Termite Data Analysis for Paper: Clagget et al, 2018.

Reference

Clagget, N., A. Surovek, and W. Capehart, 2018: A Bio-inspired examination of the role of material and environment in the development of multi- functional structural forms, Journal of Structural Engineering.

Additional Libraries

```
library("lattice")
```

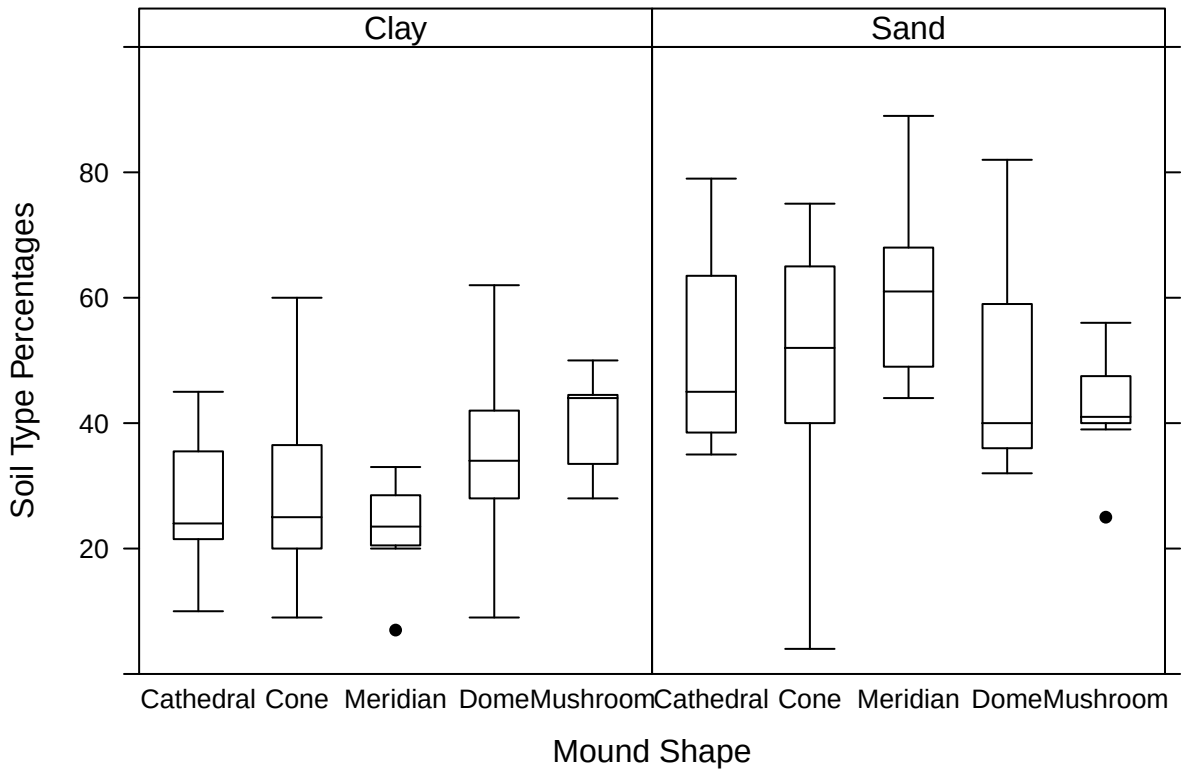
Reading in Data as CSV for Processing in R

```
data_directory = "/Users/wjc/GitHub/Termites_Climate/Data_Files_for_R/"


MOUNDS_DATA = read.csv(file = paste(data_directory,
                                    "Full_Data_Summary_WJC_MOD.csv",
                                    sep = ""
                                    ),
                       header = TRUE,
                       sep    = ","
                       )
```

Figure 7

```
sand         = data.frame(Mound_Shape = MOUNDS_DATA$Mound_Shape,
                          Percentage  = MOUNDS_DATA$Soil_Sand_Percentage)
sand$Class   = "Sand"

clay         = data.frame(Mound_Shape = MOUNDS_DATA$Mound_Shape,
                          Percentage  = MOUNDS_DATA$Soil_Clay_Percentage)
clay$Class   = "Clay"


sand_clay    = rbind(sand,
                     clay)

sand_clay$Mound_Shape = factor(x      = sand_clay$Mound_Shape,
                               levels = c("Cathedral",
                                          "Cone",
                                          "Meridian",
                                          "Dome",
                                          "Mushroom")
                               )

bwplot(x = Percentage ~ Mound_Shape | Class,
```

```
        data    = sand_clay,
        ylab    = "Soil Type Percentages",
        ylim     = c(0,100),
        xlab = "Mound Shape",
        par.settings = list(strip.background = list(col = "white"),
                            box.dot          = list(col = "black", pch = "|"),
                            dot.symbol       = list(col = "black", fg  = "black"),
                            box.rectangle    = list(col = "black", lty = "solid"),
                            box.umbrella     = list(col = "black", lty = "solid"),
                            plot.symbol      = list(col = "black", pch = 16)
                            )
      )
```

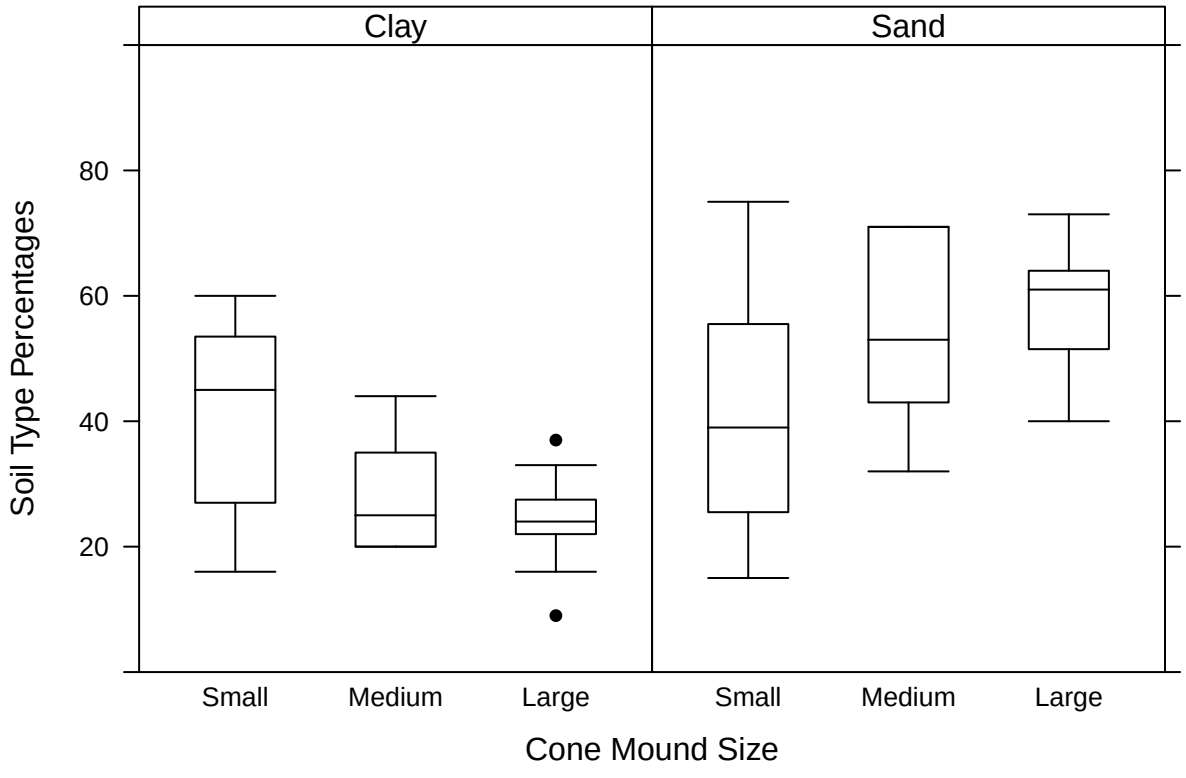



```
remove(sand_clay)
```

Figure 8

```
sand       = data.frame(Cone_Size  = MOUNDS_DATA$Cone_Size[           MOUNDS_DATA$Cone_Size != 0],
                        Percentage = MOUNDS_DATA$Soil_Sand_Percentage[MOUNDS_DATA$Cone_Size != 0])
sand$Class = "Sand"

clay       = data.frame(Cone_Size  = MOUNDS_DATA$Cone_Size[           MOUNDS_DATA$Cone_Size != 0],
                        Percentage = MOUNDS_DATA$Soil_Clay_Percentage[MOUNDS_DATA$Cone_Size != 0])
clay$Class = "Clay"


sand_clay = rbind(sand,
```

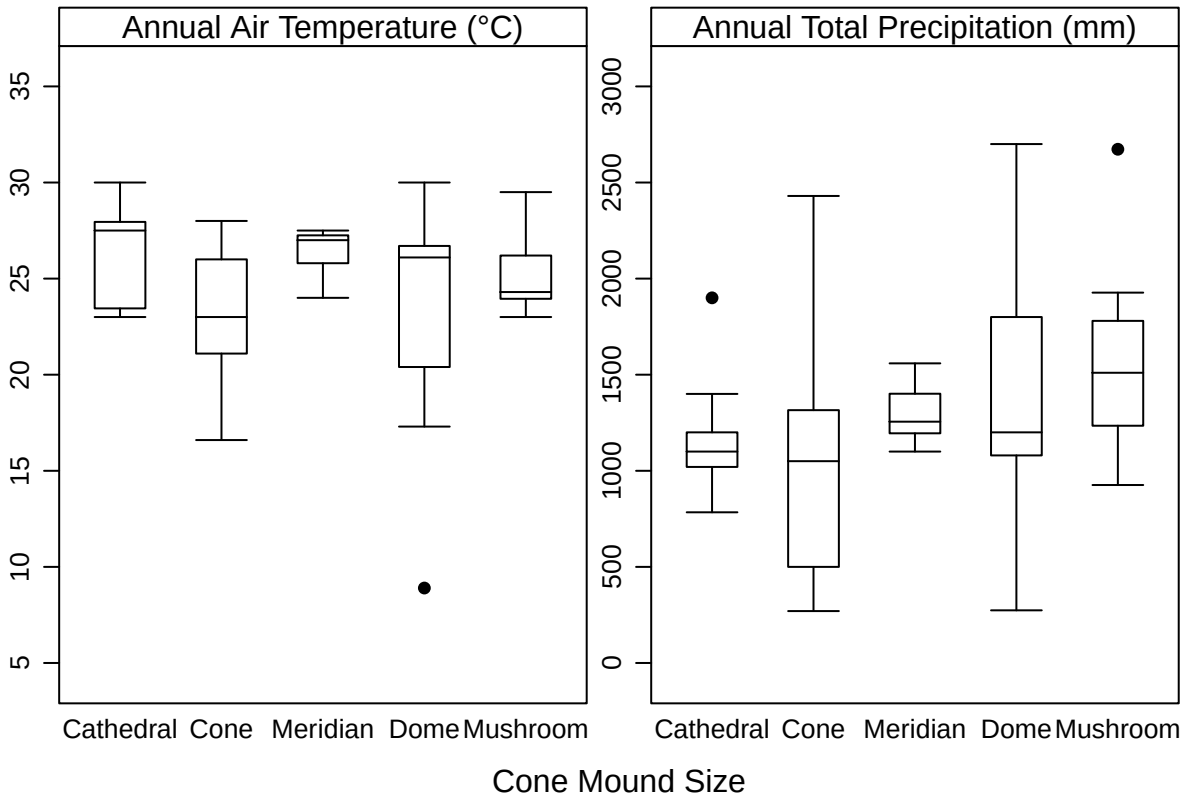
```
                  clay)

remove(sand,
       clay)

sand_clay$Cone_Size = factor(x      = sand_clay$Cone_Size,
                             levels = c("Small",
                                        "Medium",
                                        "Large")
                             )

bwplot(x = Percentage ~ Cone_Size | Class,
       data    = sand_clay,
       ylab    = "Soil Type Percentages",
       ylim     = c(0,100),
       xlab = "Cone Mound Size",
       par.settings = list(strip.background = list(col = "white"),
                           box.dot          = list(col = "black", pch = "|"),
                           dot.symbol       = list(col = "black", fg  ="black"),
                           box.rectangle    = list(col = "black", lty = "solid"),
                           box.umbrella     = list(col = "black", lty = "solid"),
                           plot.symbol      = list(col = "black", pch = 16)
                           )
      )
```




```
remove(sand_clay)
```

Figure 9

```
temp         = data.frame(Mound_Shape  = MOUNDS_DATA$Mound_Shape,
                          ClimateValue = MOUNDS_DATA$Mean_Annual_Temperature)
temp$ClimVar = "Annual Air Temperature (°C)"

prec         = data.frame(Mound_Shape  = MOUNDS_DATA$Mound_Shape,
                          ClimateValue = MOUNDS_DATA$Mean_Annual_RainFall)
prec$ClimVar = "Annual Total Precipitation (mm)"


climate = rbind(temp,
                prec)

climate$Mound_Shape = factor(x      = climate$Mound_Shape,
                             levels = c("Cathedral",
                                        "Cone",
                                        "Meridian",
                                        "Dome",
                                        "Mushroom")
                             )

bwplot(x = ClimateValue ~ Mound_Shape | ClimVar,
        data    = climate,
        xlab = "Cone Mound Size",
        scales = list(relation = "free"),
        ylab = "",
        ylim = list( c(5,  35),
                     c(0,3000) ),
        par.settings = list(strip.background = list(col = "white"),
                            box.dot          = list(col = "black", pch = "|"),
                            dot.symbol       = list(col = "black", fg  = "black"),
                            box.rectangle    = list(col = "black", lty = "solid"),
                            box.umbrella     = list(col = "black", lty = "solid"),
                            plot.symbol      = list(col = "black", pch = 16)
                            )
       )
```




```
remove(climate,
       temp,prec)
```