Data visualizations can be generalized as consisting of three parts

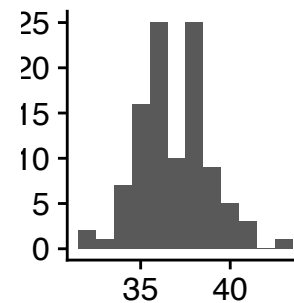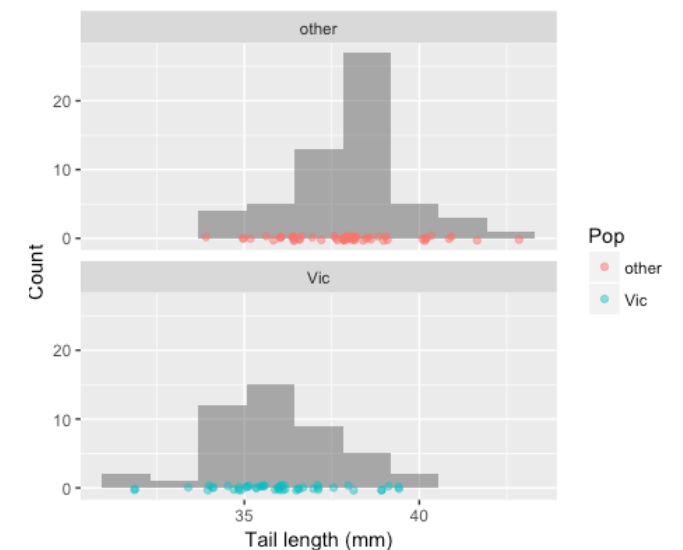**Data** + **Geometric Mapping** + **Aesthetic Properties of the Geometric Mapping**


```
ggplot(data = <DATA>) + <GEOM_FUNCTION>(mapping = aes(<MAPPINGS>))
```
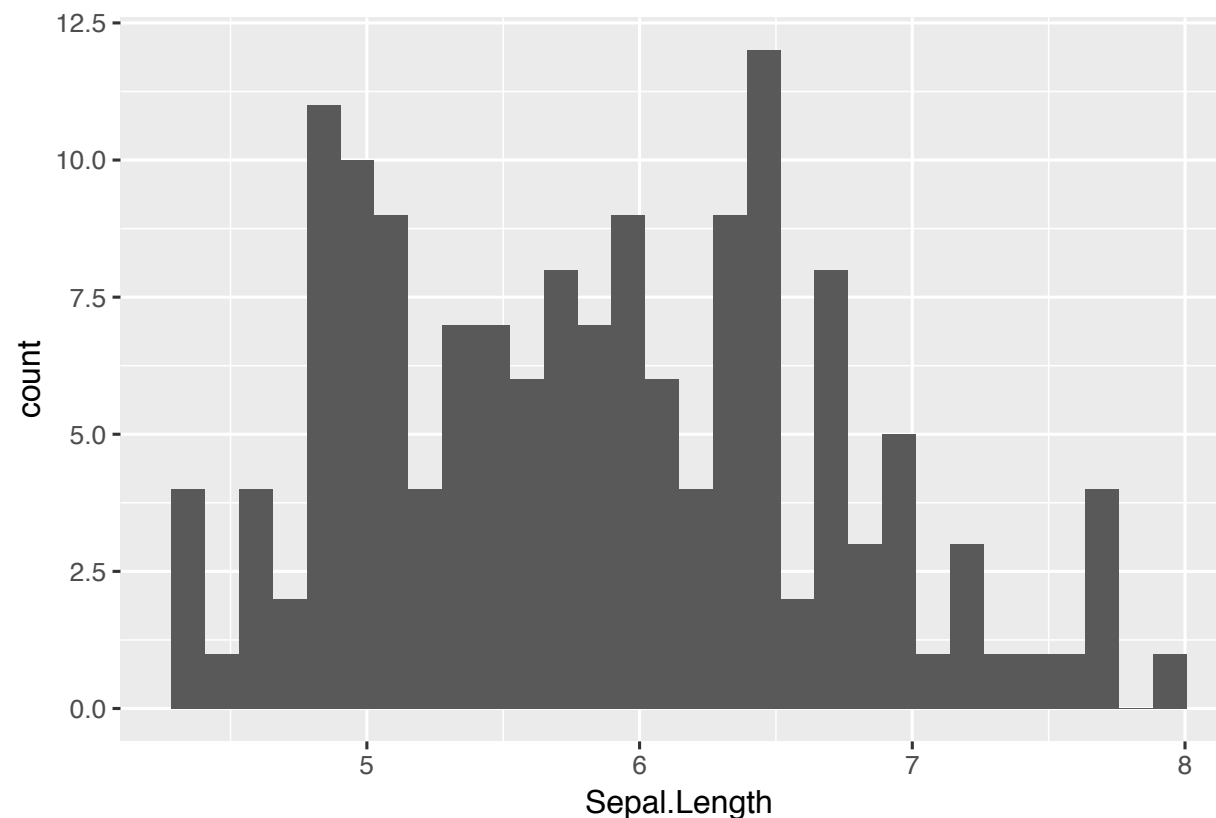
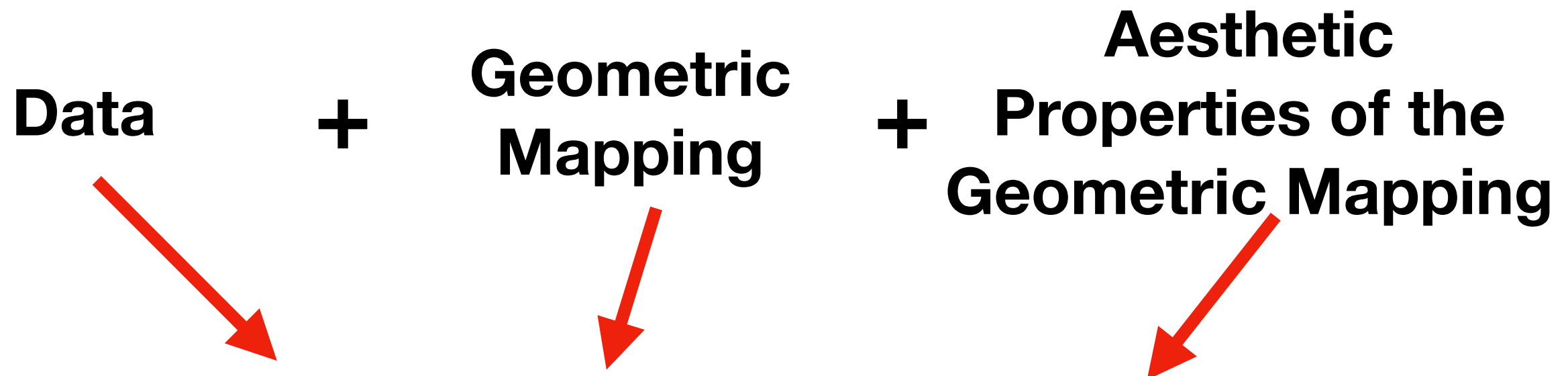# Example 1: Creating a histogram

Data + **Geometric Mapping** + **Aesthetic Properties of the Geometric Mapping**
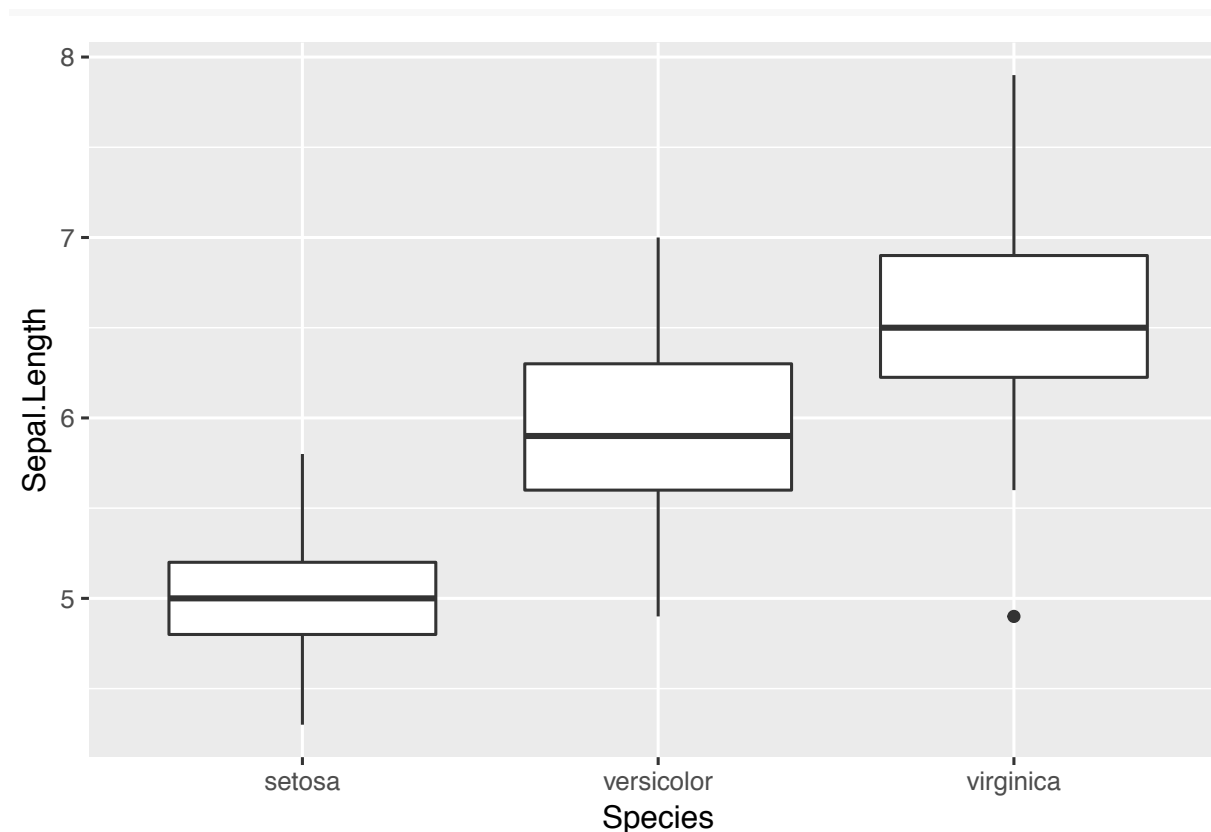
```
ggplot(data = iris) + geom_histogram(mapping = aes(x = Sepal.Length))
```

Example 2: Creating a Boxplot

Data **+** **Geometric Mapping** **+** **Aesthetic Properties of the Geometric Mapping**
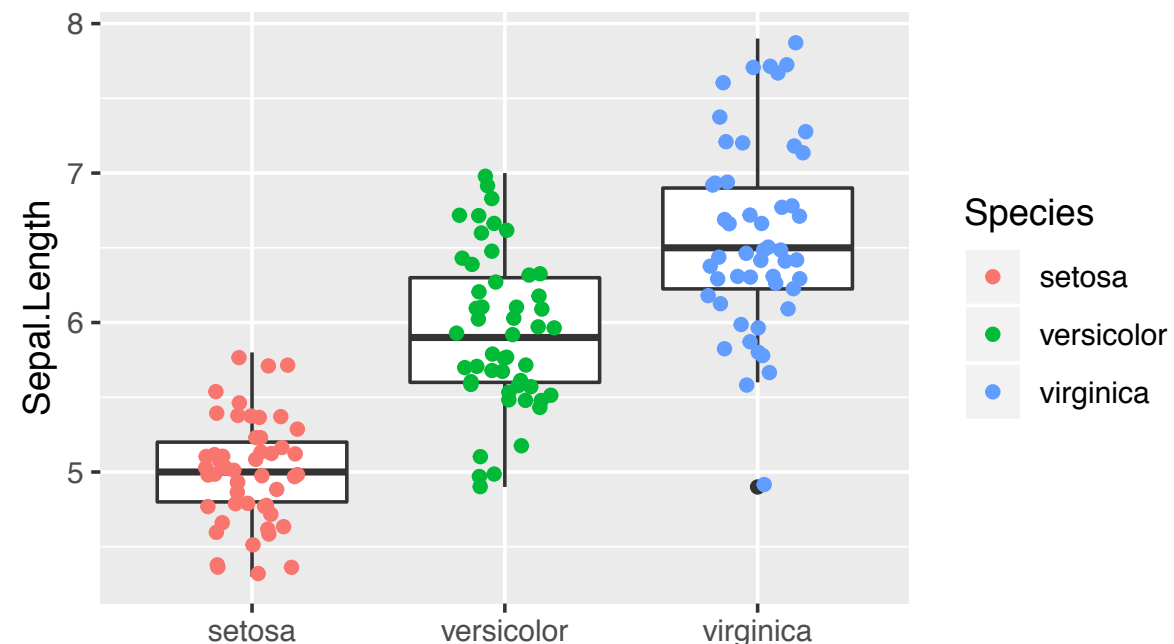
```
ggplot(data = iris) + geom_boxplot(mapping = aes(x = Species,
                                                 y = Sepal.Length))
```

# Example 3: Combining Geometric Representations

Data + **Geometric Mapping** + **Aesthetic Properties of the Geometric Mapping**

```
ggplot(data = iris) + geom_boxplot(mapping = aes(x = Species,
                                                  y = Sepal.Length)) +
             geom_jitter(mapping = aes(x = Species,
                                       y = Sepal.Length,
                                       color = Species),
                         width = 0.2)
```

Faceting creates subplots
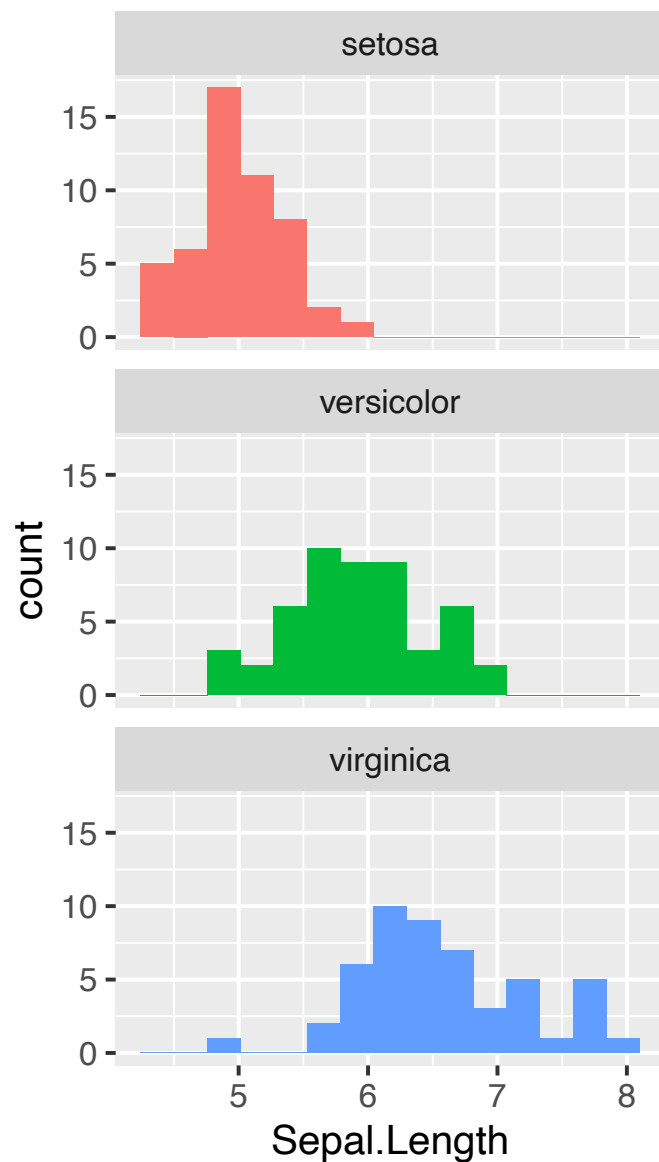# based on conditioning of one or more variables

```
ggplot(data = iris, aes(x = Sepal.Length, fill=Species)) +
  geom_histogram(bins=15) + facet_wrap(~Species,ncol=1)
```
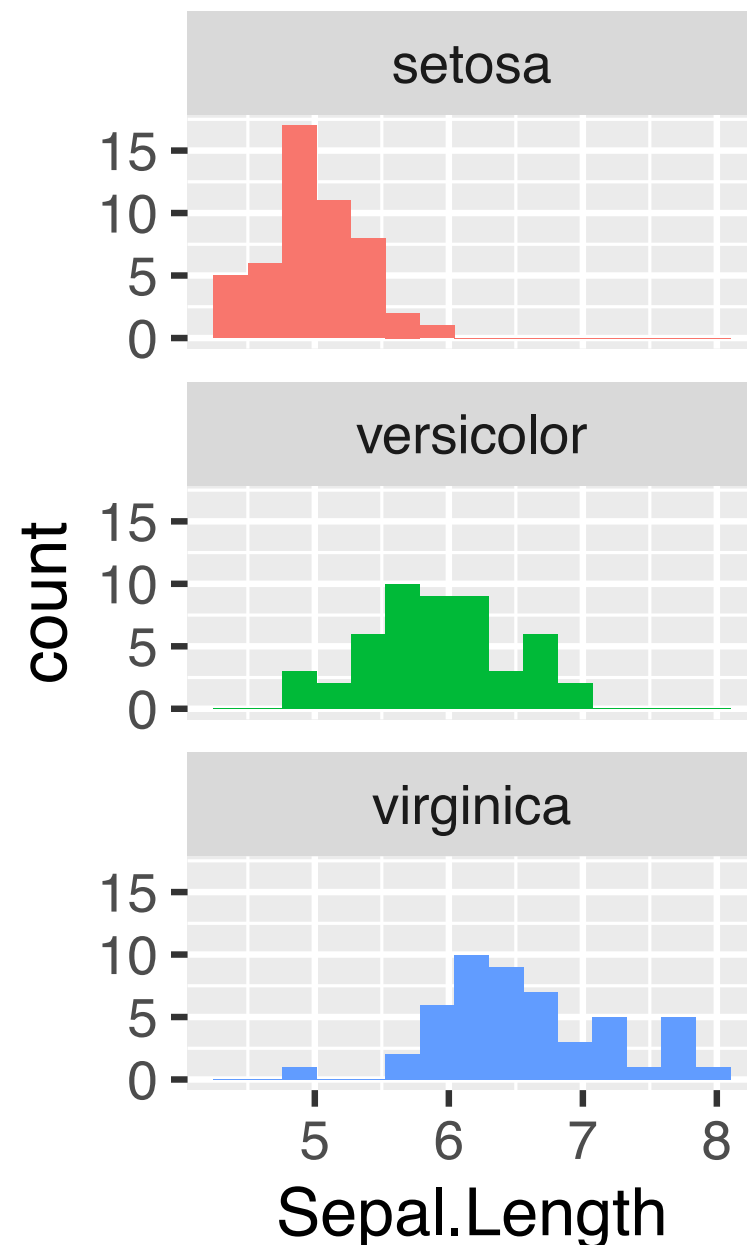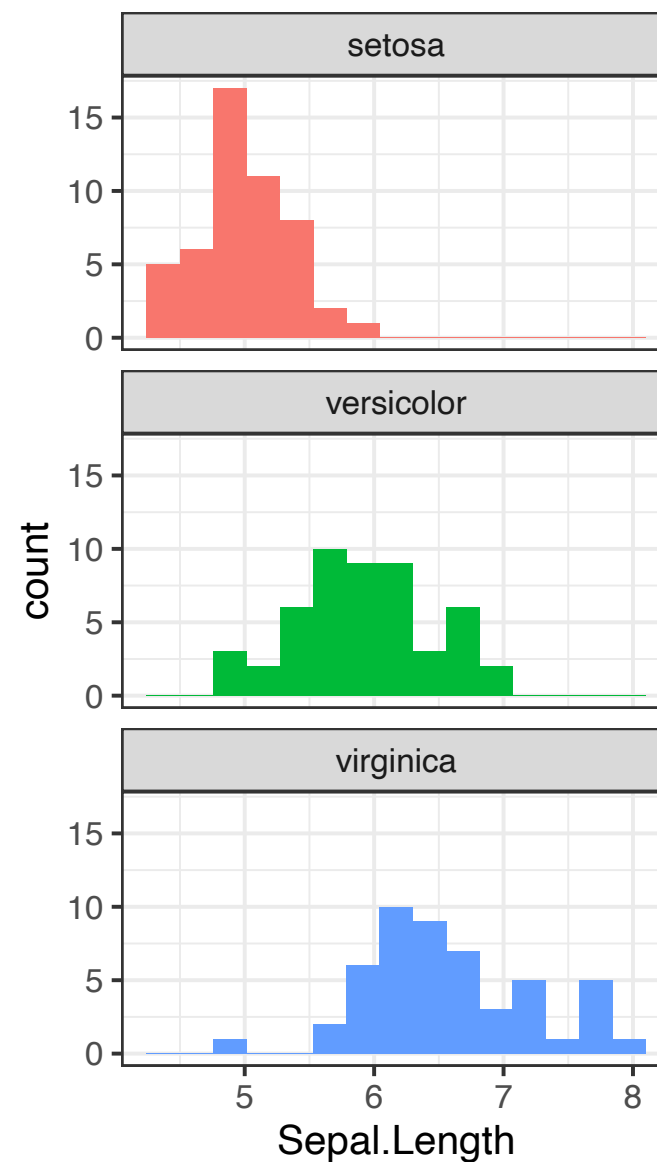
Themes change look-and-feel ac[...]plot

default theme

```r
ggplot(data = iris, aes(x = Sepal.Length, fill=Species)) +
  geom_histogram(bins=15) + facet_wrap(~Species,ncol=1) +
  theme(aspect.ratio = 0.5, legend.position = "none")
```
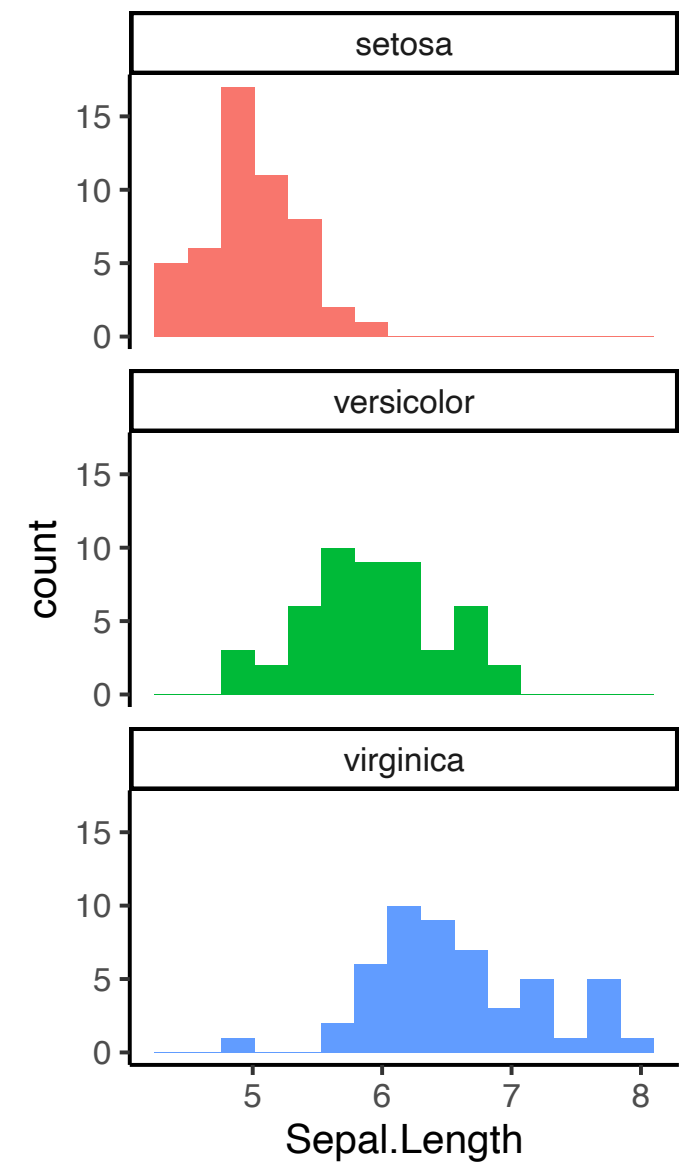

+theme_bw()

```r
ggplot(data = iris, aes(x = Sepal.Length, fill=Species)) +
  geom_histogram(bins=15) + facet_wrap(~Species,ncol=1) +
  theme_bw() + theme(aspect.ratio = 0.5, legend.position = "none")
```
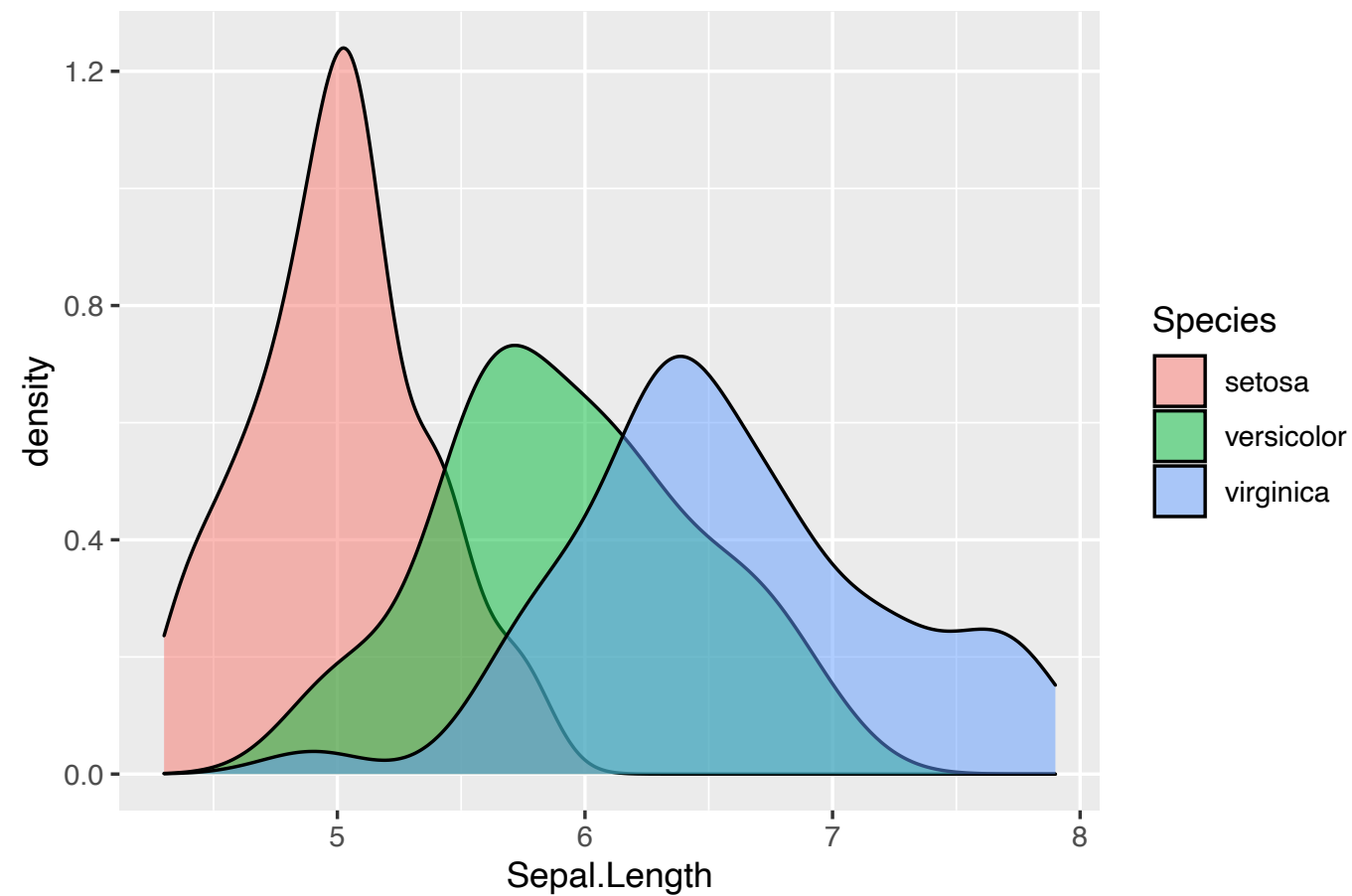

+theme_classic()

```r
ggplot(data = iris, aes(x = Sepal.Length, fill=Species)) +
  geom_histogram(bins=15) + facet_wrap(~Species,ncol=1) +
  theme_classic() + theme(aspect.ratio = 0.5, legend.position = "none")
```
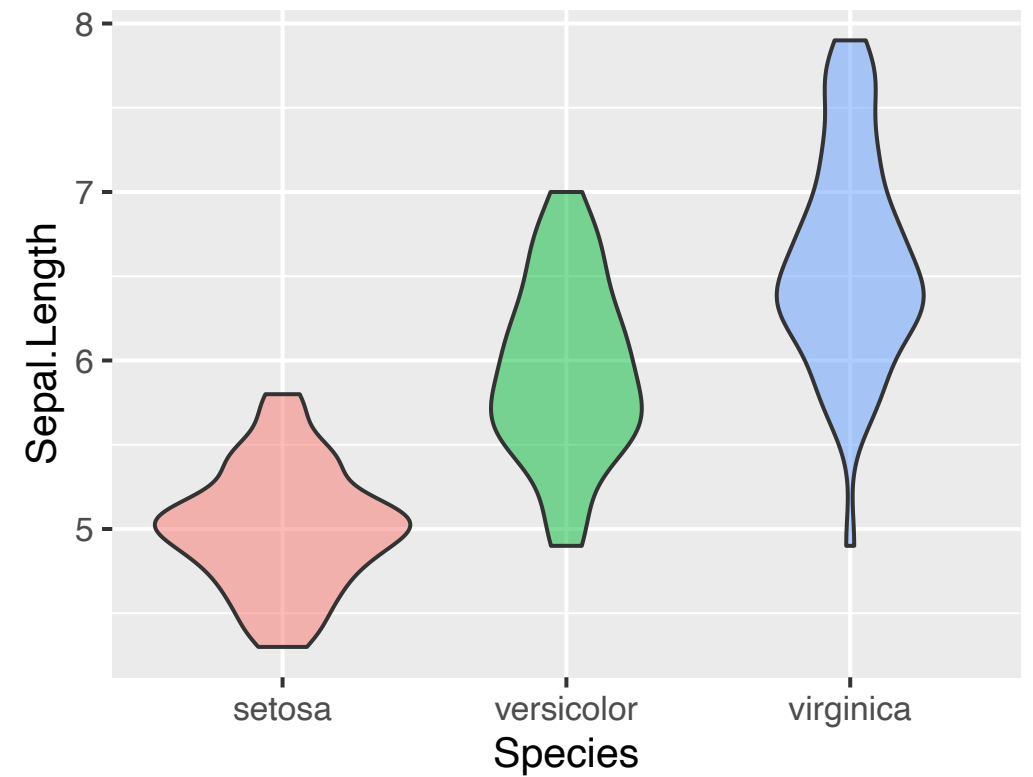
"Geom" tour: Density and violin plots
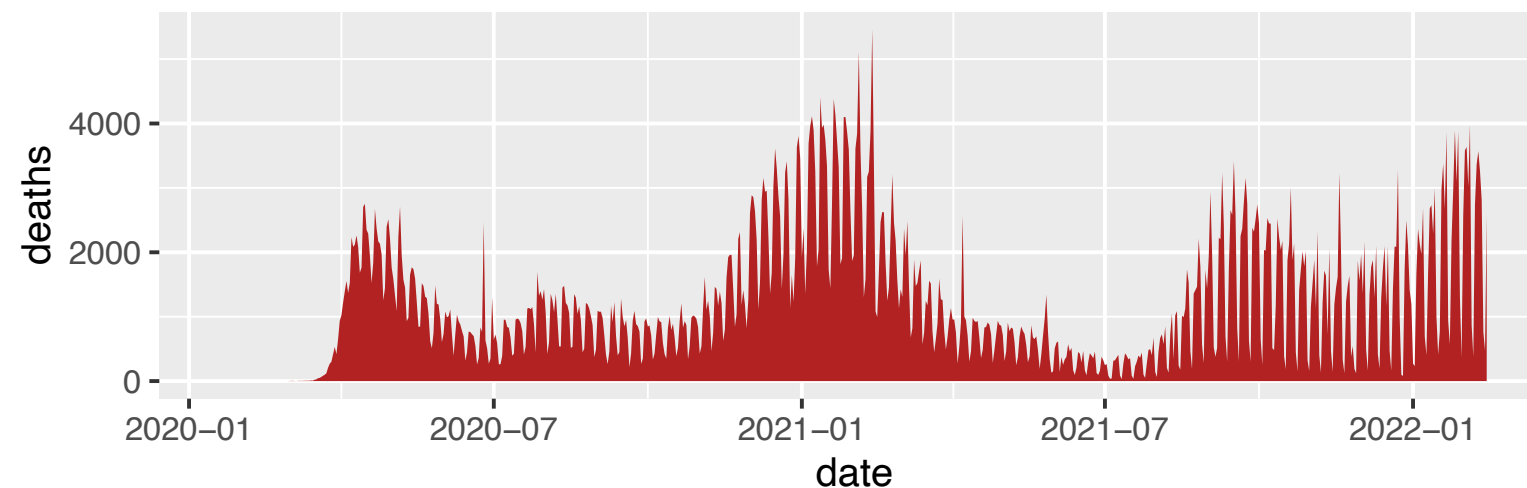
"Geom" tour: Scatter and 2d density
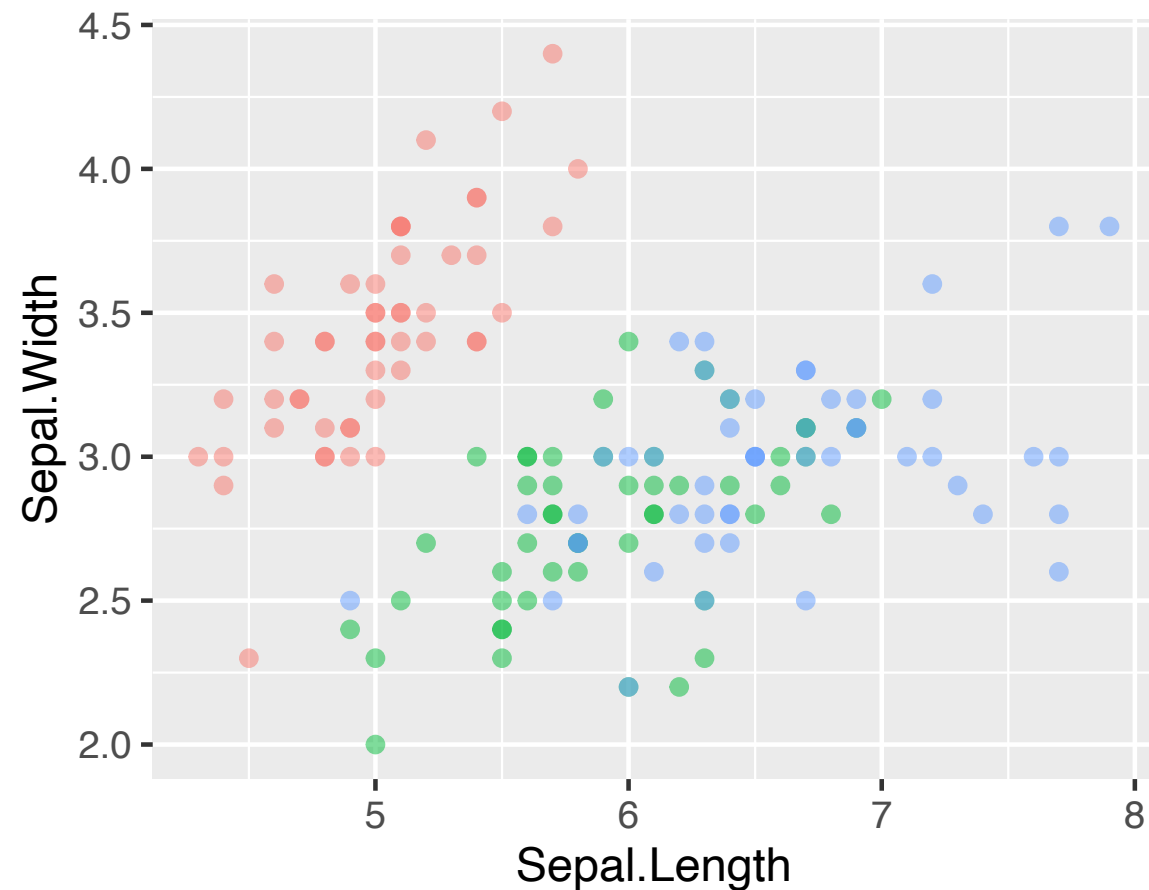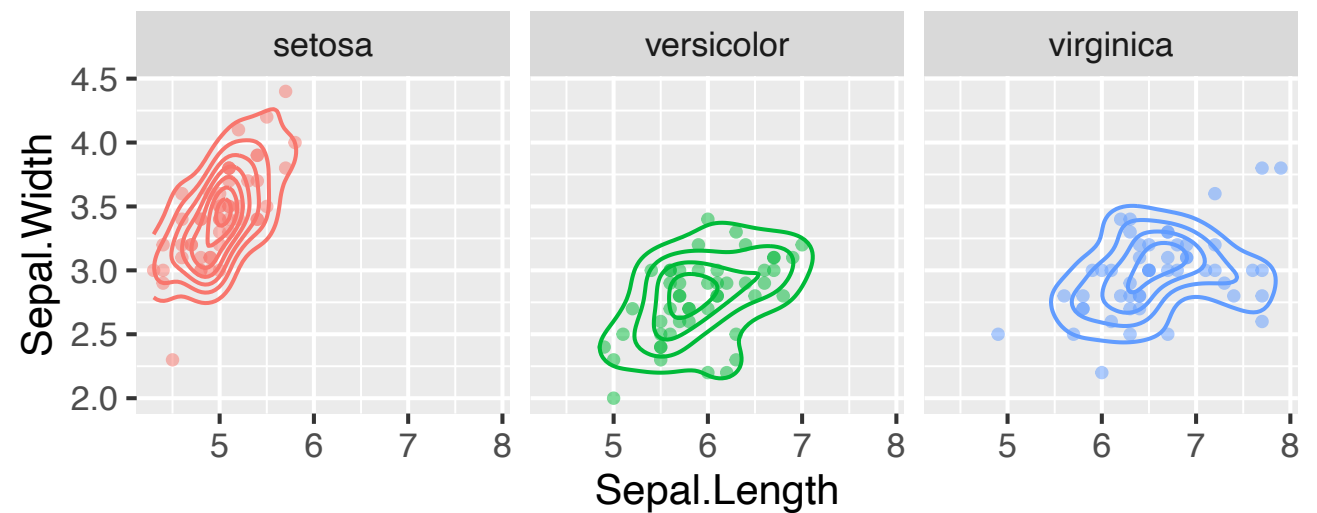
"Geom" tour: Line and Area plots

```
ggplot(data = covid, aes(x = date, y = deaths)) +
  geom_line()
```
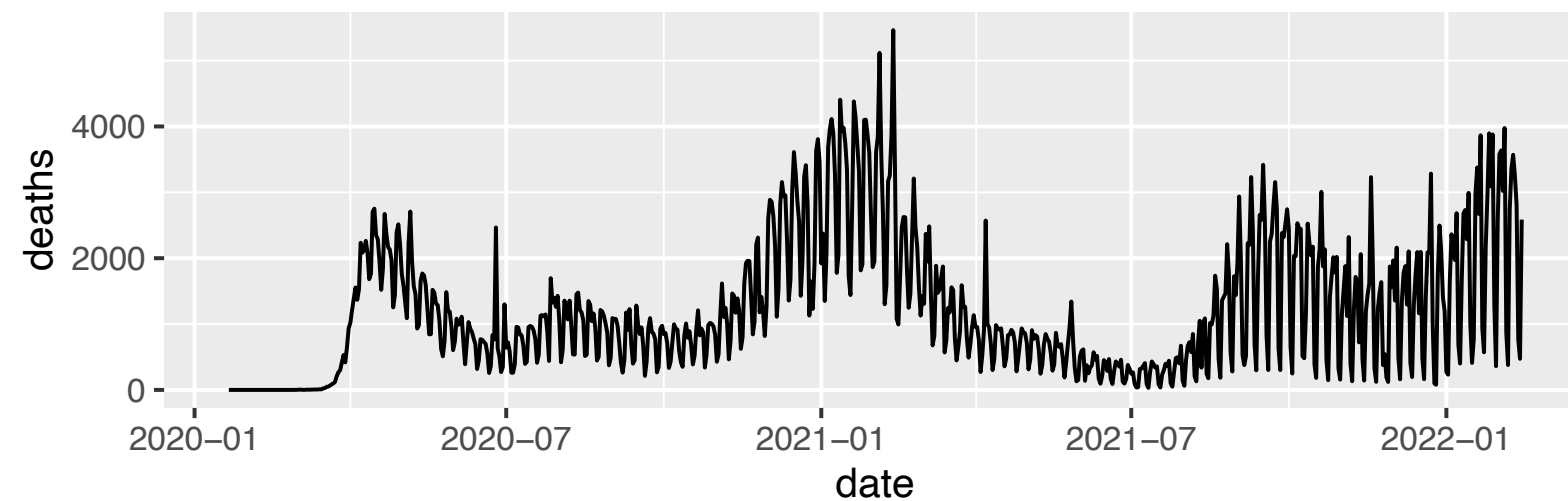


```
ggplot(data = covid, aes(x = date, y = deaths)) +
  geom_area(fill="firebrick")
```

"Geom" tour: Heat maps

```r
SE_states <- c("North Carolina","South Carolina",
               "Arkansas","Georgia","Tennessee",
               "Louisiana","Alabama","Florida")

us_states %>%
  filter(state %in% SE_states) %>%
  arrange(state) %>%
  ggplot(aes(x=date, y=state, fill=cases_avg_per_100k)) +
    geom_tile() +
    scale_fill_viridis(option = "C")
```