Week-7: Challenge

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2023-10-02

A. About ggplot2

1. Load packages (Slide #6)

```
library(tidyverse)
```

```
## ── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ─
─
## ✔ dplyr     1.1.2     ✔ readr     2.1.4
## ✔ forcats   1.0.0     ✔ stringr   1.5.0
## ✔ ggplot2   3.4.3     ✔ tibble    3.2.1
## ✔ lubridate 1.9.2     ✔ tidyr     1.3.0
## ✔ purrr     1.0.2
## ── Conflicts ────────────────────────────────────────── tidyverse_conflicts() ─
─
## ✖ dplyr::filter() masks stats::filter()
## ✖ dplyr::lag()    masks stats::lag()
## ℹ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conf
licts to become errors
```

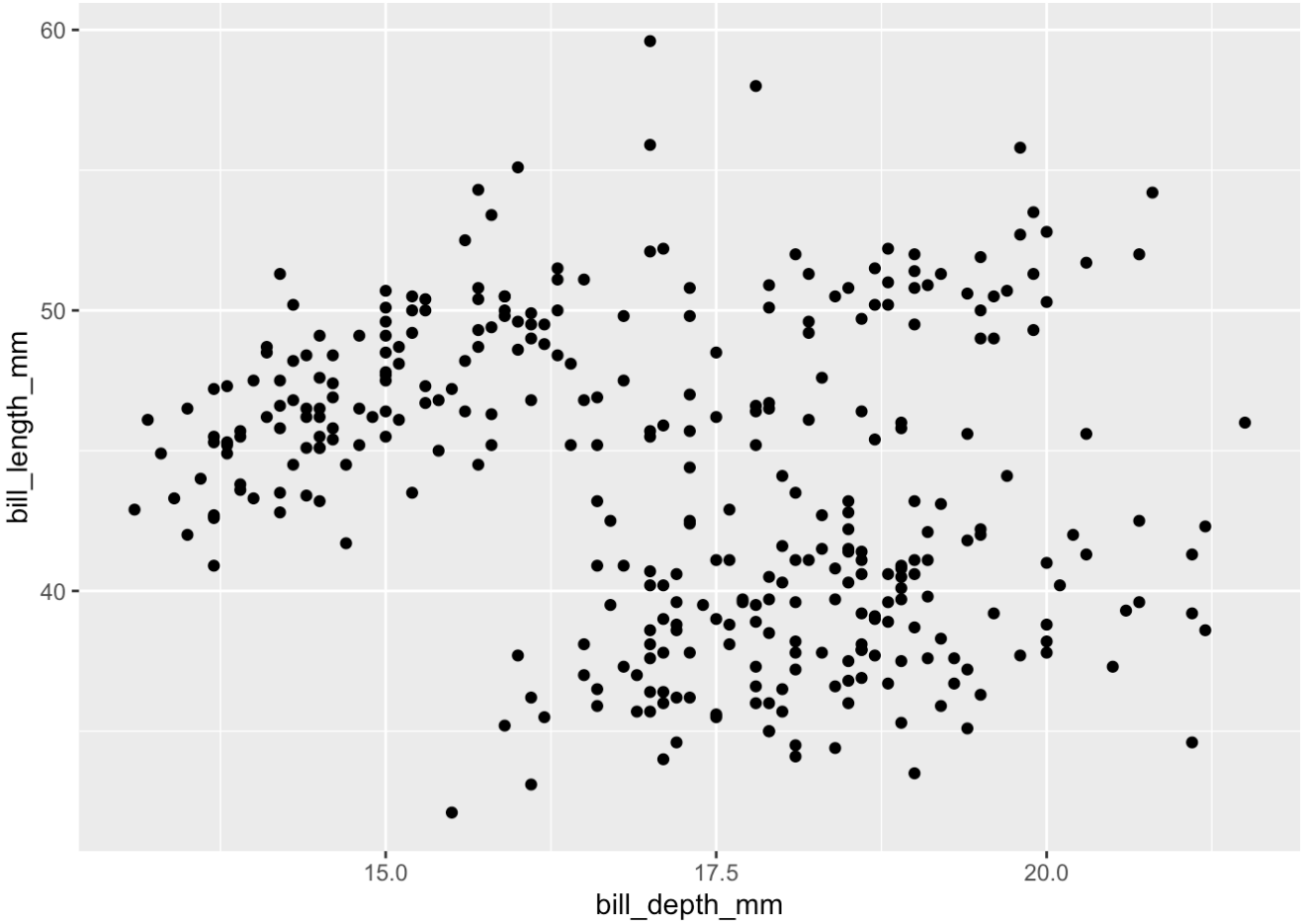
```
#install.packages("palmerpenguins")
library(palmerpenguins)
#look at the dataset
glimpse(penguins)
```

```
## Rows: 344
## Columns: 8
## $ species           <fct> Adelie, Adelie, Adelie, Adelie, Adelie, Adelie, Adel…
## $ island            <fct> Torgersen, Torgersen, Torgersen, Torgersen, Torgerse…
## $ bill_length_mm    <dbl> 39.1, 39.5, 40.3, NA, 36.7, 39.3, 38.9, 39.2, 34.1, …
## $ bill_depth_mm     <dbl> 18.7, 17.4, 18.0, NA, 19.3, 20.6, 17.8, 19.6, 18.1, …
## $ flipper_length_mm <int> 181, 186, 195, NA, 193, 190, 181, 195, 193, 190, 186…
## $ body_mass_g       <int> 3750, 3800, 3250, NA, 3450, 3650, 3625, 4675, 3475, …
## $ sex               <fct> male, female, female, NA, female, male, female, male…
## $ year              <int> 2007, 2007, 2007, 2007, 2007, 2007, 2007, 2007, 2007…
```

2. Palmer penguin plot recreation - data frame and axes with points (Slide #8-11)

```
ggplot(penguins) + aes(x = bill_depth_mm, y = bill_length_mm) + geom_point()
```

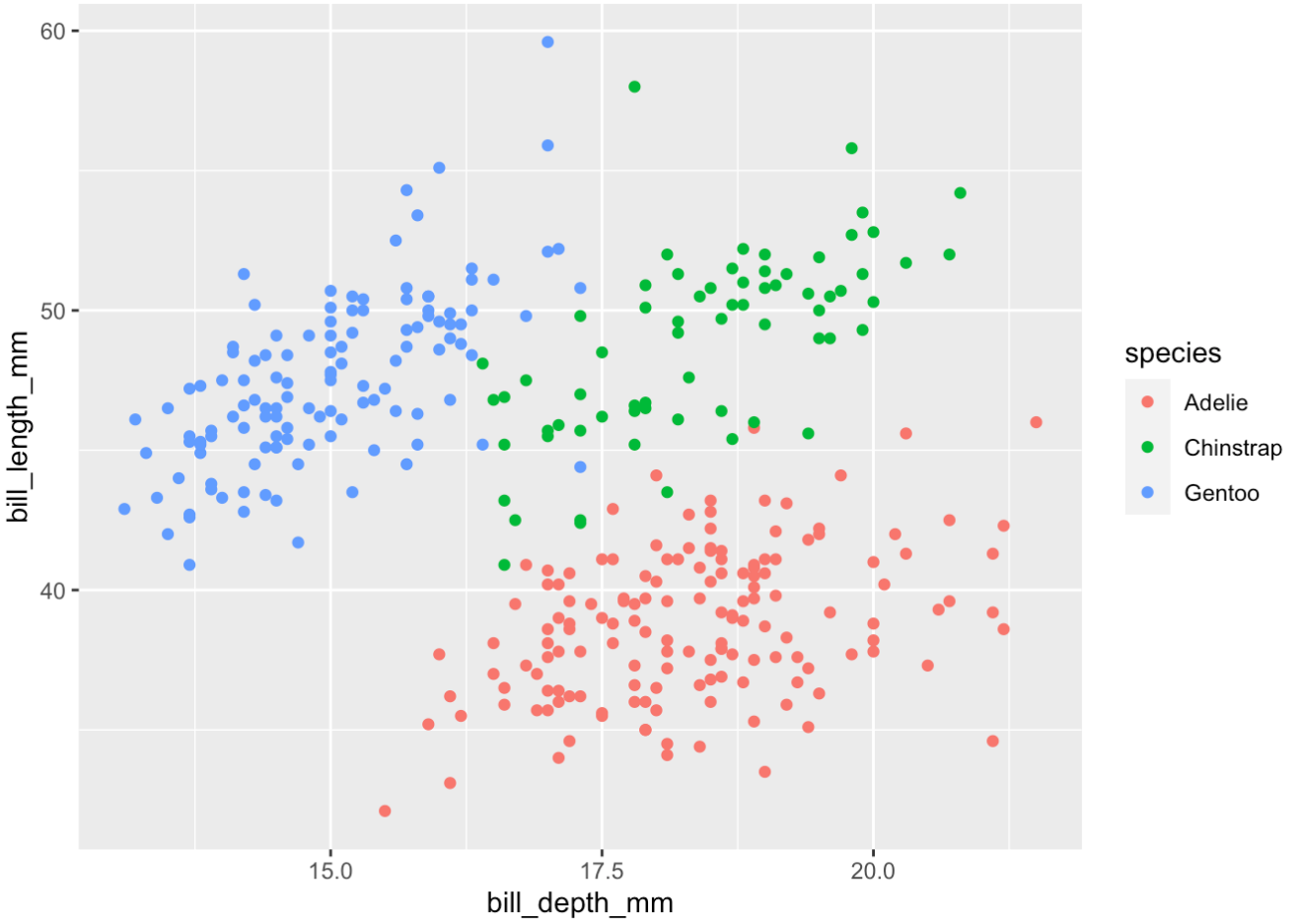
```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```



3. Palmer penguin plot recreation - Map species to colour of point (Slide #12)

```
ggplot(penguins) +
       aes(x = bill_depth_mm, y = bill_length_mm, colour = species) +
  geom_point()
```

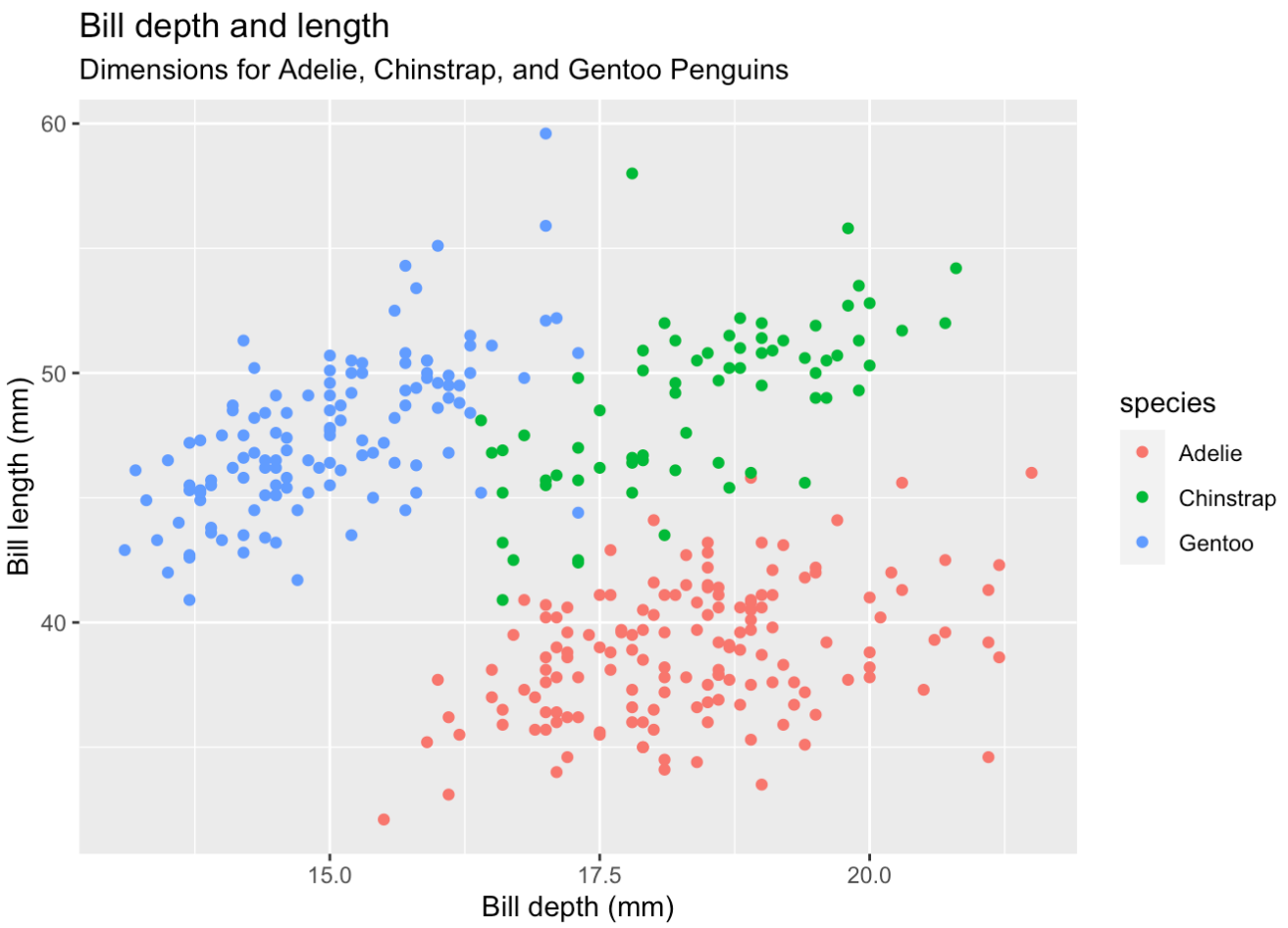
```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```



4. Palmer penguin plot recreation - labels (Slide #13-15)

```
ggplot(penguins) +
        aes(x = bill_depth_mm, y = bill_length_mm, colour = species) +
  geom_point() +
  labs(title = "Bill depth and length",
       subtitle = "Dimensions for Adelie, Chinstrap, and Gentoo Penguins",
       x = "Bill depth (mm)",
       y = "Bill length (mm)")
```

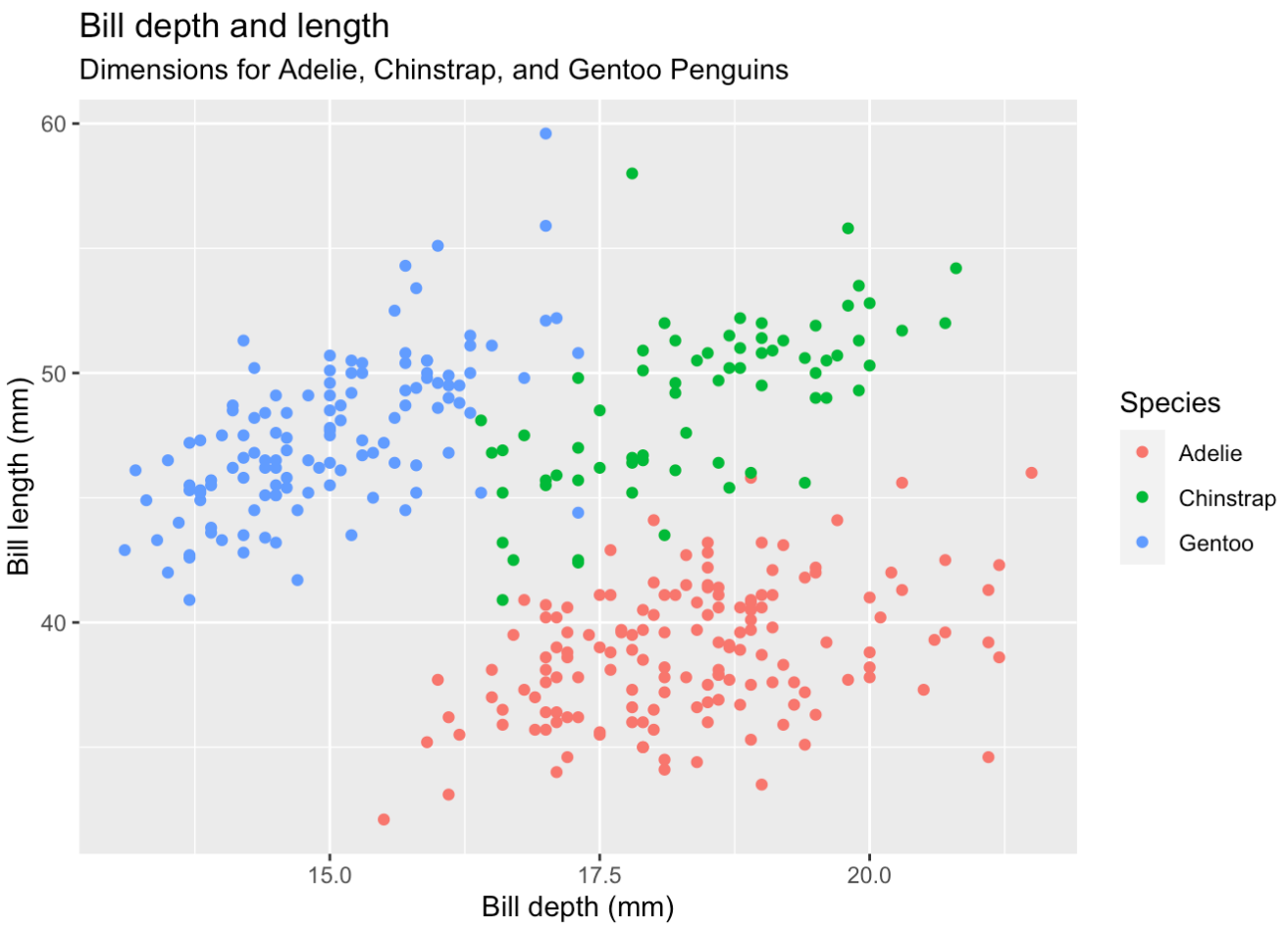
```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```



5. Palmer penguin plot recreation - Adding a legend (Slide #16)

```
ggplot(penguins) +
        aes(x = bill_depth_mm, y = bill_length_mm, colour = species) +
  geom_point() +
  labs(title = "Bill depth and length",
       subtitle = "Dimensions for Adelie, Chinstrap, and Gentoo Penguins",
       x = "Bill depth (mm)",
       y = "Bill length (mm)",
       colour = "Species")
```

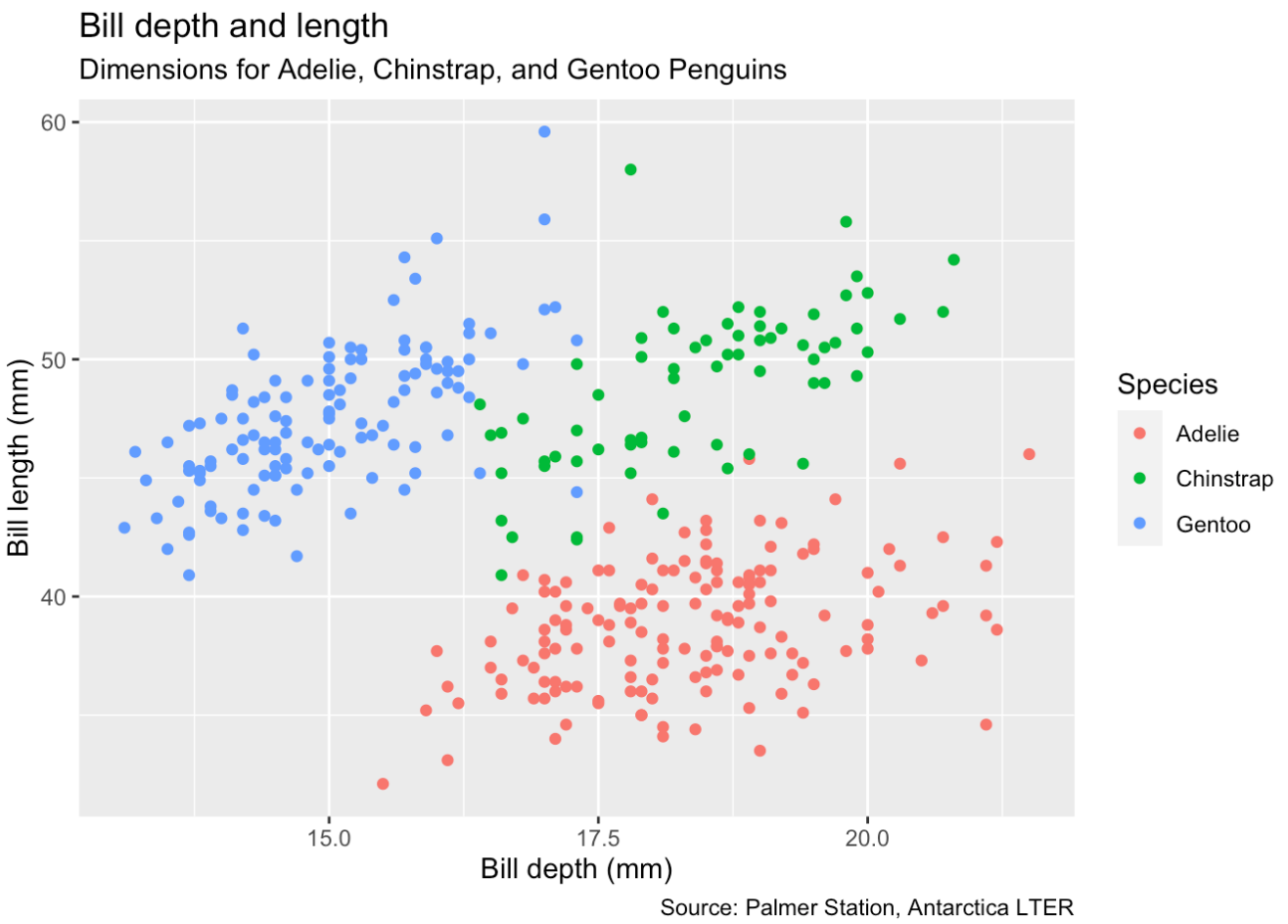
```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```



6. Palmer penguin plot recreation - Caption for data source (Slide #17)

```
ggplot(penguins) +
        aes(x = bill_depth_mm, y = bill_length_mm, colour = species) +
  geom_point() +
  labs(title = "Bill depth and length",
       subtitle = "Dimensions for Adelie, Chinstrap, and Gentoo Penguins",
       x = "Bill depth (mm)",
       y = "Bill length (mm)",
       colour = "Species",
       caption = "Source: Palmer Station, Antarctica LTER")
```

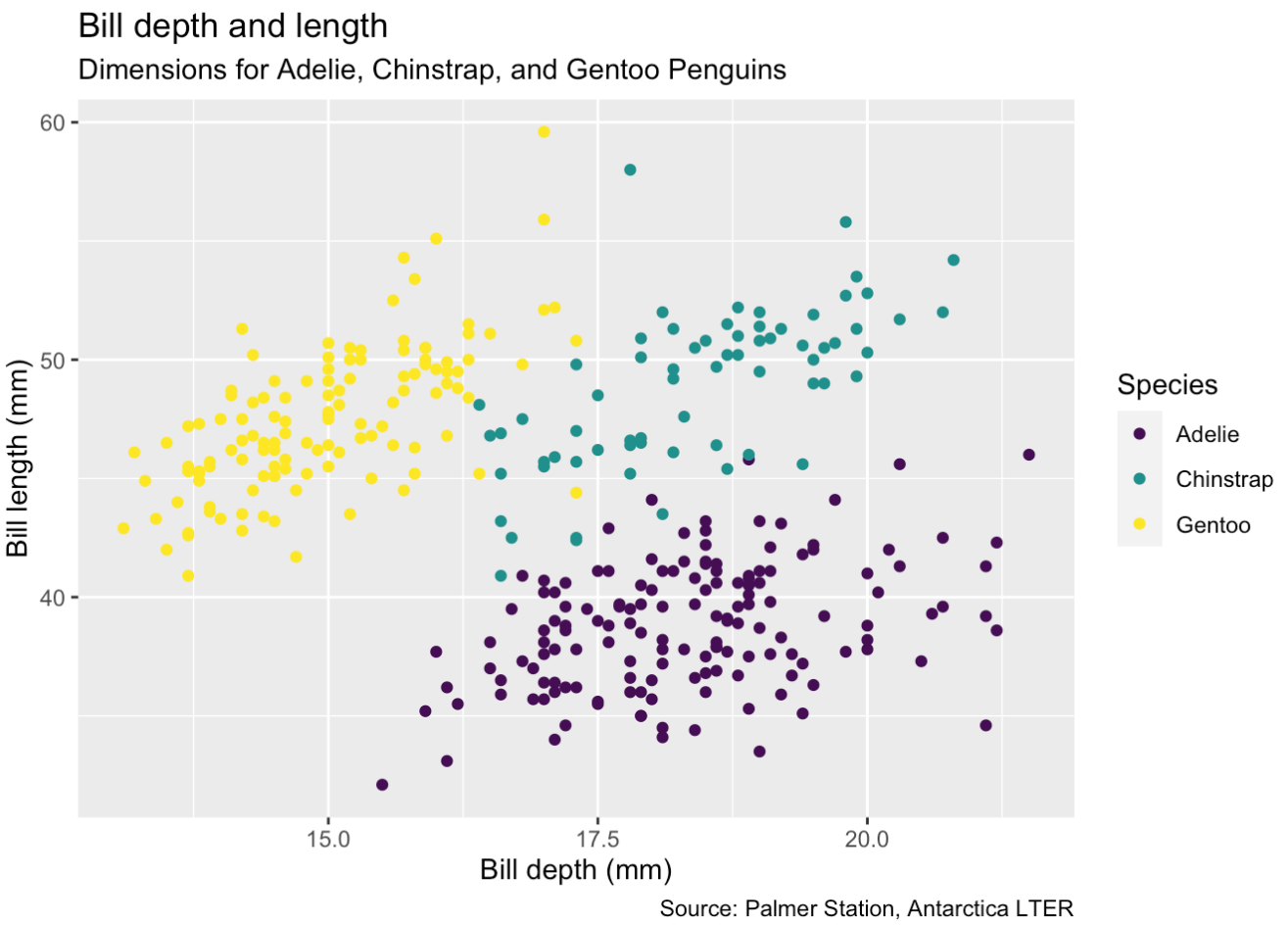
```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```



7. Palmer penguin plot recreation - Discrete colours for color blindness (Slide #18)

```
ggplot(penguins) +
        aes(x = bill_depth_mm, y = bill_length_mm, colour = species) +
  geom_point() +
  labs(title = "Bill depth and length",
       subtitle = "Dimensions for Adelie, Chinstrap, and Gentoo Penguins",
       x = "Bill depth (mm)",
       y = "Bill length (mm)",
       colour = "Species",
       caption = "Source: Palmer Station, Antarctica LTER") +
  scale_colour_viridis_d()
```

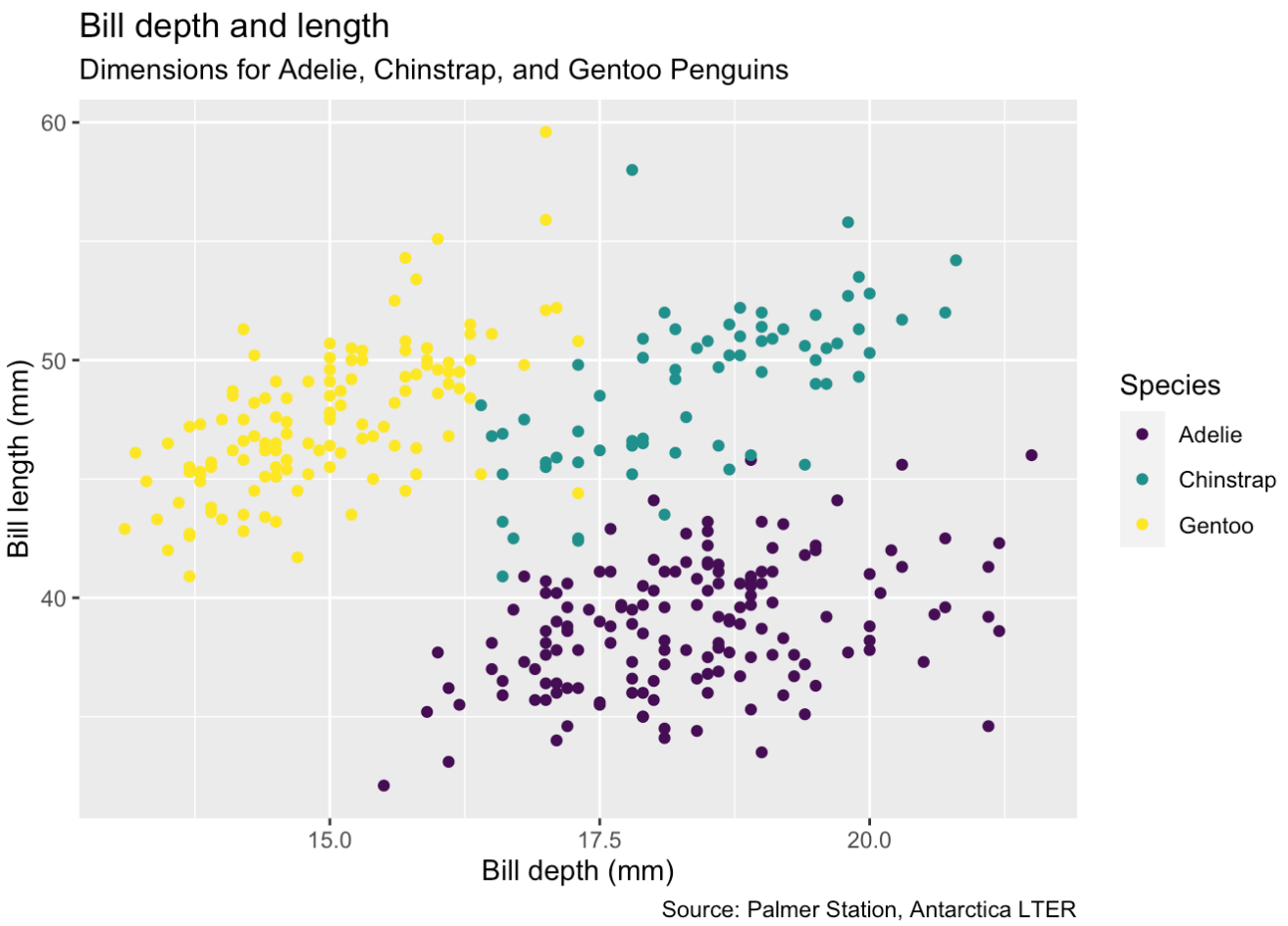
```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```



8. Omitting first 2 arguments' names when building plots (data, mapping) (Slide #20)

```
ggplot(penguins) +
  aes(x = bill_depth_mm, y = bill_length_mm, colour = species) +
  geom_point() +
  labs(title = "Bill depth and length",
       subtitle = "Dimensions for Adelie, Chinstrap, and Gentoo Penguins",
       x = "Bill depth (mm)",
       y = "Bill length (mm)",
       colour = "Species",
       caption = "Source: Palmer Station, Antarctica LTER") +
  scale_colour_viridis_d()
```

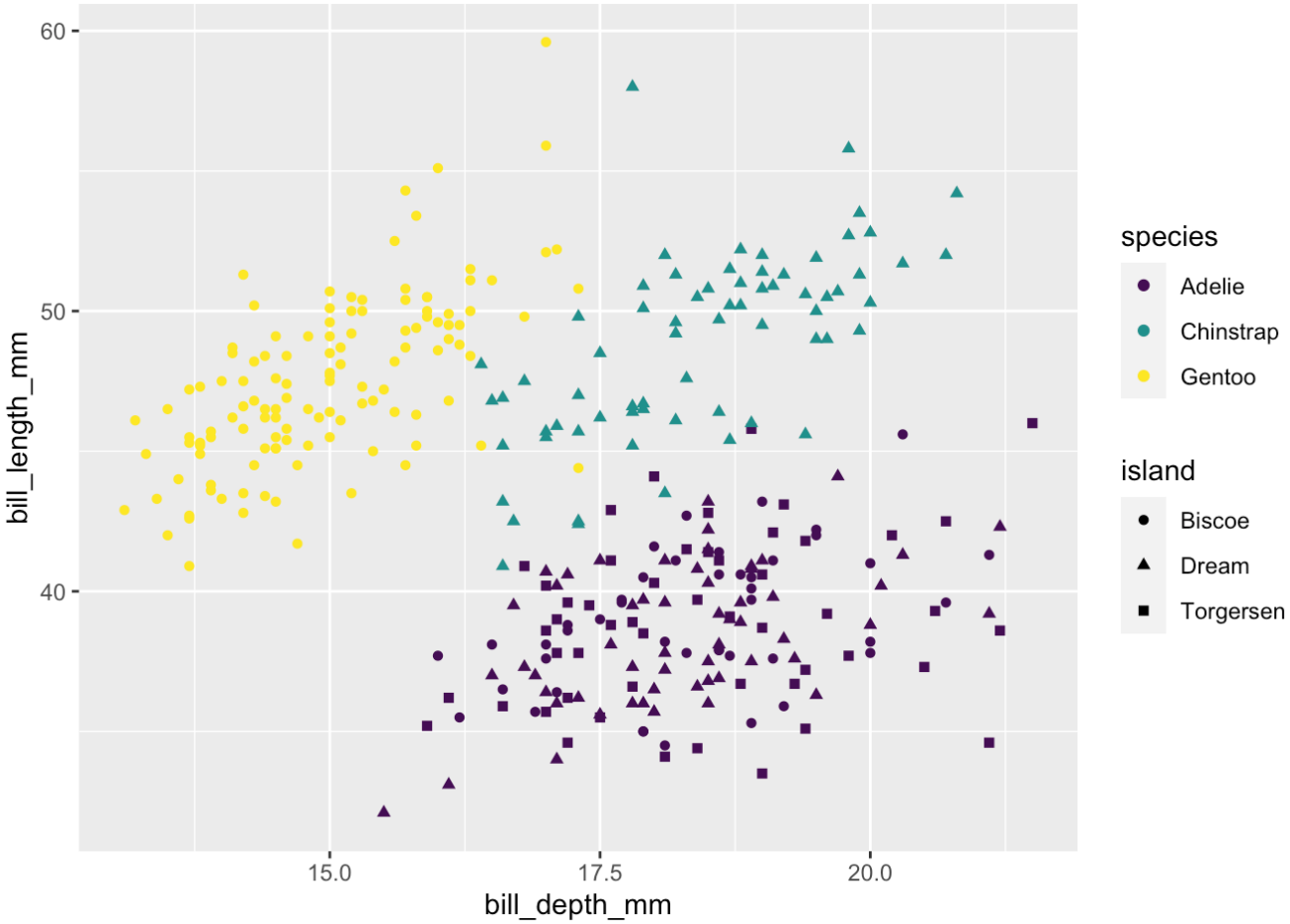
```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```



9. ggplot aesthetics options - Shape (Color alr shown above) (Slide #23)

```
ggplot(penguins) +
  aes(x = bill_depth_mm, y = bill_length_mm, colour = species, shape = island) +
  geom_point() +
  scale_colour_viridis_d()
```

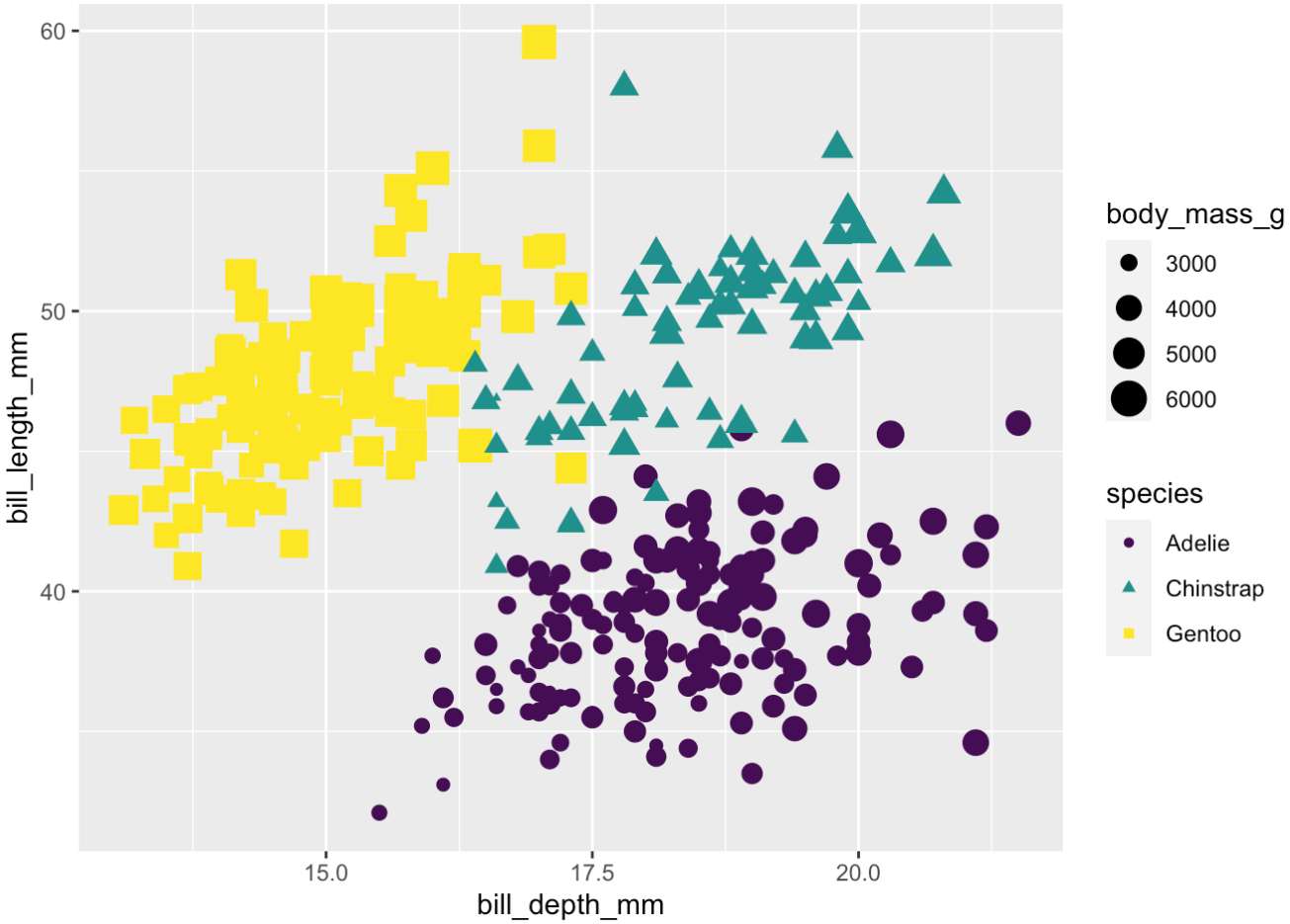
```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```



10. aes options - Size & Shape (Slide #25)

```
ggplot(penguins) +
  aes(x = bill_depth_mm, y = bill_length_mm, colour = species, shape = species, si
ze = body_mass_g) +
  geom_point() + scale_colour_viridis_d()
```

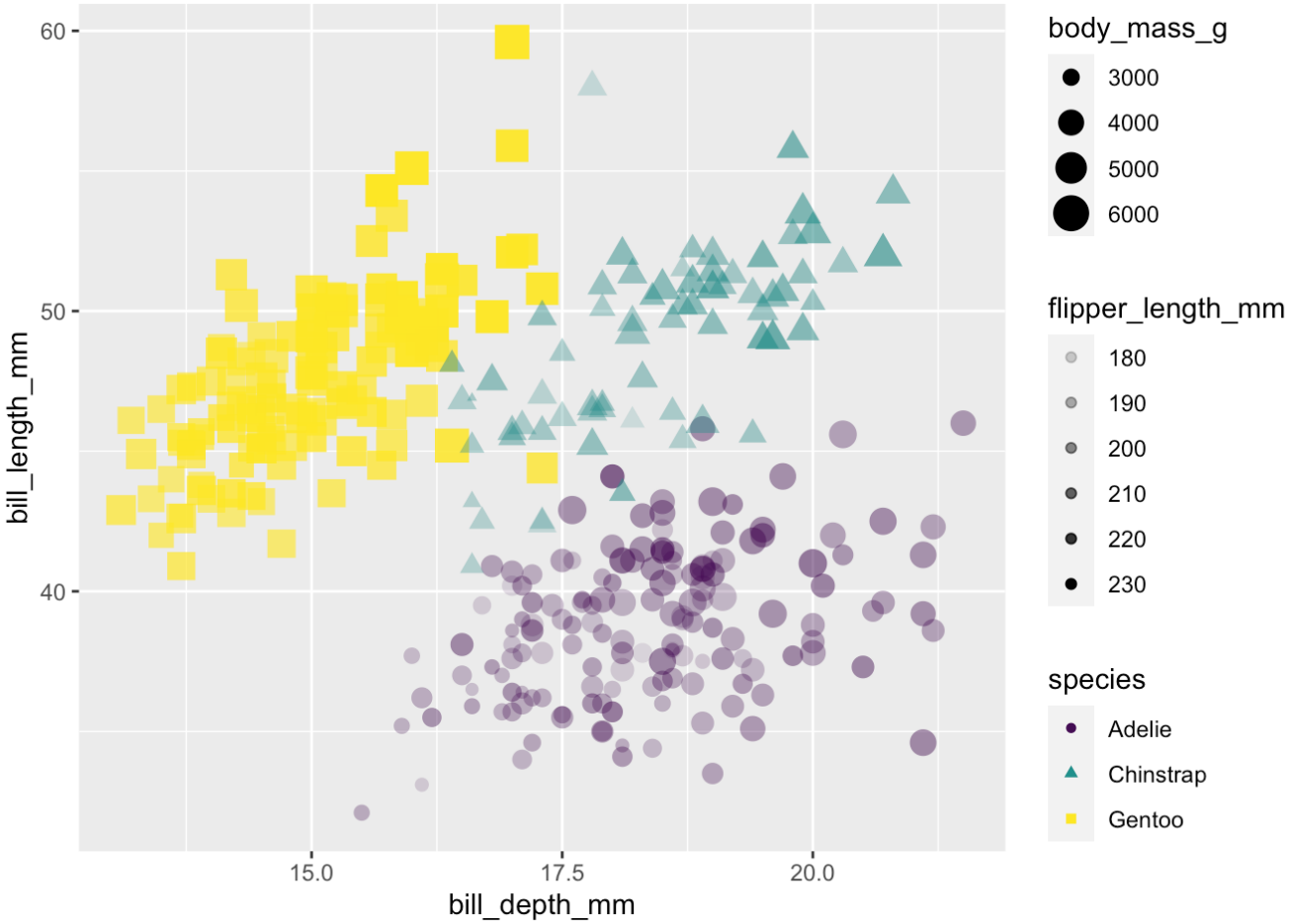
```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```



11. aes options - Size, Shape, Alpha (Slide #26)

```
ggplot(penguins) +
  aes(x = bill_depth_mm, y = bill_length_mm, colour = species, shape = species, si
ze = body_mass_g, alpha = flipper_length_mm) +
  geom_point() + scale_colour_viridis_d()
```

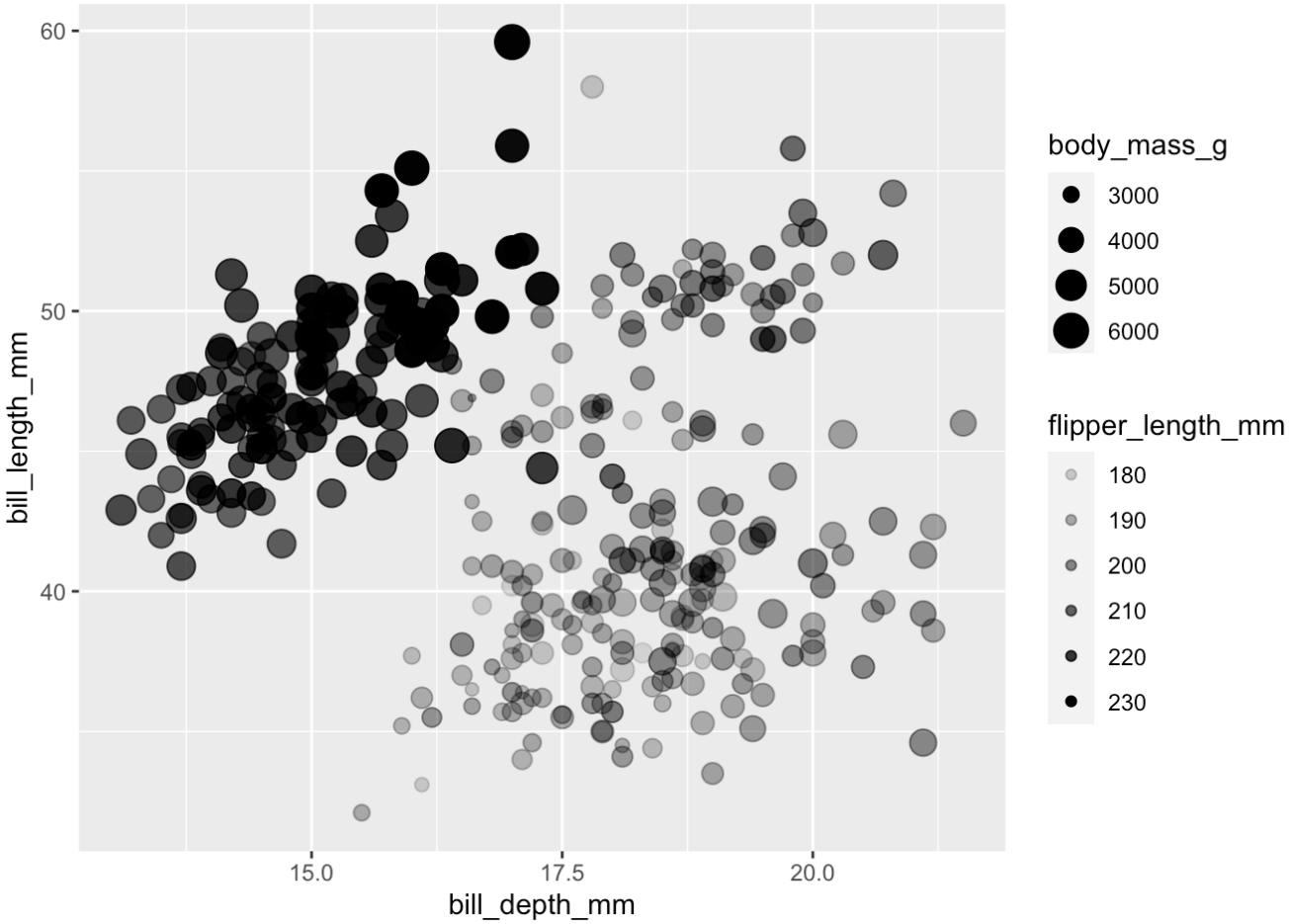
```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```



12. Mapping VS Setting (Slide #28)

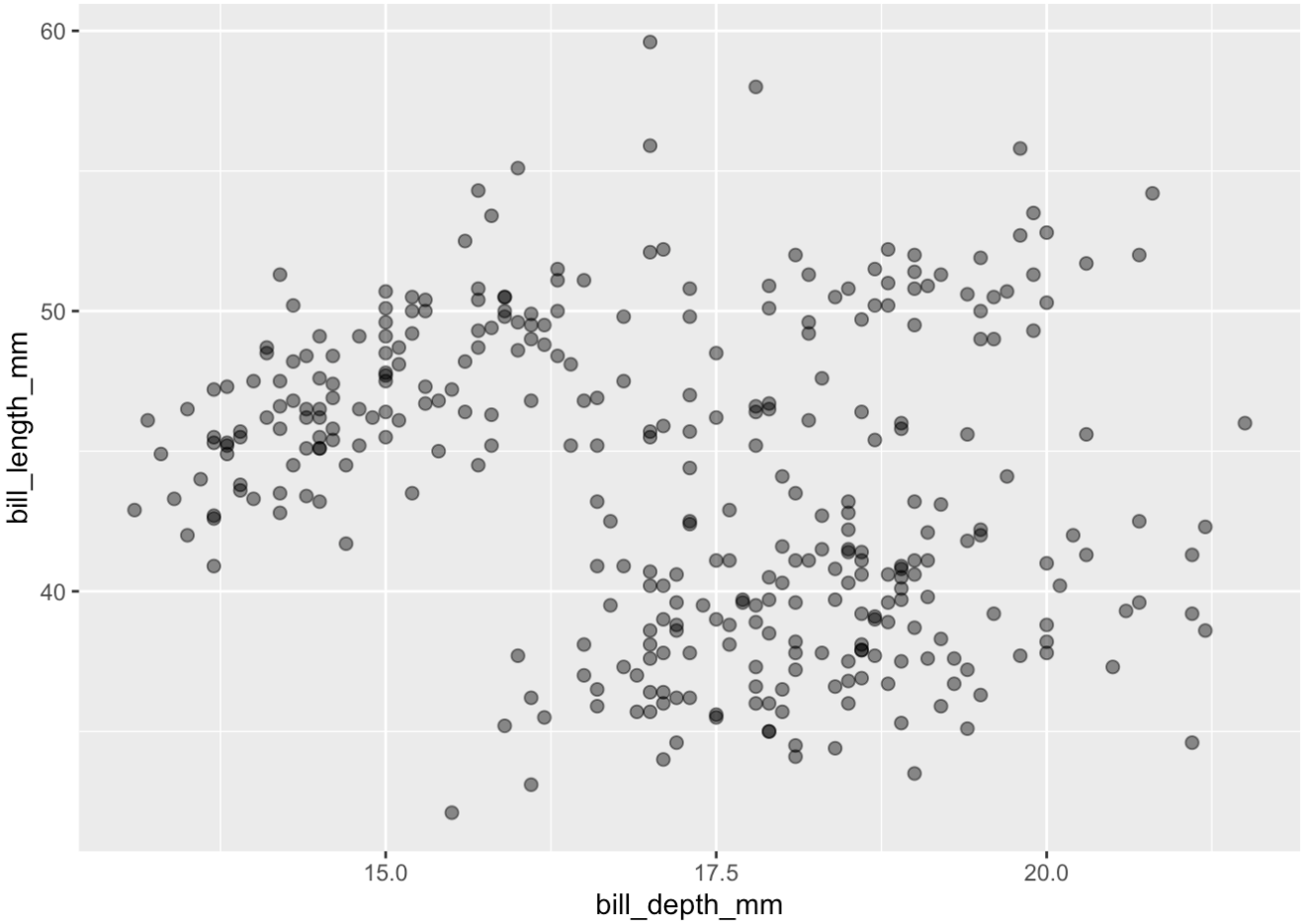
```
#Previous code was mapping:
ggplot(penguins) +
  aes(x = bill_depth_mm, y = bill_length_mm, size = body_mass_g, alpha = flipper_l
ength_mm) +
  geom_point()
```

```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```




```
#These are settings:
ggplot(penguins) +
  aes(x = bill_depth_mm, y = bill_length_mm) +
  geom_point(size = 2, alpha = 0.5)
```

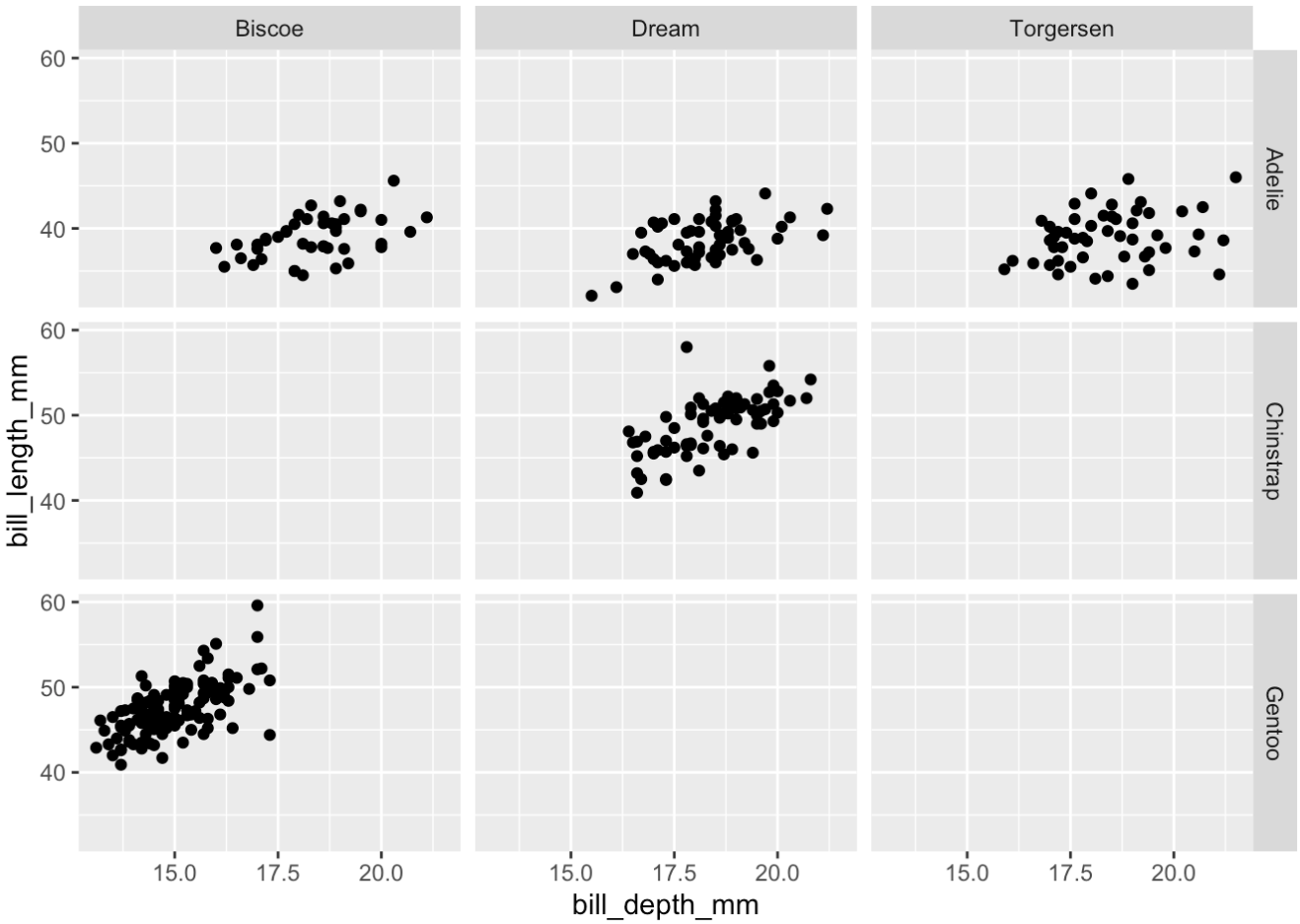
```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```



13. Faceting (Slide #29)

```
# Facets are smaller plots that display subsets of the data; useful for exploring
conditional relationships and large data
ggplot(penguins) +
  aes(x = bill_depth_mm, y = bill_length_mm) +
  geom_point() +
  facet_grid(species ~ island)
```

```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```

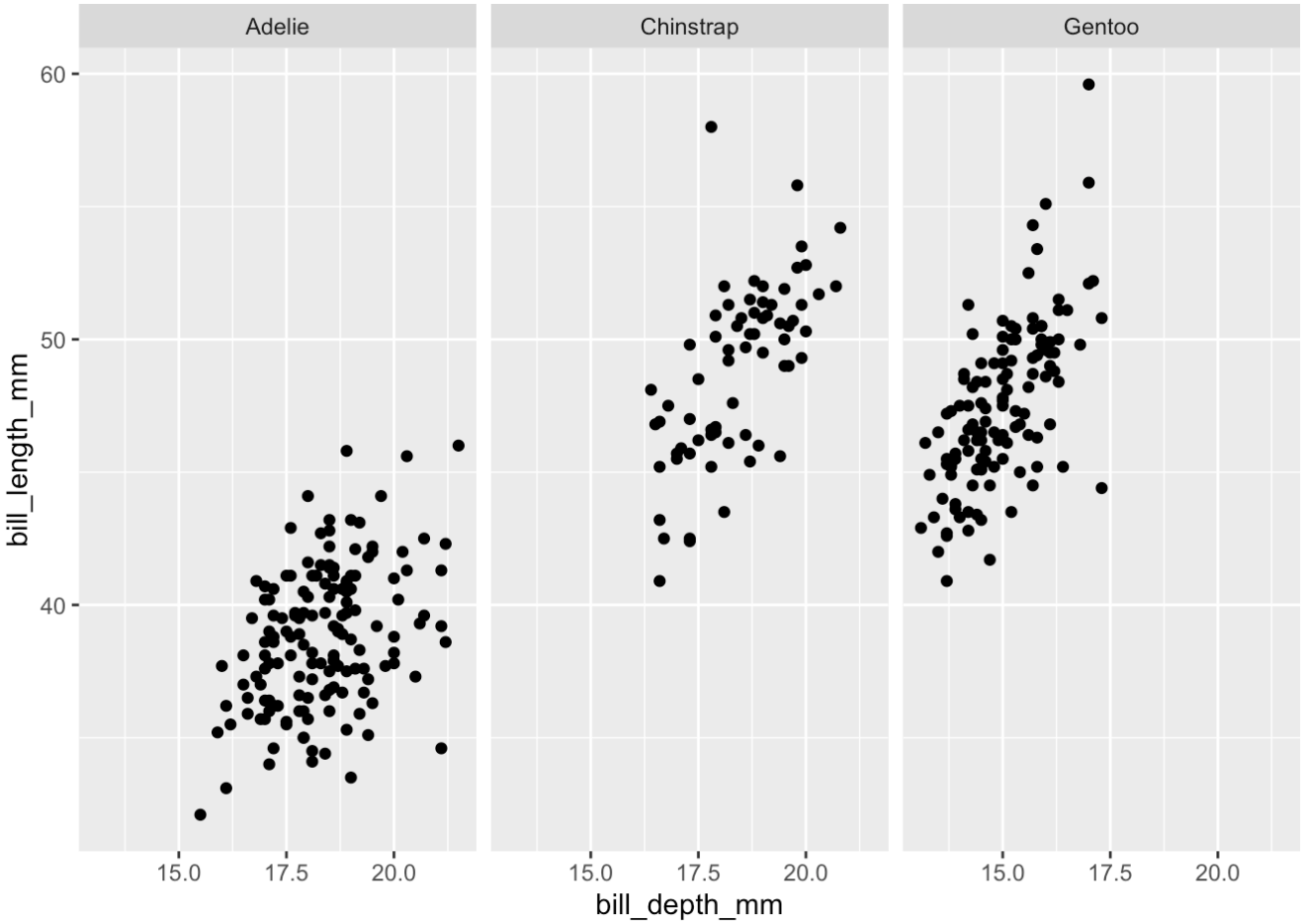



```
#rows ~ columns
```

14. Faceting - Only one variable (Slide #32 and Slide #34)

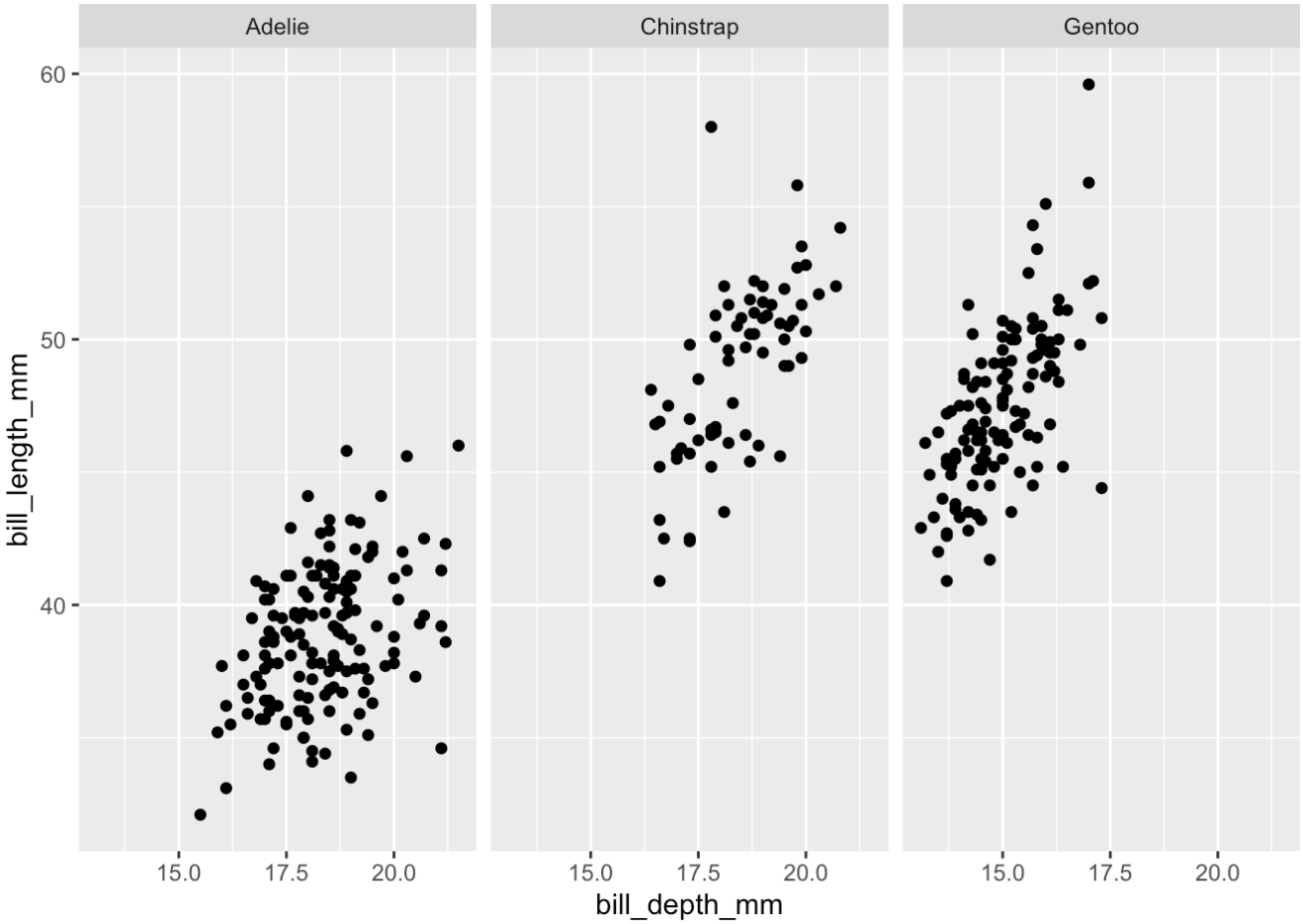
```
#with facet_wrap
ggplot(penguins) +
  aes(x = bill_depth_mm, y = bill_length_mm) +
  geom_point() +
  facet_wrap(~ species)
```

```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```




```
#with facet_grid
ggplot(penguins) +
  aes(x = bill_depth_mm, y = bill_length_mm) +
  geom_point() +
  facet_grid(. ~ species)
```

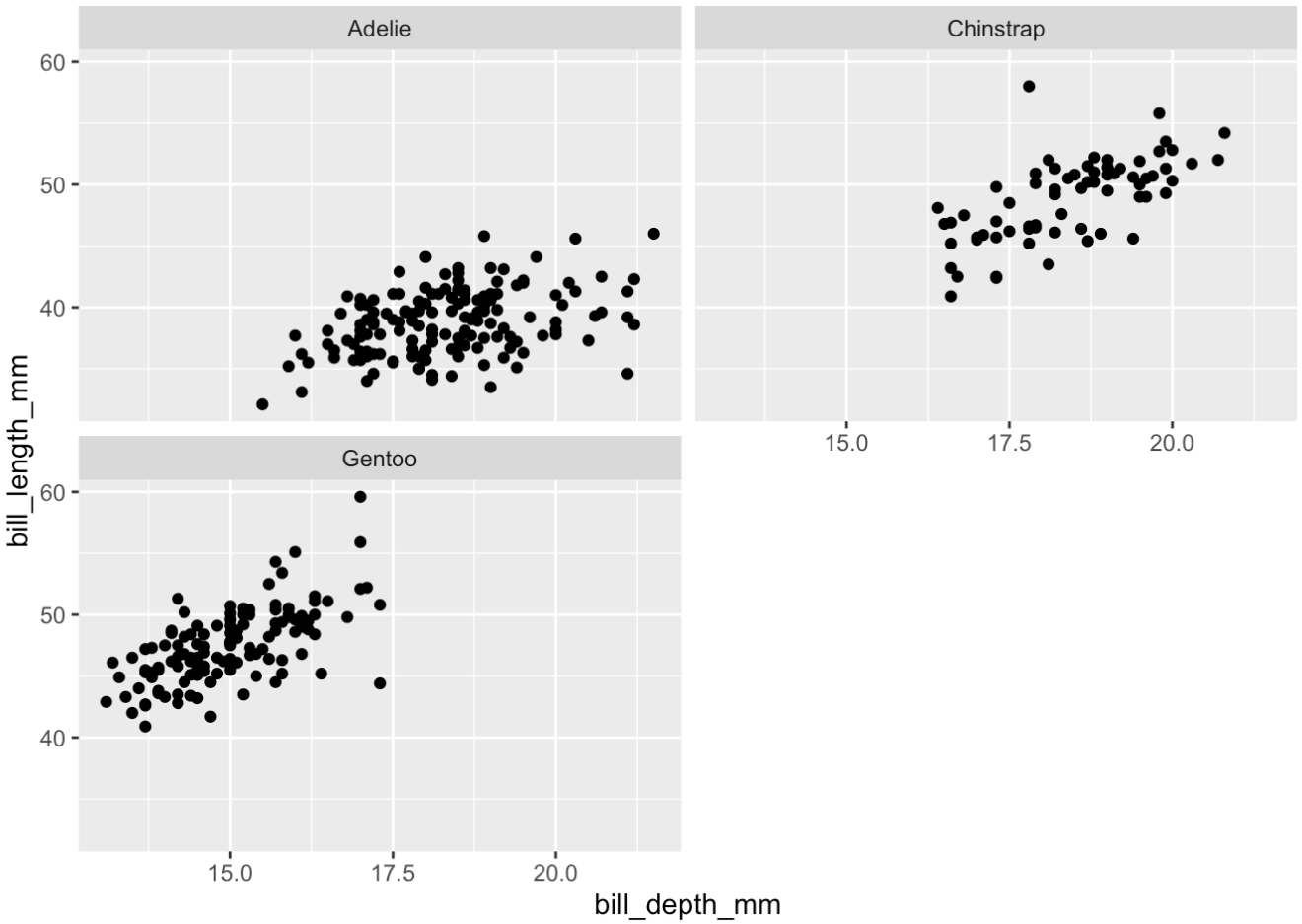
```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```



15. Faceting - Wrapping w ncol (one variable) (Slide #33)

```
ggplot(penguins) +
  aes(x = bill_depth_mm, y = bill_length_mm) +
  geom_point() +
  facet_wrap(~ species, ncol = 2)
```

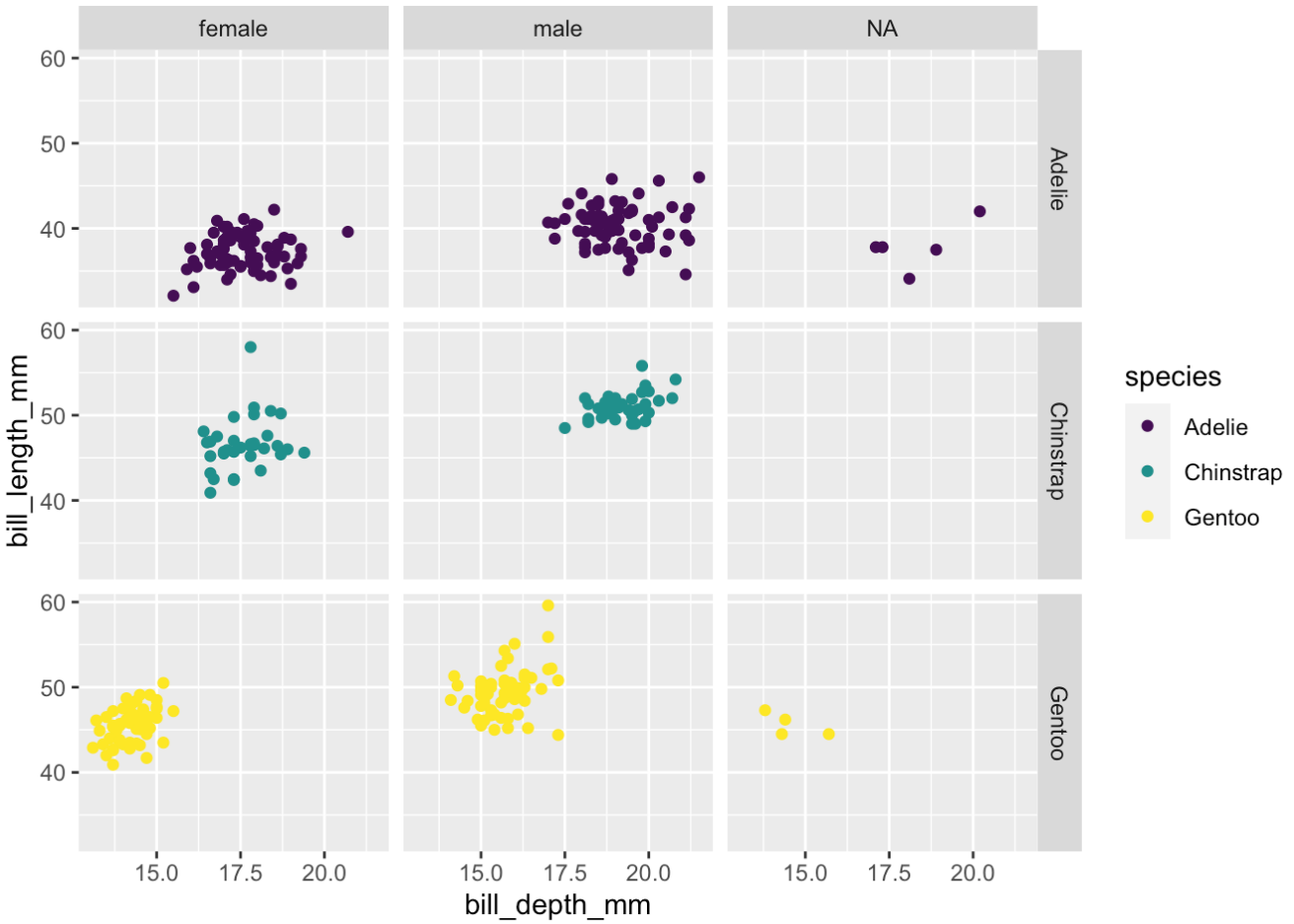
```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```



16. Faceting - Facet and Color (Slide #35)

```
ggplot(penguins) +
  aes(x = bill_depth_mm, y = bill_length_mm, color = species) +
  geom_point() +
  facet_grid(species ~ sex) +
  #not necessary; js to change color scheme:
  scale_color_viridis_d()
```

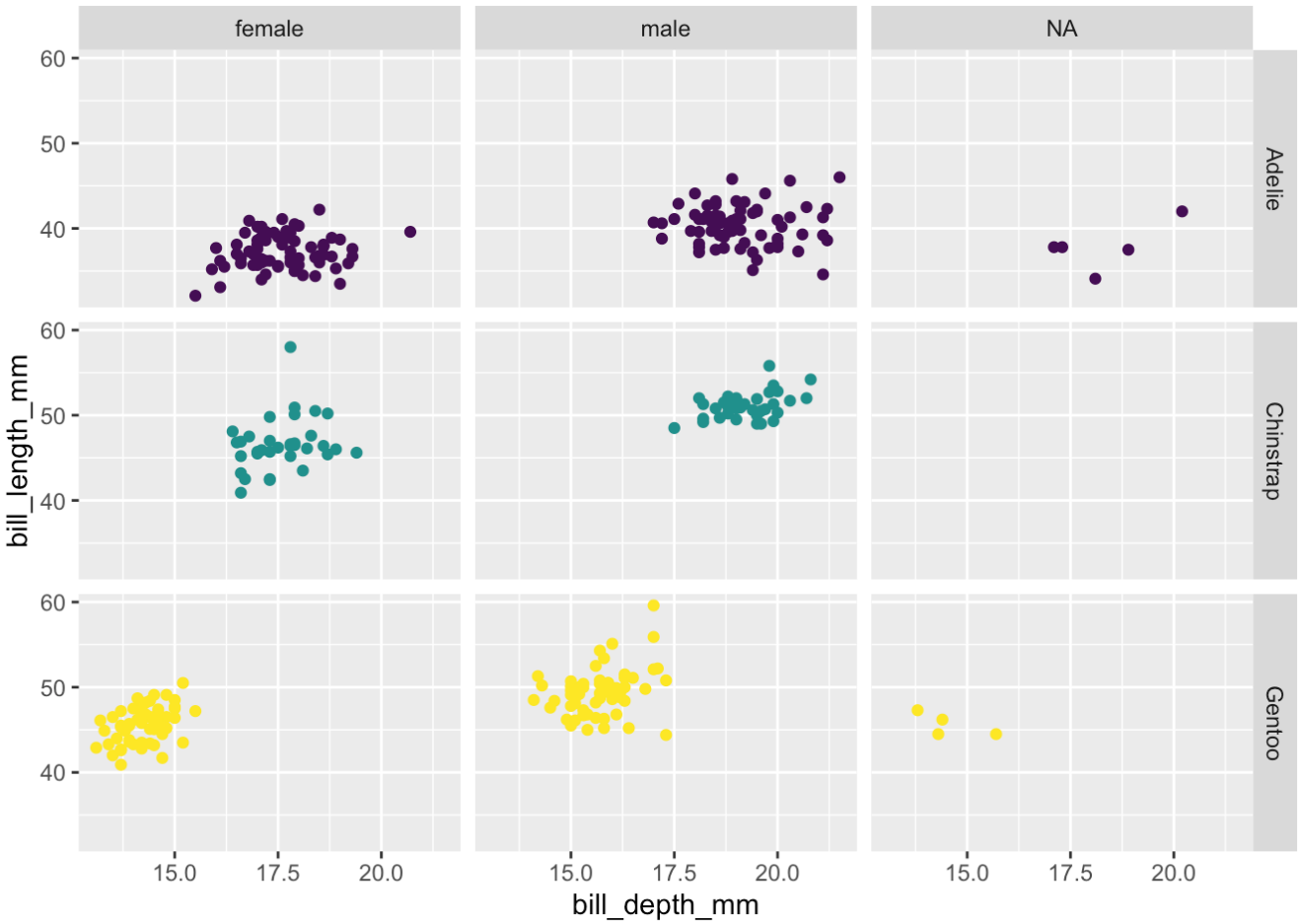
```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```



17. Faceting - Remove the legend (Slide #37)

```
ggplot(penguins) +
  aes(x = bill_depth_mm, y = bill_length_mm, color = species) +
  geom_point() +
  facet_grid(species ~ sex) +
  scale_color_viridis_d() +
  guides(color = "none")
```

```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```



B. Visualizing numeric variables

18. Load and glimpse Lending Club data (Slide #39)

```
library(openintro)
```

```
## Loading required package: airports
```

```
## Loading required package: cherryblossom
```

```
## Loading required package: usdata
```

```
glimpse(loans_full_schema)
```

```
## Rows: 10,000
## Columns: 55
## $ emp_title                          <chr> "global config engineer ", "warehouse…
## $ emp_length                         <dbl> 3, 10, 3, 1, 10, NA, 10, 10, 10, 3, 1…
## $ state                              <fct> NJ, HI, WI, PA, CA, KY, MI, AZ, NV, I…
## $ homeownership                      <fct> MORTGAGE, RENT, RENT, RENT, RENT, OWN…
## $ annual_income                      <dbl> 90000, 40000, 40000, 30000, 35000, 34…
## $ verified_income                    <fct> Verified, Not Verified, Source Verifi…
## $ debt_to_income                     <dbl> 18.01, 5.04, 21.15, 10.16, 57.96, 6.4…
## $ annual_income_joint                <dbl> NA, NA, NA, NA, 57000, NA, 155000, NA…
## $ verification_income_joint          <fct> , , , , Verified, , Not Verified, , ,…
## $ debt_to_income_joint               <dbl> NA, NA, NA, NA, 37.66, NA, 13.12, NA,…
## $ delinq_2y                          <int> 0, 0, 0, 0, 0, 1, 0, 1, 1, 0, 0, 0, 0…
## $ months_since_last_delinq           <int> 38, NA, 28, NA, NA, 3, NA, 19, 18, NA…
## $ earliest_credit_line               <dbl> 2001, 1996, 2006, 2007, 2008, 1990, 2…
## $ inquiries_last_12m                 <int> 6, 1, 4, 0, 7, 6, 1, 1, 3, 0, 4, 4, 8…
## $ total_credit_lines                 <int> 28, 30, 31, 4, 22, 32, 12, 30, 35, 9,…
## $ open_credit_lines                  <int> 10, 14, 10, 4, 16, 12, 10, 15, 21, 6,…
## $ total_credit_limit                 <int> 70795, 28800, 24193, 25400, 69839, 42…
## $ total_credit_utilized              <int> 38767, 4321, 16000, 4997, 52722, 3898…
## $ num_collections_last_12m           <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ num_historical_failed_to_pay       <int> 0, 1, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 0…
## $ months_since_90d_late              <int> 38, NA, 28, NA, NA, 60, NA, 71, 18, N…
## $ current_accounts_delinq            <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ total_collection_amount_ever       <int> 1250, 0, 432, 0, 0, 0, 0, 0, 0, 0, 0,…
## $ current_installment_accounts       <int> 2, 0, 1, 1, 1, 0, 2, 2, 6, 1, 2, 1, 2…
## $ accounts_opened_24m                <int> 5, 11, 13, 1, 6, 2, 1, 4, 10, 5, 6, 7…
## $ months_since_last_credit_inquiry   <int> 5, 8, 7, 15, 4, 5, 9, 7, 4, 17, 3, 4,…
## $ num_satisfactory_accounts          <int> 10, 14, 10, 4, 16, 12, 10, 15, 21, 6,…
## $ num_accounts_120d_past_due         <int> 0, 0, 0, 0, 0, 0, 0, NA, 0, 0, 0, 0, …
## $ num_accounts_30d_past_due          <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ num_active_debit_accounts          <int> 2, 3, 3, 2, 10, 1, 3, 5, 11, 3, 2, 2,…
## $ total_debit_limit                  <int> 11100, 16500, 4300, 19400, 32700, 272…
## $ num_total_cc_accounts              <int> 14, 24, 14, 3, 20, 27, 8, 16, 19, 7, …
## $ num_open_cc_accounts               <int> 8, 14, 8, 3, 15, 12, 7, 12, 14, 5, 8,…
## $ num_cc_carrying_balance            <int> 6, 4, 6, 2, 13, 5, 6, 10, 14, 3, 5, 3…
## $ num_mort_accounts                  <int> 1, 0, 0, 0, 0, 3, 2, 7, 2, 0, 2, 3, 3…
## $ account_never_delinq_percent       <dbl> 92.9, 100.0, 93.5, 100.0, 100.0, 78.1…
## $ tax_liens                          <int> 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ public_record_bankrupt             <int> 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0…
## $ loan_purpose                       <fct> moving, debt_consolidation, other, de…
## $ application_type                   <fct> individual, individual, individual, i…
## $ loan_amount                        <int> 28000, 5000, 2000, 21600, 23000, 5000…
## $ term                               <dbl> 60, 36, 36, 36, 36, 36, 60, 60, 36, 3…
## $ interest_rate                      <dbl> 14.07, 12.61, 17.09, 6.72, 14.07, 6.7…
## $ installment                        <dbl> 652.53, 167.54, 71.40, 664.19, 786.87…
## $ grade                              <fct> C, C, D, A, C, A, C, B, C, A, C, B, C…
## $ sub_grade                          <fct> C3, C1, D1, A3, C3, A3, C2, B5, C2, A…
## $ issue_month                        <fct> Mar-2018, Feb-2018, Feb-2018, Jan-201…
## $ loan_status                        <fct> Current, Current, Current, Current, C…
## $ initial_listing_status             <fct> whole, whole, fractional, whole, whol…
## $ disbursement_method                <fct> Cash, Cash, Cash, Cash, Cash, Cash, C…
## $ balance                            <dbl> 27015.86, 4651.37, 1824.63, 18853.26,…
## $ paid_total                         <dbl> 1999.330, 499.120, 281.800, 3312.890,…
```

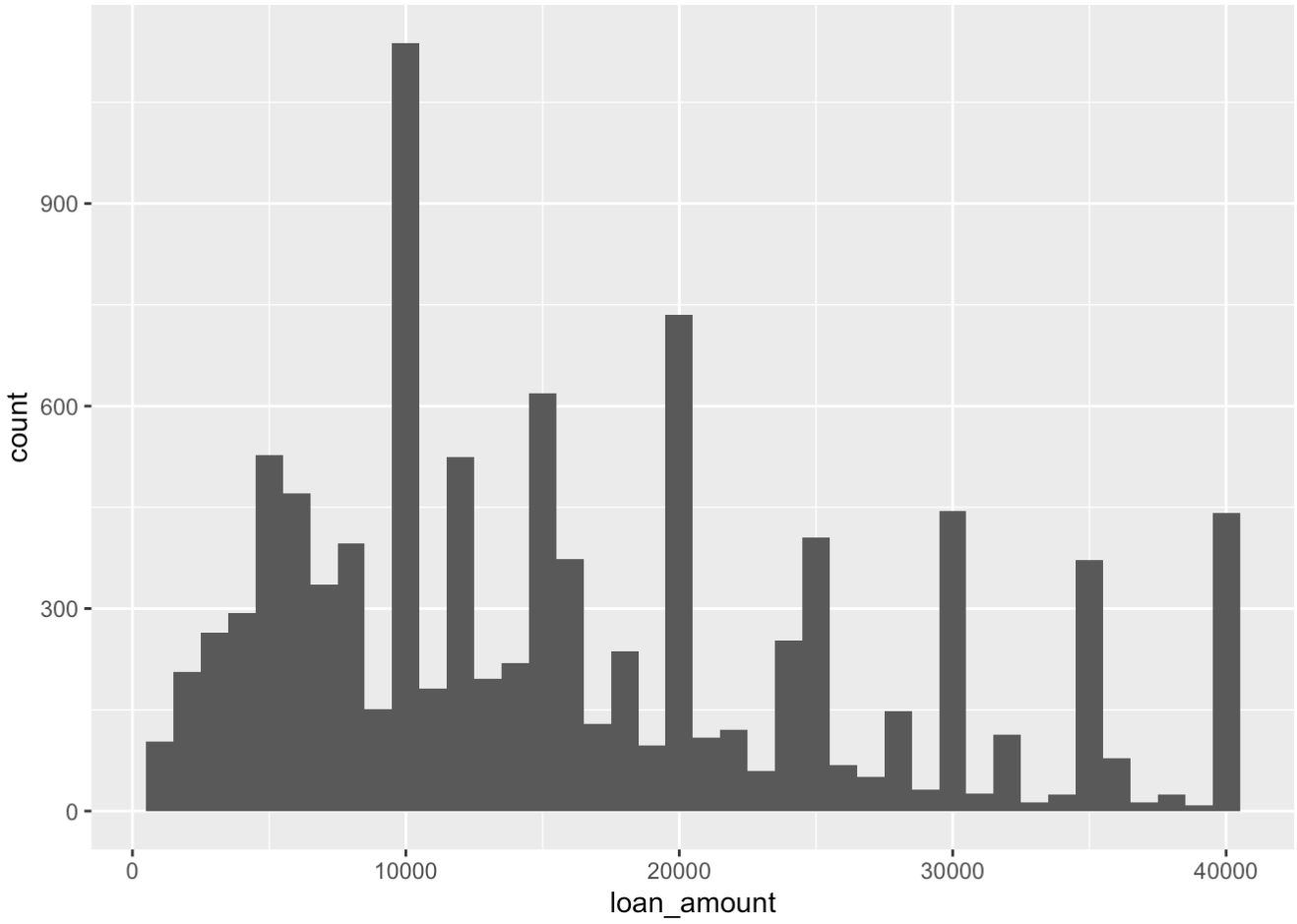
```
## $ paid_principal                <dbl> 984.14, 348.63, 175.37, 2746.74, 1569…
## $ paid_interest                 <dbl> 1015.19, 150.49, 106.43, 566.15, 754.…
## $ paid_late_fees                <dbl> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
```

19. Select some variables (Slide #40)

```
loans <- loans_full_schema %>%
  select(loan_amount, interest_rate, term, grade, state, annual_income, homeowners
hip, debt_to_income)
```

20. Histogram (Slide #46-47)

```
ggplot(loans) +
  aes(x = loan_amount) +
  geom_histogram(binwidth = 1000)
```




```
#binwidth to change... bin width.
```

21. Filling a histogram with a categorical variable (Slide #51)