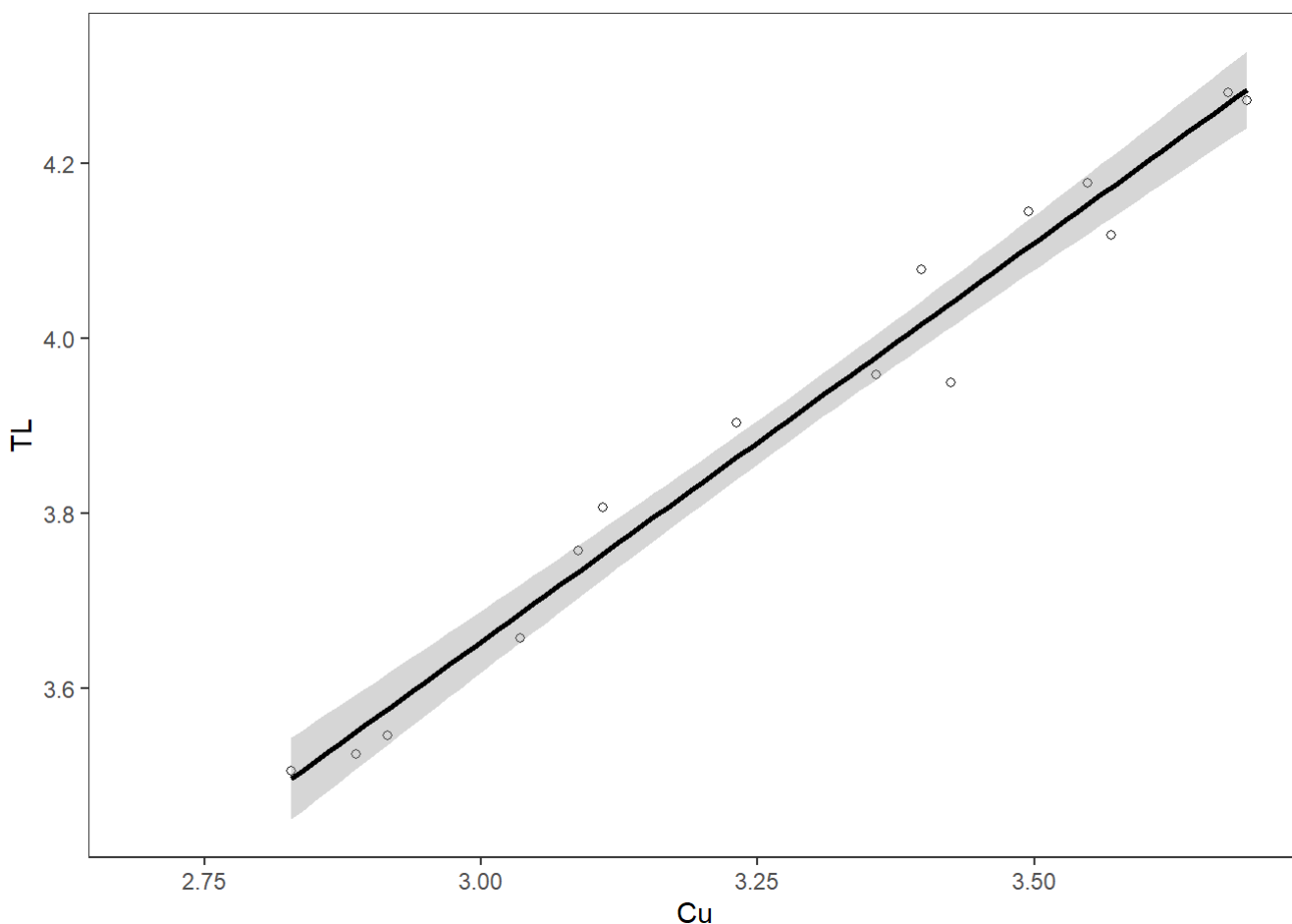
```
##
## Call:
## lm(formula = TL ~ Cu)
##
## Coefficients:
## (Intercept)      Cu
##      0.9139      0.9131
```

```
## Final plot
ggplot(MysticeteData2, aes(y=TL, x=Cu)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
```

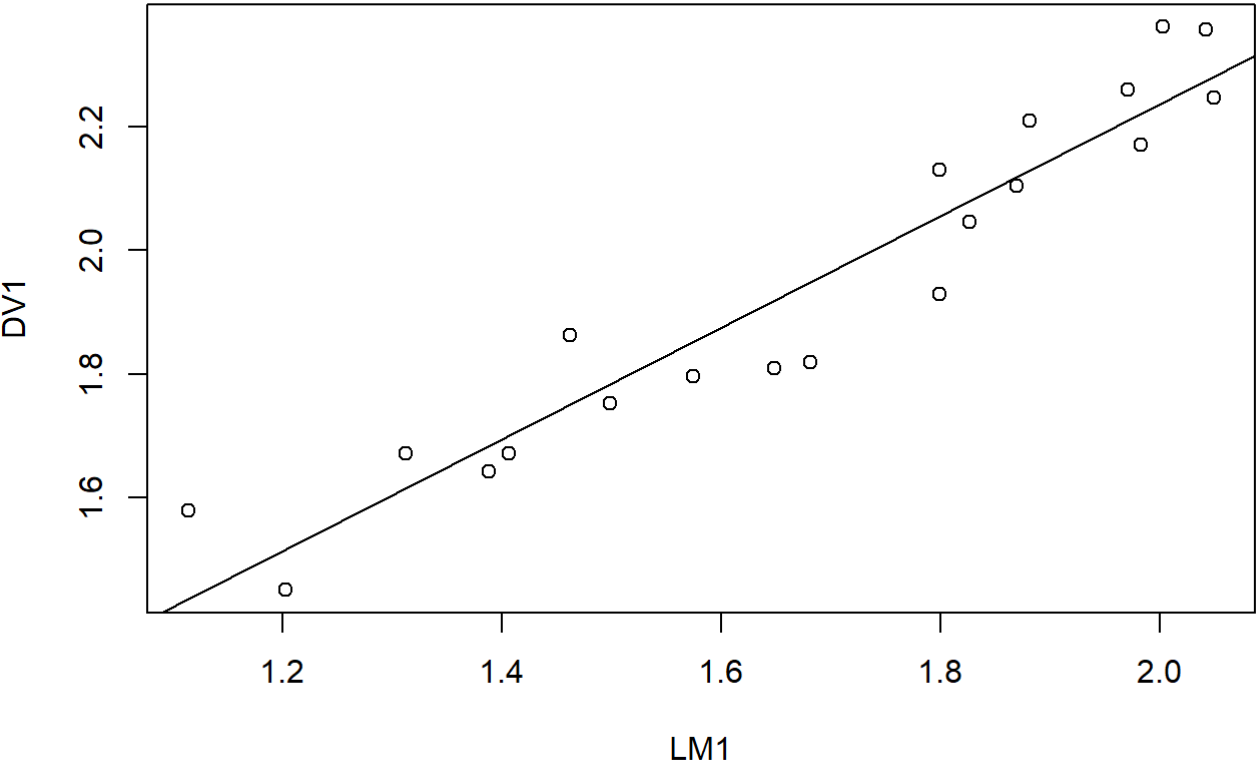
```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning: Removed 5 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 5 rows containing missing values (geom_point).
```



```
### DORSAL-VENTRAL 1 VS MEDIAL-LATERAL 1
## Plot scatterplot
plot(DV1~LM1)
abline(lm(DV1~LM1))
```



```
## Get summary statistics
summary(lm(DV1~LM1))
```

```
##
## Call:
## lm(formula = DV1 ~ LM1)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.12923 -0.05142 -0.03049  0.07636  0.14226
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.43364    0.11512   3.767  0.00141 **
## LM1          0.90120    0.06775  13.302 9.45e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.08593 on 18 degrees of freedom
## Multiple R-squared:  0.9077, Adjusted R-squared:  0.9025
## F-statistic: 176.9 on 1 and 18 DF, p-value: 9.449e-11
```

```
## Get regression equation
lm(DV1~LM1)
```

```
##  
## Call:  
## lm(formula = DV1 ~ LM1)  
##  
## Coefficients:  
## (Intercept)          LM1  
##      0.4336      0.9012
```

```
## Final plot  
ggplot(MysticeteData2, aes(y=DV1, x=LM1, shape = Taxa, col = Taxa)) + geom_point(shape=1) + g  
eom_smooth(method=lm, col = "black")+ theme_bw() + theme(panel.grid.major = element_blank(),p  
anel.grid.minor = element_blank()) + xlab("Lateral-Medial") + ylab("Dorsal-Ventral")
```

```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning in qt((1 - level)/2, df): NaNs produced
```

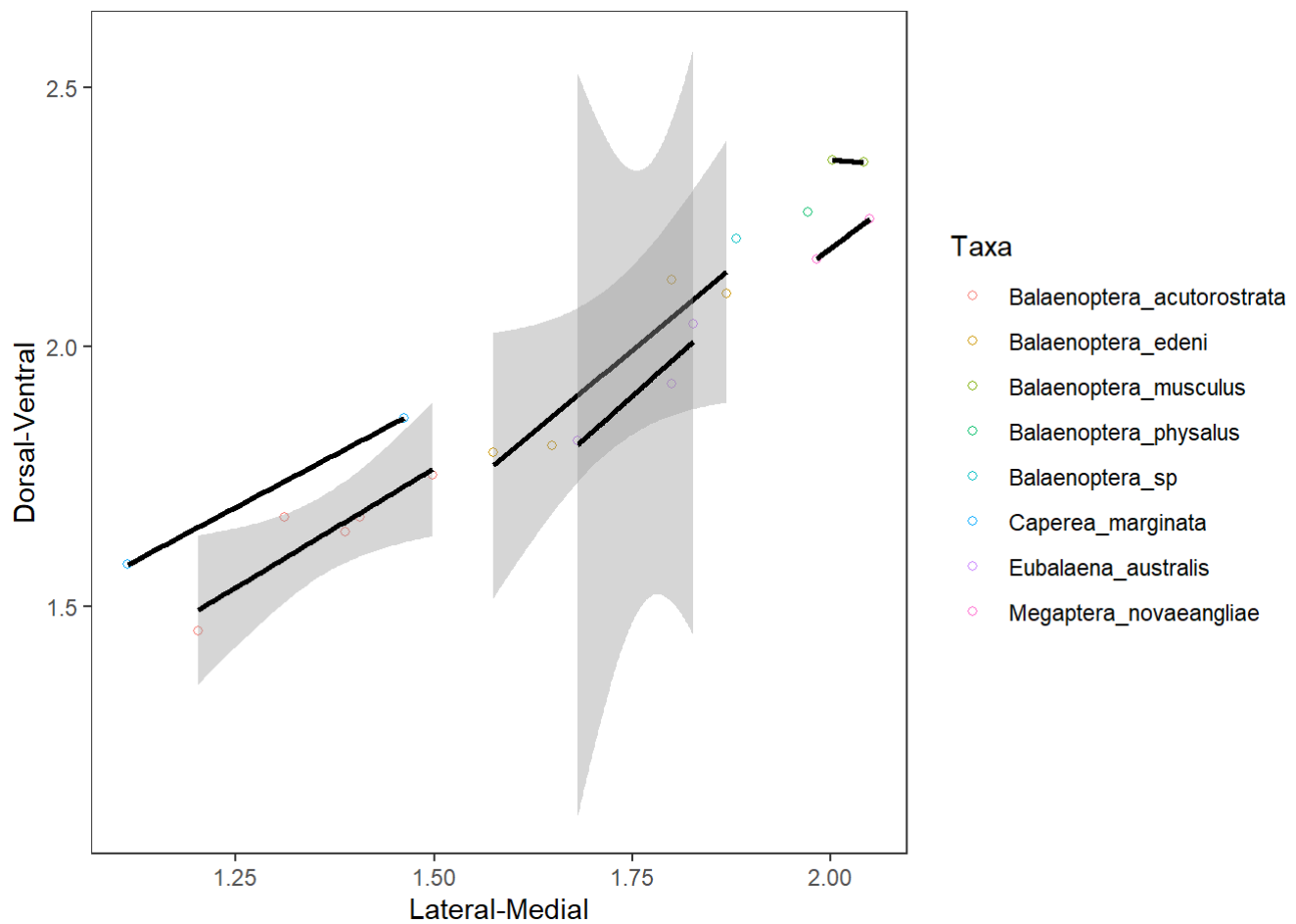
```
## Warning in qt((1 - level)/2, df): NaNs produced
```

```
## Warning in qt((1 - level)/2, df): NaNs produced
```

```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning  
## -Inf
```

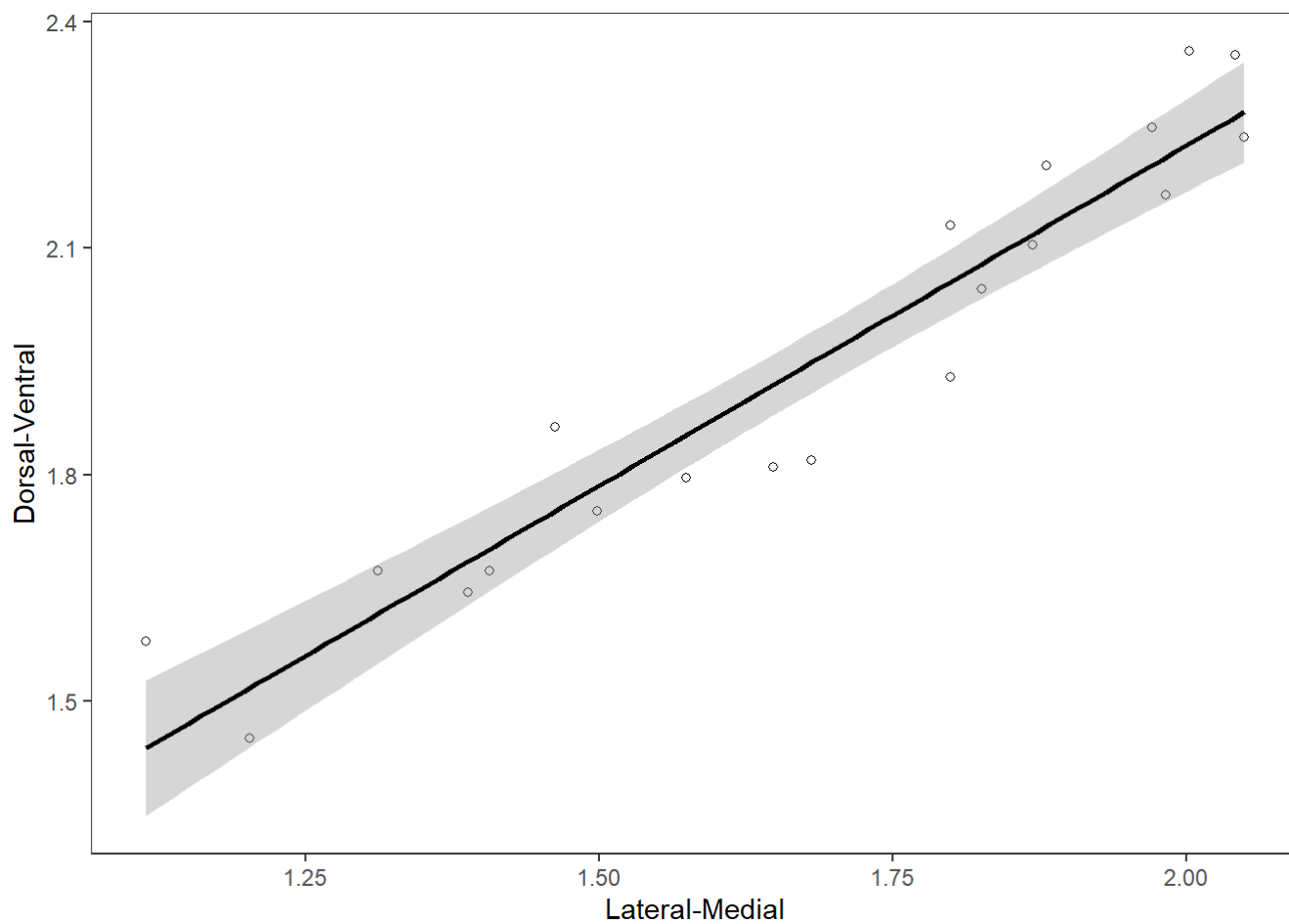
```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning  
## -Inf
```

```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning  
## -Inf
```



```
ggplot(MysticeteData2, aes(y=DV1, x=LM1)) + geom_point(shape=1) + geom_smooth(method=lm, col = "black") + theme_bw() + theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) + xlab("Lateral-Medial") + ylab("Dorsal-Ventral")
```

```
## `geom_smooth()` using formula 'y ~ x'
```

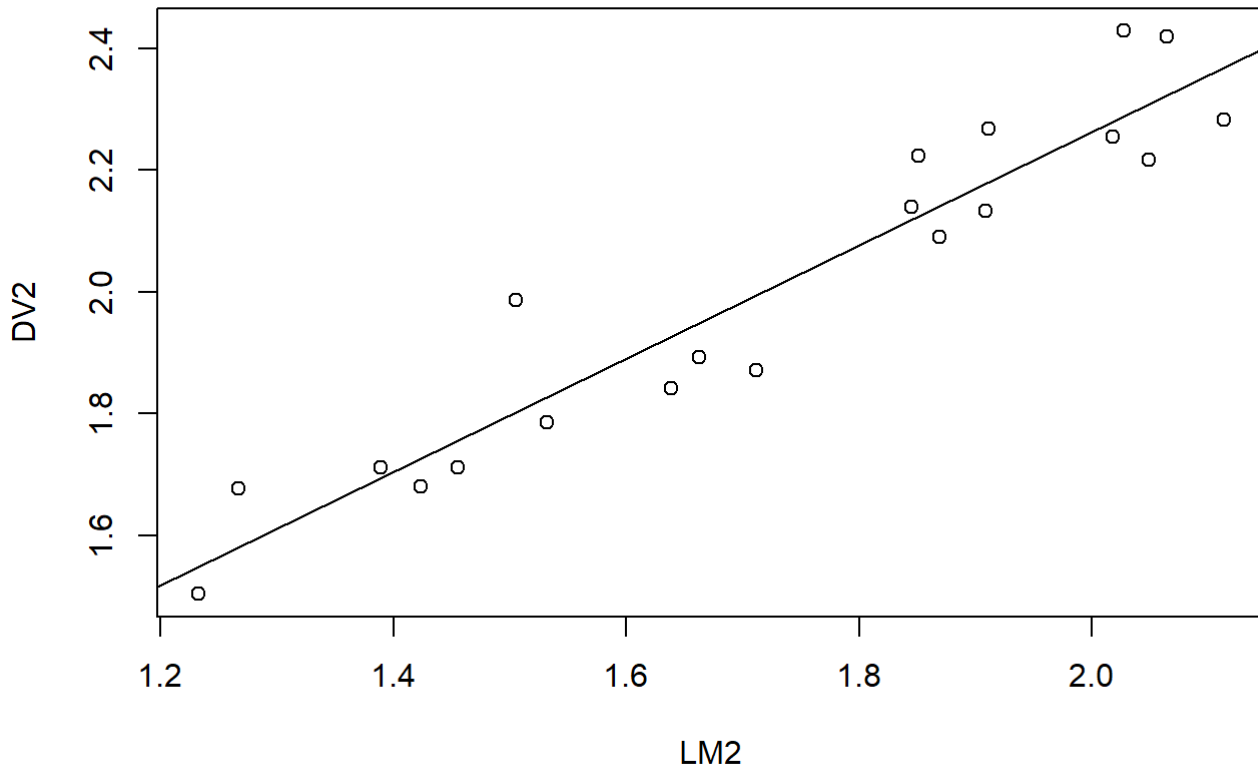


```
### DORSAL-VENTRAL 2 VS MEDIAL-LATERAL 2
```

```
## Plot scatterplot
```

```
plot(DV2~LM2)
```

```
abline(lm(DV2~LM2))
```



```
## Get summary statistics
summary(lm(DV2~LM2))
```

```
##
## Call:
## lm(formula = DV2 ~ LM2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.12270 -0.05268 -0.04302  0.08960  0.18386
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.40490    0.12761   3.173  0.00527 **
## LM2          0.92882    0.07312  12.703 2.01e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.08938 on 18 degrees of freedom
## Multiple R-squared:  0.8996, Adjusted R-squared:  0.8941
## F-statistic: 161.4 on 1 and 18 DF,  p-value: 2.009e-10
```

```
## Get regression equation
lm(DV2~LM2)
```

```
##  
## Call:  
## lm(formula = DV2 ~ LM2)  
##  
## Coefficients:  
## (Intercept)          LM2  
##      0.4049      0.9288
```

```
## Final plot  
ggplot(MysticeteData2, aes(y=DV2, x=LM2, shape = Taxa, col = Taxa)) + geom_point(shape=1) + g  
eom_smooth(method=lm, col = "black")+ theme_bw() + theme(panel.grid.major = element_blank(),p  
anel.grid.minor = element_blank()) + xlab("Lateral-Medial II") + ylab("Dorsal-Ventral II")
```

```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning in qt((1 - level)/2, df): NaNs produced
```

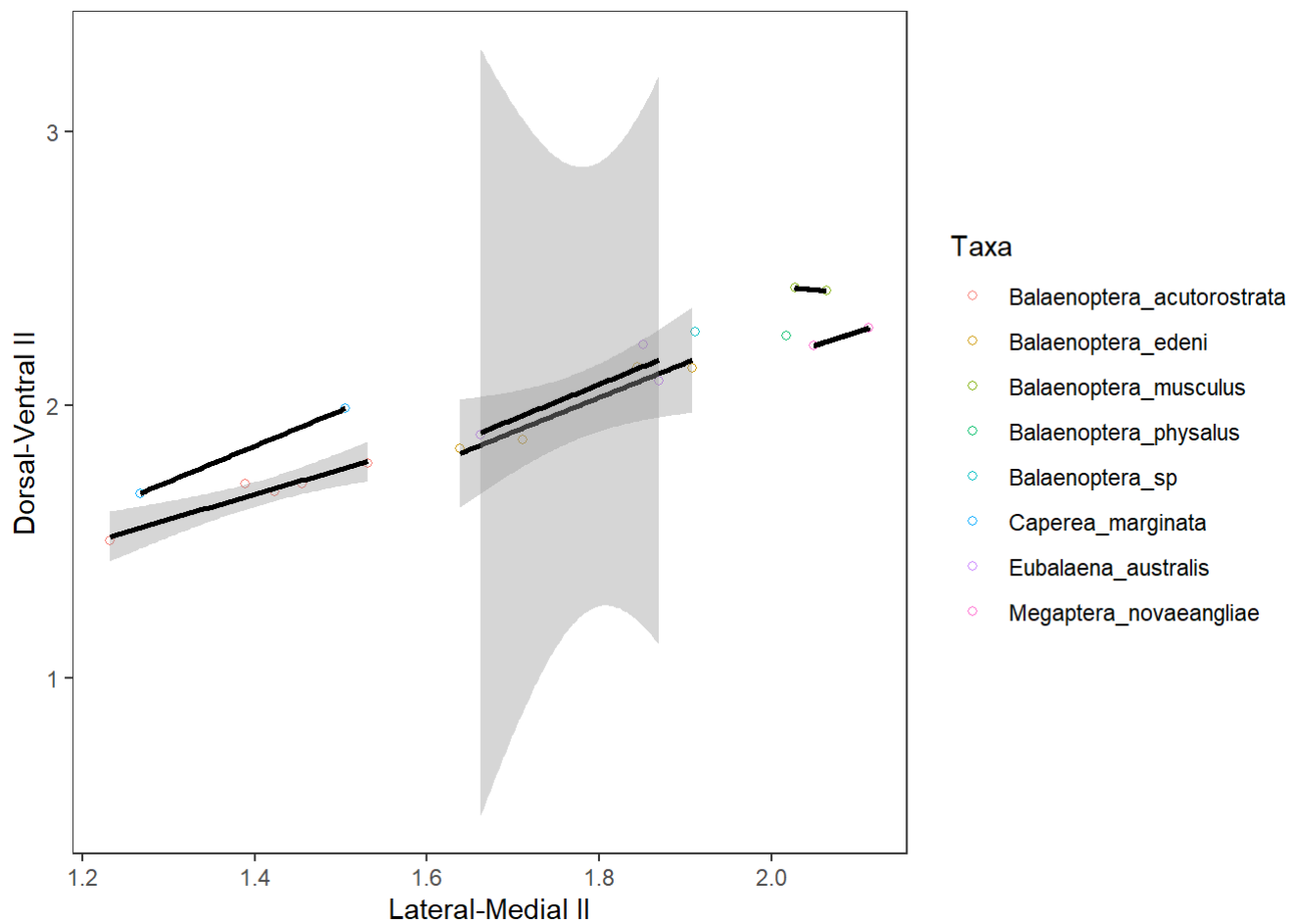
```
## Warning in qt((1 - level)/2, df): NaNs produced
```

```
## Warning in qt((1 - level)/2, df): NaNs produced
```

```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning  
## -Inf
```

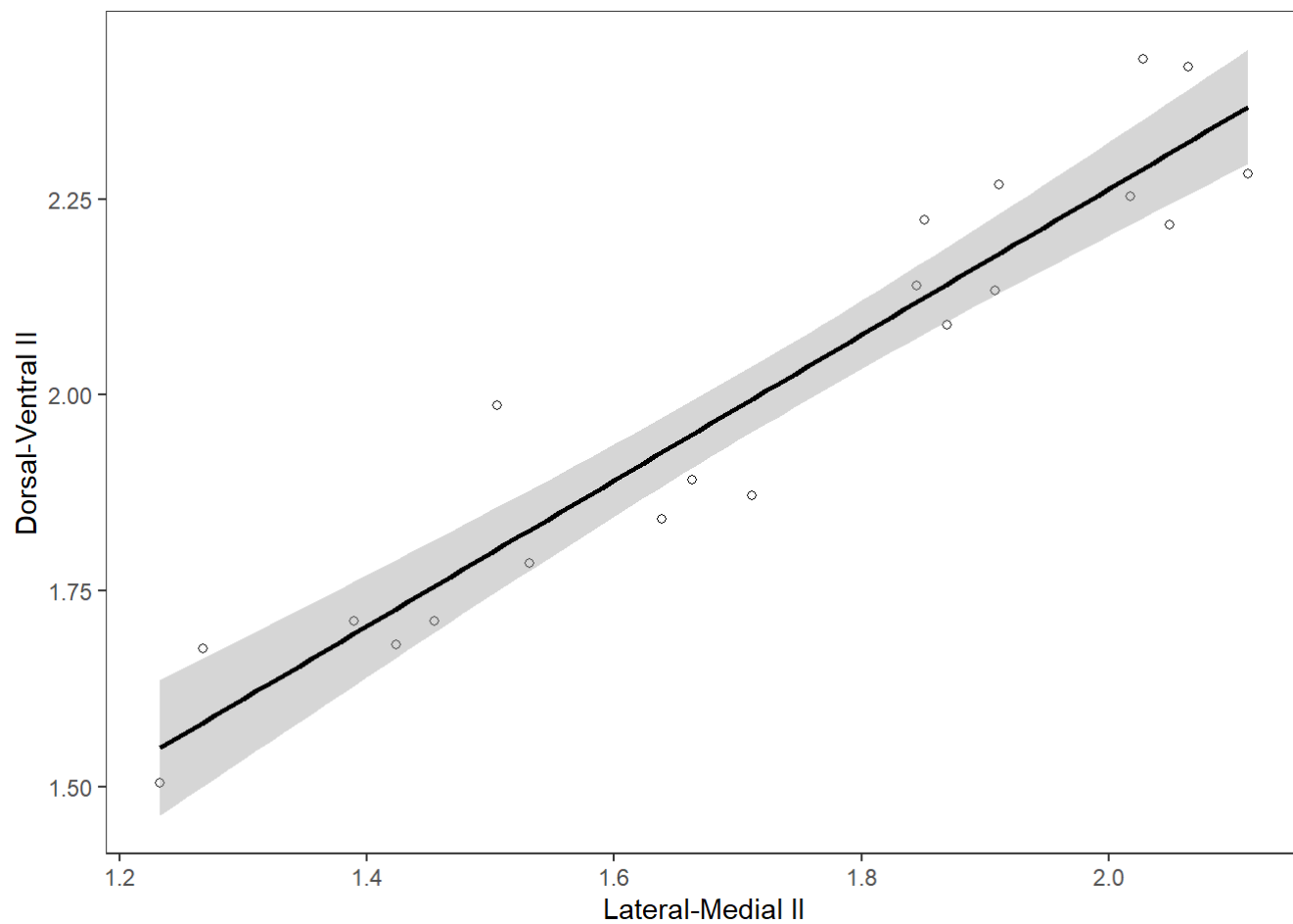
```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning  
## -Inf
```

```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning  
## -Inf
```

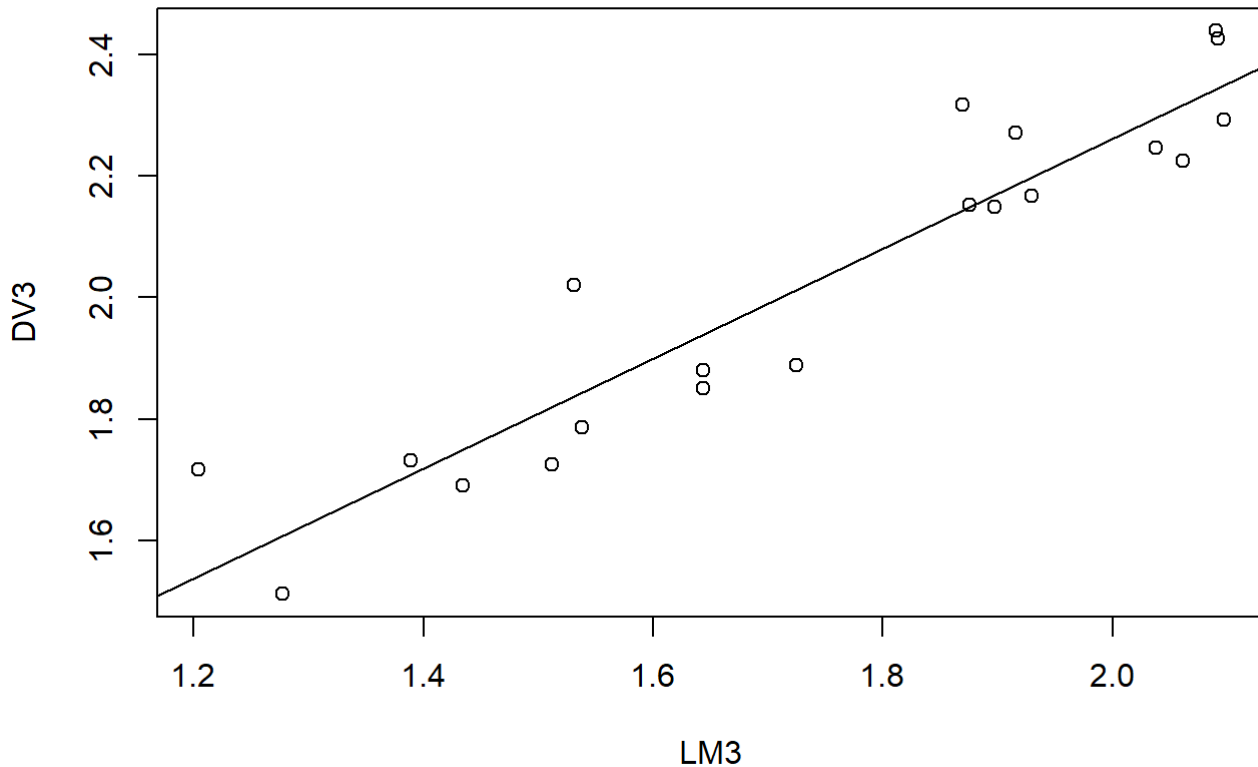



```
ggplot(MysticeteData2, aes(y=DV2, x=LM2)) + geom_point(shape=1) + geom_smooth(method=lm, col = "black") + theme_bw() + theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) + xlab("Lateral-Medial II") + ylab("Dorsal-Ventral II")
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### DORSAL-VENTRAL 3 VS MEDIAL-LATERAL 3
## Plot scatterplot
plot(DV3~LM3)
abline(lm(DV3~LM3))
```



```
## Get summary statistics
summary(lm(DV3~LM3))
```

```
##
## Call:
## lm(formula = DV3 ~ LM3)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.12290 -0.06701 -0.03972  0.08334  0.18358
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.45073    0.14286   3.155  0.00548 **
## LM3          0.90558    0.08115  11.159 1.61e-09 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1015 on 18 degrees of freedom
## Multiple R-squared:  0.8737, Adjusted R-squared:  0.8667
## F-statistic: 124.5 on 1 and 18 DF, p-value: 1.61e-09
```

```
## Get regression equation
lm(DV3~LM3)
```

```
##
## Call:
## lm(formula = DV3 ~ LM3)
##
## Coefficients:
## (Intercept)          LM3
##      0.4507      0.9056
```

```
## Final plot
ggplot(MysticeteData2, aes(y=DV3, x=LM3, shape = Taxa, col = Taxa)) + geom_point(shape=1) + g
eom_smooth(method=lm, col = "black")+ theme_bw() + theme(panel.grid.major = element_blank(),p
anel.grid.minor = element_blank()) + xlab("Lateral-Medial III") + ylab("Dorsal-Ventral III")
```

```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning in qt((1 - level)/2, df): NaNs produced
```

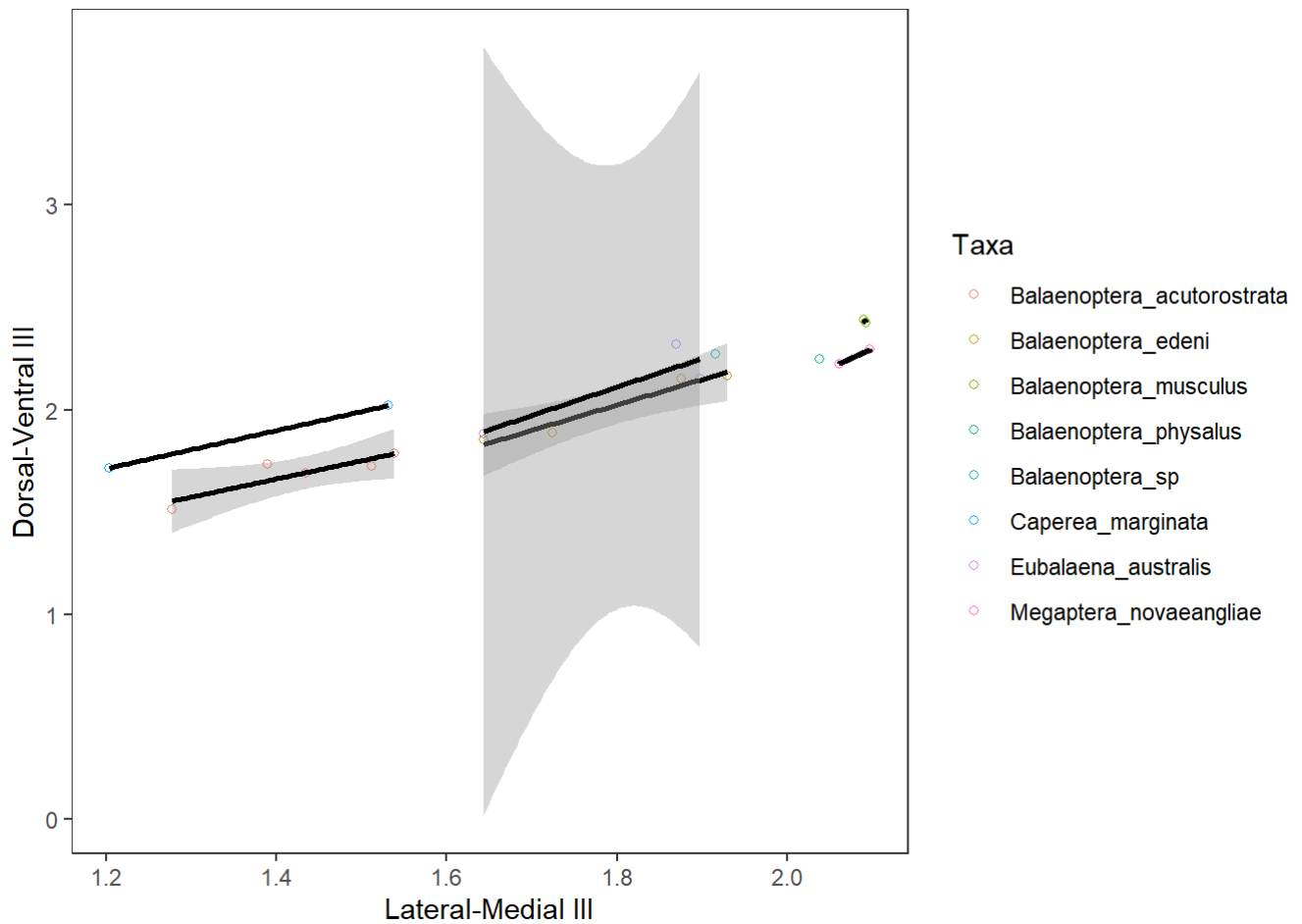
```
## Warning in qt((1 - level)/2, df): NaNs produced
```

```
## Warning in qt((1 - level)/2, df): NaNs produced
```

```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning
## -Inf
```

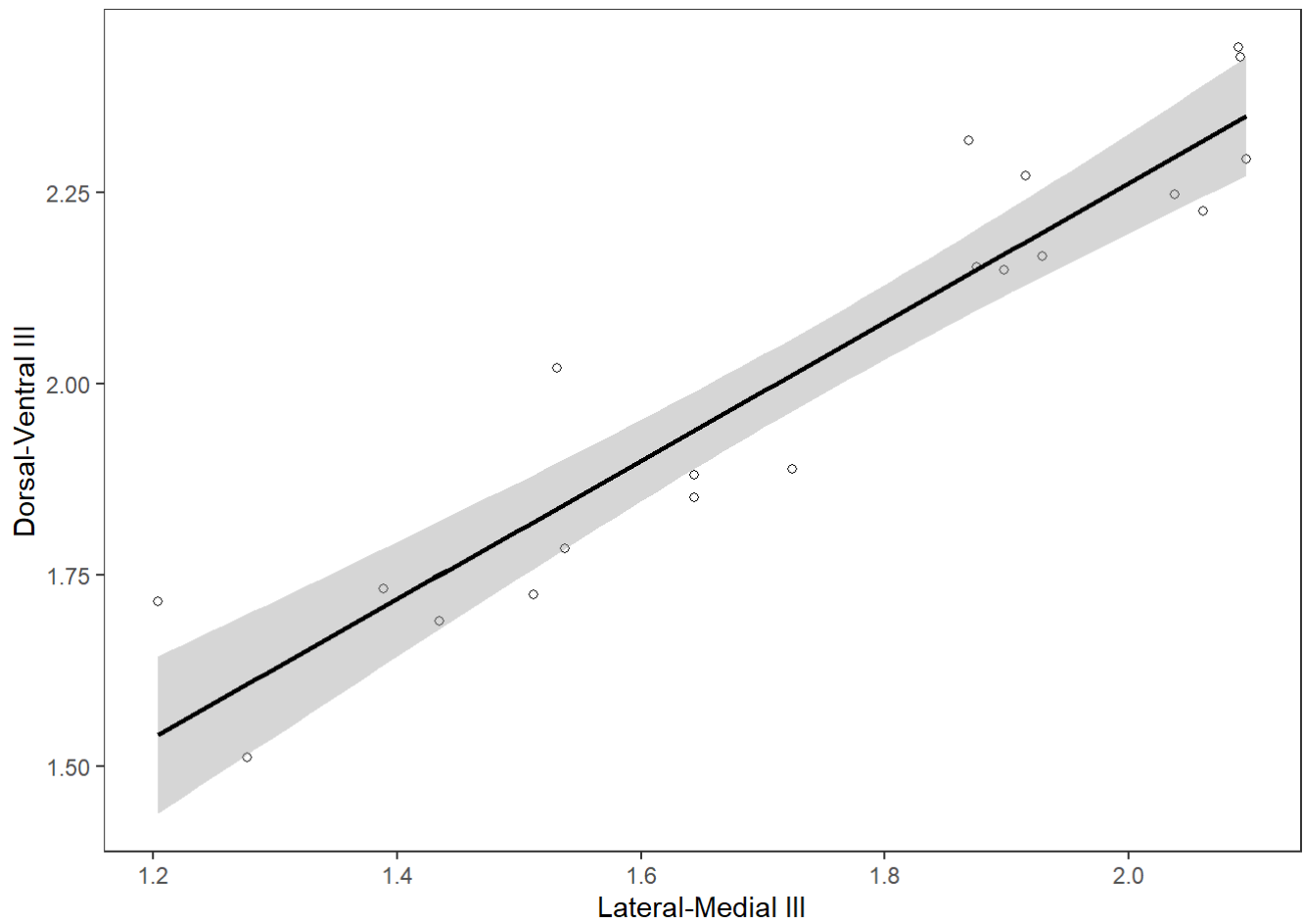
```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning
## -Inf
```

```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning
## -Inf
```

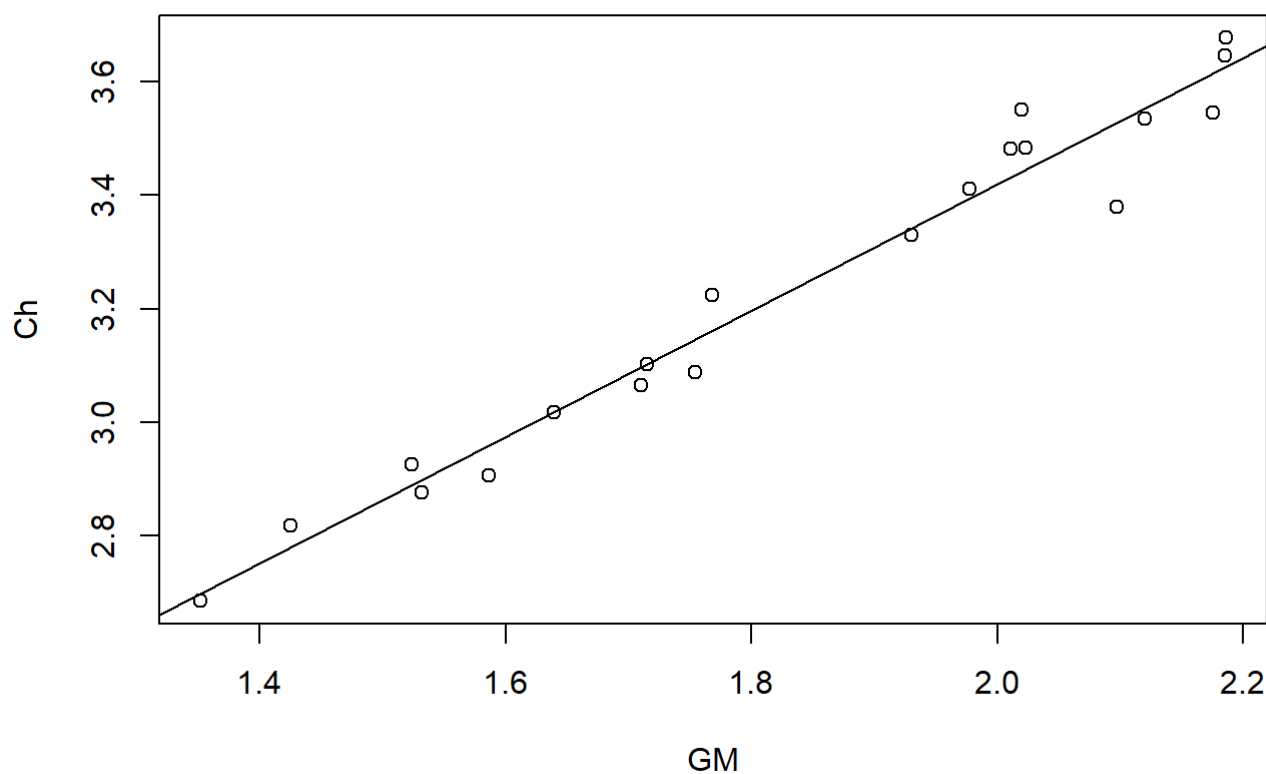


```
ggplot(MysticeteData2, aes(y=DV3, x=LM3)) + geom_point(shape=1) + geom_smooth(method=lm, col = "black") + theme_bw() + theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) + xlab("Lateral-Medial III") + ylab("Dorsal-Ventral III")
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### GEOMETRIC MEAN VS CHORD
## Plot scatterplot
plot(Ch~GM)
abline(lm(Ch~GM))
```



```
## Get summary statistics
summary(lm(Ch~GM))
```

```
##
## Call:
## lm(formula = Ch ~ GM)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.14757 -0.02452 -0.00027  0.03788  0.10912
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.19673    0.09185   13.03 1.33e-10 ***
## GM          1.11131    0.04951   22.45 1.30e-14 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.05802 on 18 degrees of freedom
## Multiple R-squared:  0.9655, Adjusted R-squared:  0.9636
## F-statistic: 503.8 on 1 and 18 DF, p-value: 1.304e-14
```

```
## Get regression equation
lm(Ch~GM)
```

```
##  
## Call:  
## lm(formula = Ch ~ GM)  
##  
## Coefficients:  
## (Intercept)          GM  
##      1.197      1.111
```

```
## Final plot  
ggplot(MysticeteData2, aes(y=Ch, x=GM, shape = Taxa, col = Taxa)) + geom_point(shape=1) + geom_smooth(method=lm, col = "black") + theme_bw() + theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) + xlab("Geometric Mean") + ylab("Chord")
```

```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning in qt((1 - level)/2, df): NaNs produced
```

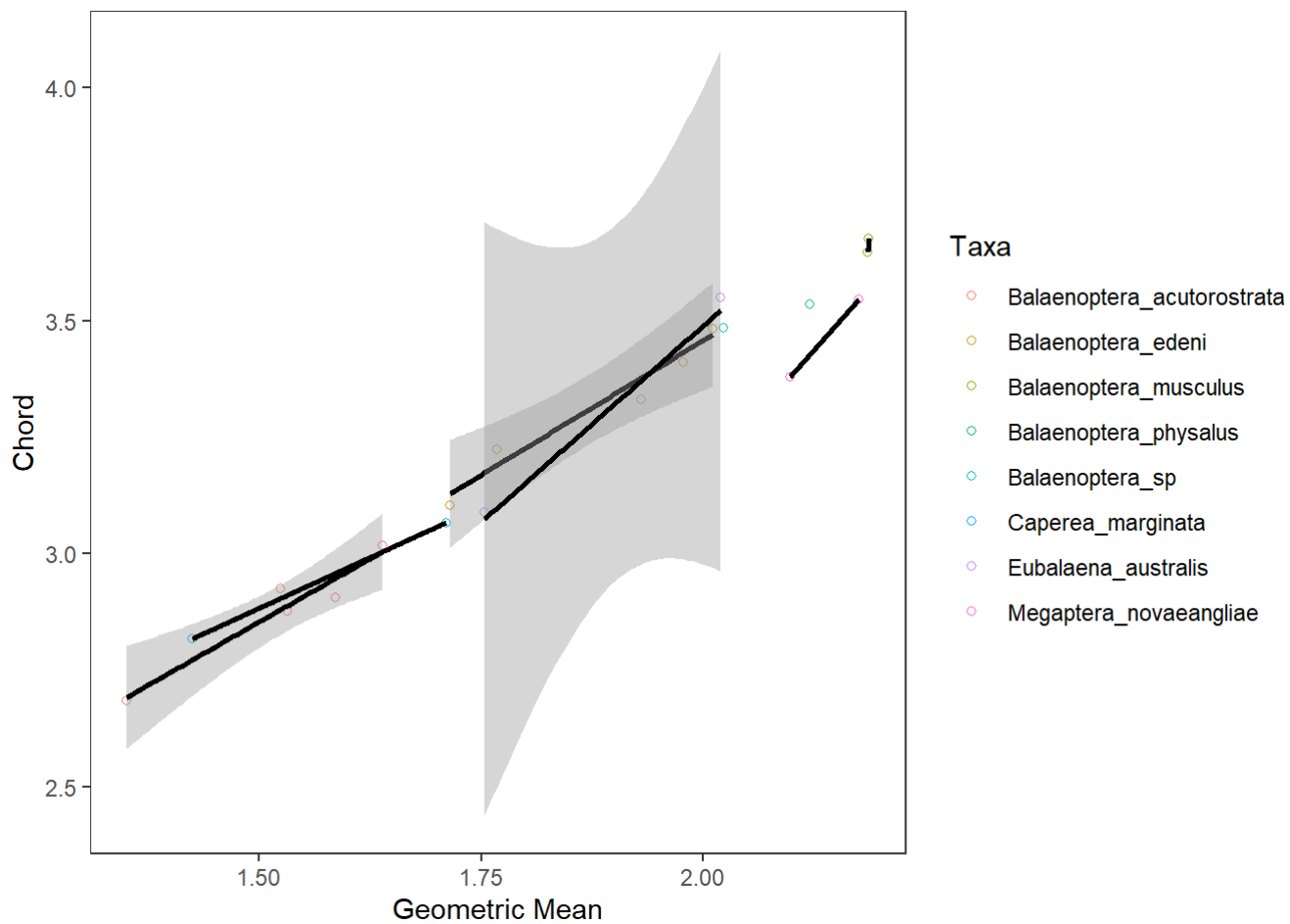
```
## Warning in qt((1 - level)/2, df): NaNs produced
```

```
## Warning in qt((1 - level)/2, df): NaNs produced
```

```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning  
## -Inf
```

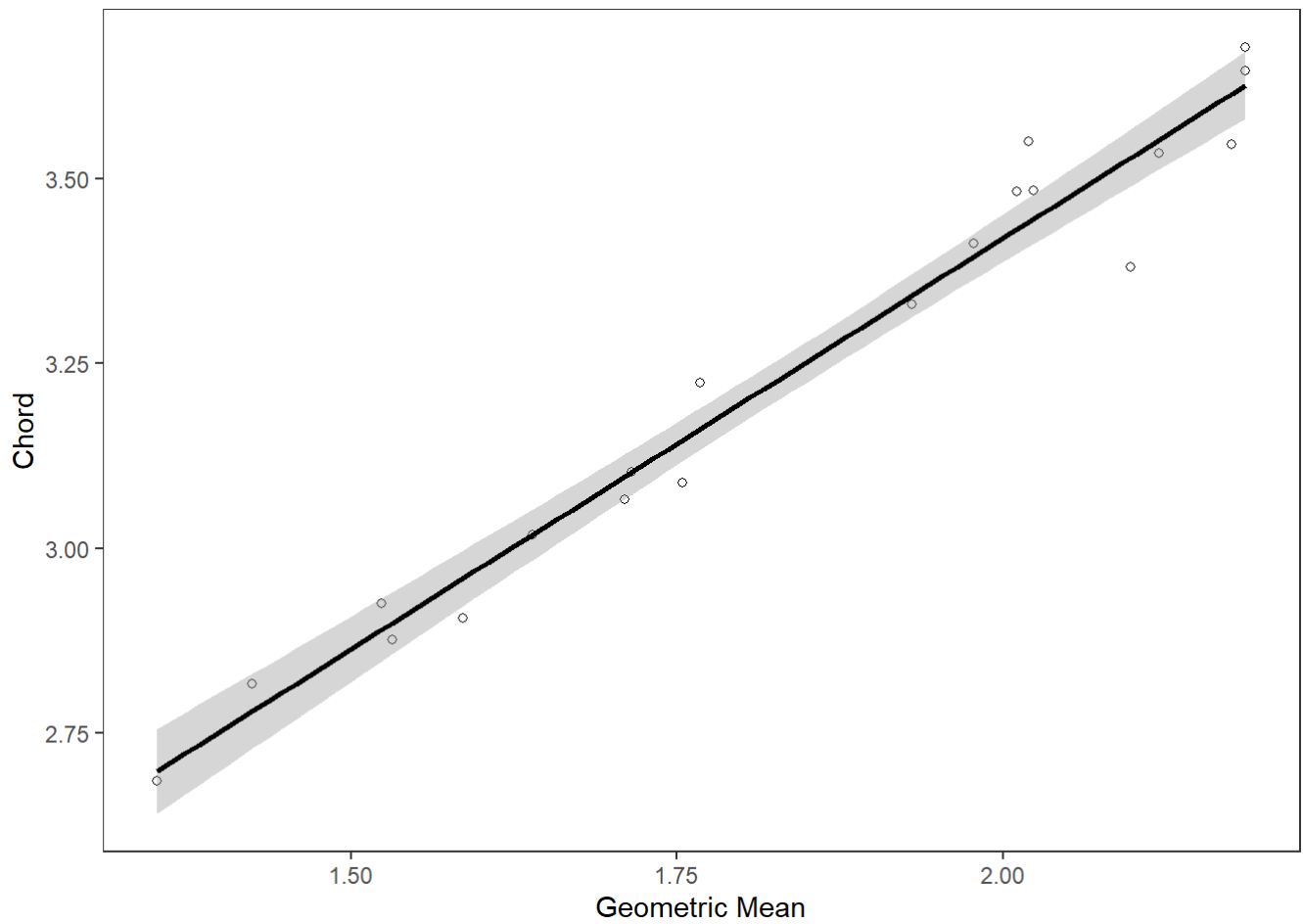
```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning  
## -Inf
```

```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning  
## -Inf
```

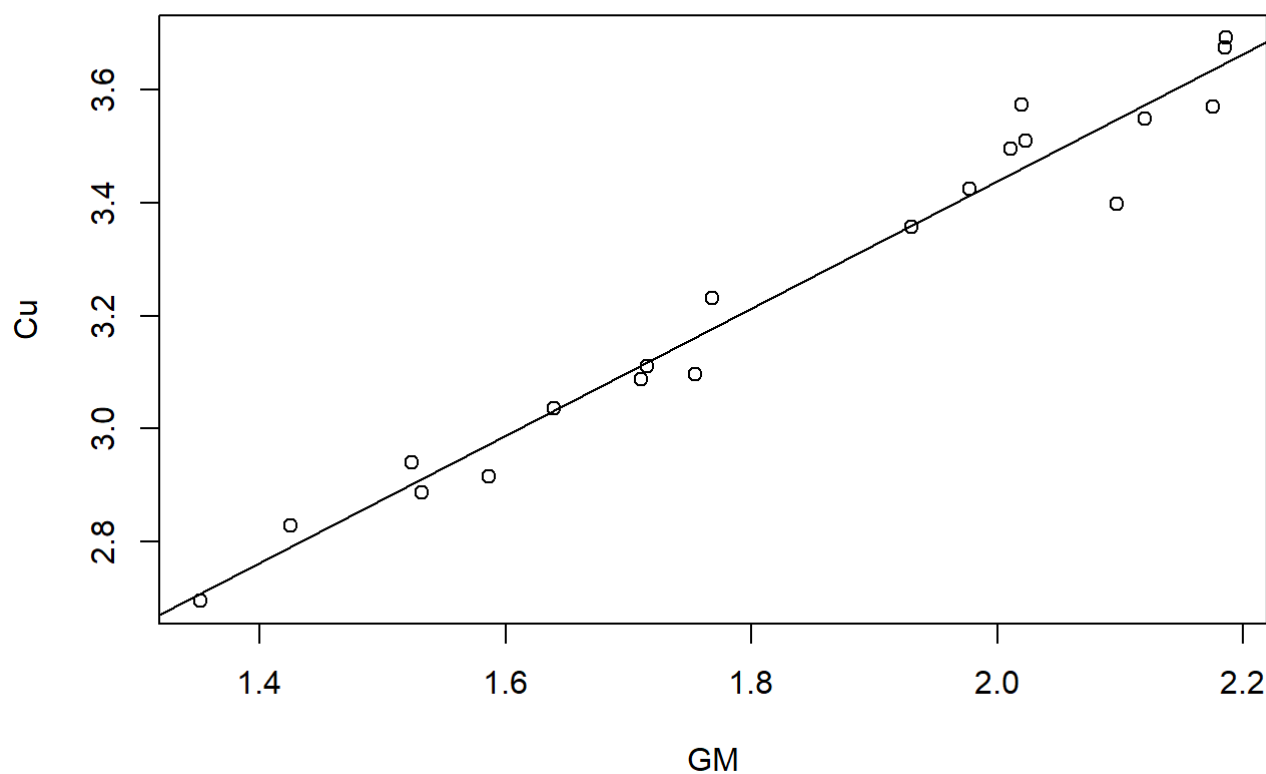



```
ggplot(MysticeteData2, aes(y=Ch, x=GM)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k()) + xlab("Geometric Mean") + ylab("Chord")
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### GEOMETRIC MEAN VS CURVILINEAR LENGTH
## Plot scatterplot
plot(Cu~GM)
abline(lm(Cu~GM))
```



```
## Get summary statistics
summary(lm(Cu~GM))
```

```
##
## Call:
## lm(formula = Cu ~ GM)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.149435 -0.023523  0.001087  0.040654  0.113321
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.18552    0.09271   12.79 1.80e-10 ***
## GM           1.12600    0.04997   22.53 1.22e-14 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.05856 on 18 degrees of freedom
## Multiple R-squared:  0.9658, Adjusted R-squared:  0.9639
## F-statistic: 507.7 on 1 and 18 DF, p-value: 1.219e-14
```

```
## Get regression equation
lm(Cu~GM)
```

```
##  
## Call:  
## lm(formula = Cu ~ GM)  
##  
## Coefficients:  
## (Intercept)          GM  
##      1.186      1.126
```

```
## Final plot  
ggplot(MysticeteData2, aes(y=Cu, x=GM, shape = Taxa, col = Taxa)) + geom_point(shape=1) + geom_smooth(method=lm, col = "black")+ theme_bw() + theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) + xlab("Geometric Mean") + ylab("Curvilinear Lenth")
```

```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning in qt((1 - level)/2, df): NaNs produced
```

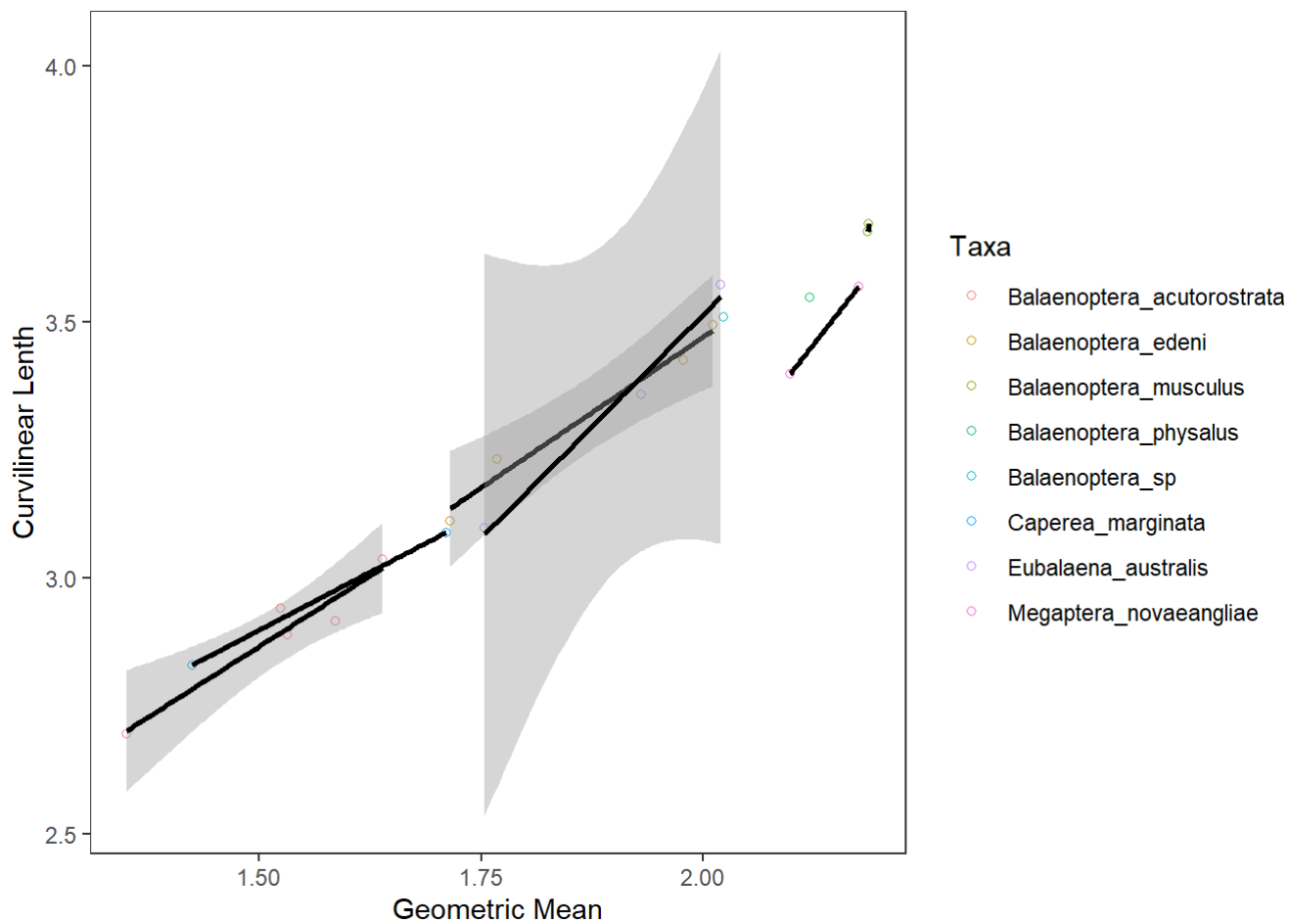
```
## Warning in qt((1 - level)/2, df): NaNs produced
```

```
## Warning in qt((1 - level)/2, df): NaNs produced
```

```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning  
## -Inf
```

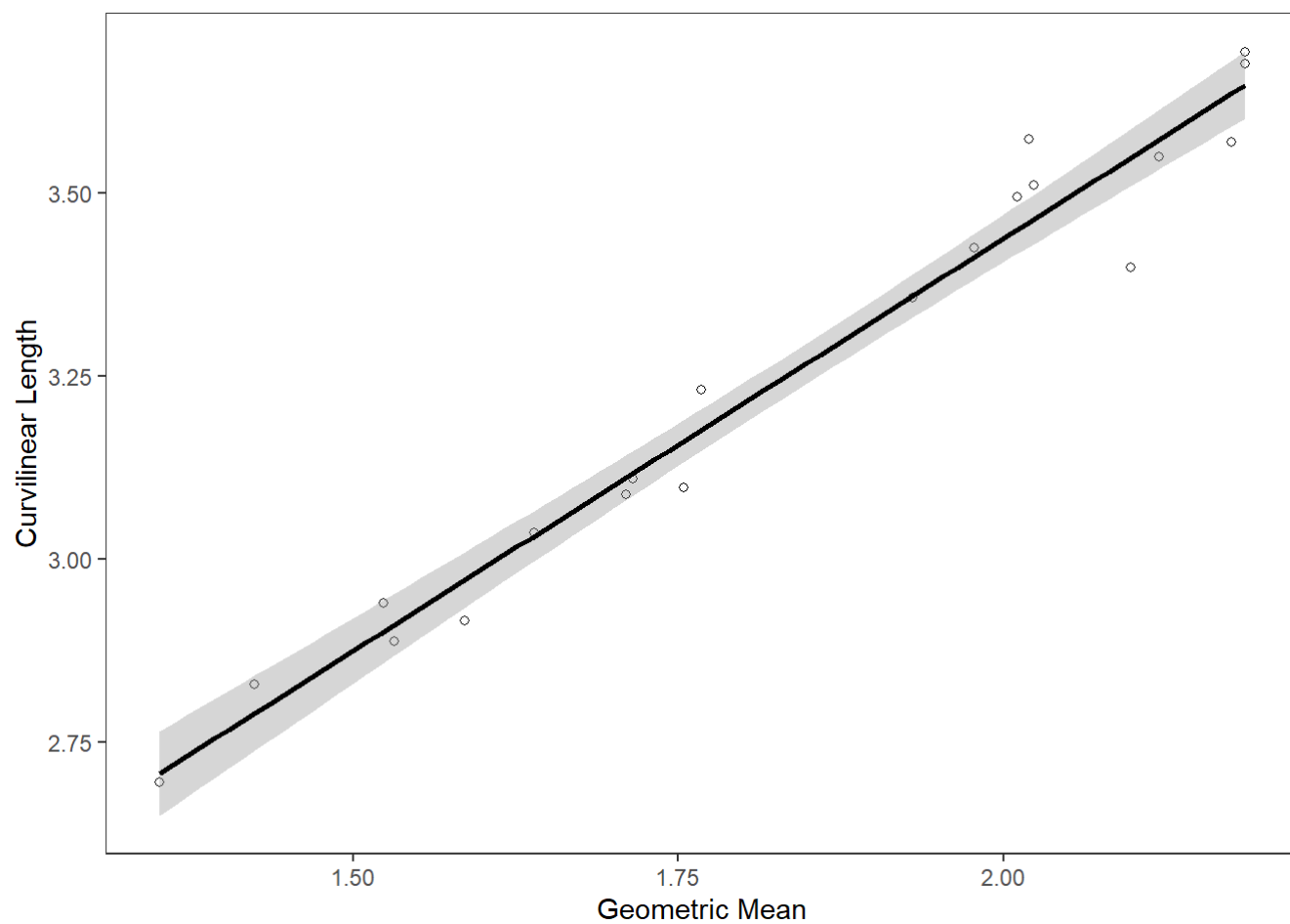
```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning  
## -Inf
```

```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning  
## -Inf
```

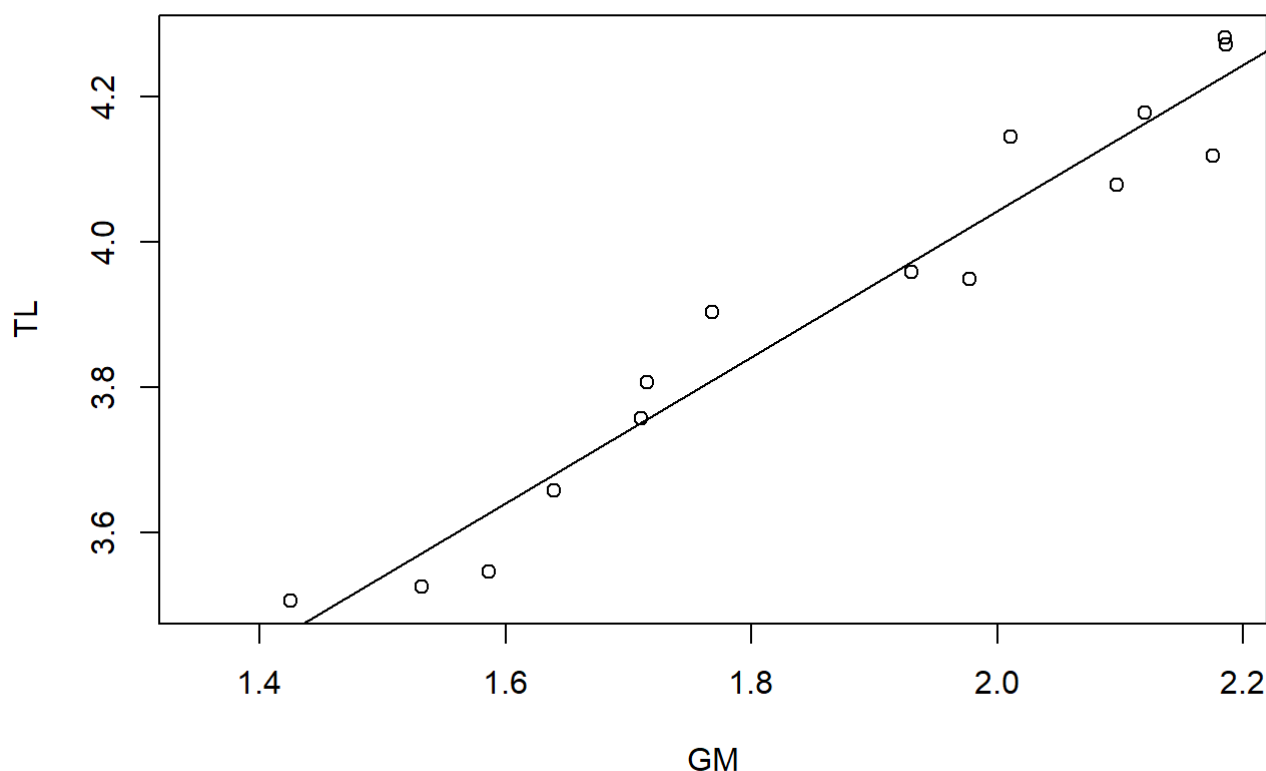


```
ggplot(MysticeteData2, aes(y=Cu, x=GM)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_blan
k()) + xlab("Geometric Mean") + ylab("Curvilinear Length")
```

```
## `geom_smooth()` using formula 'y ~ x'
```



```
### GEOMETRIC MEAN VS TOTAL LENGTH  
## Plot scatterplot  
plot(TL~GM)  
abline(lm(TL~GM))
```



```
## Get summary statistics
summary(lm(TL~GM))
```

```
##
## Call:
## lm(formula = TL ~ GM)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.100033 -0.053832  0.006653  0.046290  0.094358
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.02906    0.12560   16.16 5.51e-10 ***
## GM           1.00663    0.06655   15.13 1.24e-09 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06478 on 13 degrees of freedom
## (5 observations deleted due to missingness)
## Multiple R-squared:  0.9462, Adjusted R-squared:  0.9421
## F-statistic: 228.8 on 1 and 13 DF,  p-value: 1.244e-09
```

```
## Get regression equation
lm(TL~GM)
```

```
##  
## Call:  
## lm(formula = TL ~ GM)  
##  
## Coefficients:  
## (Intercept)          GM  
##      2.029      1.007
```

```
## Final plot  
ggplot(MysticeteData2, aes(y=TL, x=GM, shape = Taxa, col = Taxa)) + geom_point(shape=1) + geo  
m_smooth(method=lm, col = "black")+ theme_bw() + theme(panel.grid.major = element_blank(),pan  
el.grid.minor = element_blank()) + xlab("Geometric Mean") + ylab("Log10 Total Length")
```

```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning: Removed 5 rows containing non-finite values (stat_smooth).
```

```
## Warning in qt((1 - level)/2, df): NaNs produced
```

```
## Warning in qt((1 - level)/2, df): NaNs produced
```

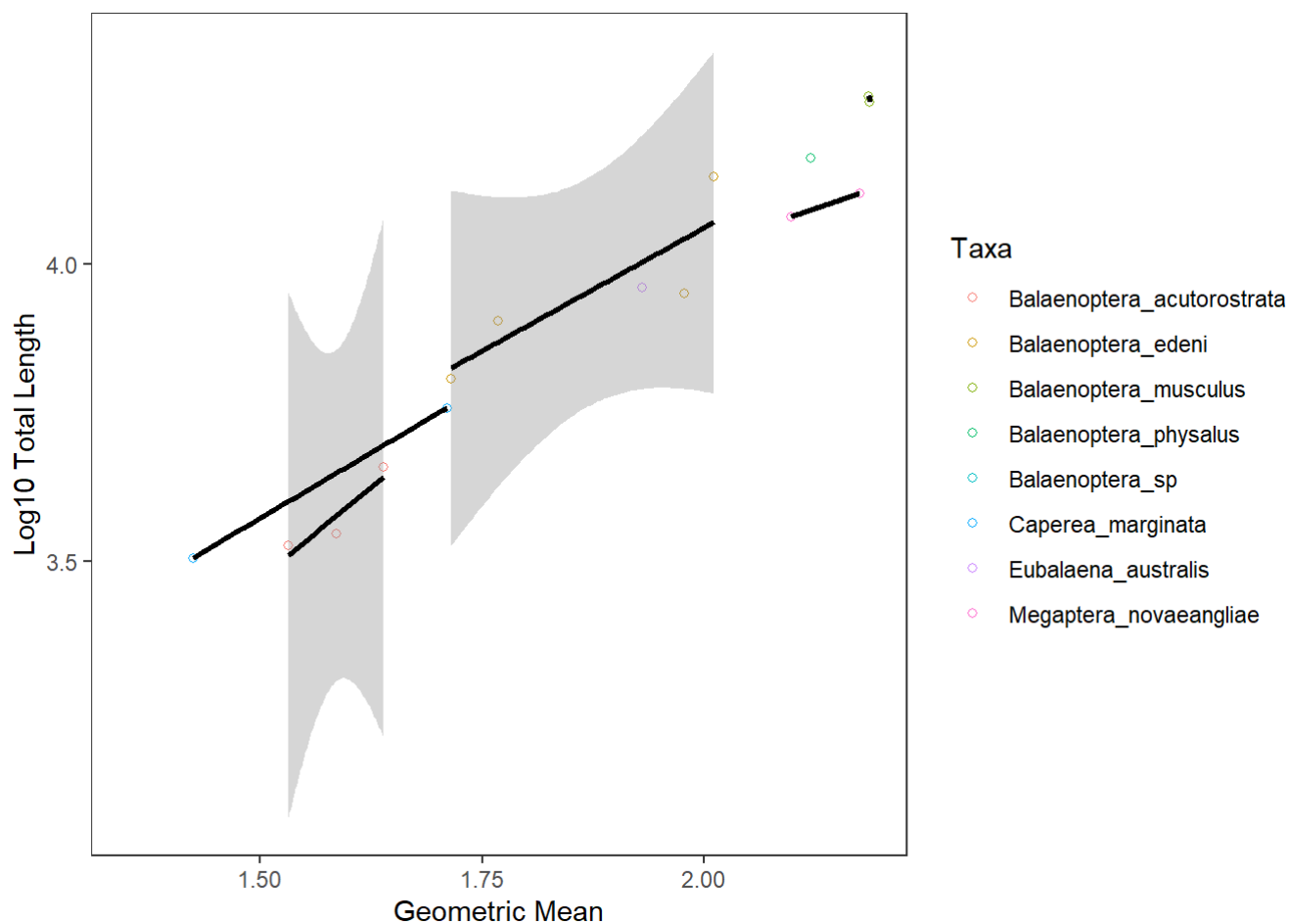
```
## Warning in qt((1 - level)/2, df): NaNs produced
```

```
## Warning: Removed 5 rows containing missing values (geom_point).
```

```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning  
## -Inf
```

```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning  
## -Inf
```

```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning  
## -Inf
```

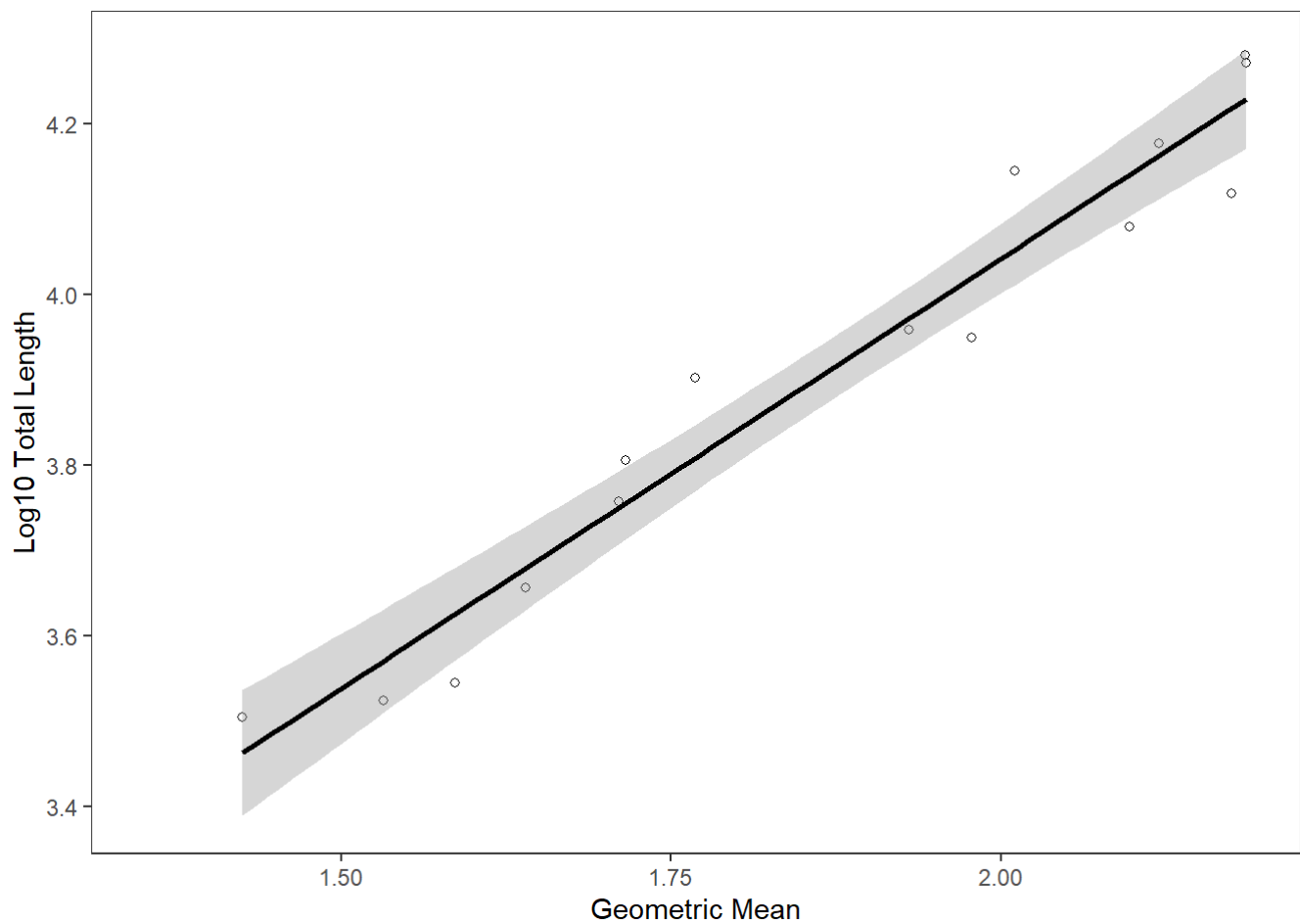



```
ggplot(MysticeteData2, aes(y=TL, x=GM)) + geom_point(shape=1) + geom_smooth(method=lm, col =
"black")+ theme_bw() + theme(panel.grid.major = element_blank(),panel.grid.minor = element_bla
nk()) + xlab("Geometric Mean") + ylab("Log10 Total Length")
```

```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning: Removed 5 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 5 rows containing missing values (geom_point).
```



```
### Multiple Linear Regressions
```

```
## MLR CH
```

```
model <- lm(Ch ~ ASG1 + DV1 +LM1 + DV2 +LM2 + DV3 + LM3, data = MysticeteData2)
```

```
summary(model)
```

```
##
## Call:
## lm(formula = Ch ~ ASG1 + DV1 + LM1 + DV2 + LM2 + DV3 + LM3, data = MysticeteData2)
##
## Residuals:
```

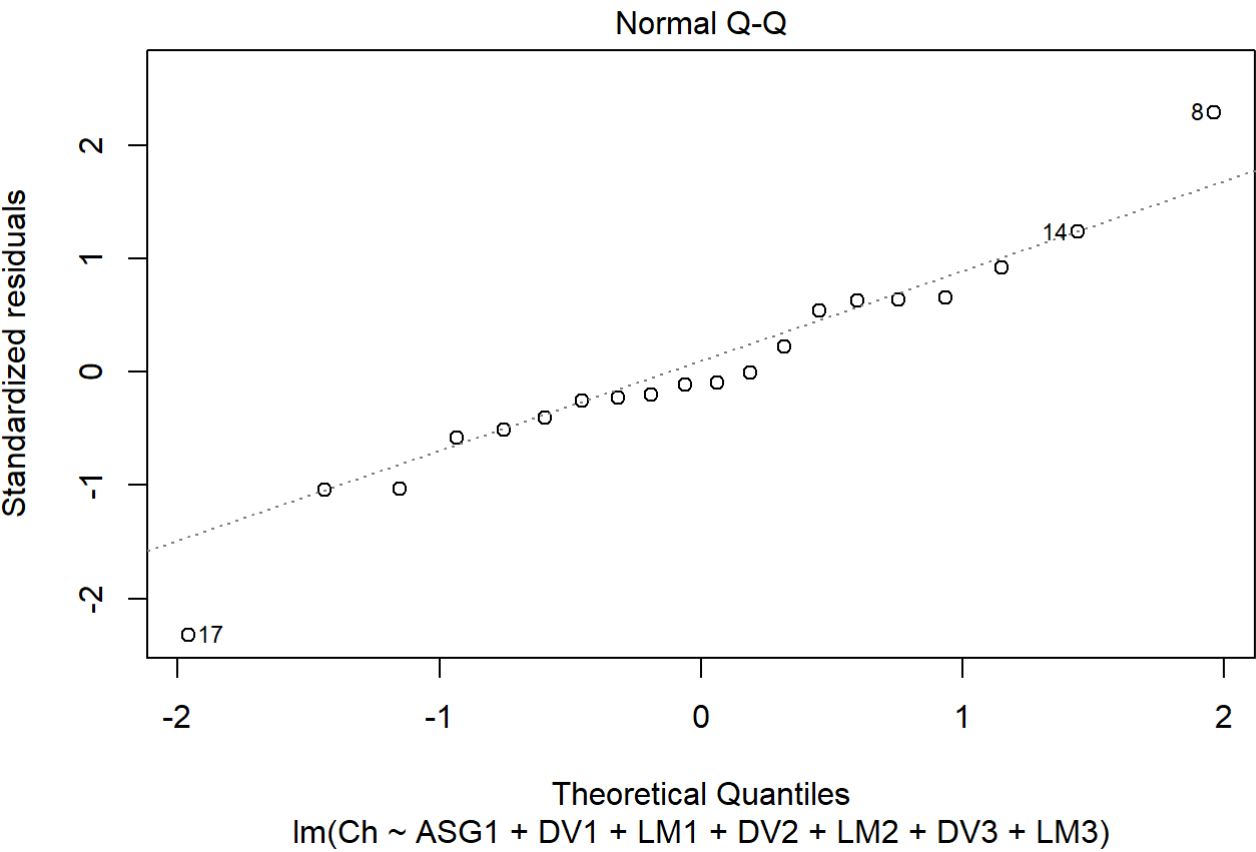
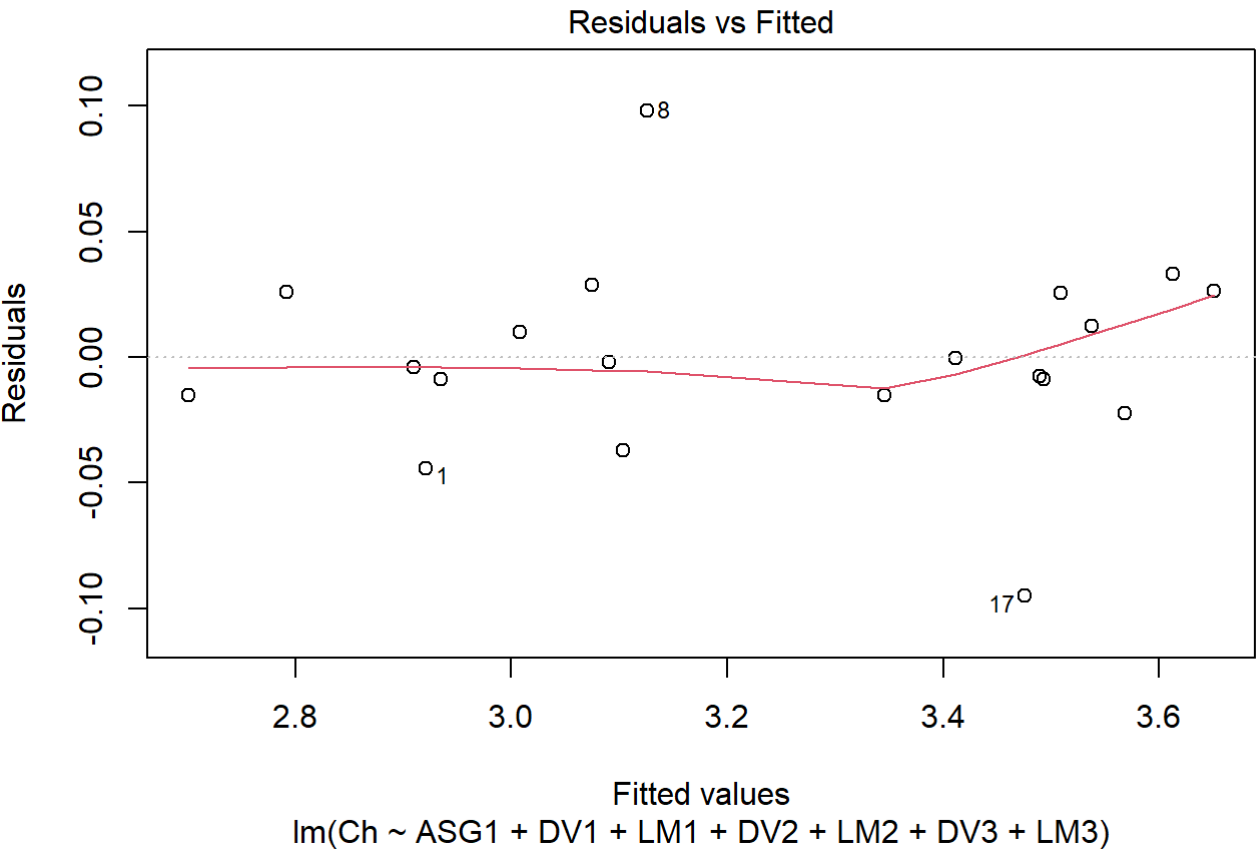
	Min	1Q	Median	3Q	Max
	-0.095084	-0.015130	-0.002986	0.025691	0.098010

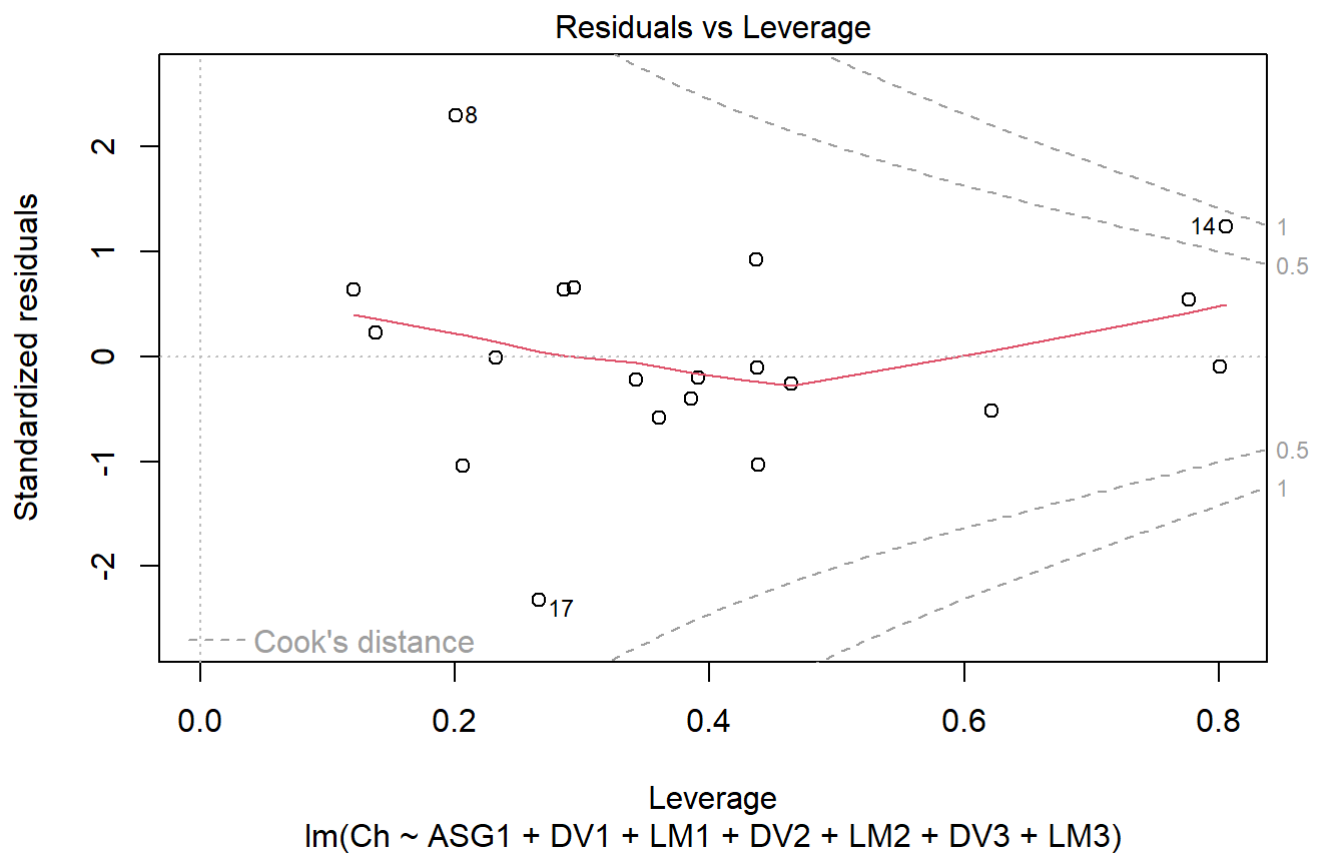
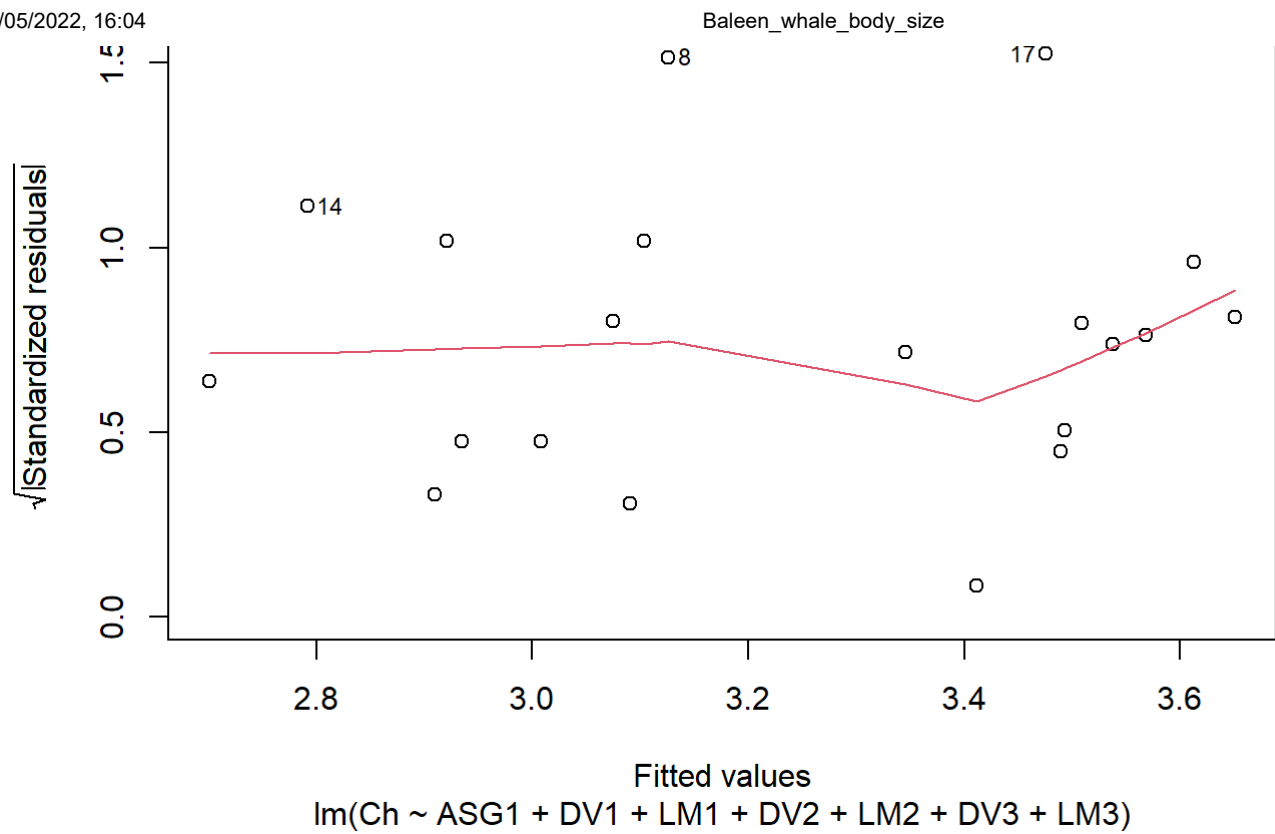
```
##
## Coefficients:
```

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1.371112	0.127219	10.778	1.59e-07 ***
ASG1	-0.190555	0.169568	-1.124	0.28309
DV1	1.456816	0.535606	2.720	0.01861 *
LM1	0.967784	0.449367	2.154	0.05230 .
DV2	-4.472175	1.591699	-2.810	0.01576 *
LM2	0.004511	0.490850	0.009	0.99282
DV3	3.686848	1.105096	3.336	0.00593 **
LM3	-0.434648	0.492337	-0.883	0.39467

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.04775 on 12 degrees of freedom
## Multiple R-squared:  0.9844, Adjusted R-squared:  0.9753
## F-statistic: 108.3 on 7 and 12 DF,  p-value: 6.882e-10
```

```
plot(model)
```





```
summary(model)$coefficient
```

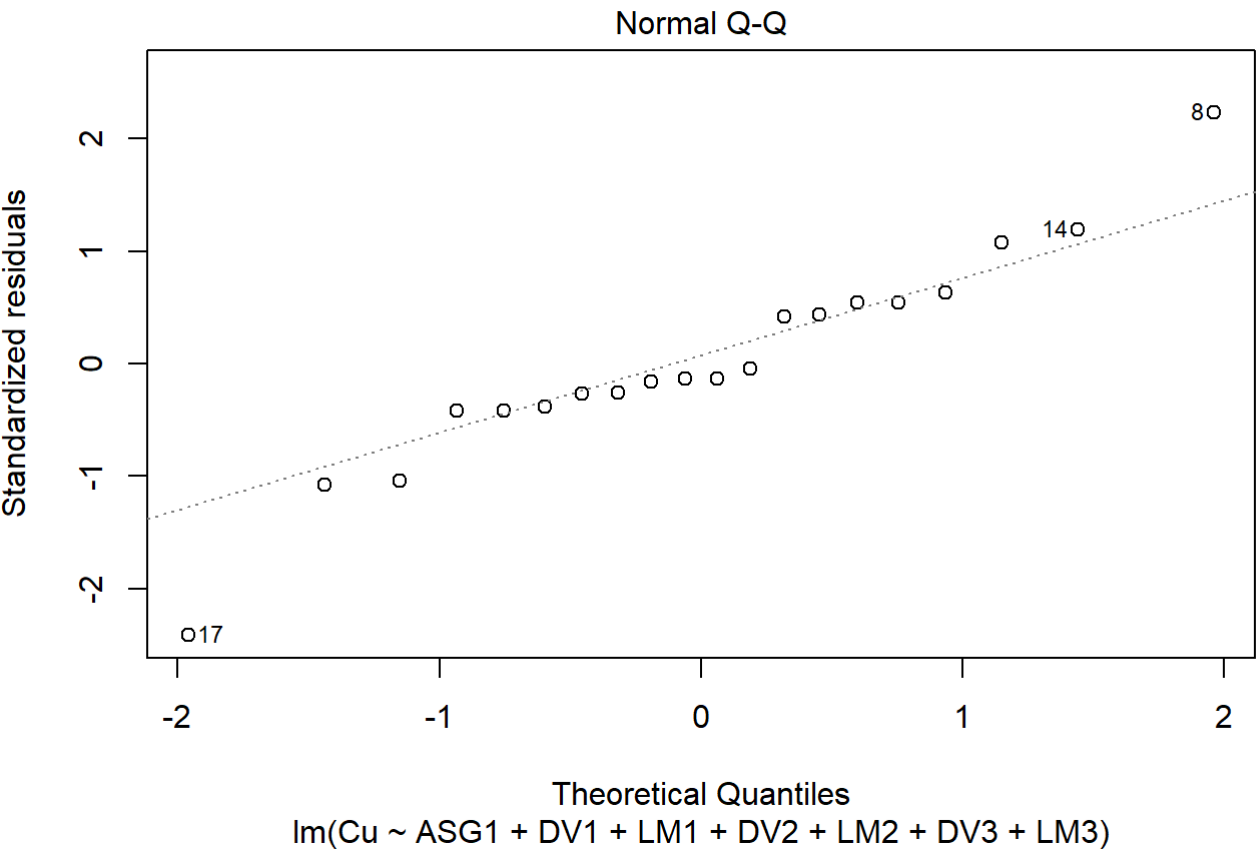
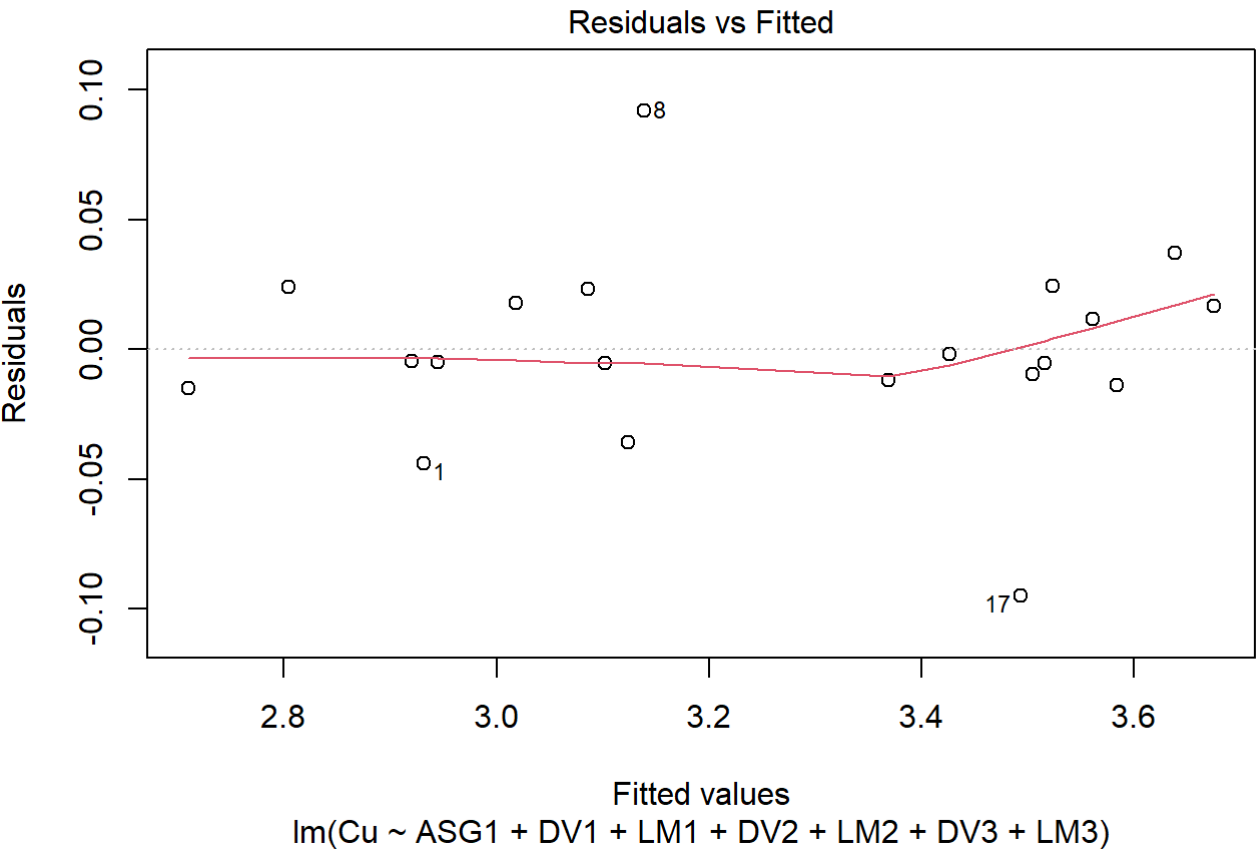
```
##               Estimate Std. Error      t value      Pr(>|t|)
## (Intercept)  1.371111837  0.1272187 10.777598461 1.585425e-07
## ASG1         -0.190554772  0.1695679  -1.123767090 2.830904e-01
## DV1          1.456816104  0.5356063   2.719938213 1.860993e-02
## LM1          0.967783705  0.4493665   2.153662121 5.230015e-02
## DV2         -4.472174859  1.5916988  -2.809686719 1.575857e-02
## LM2          0.004510765  0.4908501   0.009189699 9.928188e-01
## DV3          3.686848102  1.1050963   3.336223294 5.929401e-03
## LM3         -0.434648325  0.4923374  -0.882826132 3.946719e-01
```

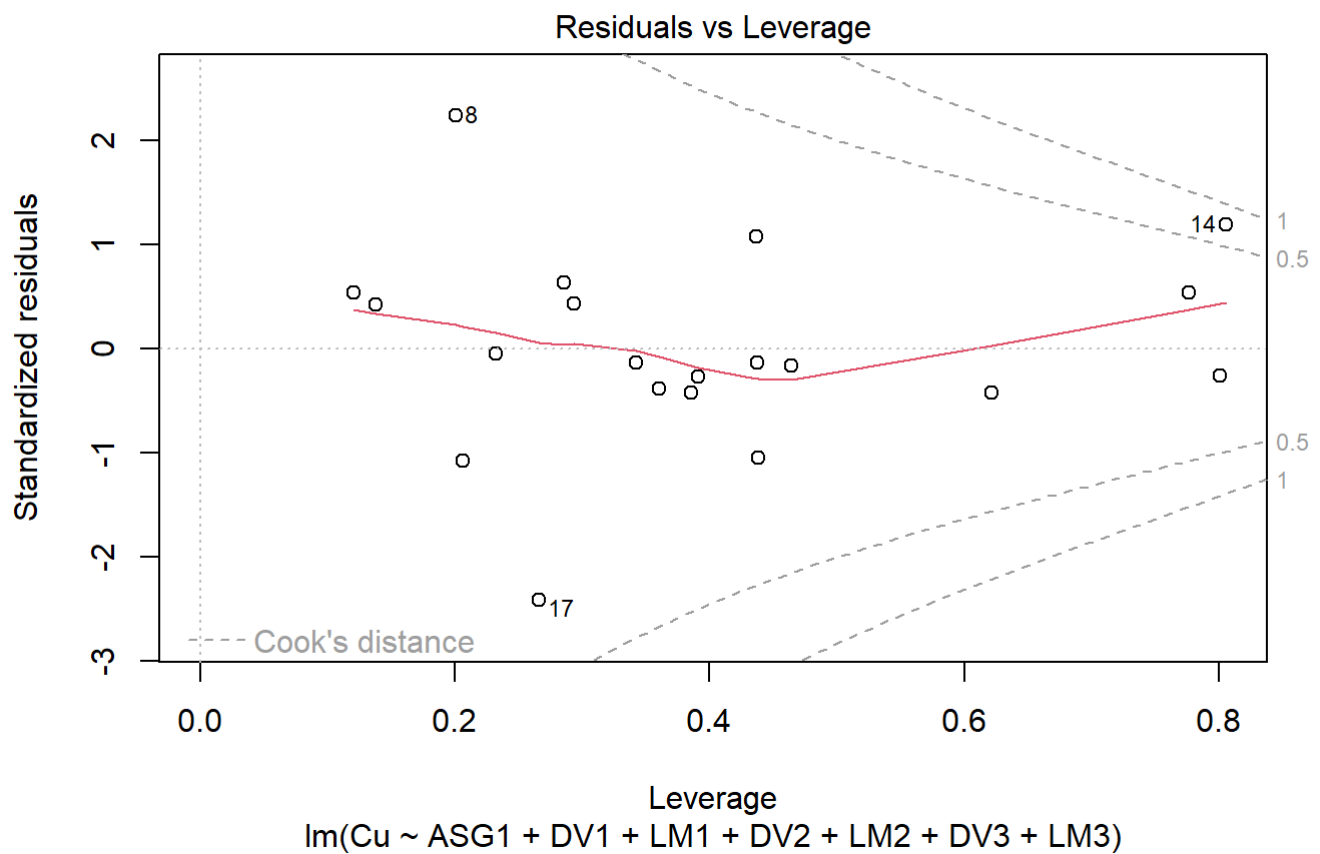
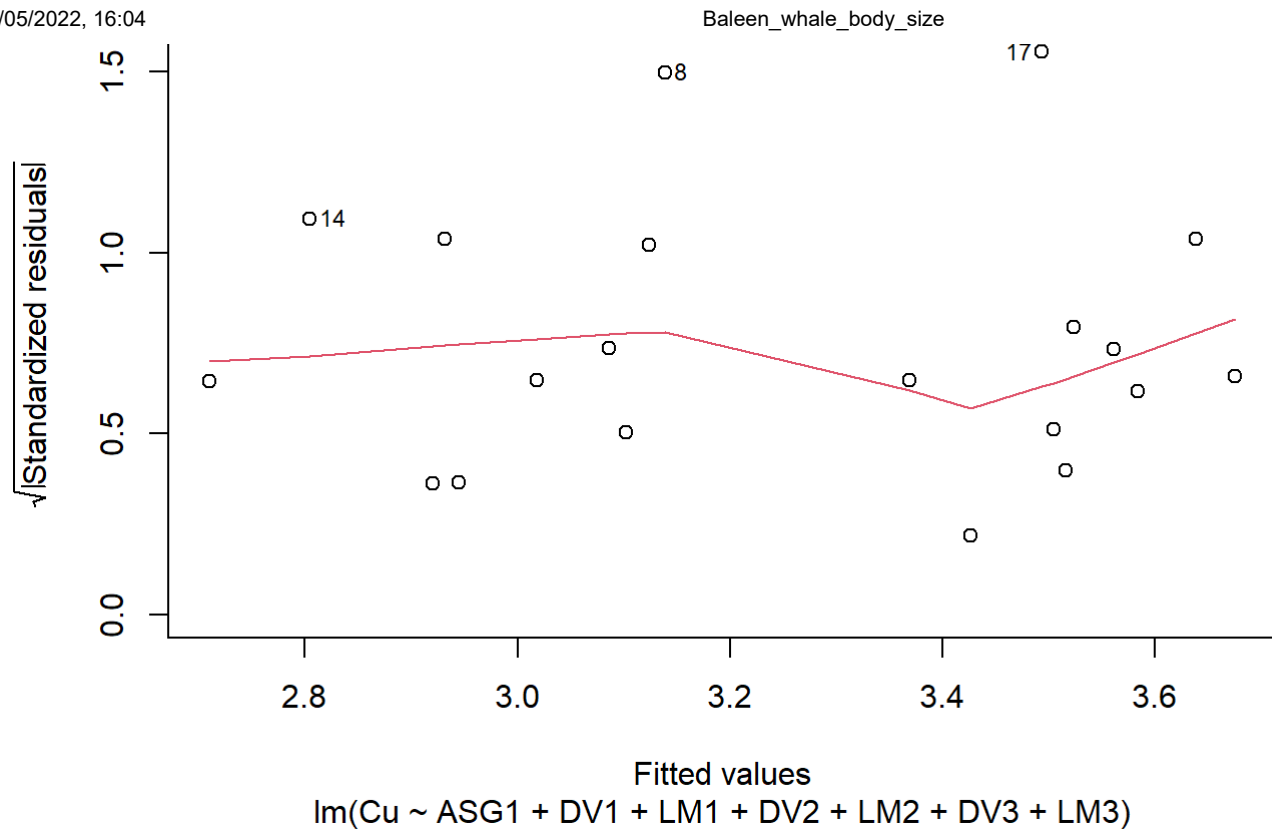
```
## MLR CU
```

```
model <- lm(Cu ~ ASG1 + DV1 + LM1 + DV2 + LM2 + DV3 + LM3, data = MysticeteData2)
summary(model)
```

```
##
## Call:
## lm(formula = Cu ~ ASG1 + DV1 + LM1 + DV2 + LM2 + DV3 + LM3, data = MysticeteData2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.094993 -0.012413 -0.004787  0.019268  0.091903
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.353207   0.122349  11.060 1.19e-07 ***
## ASG1         -0.204497   0.163077  -1.254  0.23372
## DV1          1.405851   0.515105   2.729  0.01829 *
## LM1          0.944887   0.432166   2.186  0.04933 *
## DV2         -4.391983   1.530773  -2.869  0.01411 *
## LM2         -0.006617   0.472062  -0.014  0.98905
## DV3          3.684634   1.062796   3.467  0.00466 **
## LM3         -0.401155   0.473492  -0.847  0.41345
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.04592 on 12 degrees of freedom
## Multiple R-squared:  0.986, Adjusted R-squared:  0.9778
## F-statistic: 120.4 on 7 and 12 DF, p-value: 3.699e-10
```

```
plot(model)
```



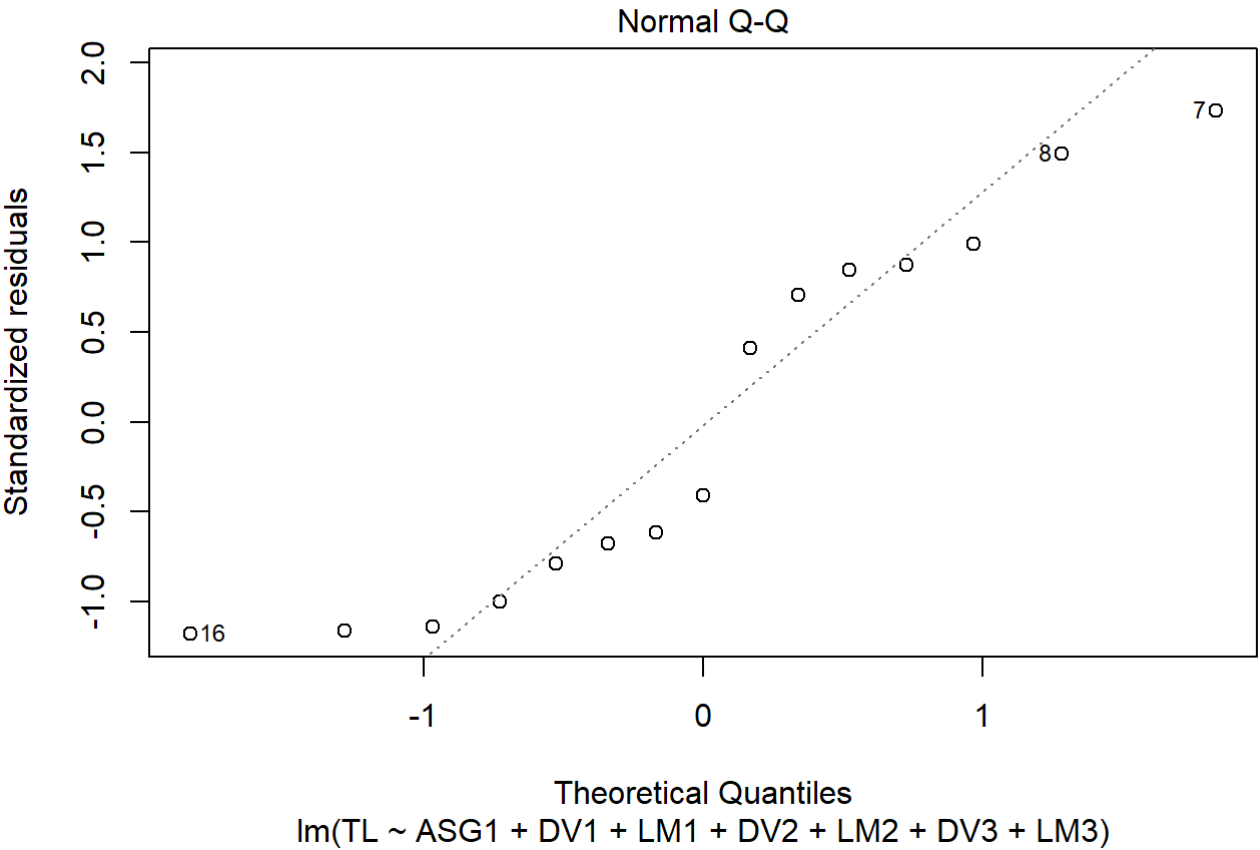
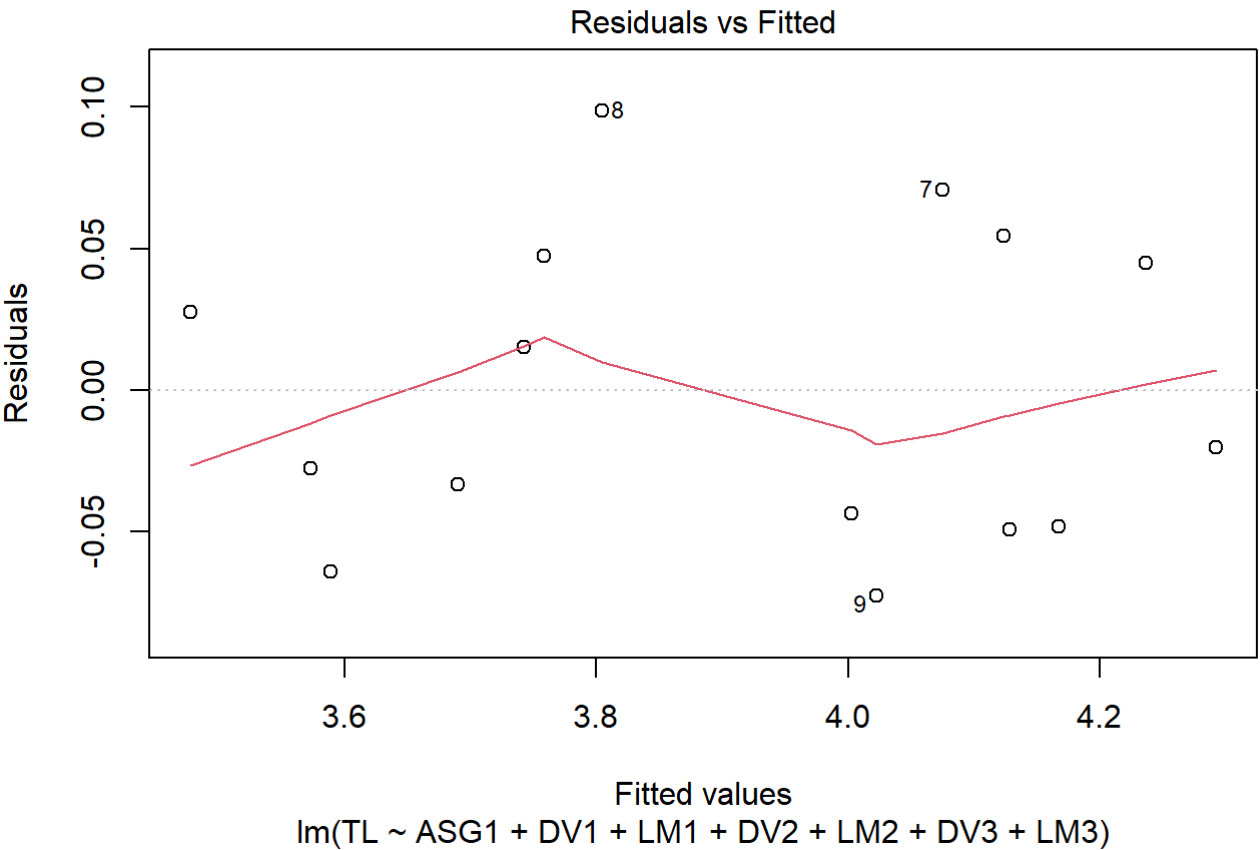
```
summary(model)$coefficient
```

```
##           Estimate Std. Error    t value    Pr(>|t|)
## (Intercept)  1.353206703   0.1223491  11.06020899 1.193211e-07
## ASG1        -0.204497499   0.1630773  -1.25399139 2.337236e-01
## DV1         1.405850774   0.5151048   2.72925178 1.829182e-02
## LM1         0.944886850   0.4321661   2.18639761 4.932530e-02
## DV2        -4.391983101   1.5307730  -2.86912756 1.411265e-02
## LM2        -0.006616728   0.4720618  -0.01401666 9.890470e-01
## DV3         3.684634383   1.0627964   3.46692414 4.657300e-03
## LM3        -0.401155464   0.4734921  -0.84722733 4.134469e-01
```

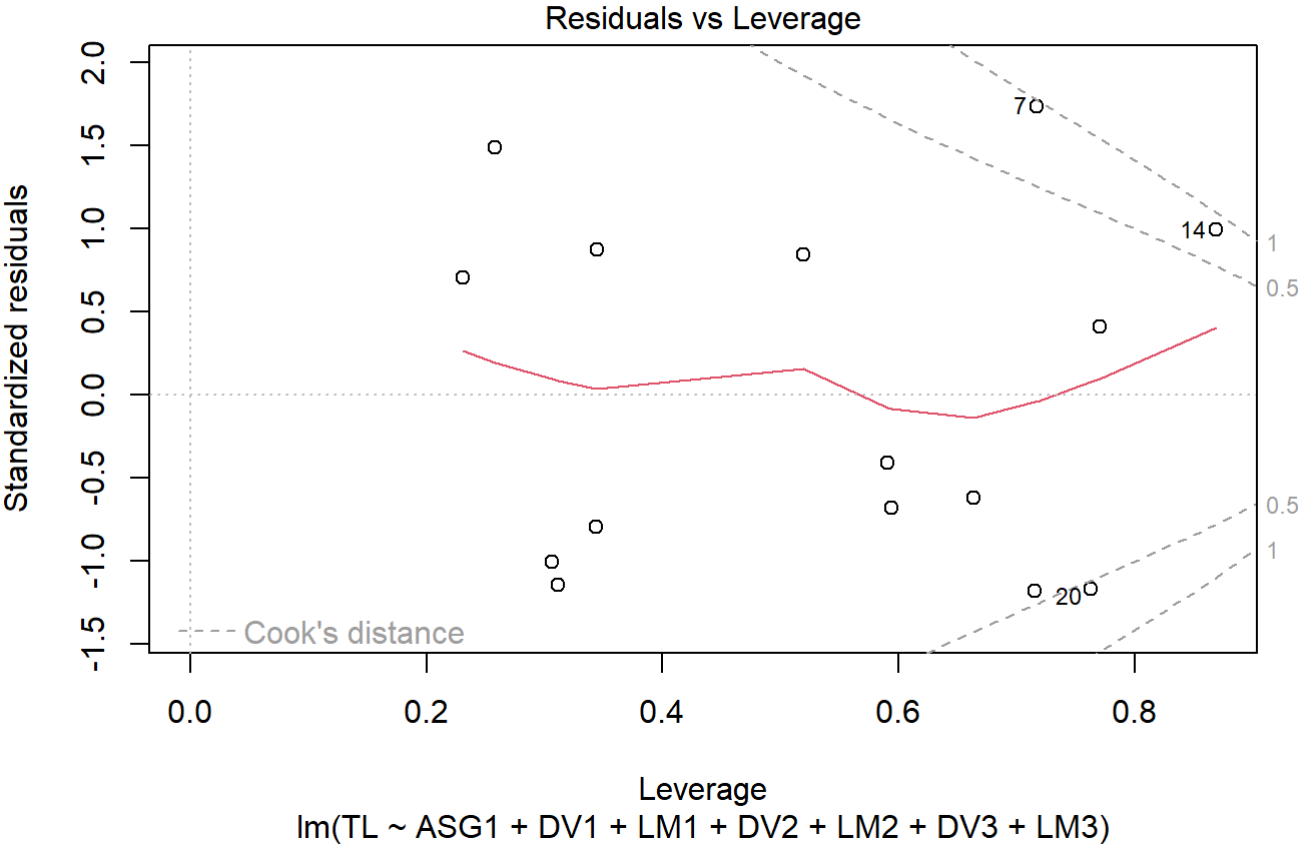
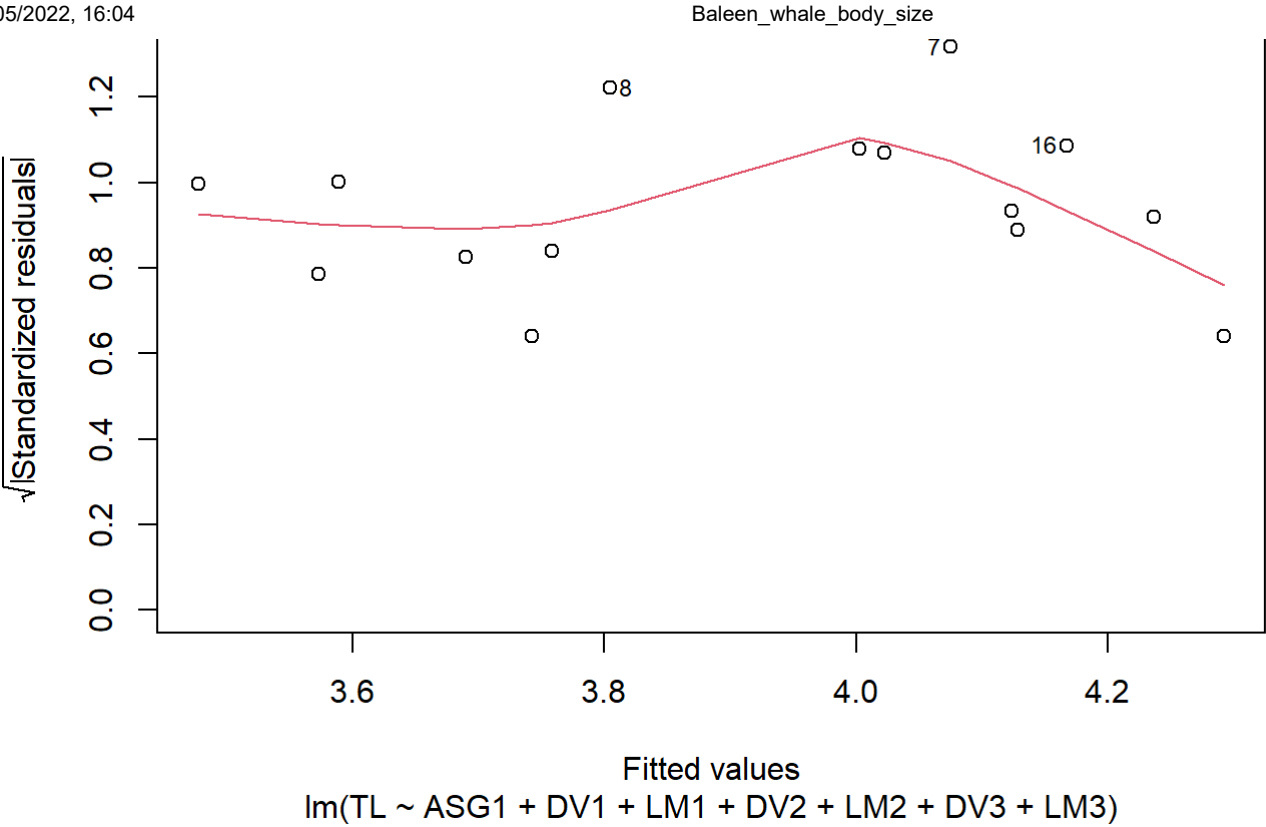
```
## MLR TL
model <- lm(TL ~ ASG1 + DV1 + LM1 + DV2 + LM2 + DV3 + LM3, data = MysticeteData2)
summary(model)
```

```
##
## Call:
## lm(formula = TL ~ ASG1 + DV1 + LM1 + DV2 + LM2 + DV3 + LM3, data = MysticeteData2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.07280 -0.04591 -0.02015  0.04621  0.09863
##
## Coefficients:
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)   2.3250     0.3489   6.664 0.000287 ***
## ASG1          -0.4724     0.5018  -0.941 0.377804
## DV1           1.1263     1.2332   0.913 0.391471
## LM1           0.5750     1.4504   0.396 0.703592
## DV2          -2.9930     3.6042  -0.830 0.433709
## LM2           0.4775     0.9689   0.493 0.637183
## DV3           2.4123     2.5729   0.938 0.379679
## LM3          -0.2699     1.3027  -0.207 0.841775
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.07679 on 7 degrees of freedom
## (5 observations deleted due to missingness)
## Multiple R-squared:  0.9593, Adjusted R-squared:  0.9187
## F-statistic: 23.59 on 7 and 7 DF, p-value: 0.0002332
```

```
plot(model)
```

Scale-Location



```
summary(model)$coefficient
```

##	Estimate	Std. Error	t value	Pr(> t)
## (Intercept)	2.3249979	0.3488916	6.6639548	0.000286803
## ASG1	-0.4724090	0.5017710	-0.9414832	0.377804312
## DV1	1.1262533	1.2332119	0.9132682	0.391470849
## LM1	0.5749745	1.4503667	0.3964339	0.703592170
## DV2	-2.9929609	3.6041693	-0.8304163	0.433708723
## LM2	0.4775428	0.9688885	0.4928769	0.637182844
## DV3	2.4122578	2.5728885	0.9375680	0.379679006
## LM3	-0.2698889	1.3027413	-0.2071700	0.841774826