

GGPLOT2

```
install.packages (“tidyverse”)  
library (tidyverse)
```

<https://ggplot2.tidyverse.org/reference/>



Month – время отбора проб дрейссены

Day – день отбора проб

Lake – изученные озера

Site – место отбора проб

Length – длина раковины моллюсков (мм)

Infection – количество инфузорий, обнаруженных в каждом моллюске

Dreissena polymorpha

Дрейссена речная

Mastitsky, 2012

```
dr=read.table('dreisena.tab',header=T)
head(dr)
```

```
##   Month Day   Lake Site Length Infection
## 1  May   1 Batorino  S3   14.9        36
## 2  May   1 Batorino  S3   14.0        30
## 3  May   1 Batorino  S3   13.0       331
## 4  May   1 Batorino  S3   14.0       110
## 5  May   1 Batorino  S3   12.0         4
## 6  May   1 Batorino  S3   14.0       171
```

```
str(dr)
```

```
## 'data.frame':   476 obs. of  6 variables:
## $ Month      : Factor w/ 3 levels "July","May","September": 2 2 2 2 2 2 2 2 2 2 ...
## $ Day        : int  1 1 1 1 1 1 1 1 1 1 ...
## $ Lake       : Factor w/ 3 levels "Batorino","Myastro",...: 1 1 1 1 1 1 1 1 1 1 ...
## $ Site       : Factor w/ 9 levels "S1","S2","S3",...: 3 3 3 3 3 3 3 3 3 3 ...
## $ Length     : num  14.9 14 13 14 12 14 12 19 16.5 18 ...
## $ Infection: int  36 30 331 110 4 171 31 887 525 497 ...
```

Основа графика

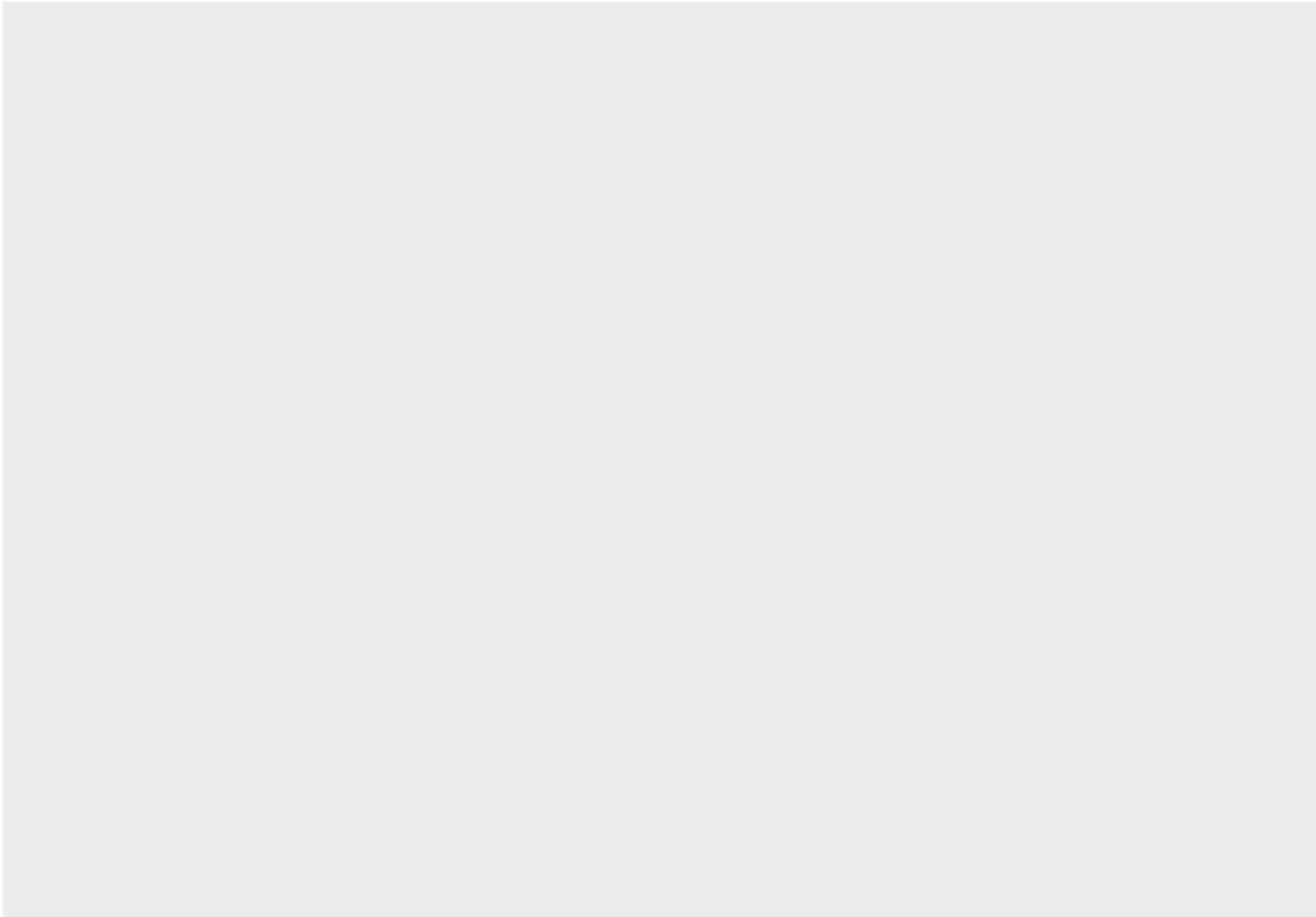
`ggplot()` – создаем новый график

`aes()` – присвоение эстетических атрибутов
геометрическим объектам

`ggsave()` – сохранение графика

Инициализация

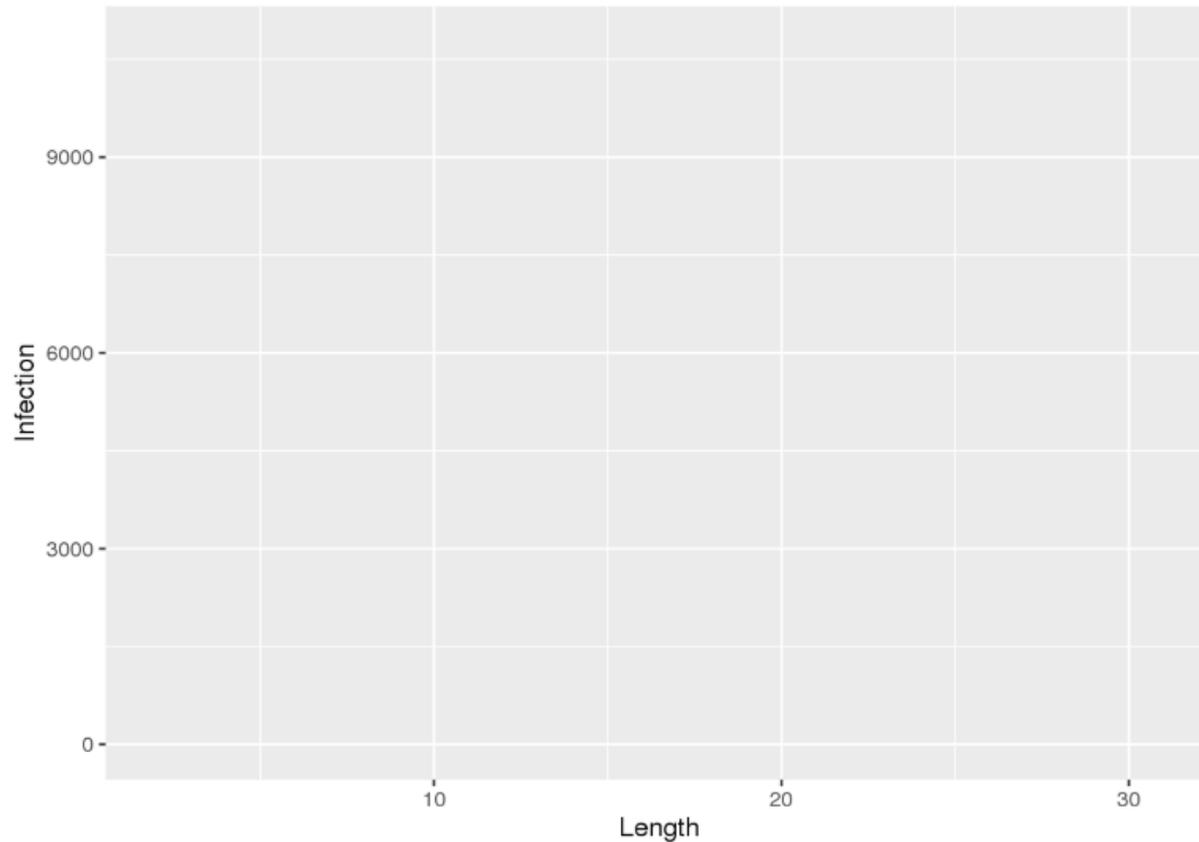
```
ggplot(data = dr)
```



Присвоение эстетических атрибутов

```
p = ggplot(data = dr)
```

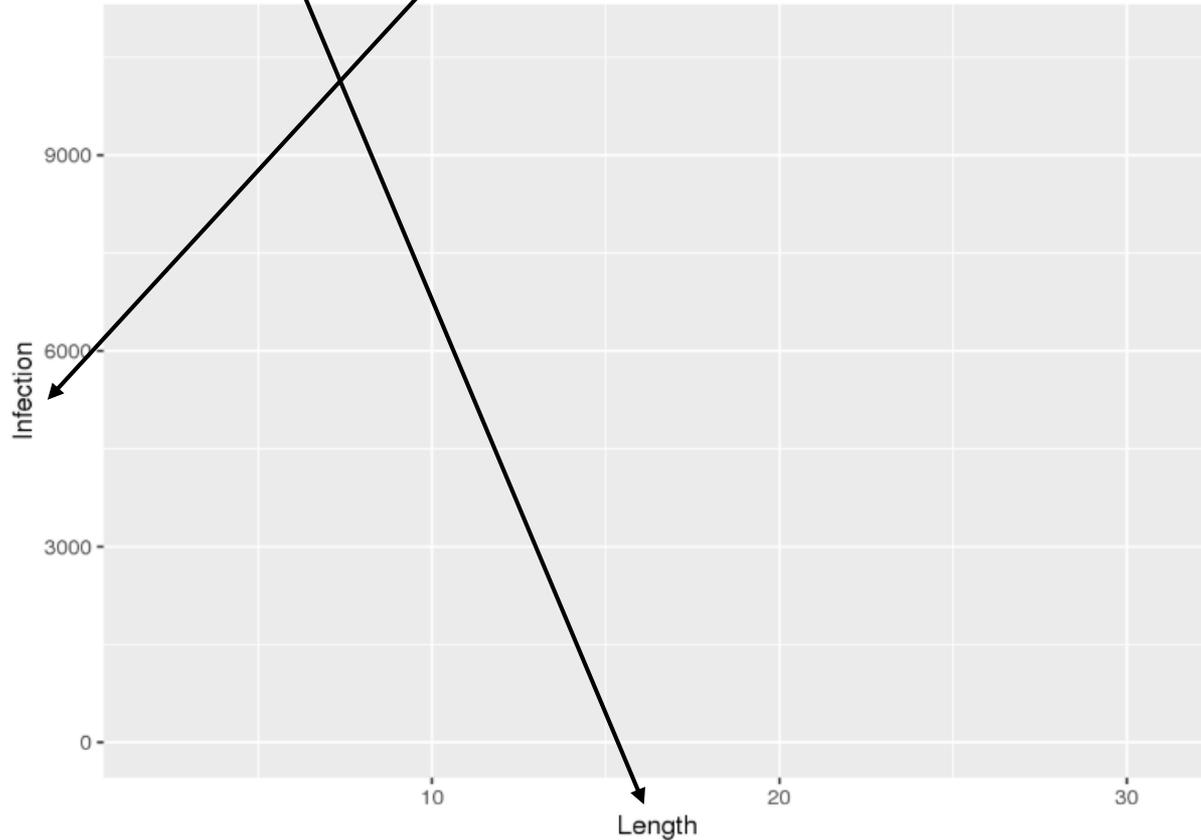
```
p + aes (Length, Infection)
```



Присвоение эстетических атрибутов

```
p = ggplot(data = dr)
```

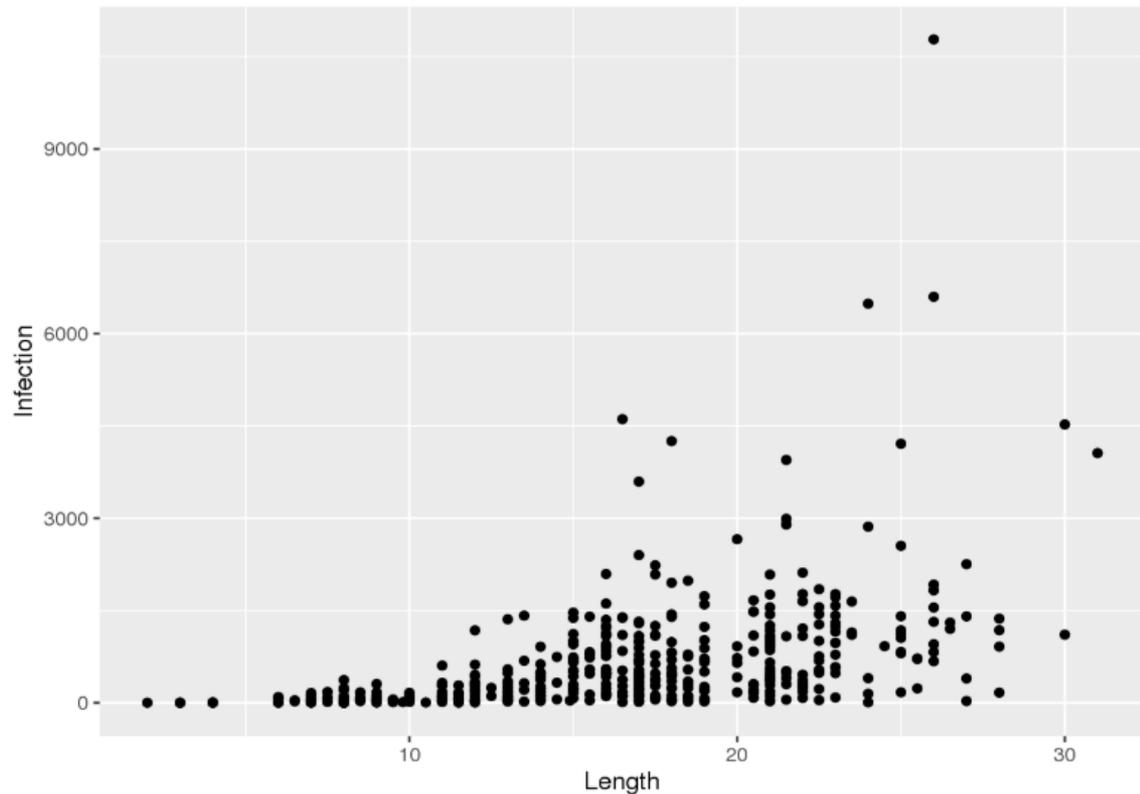
```
p + aes (Length, Infection)
```



Слой: geoms

Как хотим отобразить данные? Точками? Гистограммой? Ящик с «усами»? ...

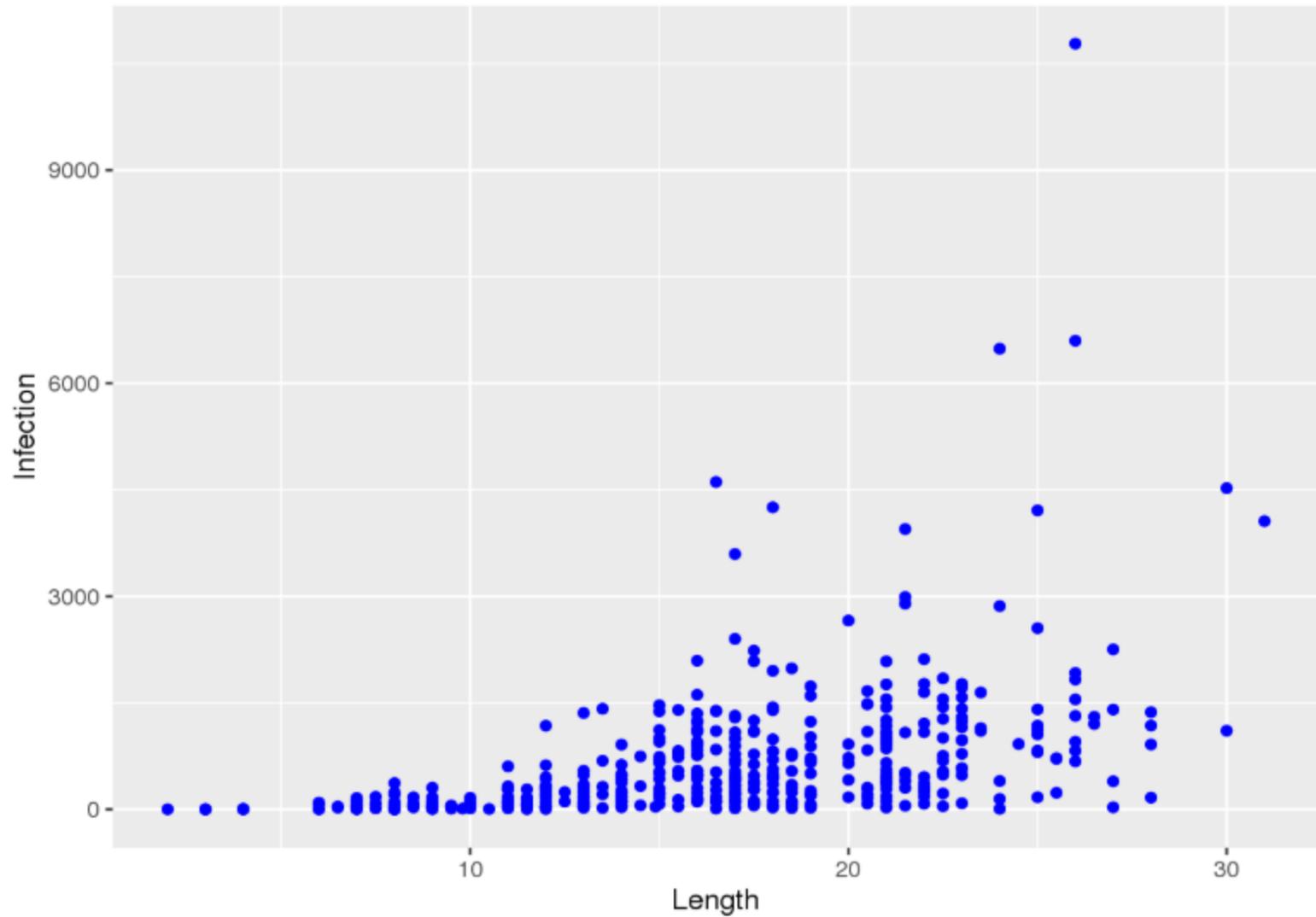
```
p = ggplot(data = dr)  
p + aes (Length, Infection) + geom_point()
```



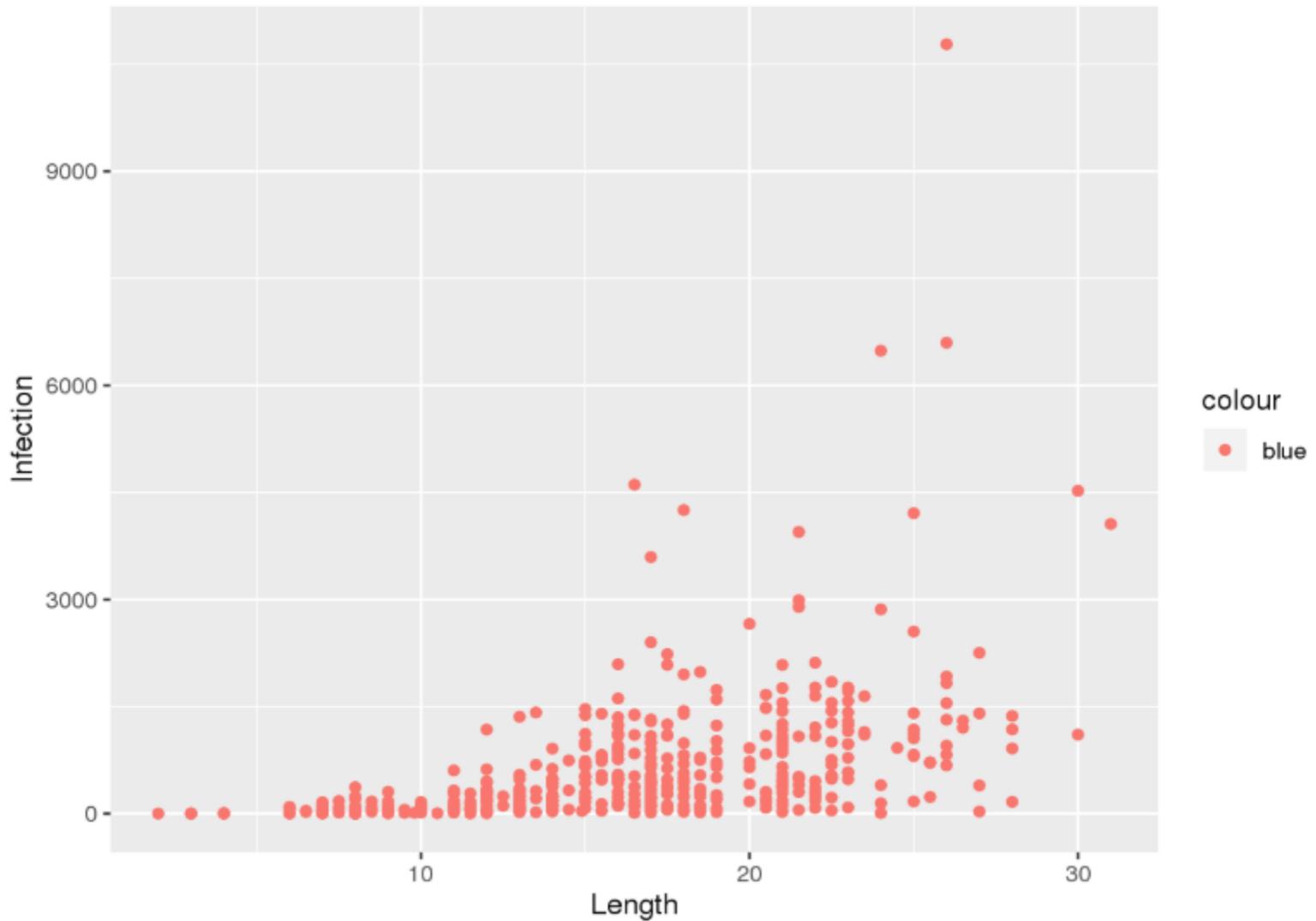
Переменные для aes() должны быть в
таблице с данными!

Хотим точки не черным цветом, а синим

```
p = ggplot(data = dr, aes (Length, Infection))  
p + geom_point(colour='blue')
```

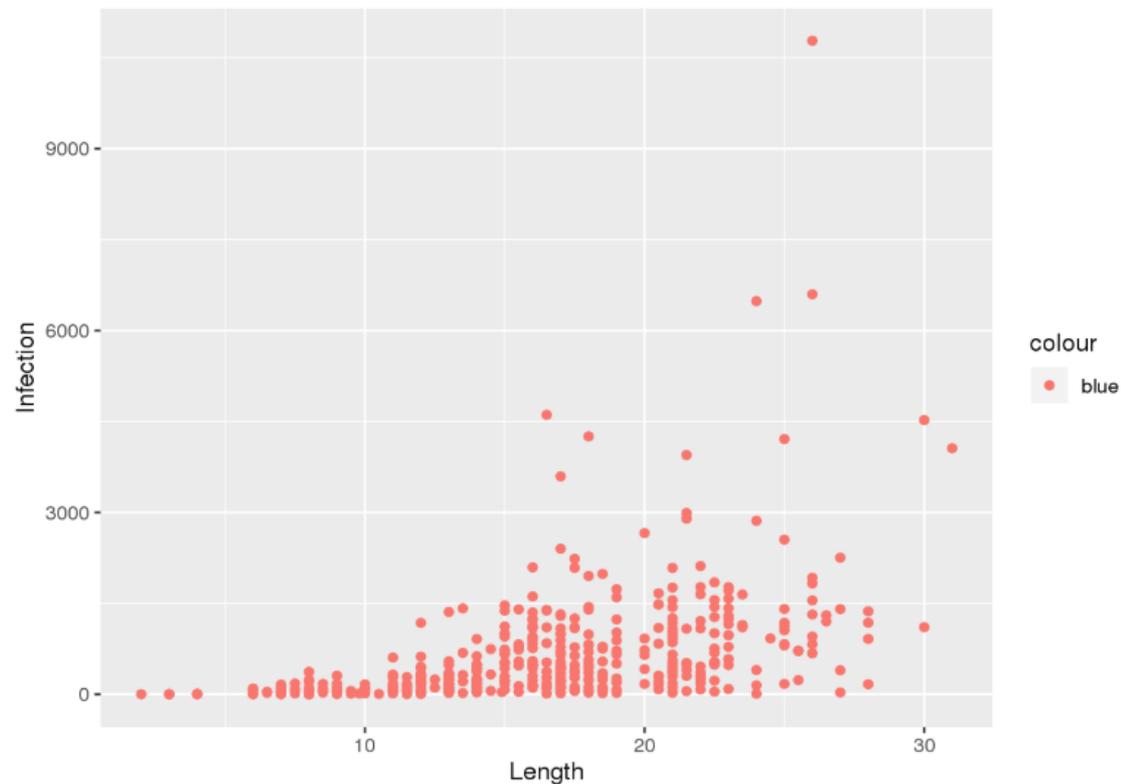


```
p = ggplot(data = dr, aes (Length, Infection))  
p + geom_point(aes(colour='blue'))
```



Создаст в таблице новую колонку с значением blue

```
p = ggplot(data = dr, aes (Length, Infection))  
p + geom_point(aes(colour='blue'))
```



Один и тот же результат!

```
p = ggplot (data = dr)  
p + aes (Length, Infection) + geom_point()
```

```
p = ggplot (data = dr, aes (Length, Infection))  
p + geom_point()
```

```
p = ggplot (data = dr)  
p + geom_point(aes (Length, Infection))
```

geom_point()

alpha – степень прозрачности цвета точек

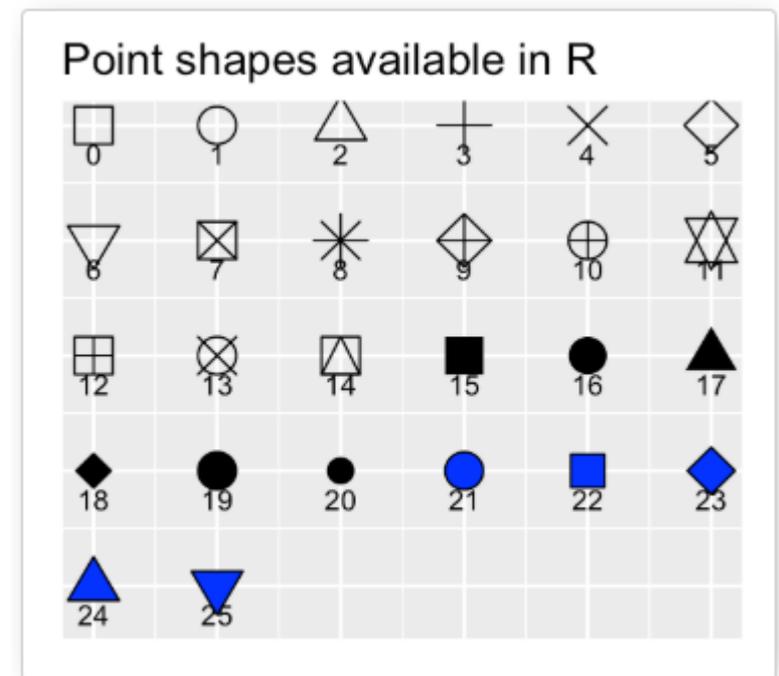
colour – цвет линий, окаймляющих точки

fill – цвет точек

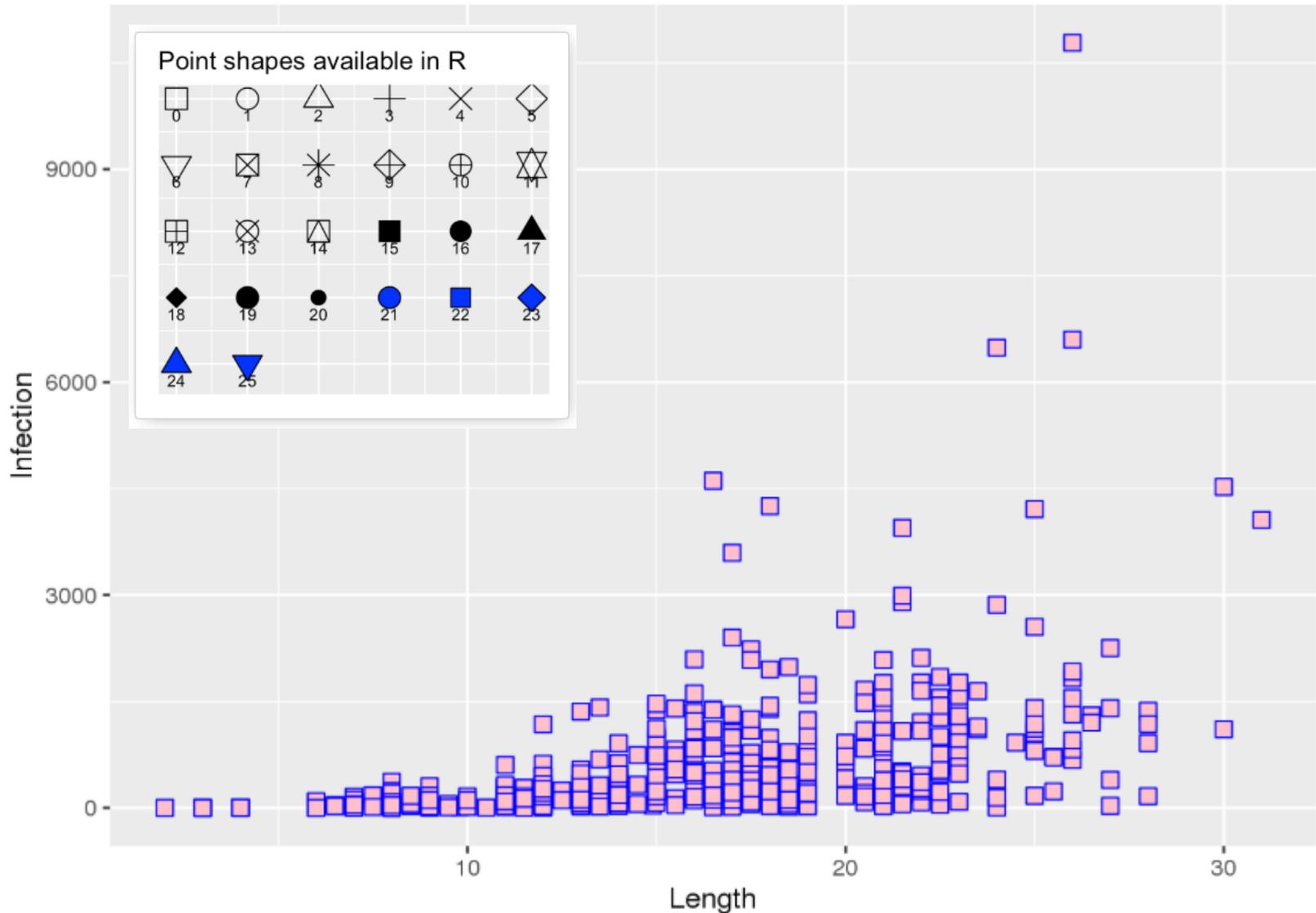
size – размер точек

shape – форма точек

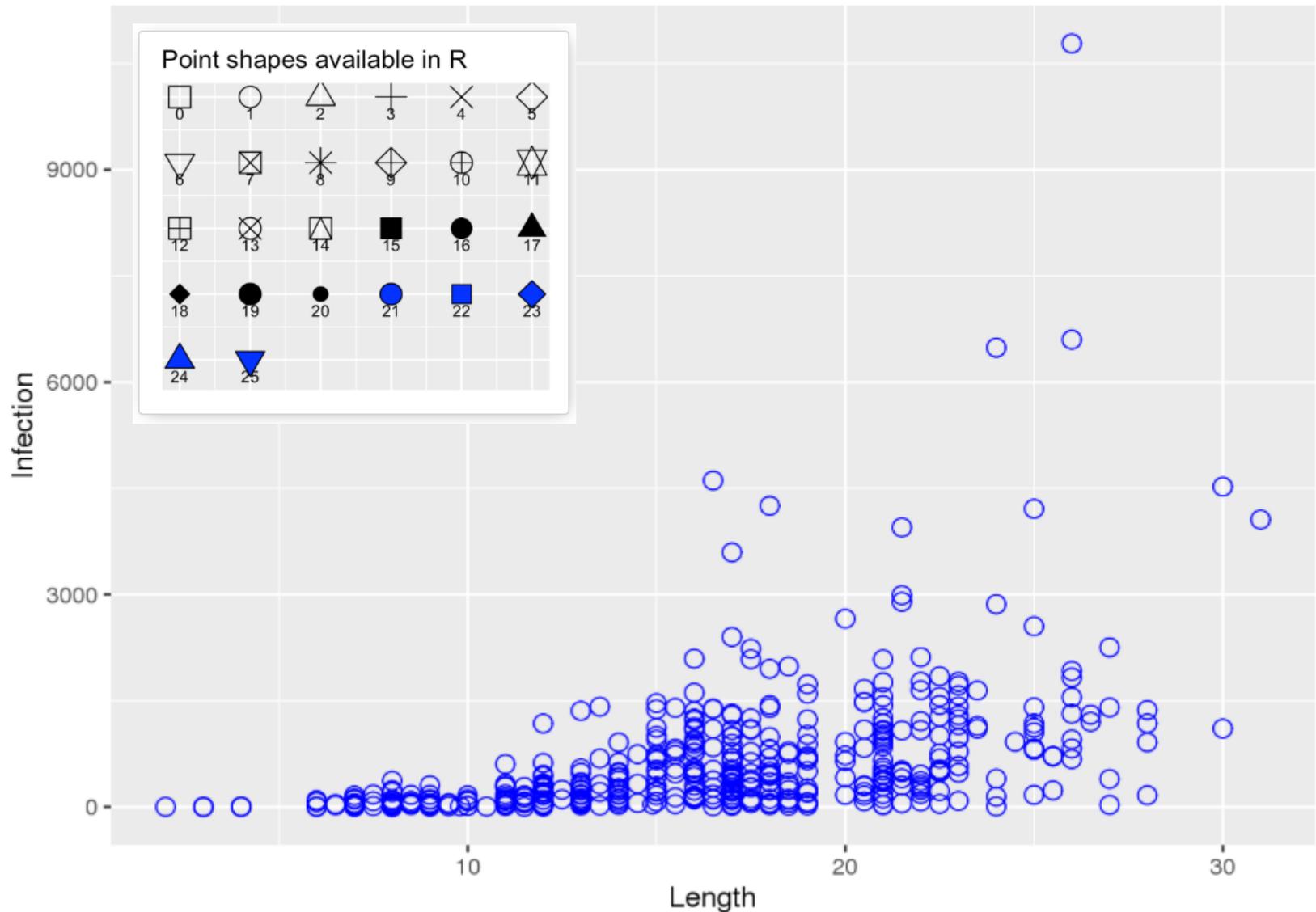
stroke – толщина линий, окаймляющих точки



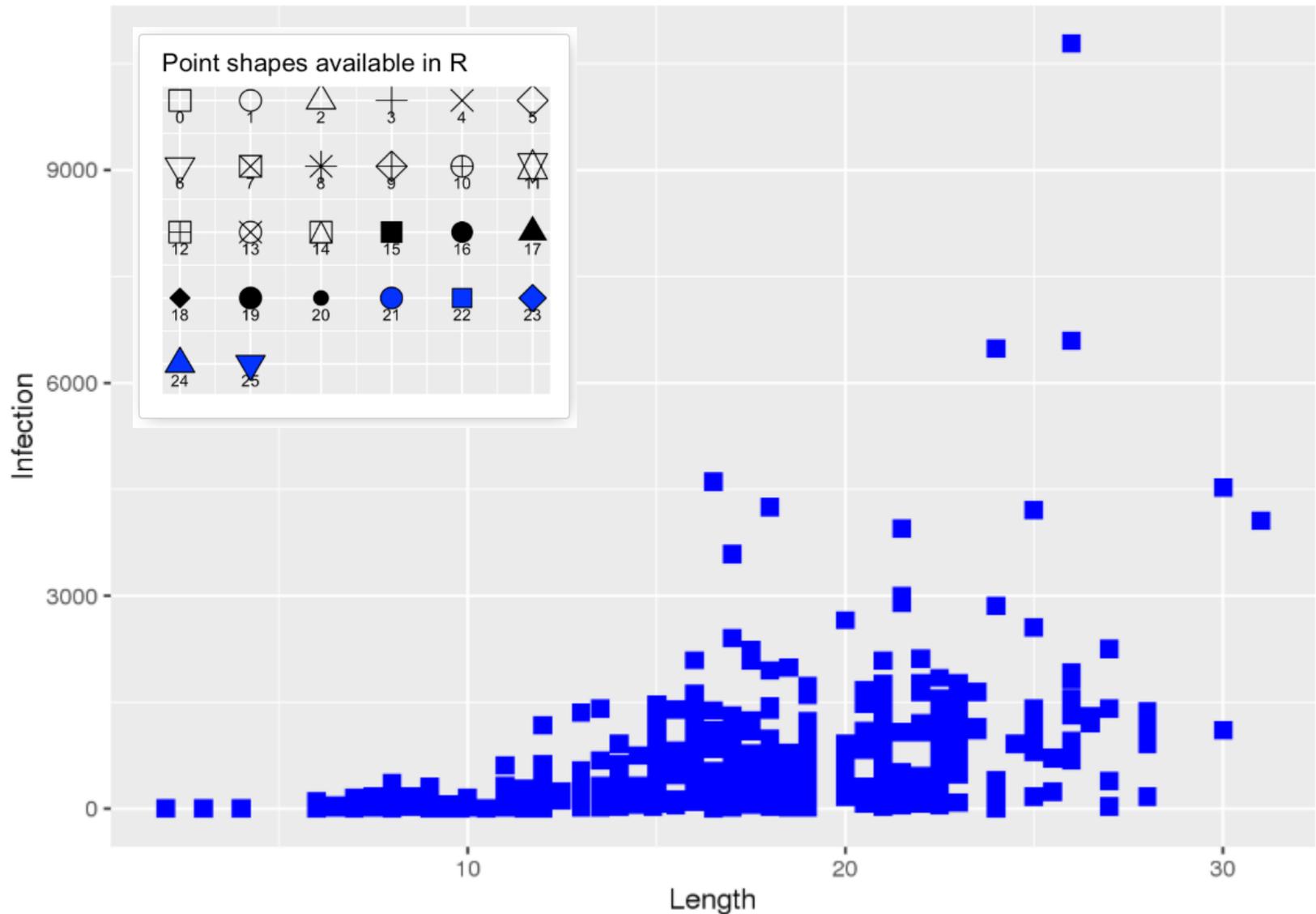
```
p = ggplot(data = dr, aes (Length, Infection))
p + geom_point(shape=22,size=3,fill='pink',colour='blue')
```



```
p = ggplot(data = dr, aes (Length, Infection))  
p + geom_point(shape=1,size=3,fill='pink',colour='blue')
```

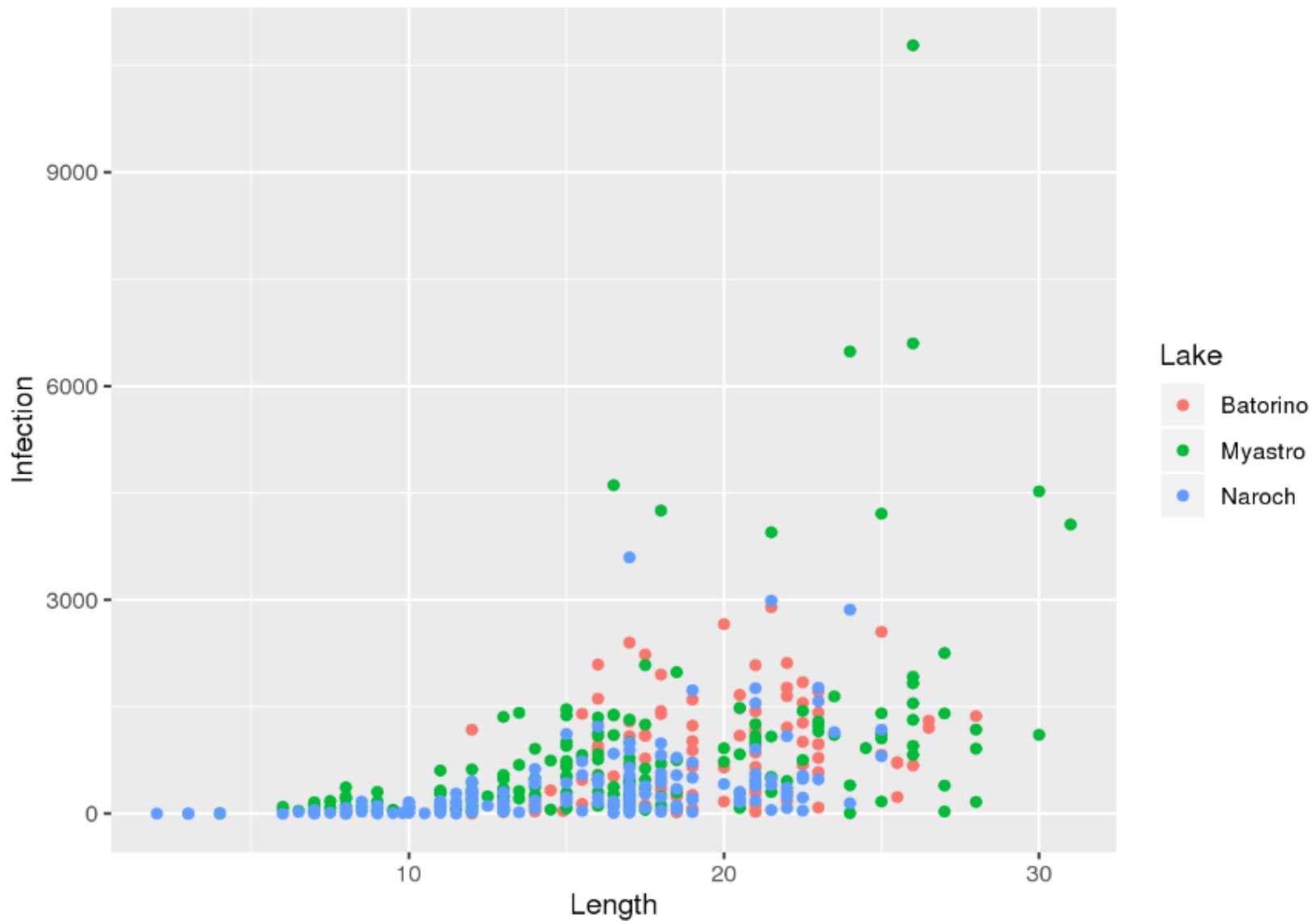


```
p = ggplot(data = dr, aes (Length, Infection))  
p + geom_point(shape=15, size=3, fill='pink', colour='blue')
```

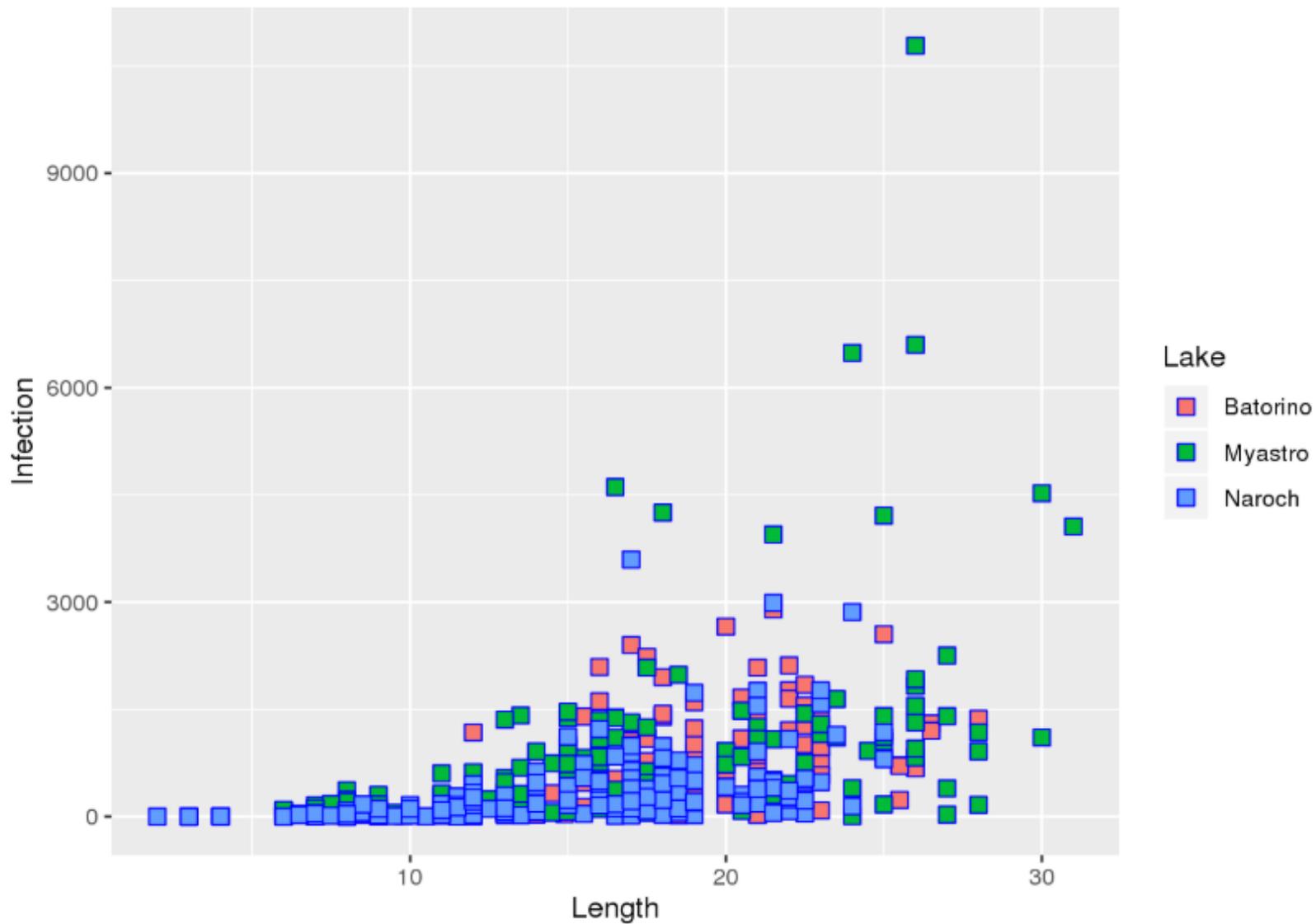


2D -> "3D"

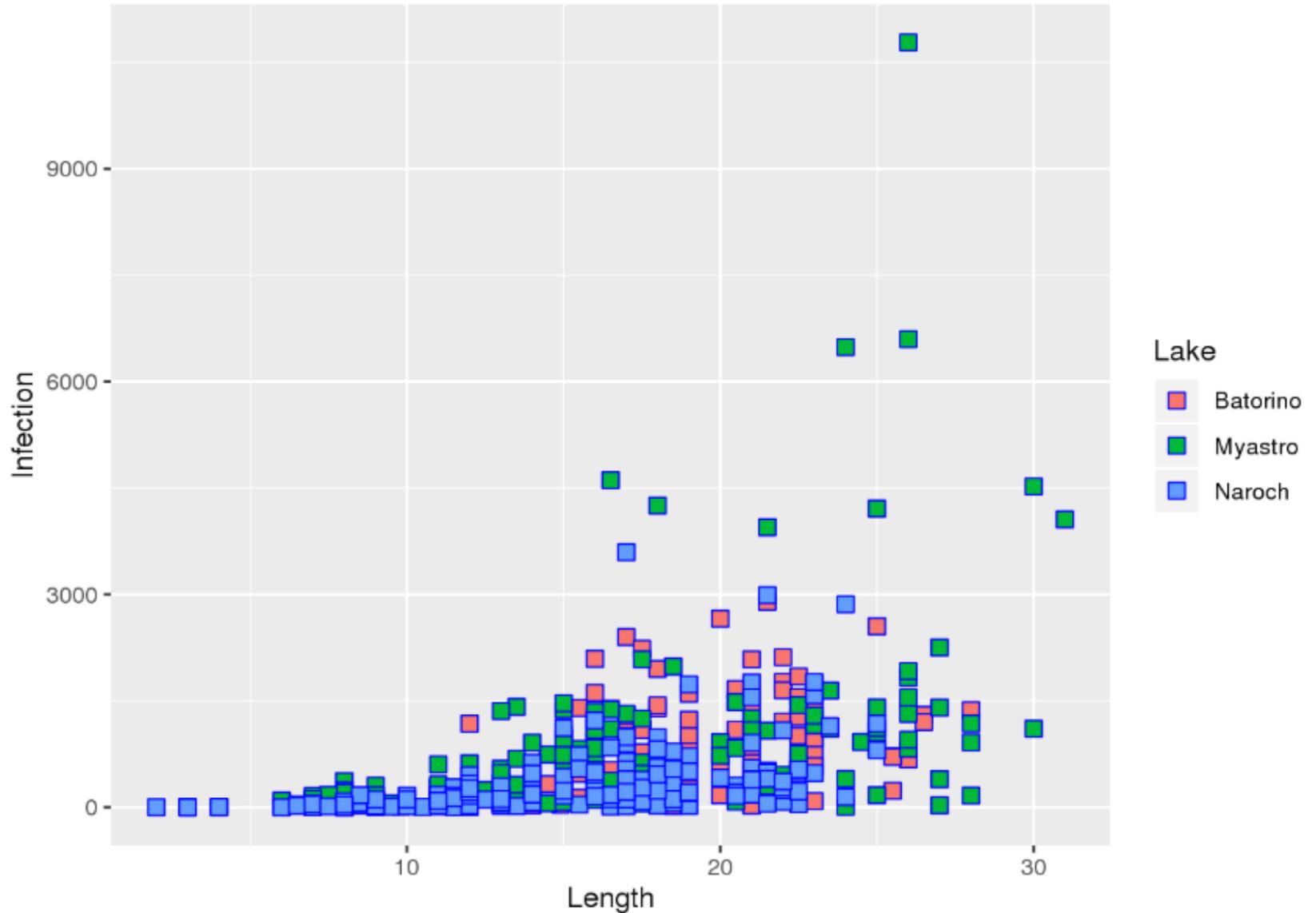
```
p = ggplot (data = dr, aes (Length, Infection, colour=Lake))  
p + geom_point()
```



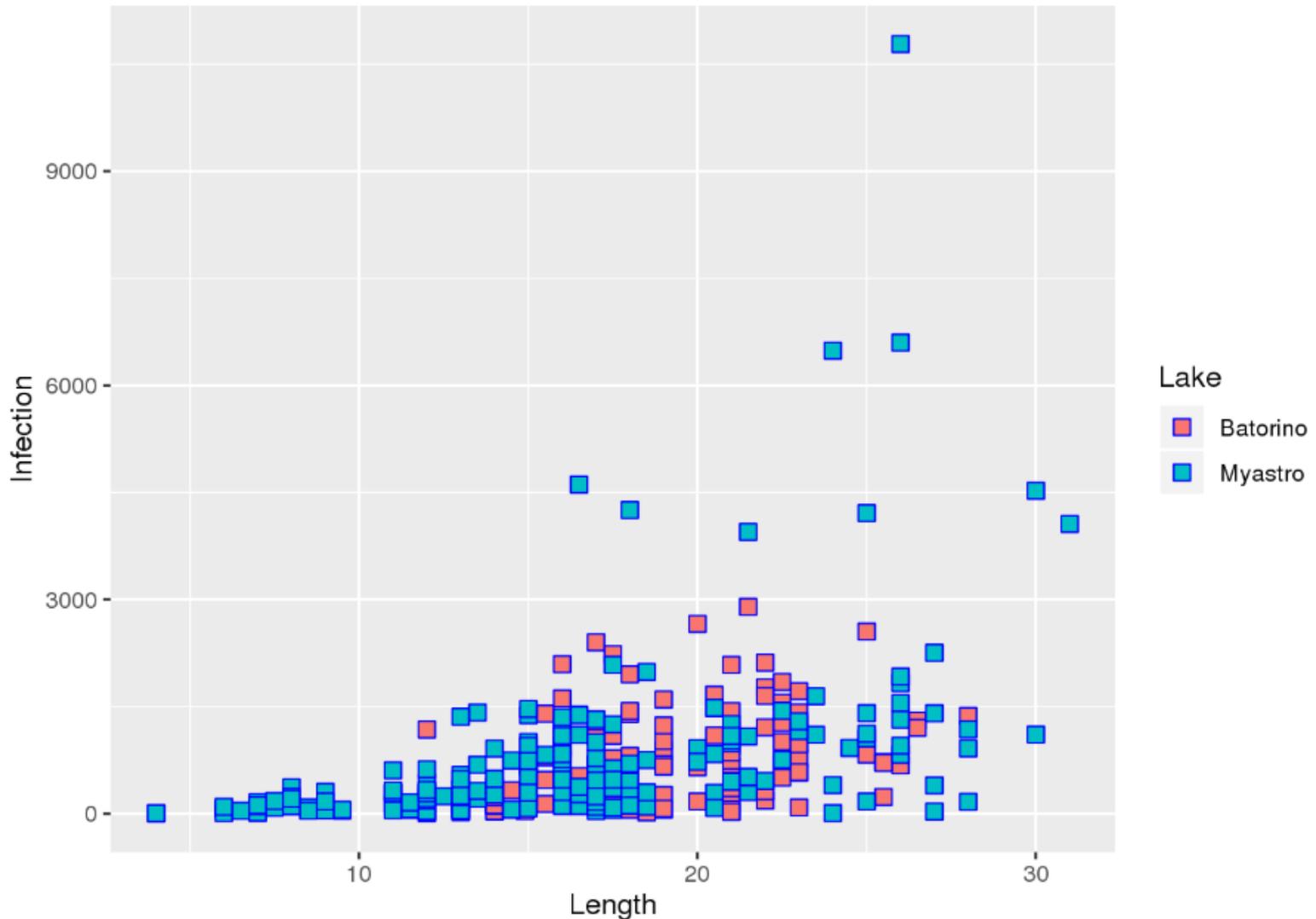
```
p = ggplot(data = dr, aes (Length, Infection,fill=Lake))  
p + geom_point(shape=22,size=3,colour='blue')
```



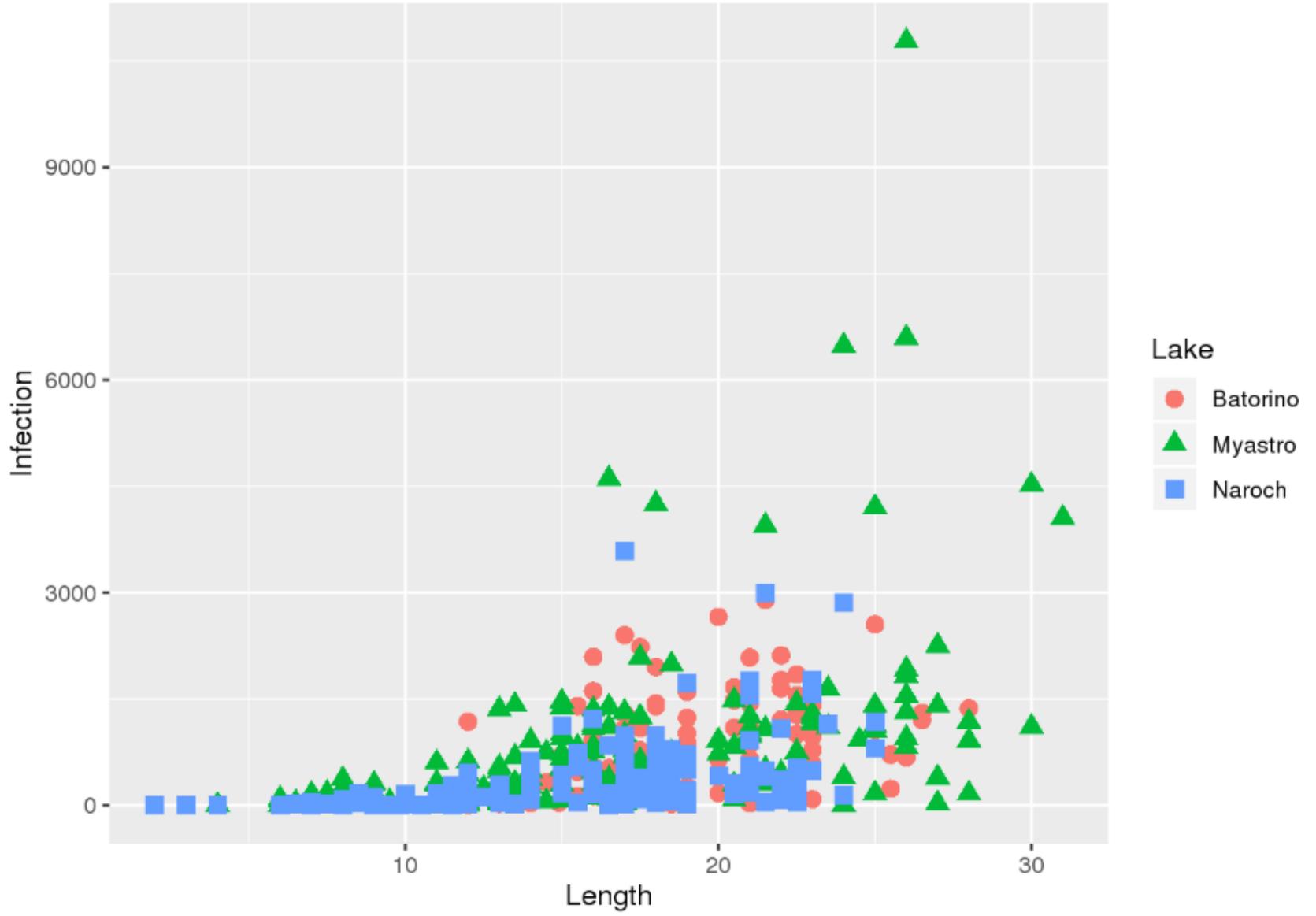
```
p = ggplot(data = dr, aes (Length, Infection))  
p + geom_point(aes(fill=Lake),shape=22,size=3,colour='blue')
```



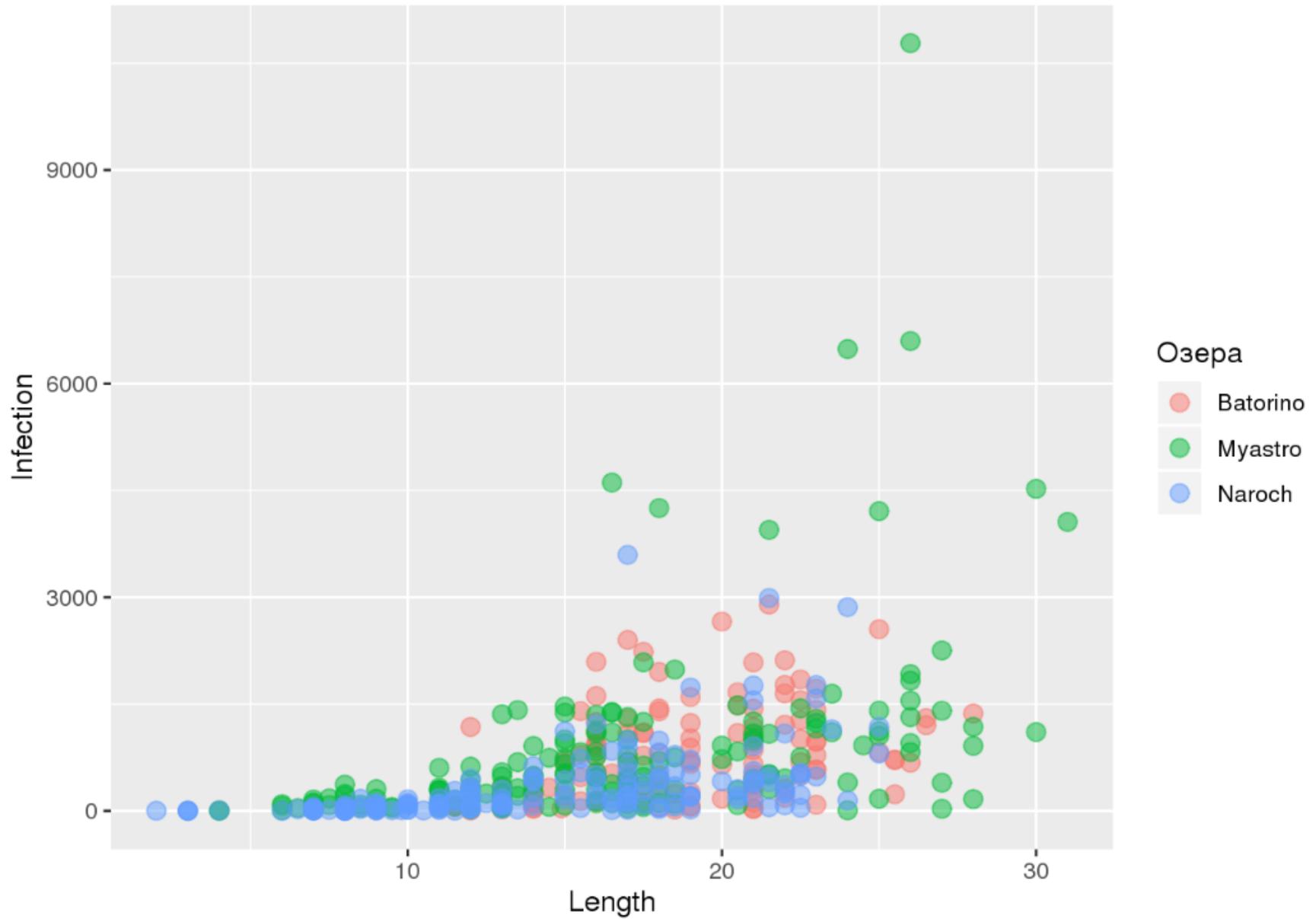
```
p = ggplot(data = filter(dr, Lake %in% c('Batorino', 'Myastro')),  
  aes (Length, Infection))  
p + geom_point(aes(fill=Lake), shape=22, size=3, colour='blue')
```



```
p = ggplot(data = dr, aes (Length, Infection))
p + geom_point(aes(shape=Lake,colour=Lake),size=3)
```



```
p = ggplot(data = dr, aes (Length, Infection,colour=Lake))  
p + geom_point(alpha=0.5,size=3) + labs(colour='Озера')
```

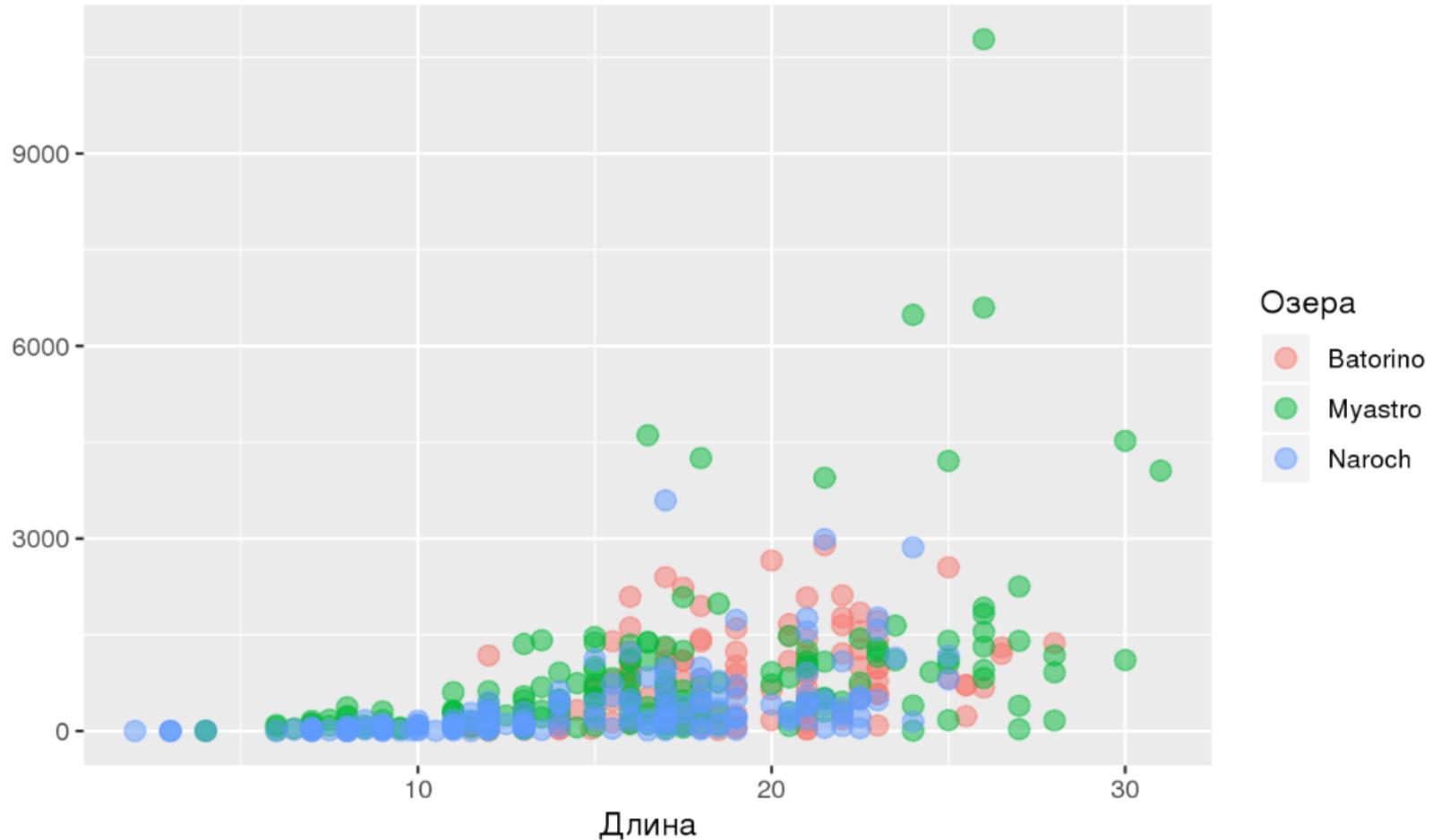


```
p = ggplot(data = dr, aes (Length, Infection,colour=Lake))
p + geom_point(alpha=0.5,size=3) +
  labs(colour='Озера',x='Длина',y=NULL,title='Dreissena polymorpha',
        subtitle = "Дрейссена речная",caption = "Mastitsky, 2012",tag = "A")
```

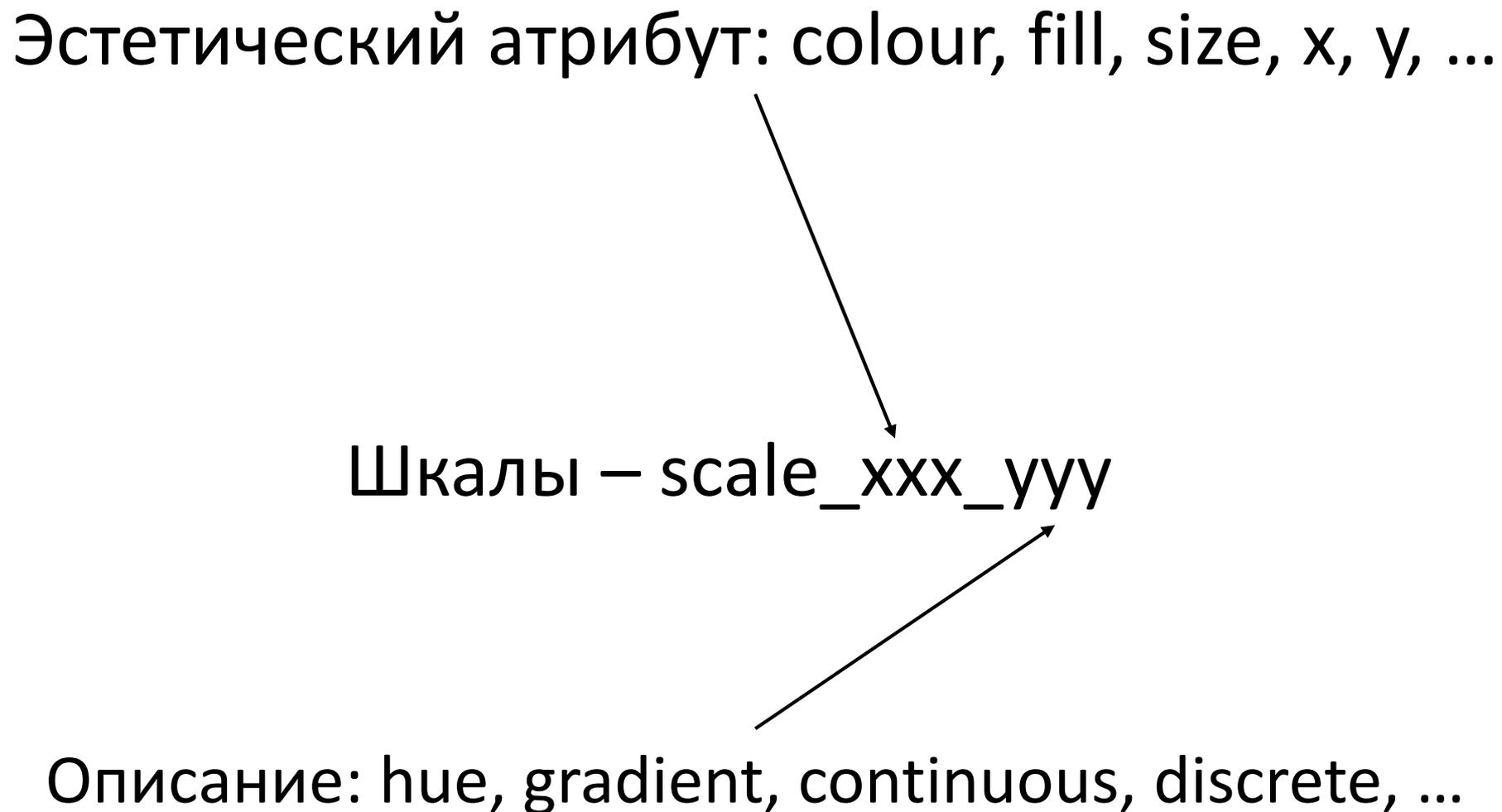
A

Dreissena polymorpha

Дрейссена речная



Эстетический атрибут: colour, fill, size, x, y, ...



Шкалы – scale_xxx_yyy

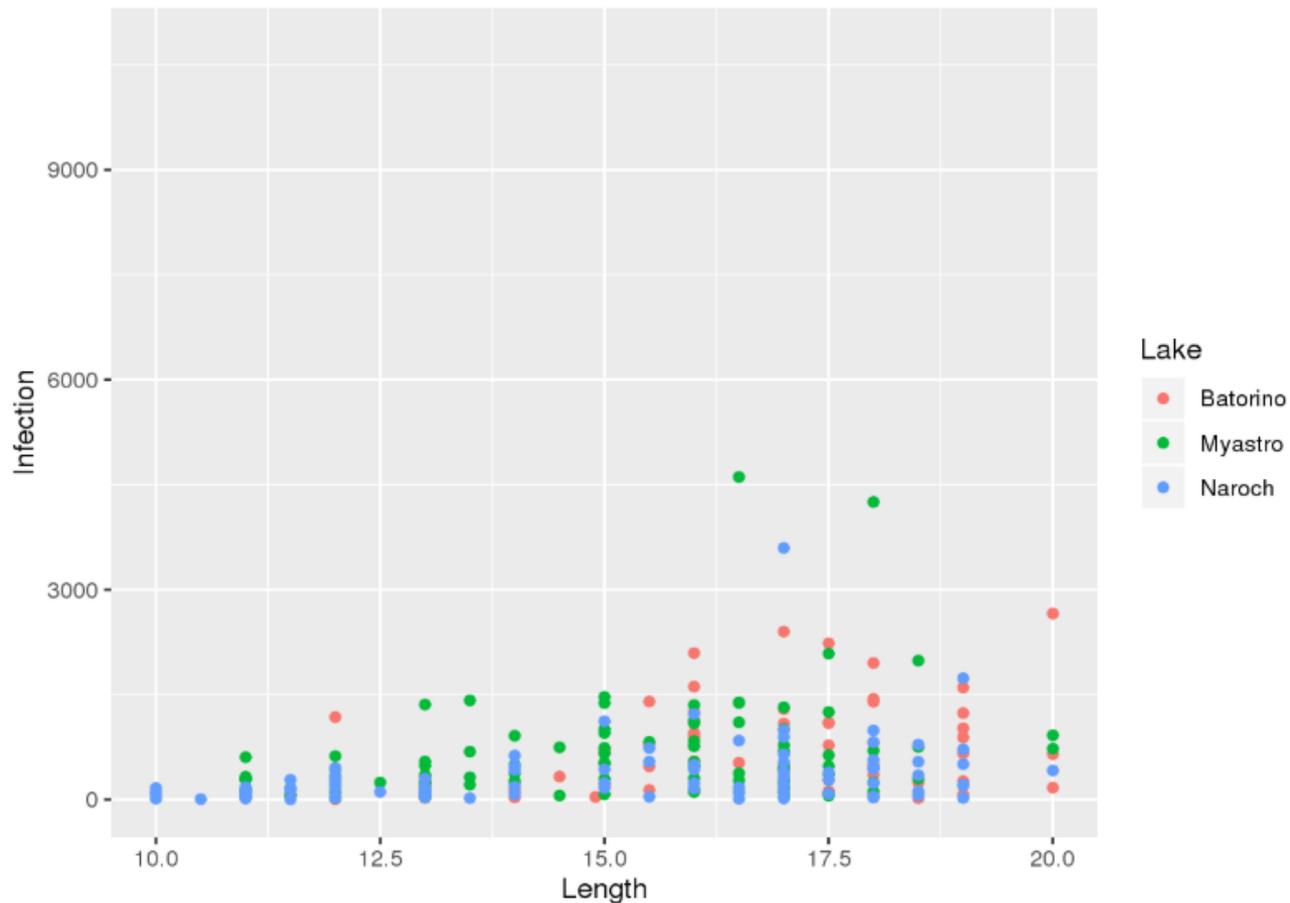
The diagram consists of three text elements arranged vertically. At the top is the text 'Эстетический атрибут: colour, fill, size, x, y, ...'. An arrow points from this text down to the middle text 'Шкалы – scale_xxx_yyy'. From the middle text, another arrow points down to the bottom text 'Описание: hue, gradient, continuous, discrete, ...'.

Описание: hue, gradient, continuous, discrete, ...

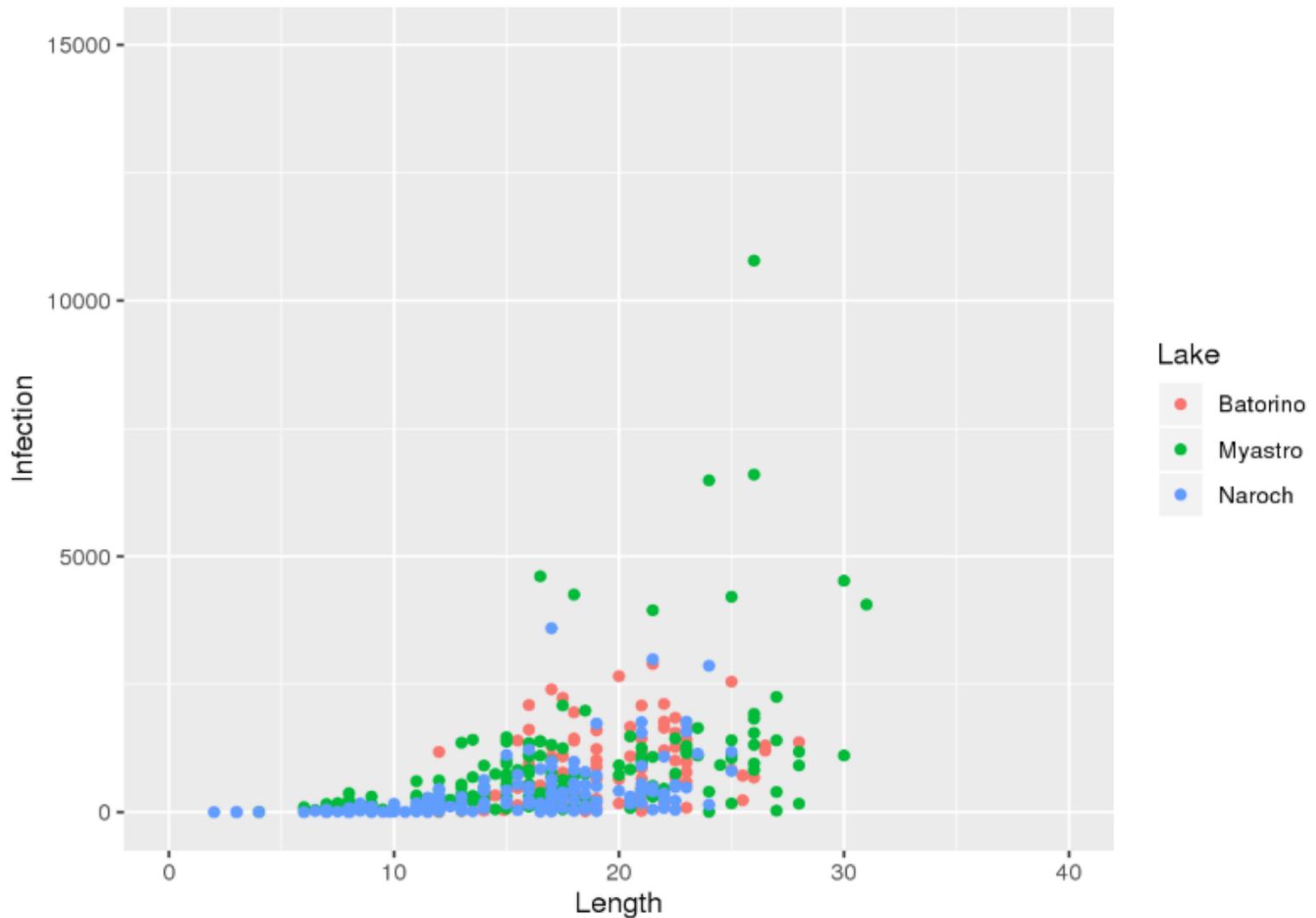
Положение вдоль оси X для количественных переменных

```
p = ggplot(data = dr, aes (Length, Infection, colour=Lake))  
p + geom_point() + scale_x_continuous(limits = c(10, 20))
```

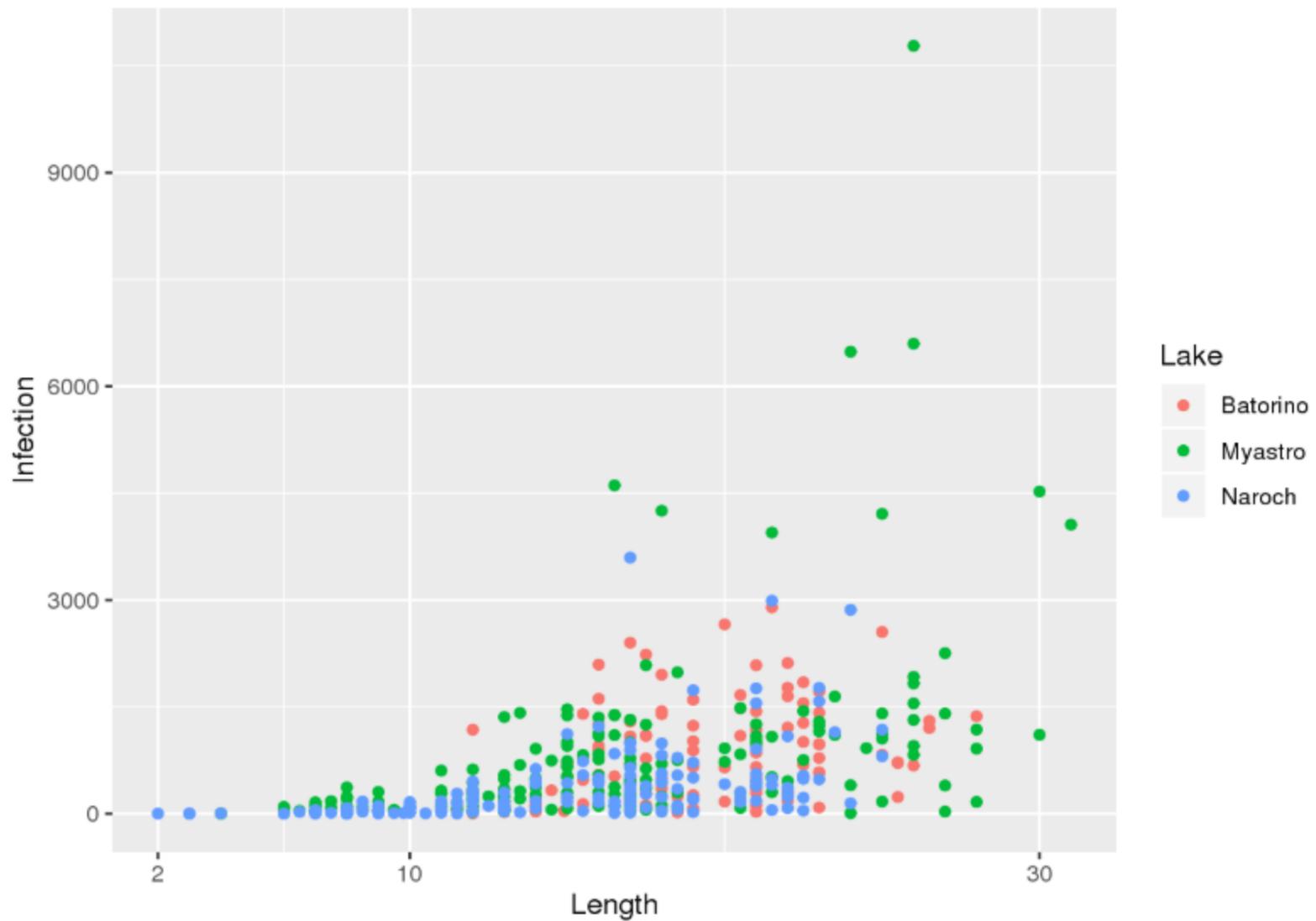
```
## Warning: Removed 198 rows containing missing values (geom_point).
```



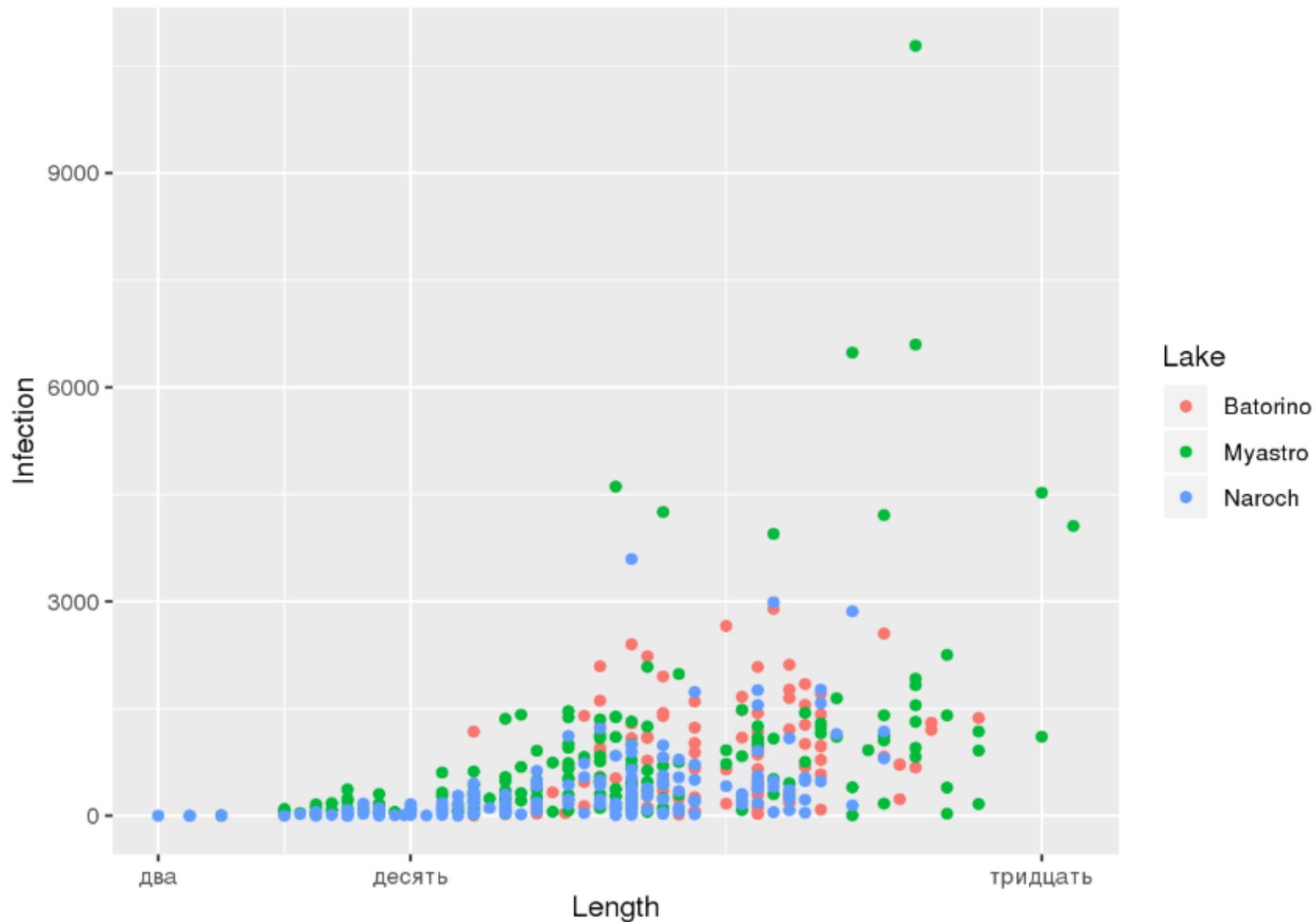
```
p = ggplot(data = dr, aes (Length, Infection,colour=Lake))  
p + geom_point() +  
  scale_x_continuous(limits = c(0,40)) +  
  scale_y_continuous(limits = c(0,15000))
```



```
p = ggplot(data = dr, aes (Length, Infection, colour=Lake))  
p + geom_point() + scale_x_continuous(breaks = c(2,10,30))
```



```
p = ggplot(data = dr, aes (Length, Infection, colour=Lake))  
p + geom_point() + scale_x_continuous(breaks = c(2,10,30),  
                                       label=c('два', 'десять', 'тридцать'))
```



Шкалы положения вдоль осей

`scale_x_continuous()`

`scale_y_continuous()`

`scale_x_log10()`

`scale_y_log10()`

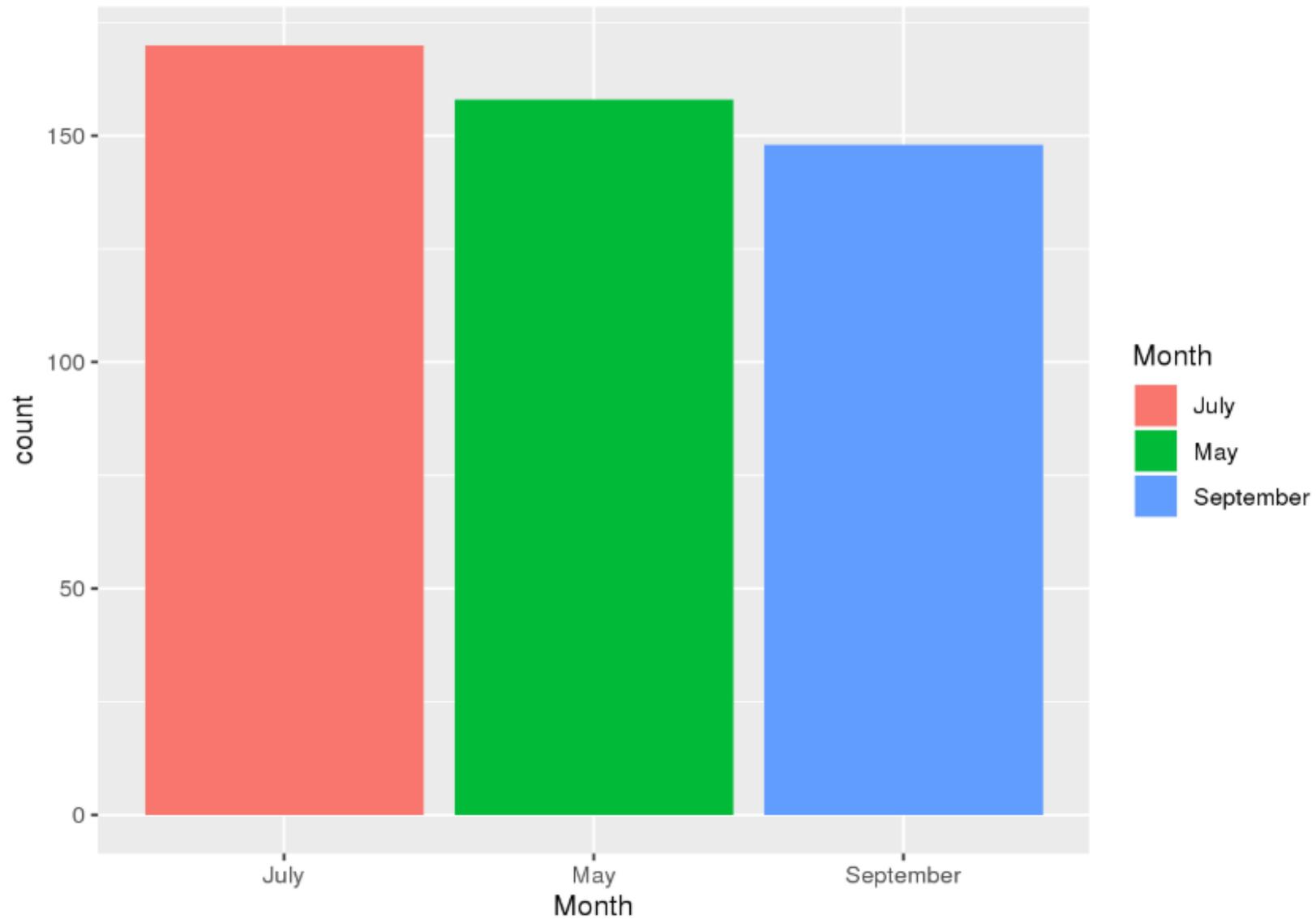
`scale_x_reverse()`

`scale_y_reverse()`

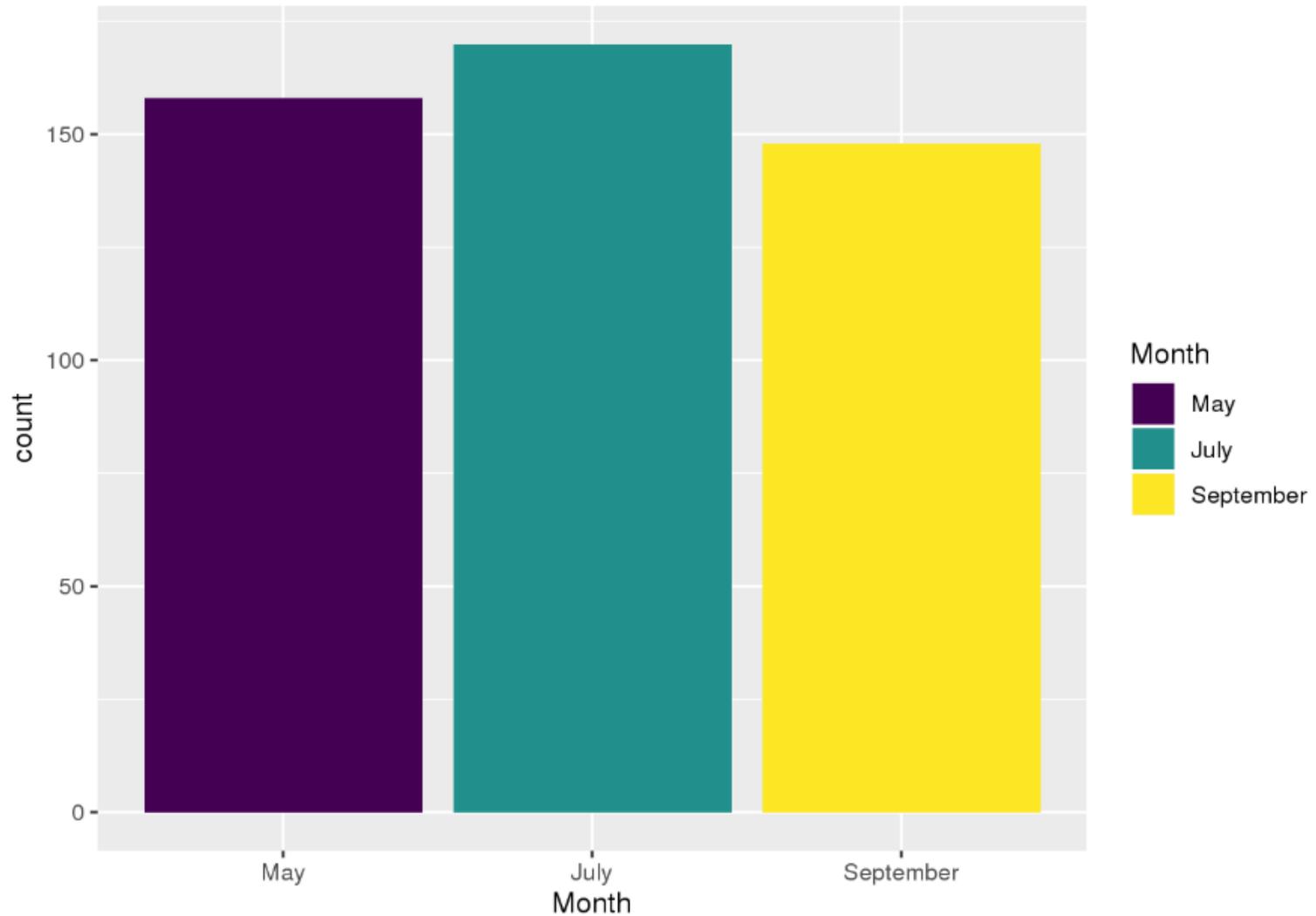
`scale_x_sqrt()`

`scale_y_sqrt()`

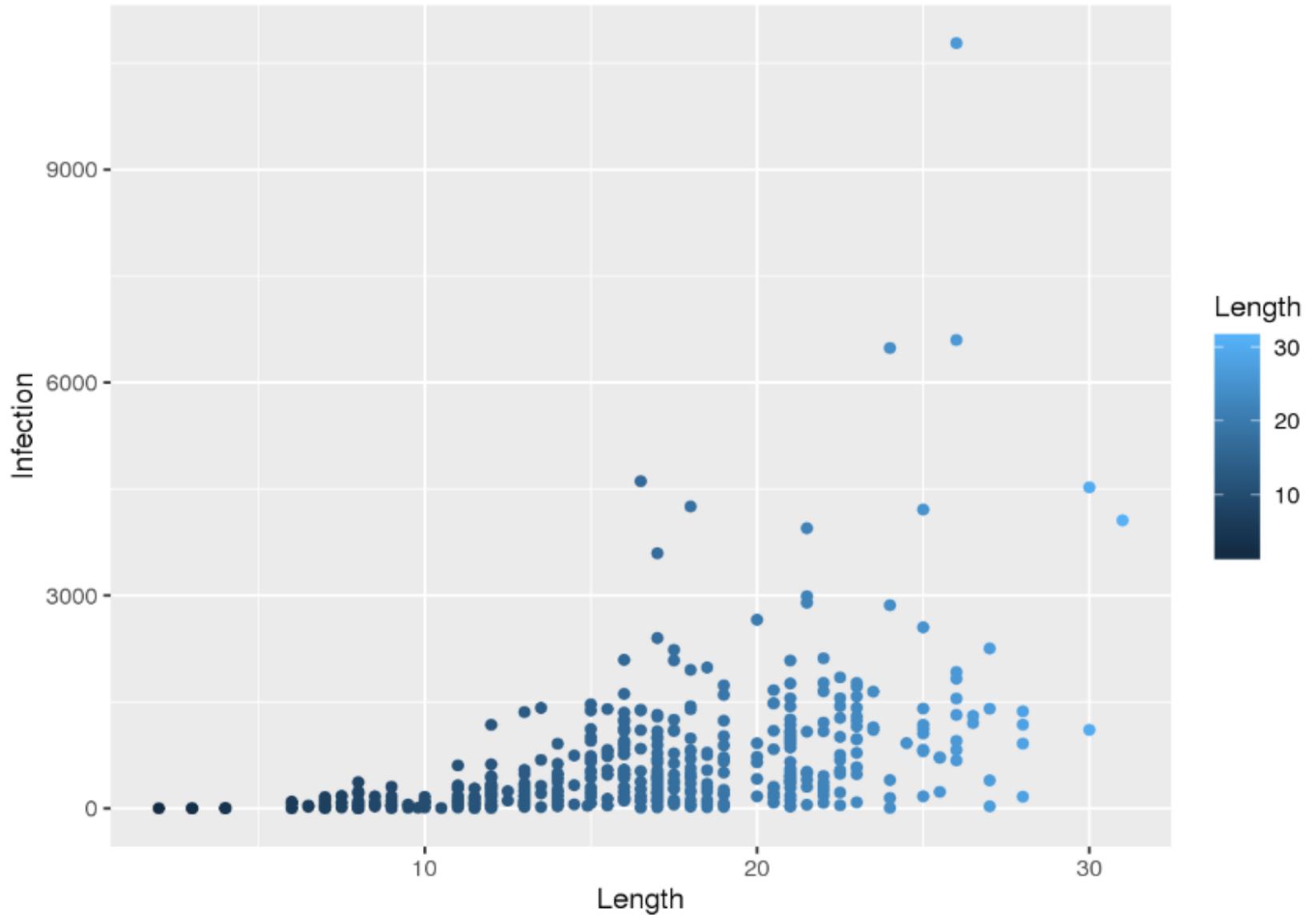
```
p = ggplot(data = dr, aes (Month, fill=Month))  
p + geom_bar()
```



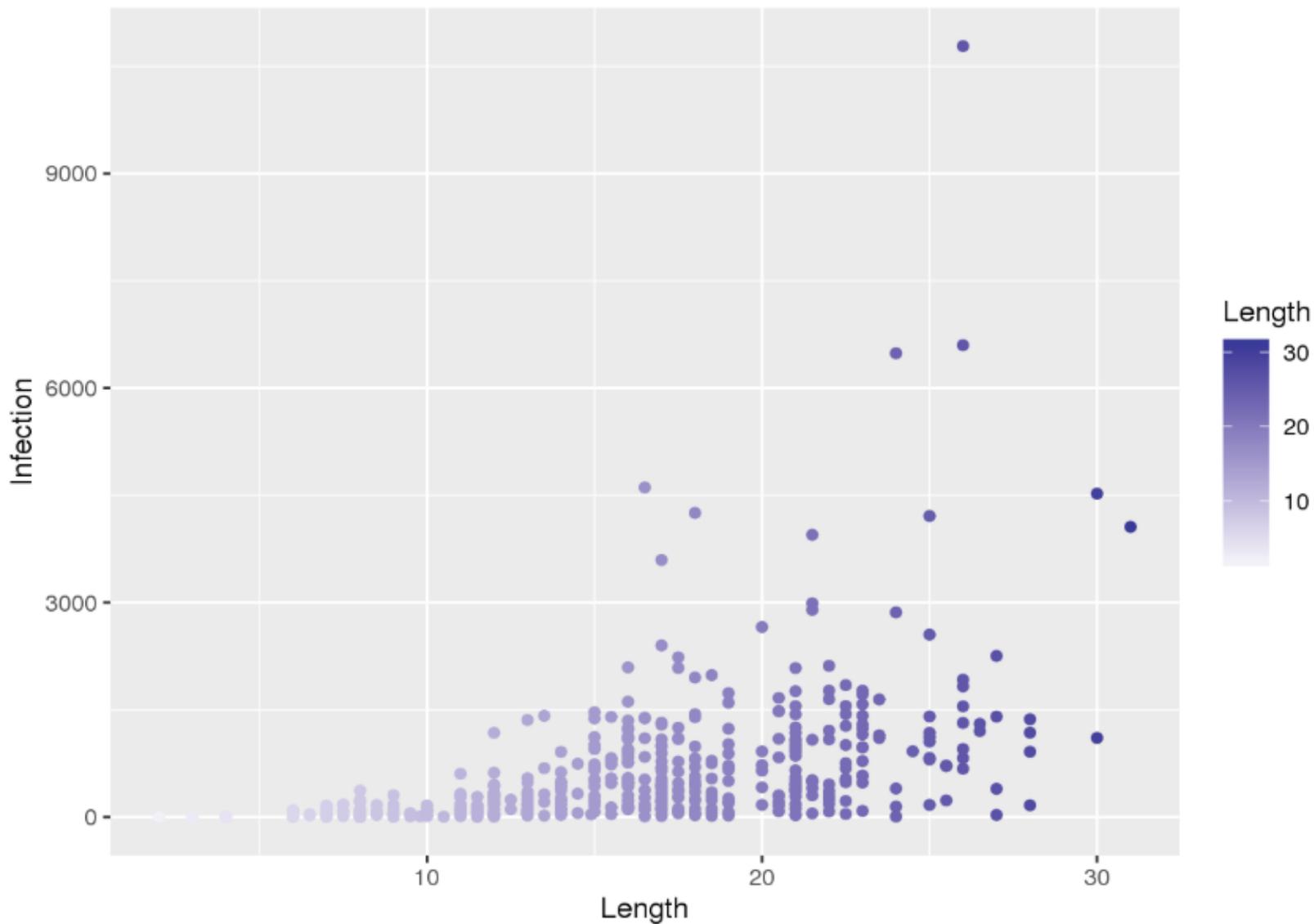
```
dr$Month = factor(dr$Month,ordered = T,  
                 levels=c('May','July','September'))  
p = ggplot(data = dr, aes (Month, fill=Month))  
p + geom_bar()
```



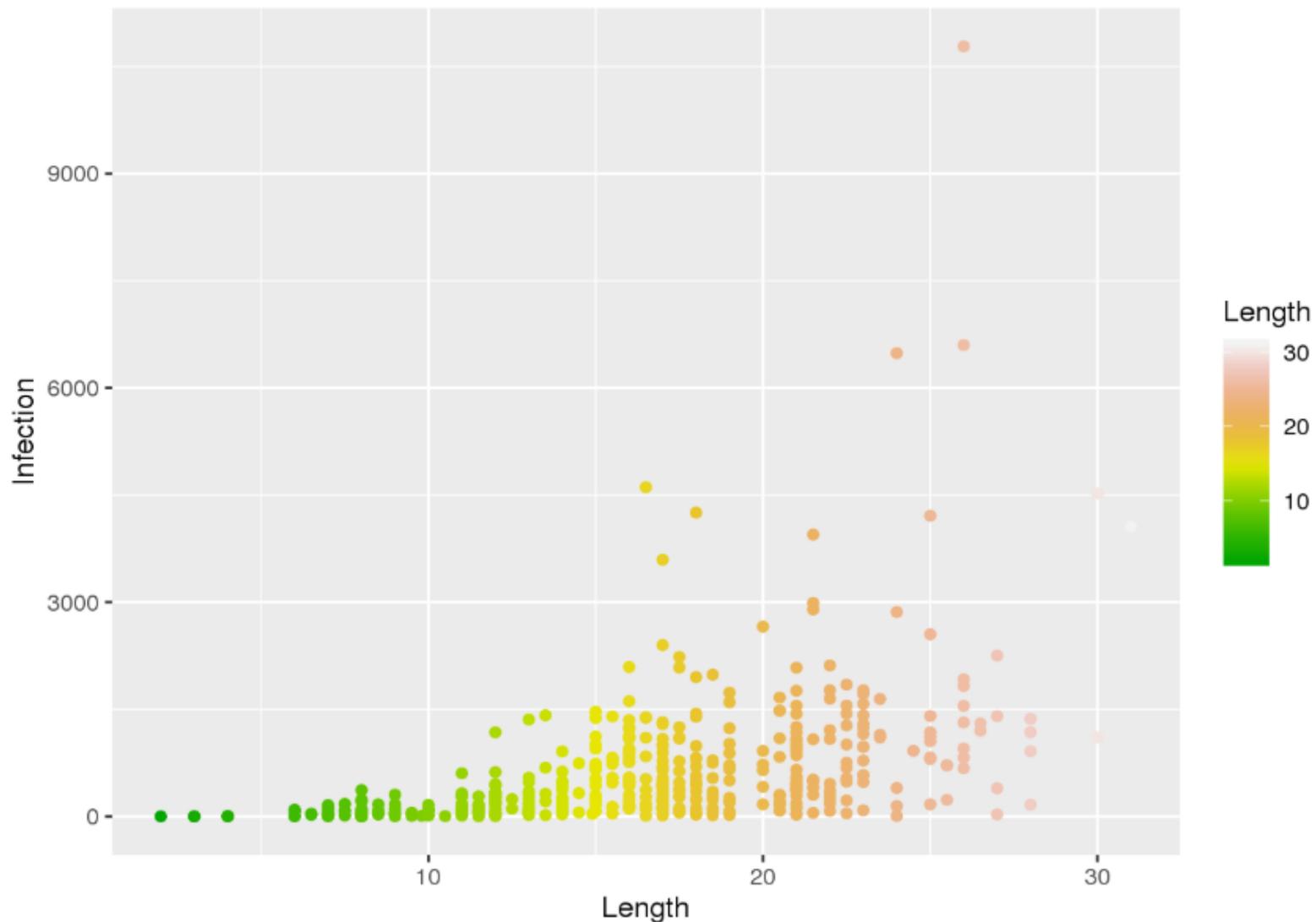
```
p = ggplot(data = dr, aes (Length, Infection, colour=Length))  
p + geom_point()
```



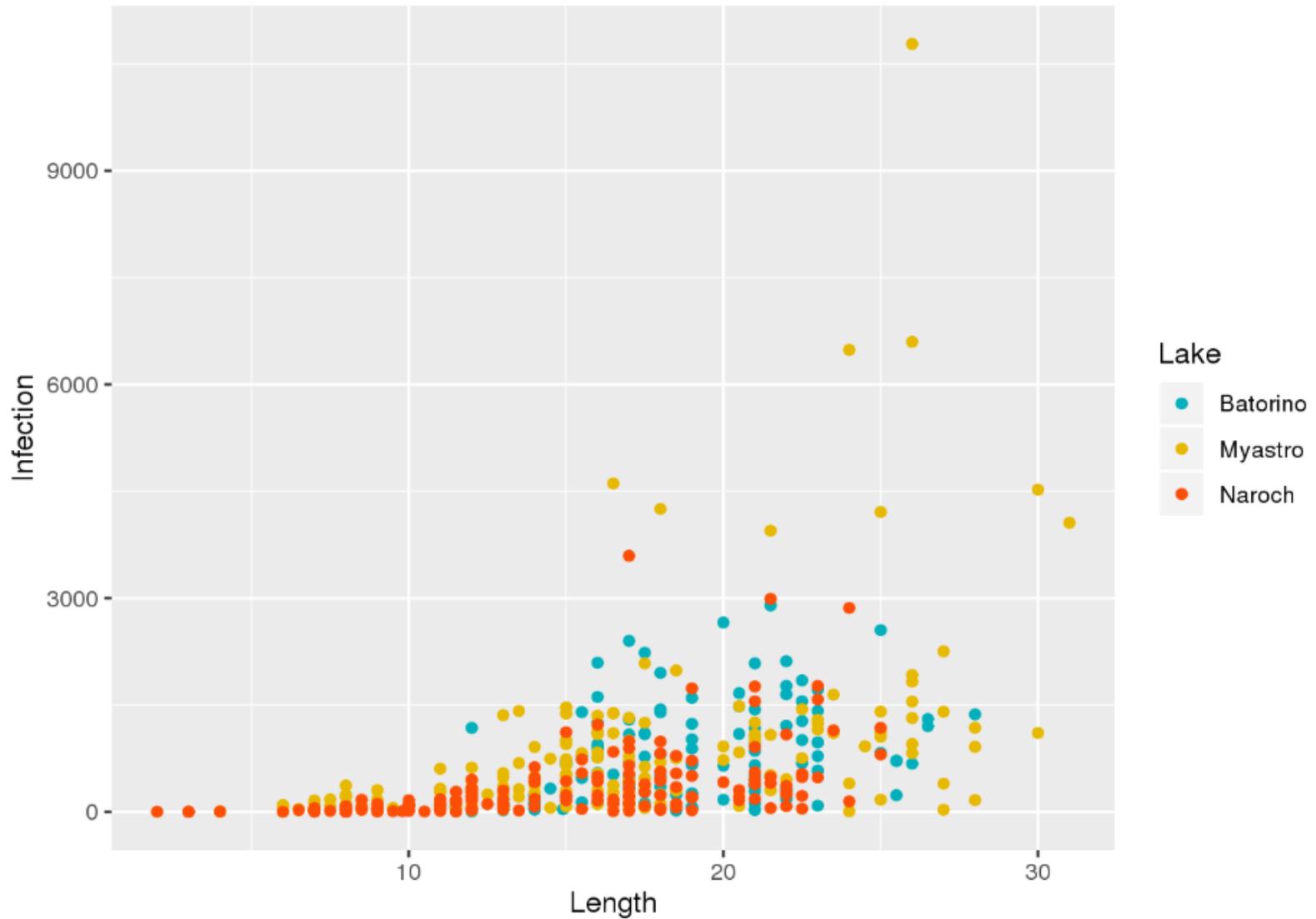
```
p = ggplot(data = dr, aes (Length, Infection, colour=Length))  
p + geom_point() + scale_colour_gradient2()
```



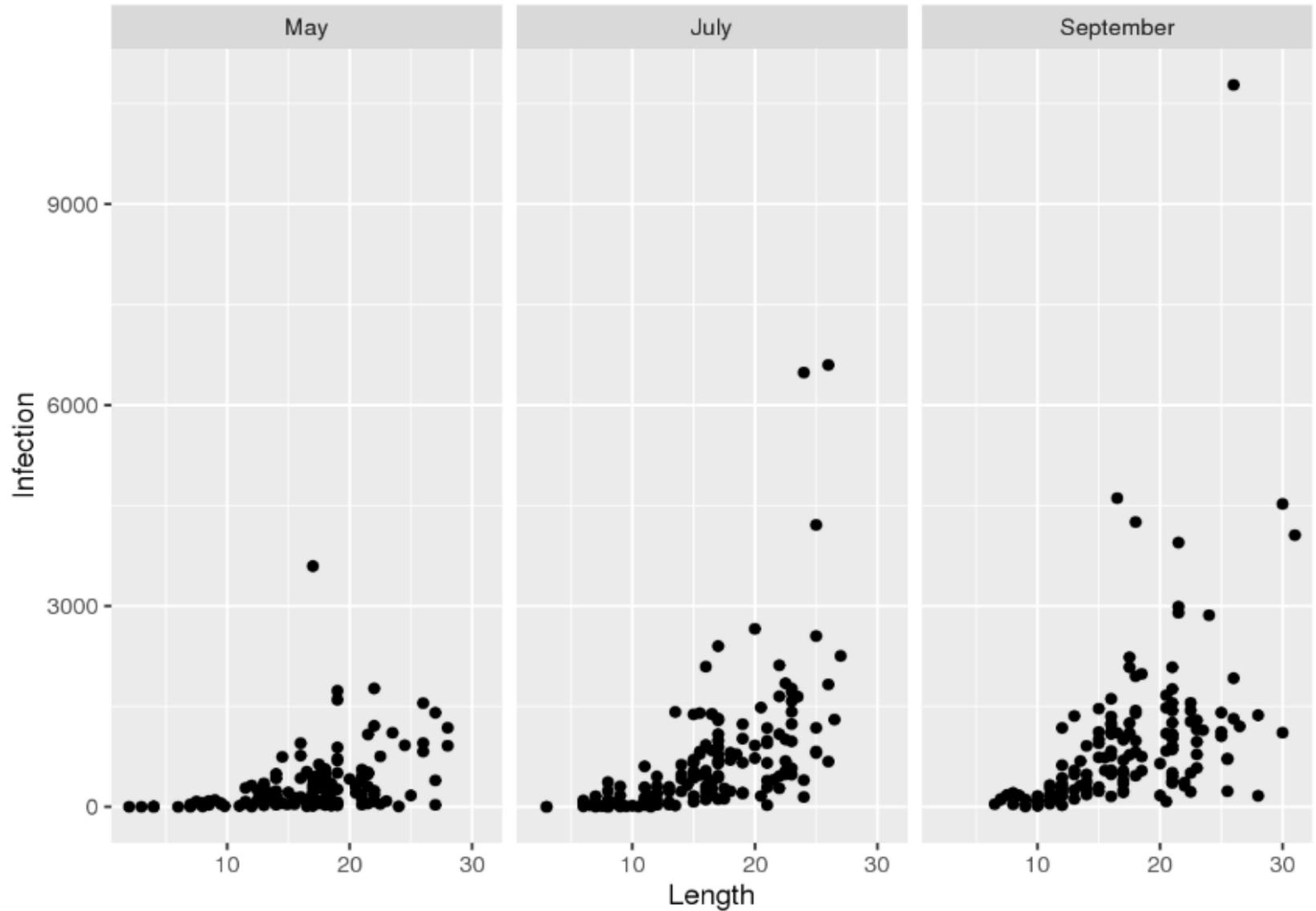
```
p = ggplot(data = dr, aes (Length, Infection, colour=Length))  
p + geom_point() +  
  scale_colour_gradientn(colours = terrain.colors(10))
```



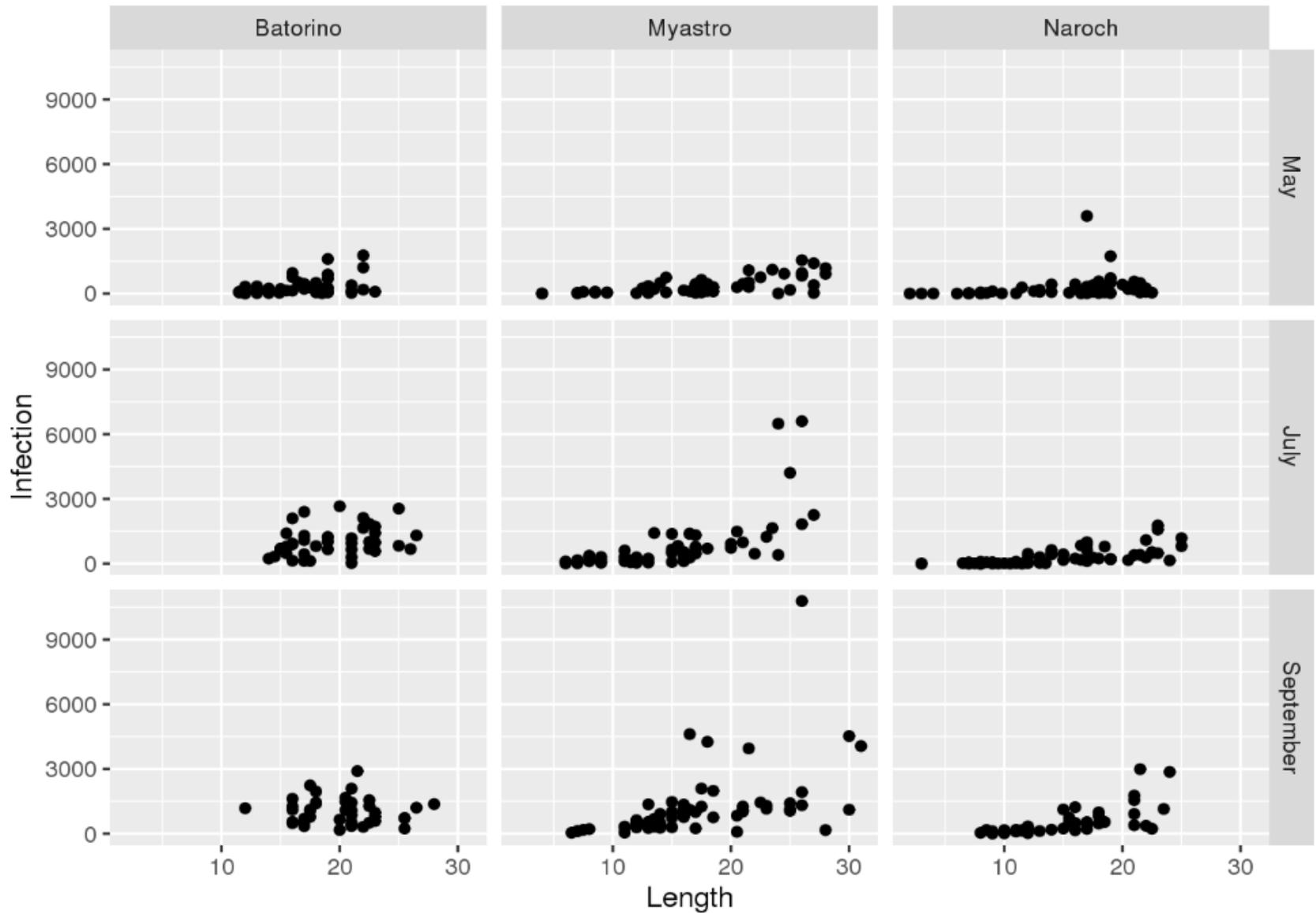
```
p = ggplot(data = dr, aes (Length, Infection, colour=Lake))  
p + geom_point() +  
  scale_color_manual(values = c("#00AFBB", "#E7B800", "#FC4E07"))
```



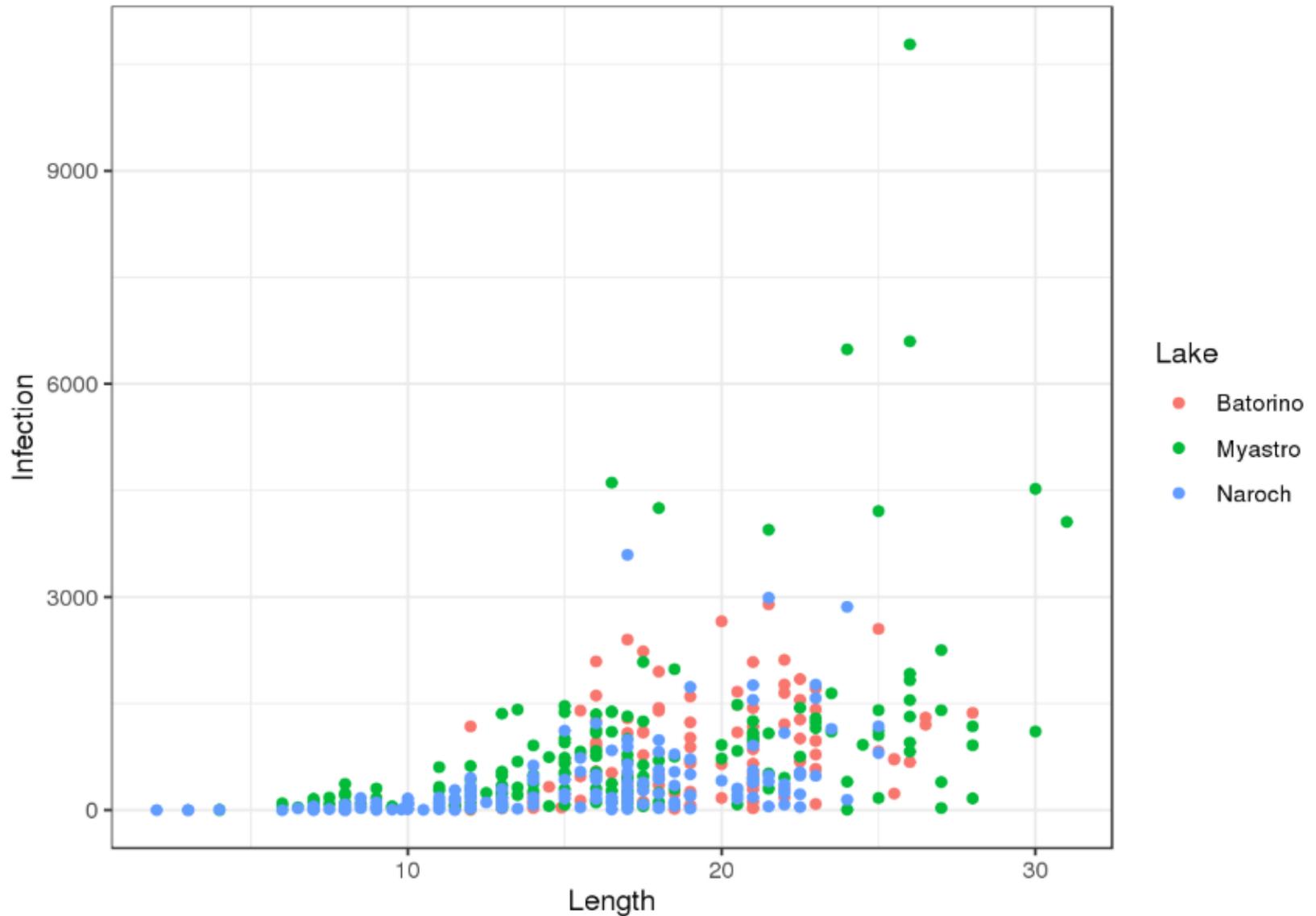
```
p = ggplot(data = dr, aes (Length, Infection))  
p + geom_point() + facet_grid(cols = vars(Month))
```



```
p = ggplot(data = dr, aes (Length, Infection))  
p + geom_point() + facet_grid(Month~Lake)
```



```
p = ggplot(data = dr, aes (Length, Infection, colour=Lake))  
p + geom_point() + theme_bw()
```



```

p = ggplot(data = dr, aes (Length, Infection, colour=Lake))
p + geom_point() + labs(title='Dreissena polymorpha \n Дрейссена речная') +
  theme(
    axis.text.x = element_text(face = "bold", color="#993333",
                                size = 12, angle = 45),
    axis.text.y = element_text(face = "bold", color = "blue",
                                size = 12, angle = 90))

```

