Solution of 9.8.1, Life history in songbirds — Martin 2015

> Martin (2015) studied songbirds in temperate and tropical environments. He showed (Figure 2A) that peak growth rate is higher in species suffering higher nest predation risk, and is lower in tropical species with the same level of risk as temperate species. In the same Figure (2B) he reported that nestling period covaries with growth rate, with tropical species having a shorter nestling periods (for the same growth rate) than temperate species. The file `Martin2015_figure2.pdf` contains a figure generated with `ggplot2` similar to Figure 2 of the original paper. Reproduce the figure using the file `Martin2015_data.csv` deposited in the `CSB/ggplot2/data` folder.

As always, we need to read the data:

```
library(tidyverse) # for ggplot
library(gridExtra) # arrange several plots on the same page

m2015 <- read_tsv("../data/Martin2015_data.csv")
dim(m2015)
```

```
# [1] 72 15
```

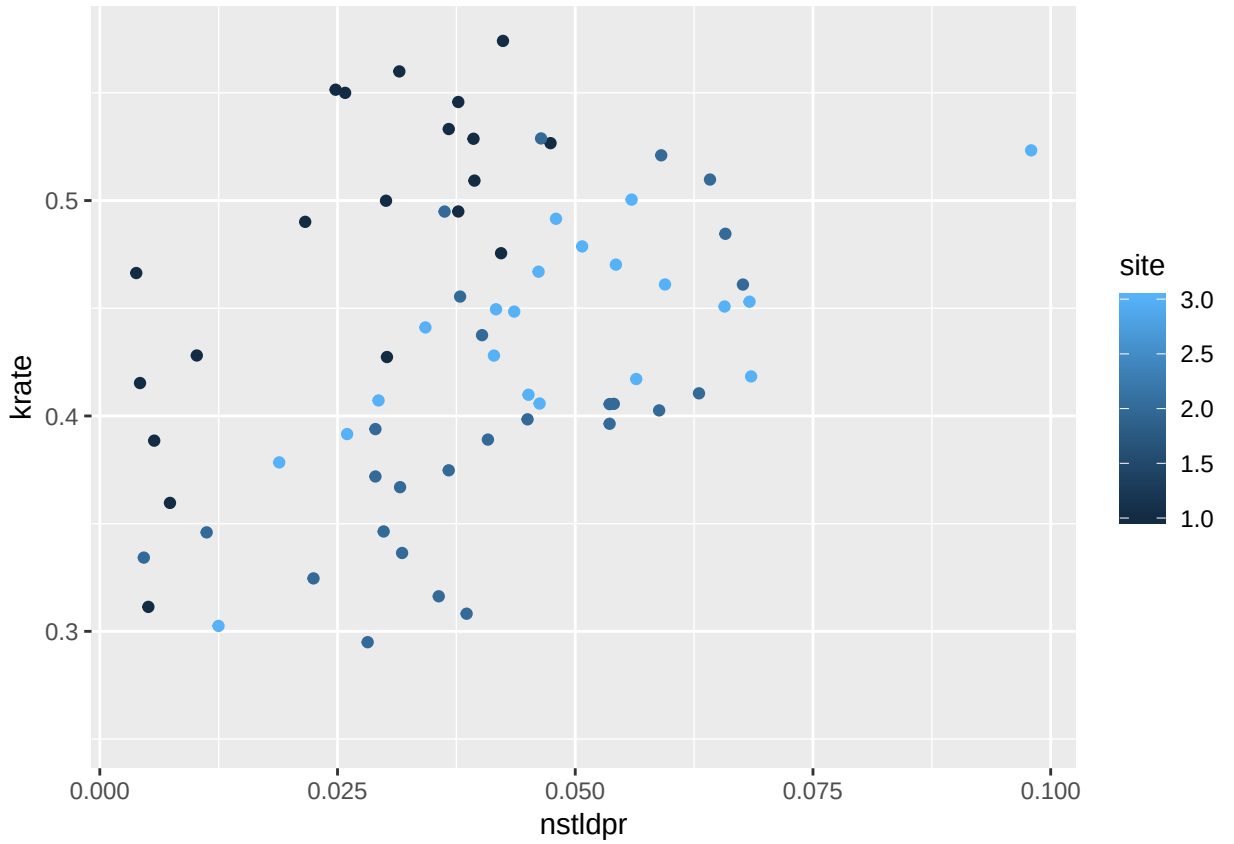
```
head(m2015)
```

```
# # A tibble: 6 x 15
#   species nstldpr  nstl krate kwing PropWCfldg Propmassfldg trips tripsnstl
#   <chr>     <dbl> <dbl> <dbl> <dbl>      <dbl>        <dbl> <dbl>     <dbl>
# 1 Empido~ 0.0302   15.0 0.427 0.282      0.690        1.05  19.9       6.14
# 2 Vireo_~ 0.0422   13.4 0.476 0.308     NA           NA      7.10      2.92
# 3 Vireo_~ 0.0216   13.4 0.490 0.273      0.652        0.986 10.9       3.50
# 4 Parus_~ 0.00738  21.4 0.360 0.230      0.850        1.06  19.8       3.77
# 5 Turdus~ 0.0301   14.7 0.500 0.316      0.604        0.786  6.23      1.88
# 6 Cathar~ 0.0474   12.6 0.527 0.328      0.644        0.853  5.93      1.90
# # ... with 6 more variables: cs <dbl>, armort <dbl>, lmas <dbl>,
# #   aerial <int>, regurg <int>, site <int>
```

For panel A, we want to plot the peak growth rate (`krate`) against the nestling predation rate (`nstldpr`), coloring the points according to `site`.

Let's start plotting:

```
plA <- ggplot(data = m2015) +
  aes(x = nstldpr, y = krate, colour = site) +
  geom_point()
plA
```



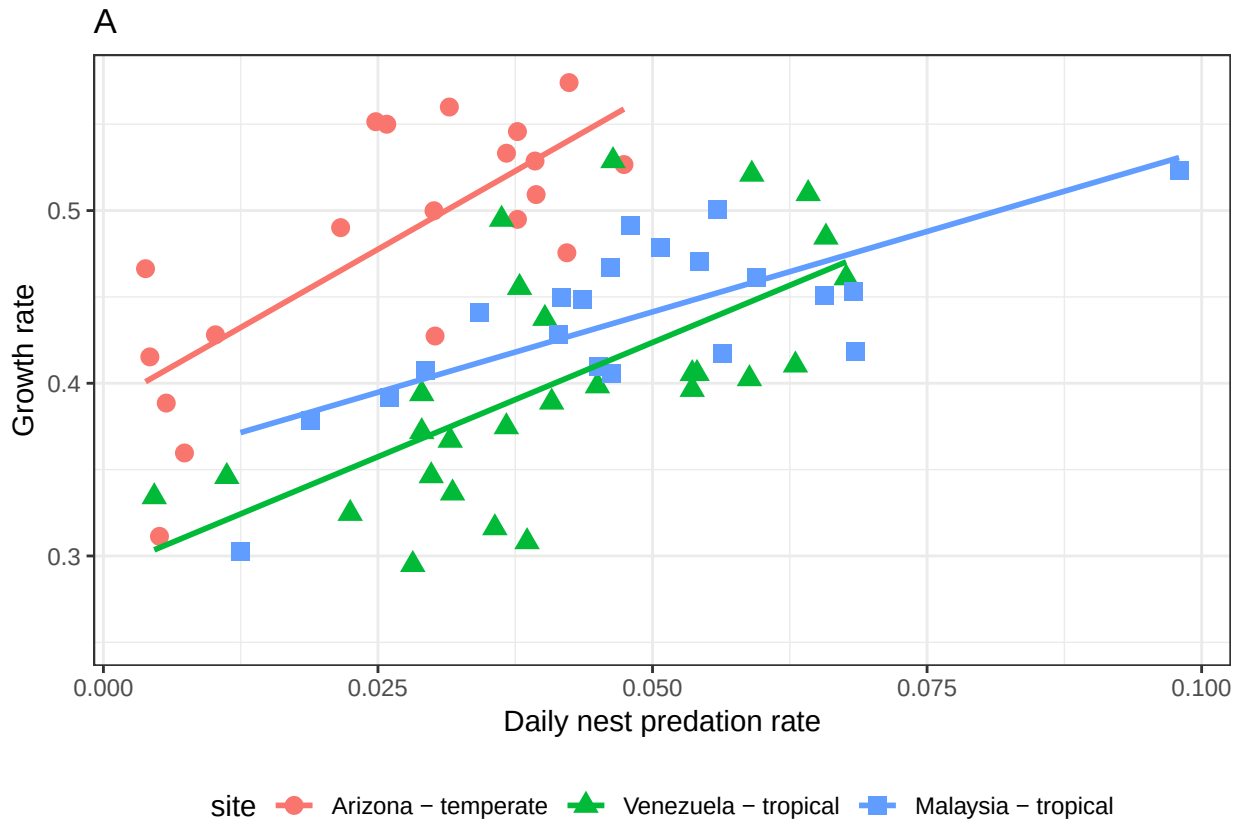
For easier visualization, let's transform `site` into a factor:

```
m2015$site <- factor(m2015$site, levels = c(1,2,3),
                     labels = c("Arizona - temperate",
                                "Venezuela - tropical",
                                "Malaysia - tropical"))

# Now add labels
plA <- ggplot(data = m2015) +
  aes(x = nstldpr, y = krate, colour = site, shape = site) +
  geom_point(size = 3)
plA <- plA + xlab("Daily nest predation rate") +
  ylab("Growth rate") +
  ggtitle("A")
plA
```

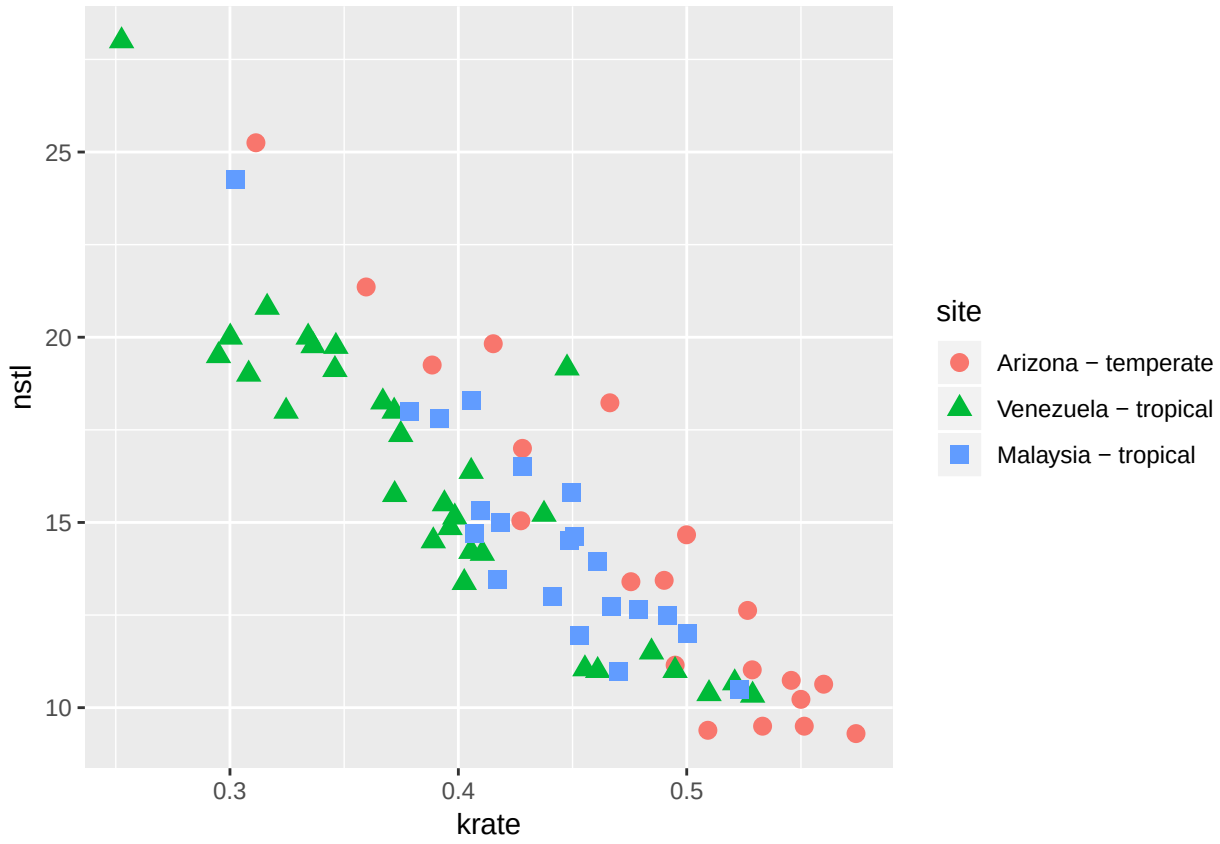
And make it prettier:

```
plA <- plA +
  theme_bw() +
  theme(legend.position = "bottom") +
  geom_smooth(method = "glm", se = FALSE)
plA
```

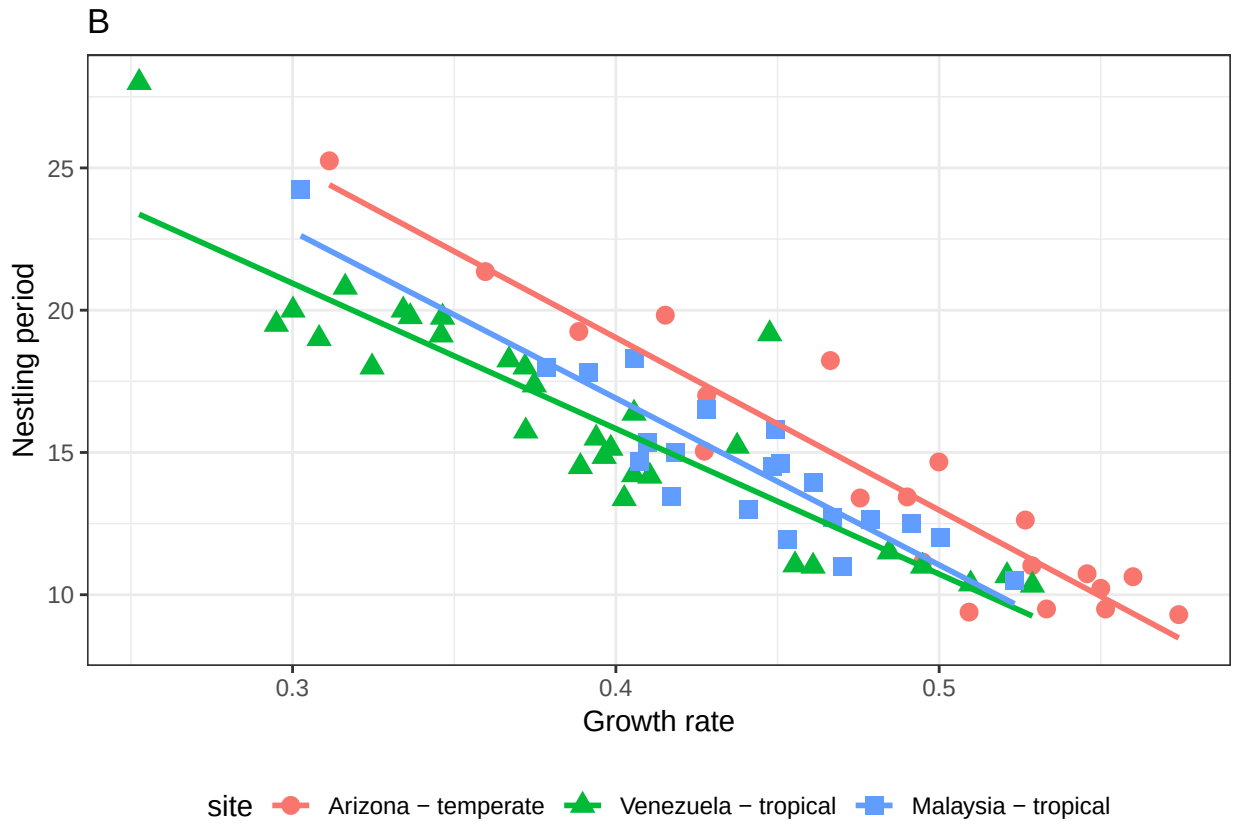


Good. Now let's start working on panel B: we need to plot the nestling period (`nstl`) against the growth rate (`krate`). Again, we color and choose shapes according to `site`.

```
plB <- ggplot(data = m2015) +
  aes(x = krate, y = nstl, colour = site, shape = site) +
  geom_point(size = 3)
plB
```

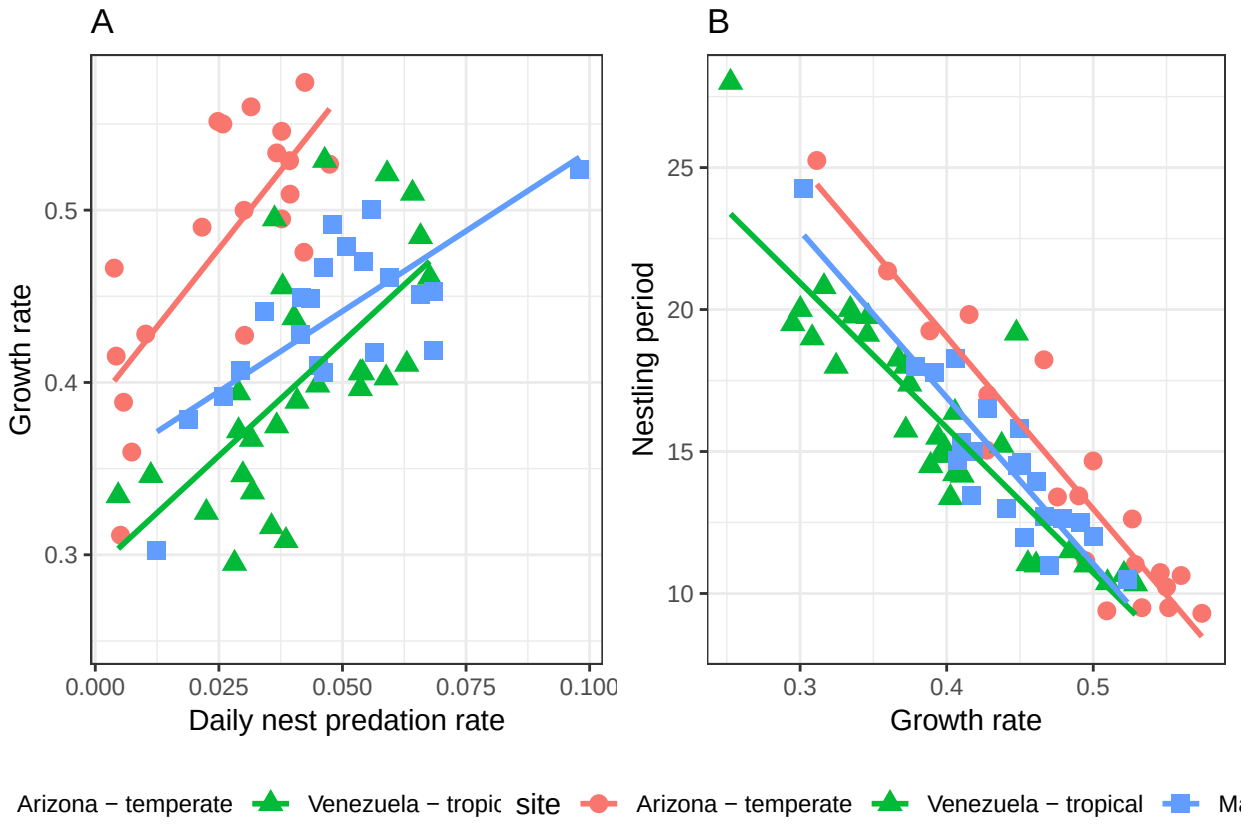



```
# Add labels
plB <- plB +
  xlab("Growth rate") +
  ylab("Nestling period") +
  ggtitle("B")
# Add linear model, and move legend
plB <- plB +
  theme_bw() +
  theme(legend.position = "bottom") +
  geom_smooth(method = "glm", se = FALSE)
plB
```



Finally, combine the two plots using `gridExtra`:

```
grid.arrange(plA, plB, ncol = 2)
```



That's it! Try playing with the colors and shapes. When you are happy with your results, you can save the graph using the command `pdf`.

```
pdf(file = "../data/Martin2015_figure2.pdf",
    width = 12, height = 7)
grid.arrange(plA, plB, ncol = 2)
dev.off()
```

```
# pdf
#   2
```