

Code Along 7

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2023-10-04

```
library(tidyverse)
```

```
## Warning: package 'tidyverse' was built under R version 4.2.3
```

```
## Warning: package 'ggplot2' was built under R version 4.2.3
```

```
## Warning: package 'tibble' was built under R version 4.2.3
```

```
## Warning: package 'tidyr' was built under R version 4.2.3
```

```
## Warning: package 'readr' was built under R version 4.2.3
```

```
## Warning: package 'purrr' was built under R version 4.2.2
```

```
## Warning: package 'dplyr' was built under R version 4.2.3
```

```
## Warning: package 'stringr' was built under R version 4.2.2
```

```
## Warning: package 'forcats' was built under R version 4.2.3
```

```
## Warning: package 'lubridate' was built under R version 4.2.3
```

```
## — 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     1.0.1
## — Conflicts — tidyverse_conflicts() —
## ✗ dplyr::filter() masks stats::filter()
## ✗ dplyr::lag()     masks stats::lag()
## i Use the [8];http://conflicted.r-lib.org/[8]; to force all conflict
s to become errors
```

```
#install.packages("palmerpenguins")
library(palmerpenguins)
```

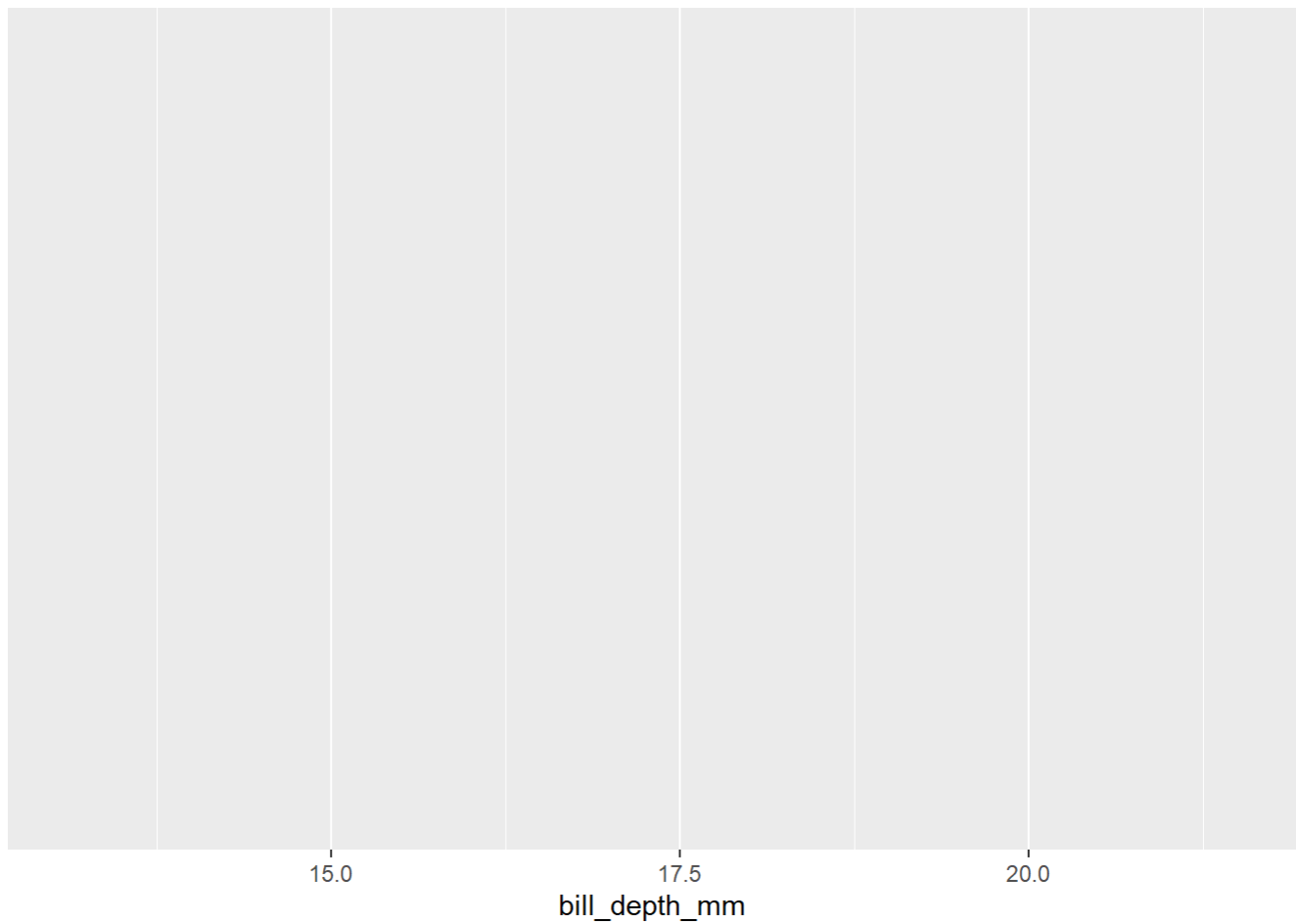
```
## Warning: package 'palmerpenguins' was built under R version 4.2.3
```

```
glimpse(penguins)
```

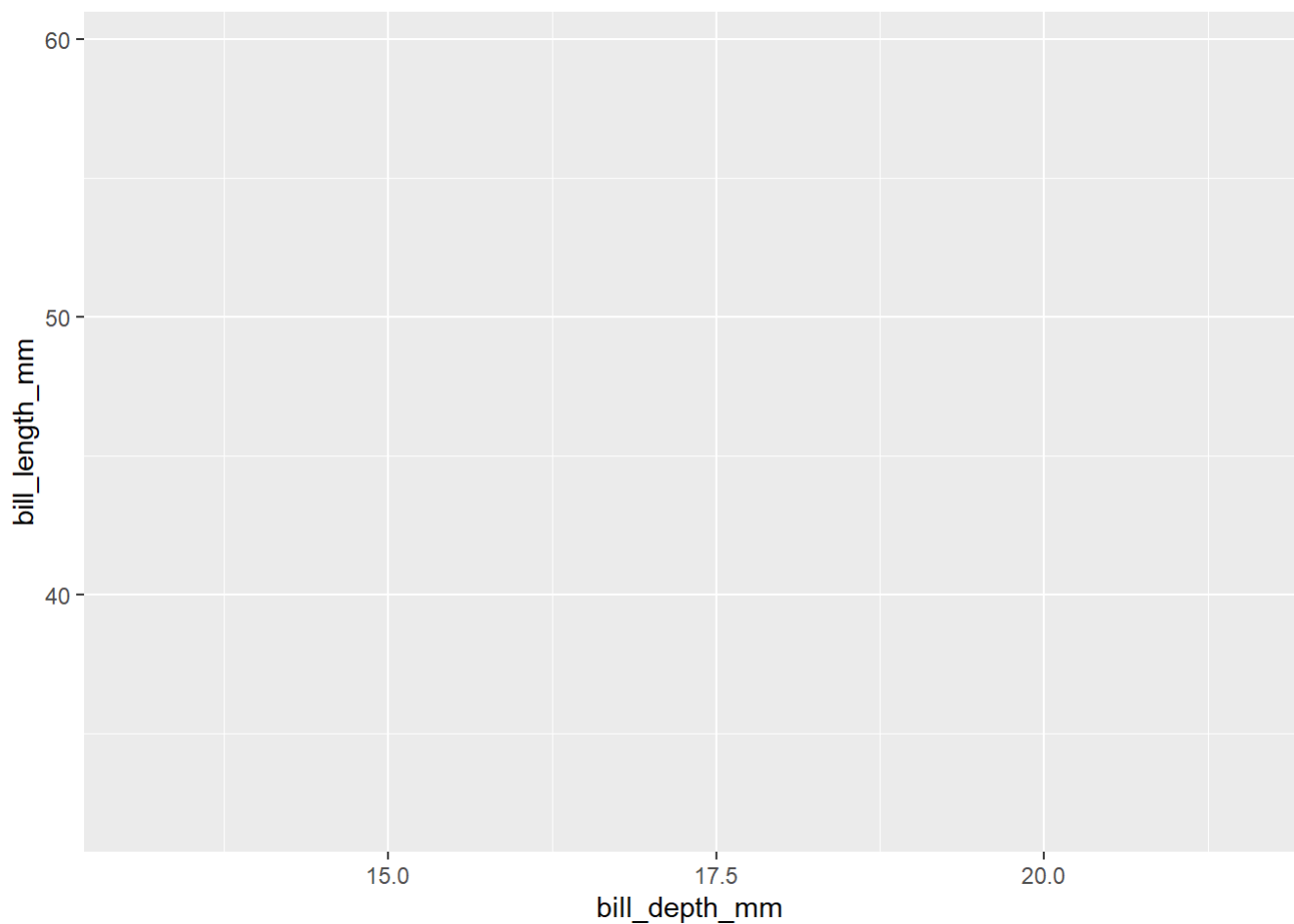
```
## Rows: 344
## Columns: 8
## $ species      <fct> Adelie, Adelie, Adelie, Adelie, Adelie, Adelie, Adel...
## $ island       <fct> Torgersen, Torgersen, Torgersen, Torgersen, Torgersen...
## $ bill_length_mm <dbl> 39.1, 39.5, 40.3, NA, 36.7, 39.3, 38.9, 39.2, 34.1, ...
## $ bill_depth_mm <dbl> 18.7, 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...
```

```
ggplot(data = penguins)
```

```
# Map bill depth to the x-axis
ggplot(data = penguins,
mapping = aes(x = bill_depth_mm))
```

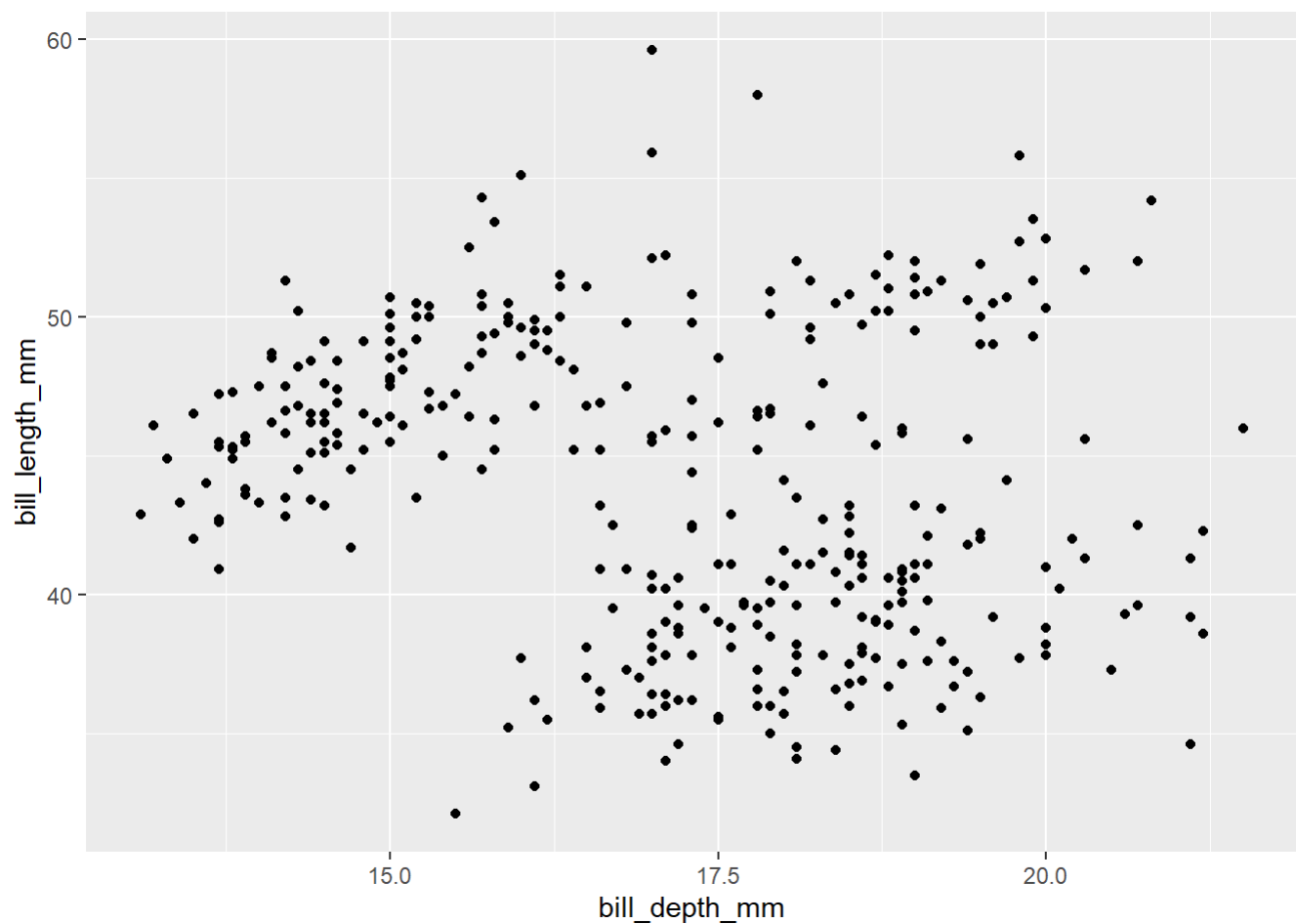


```
#Map bill length to the y-axis  
  
ggplot(data = penguins,  
mapping = aes(x = bill_depth_mm,  
y = bill_length_mm))
```



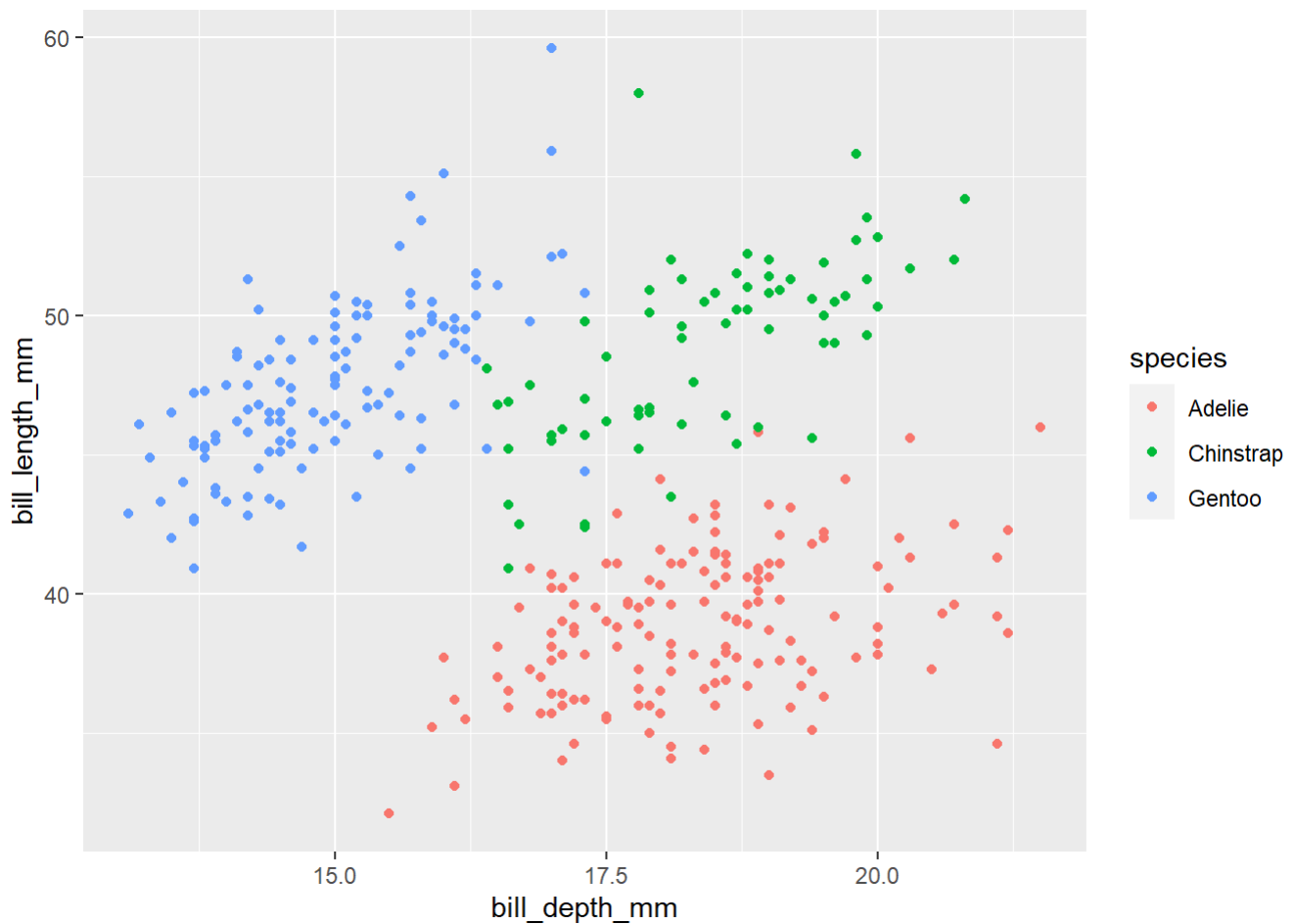
```
# Represent each observation with a point
ggplot(data = penguins,
mapping = aes(x = bill_depth_mm,
y = bill_length_mm)) +
geom_point()
```

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



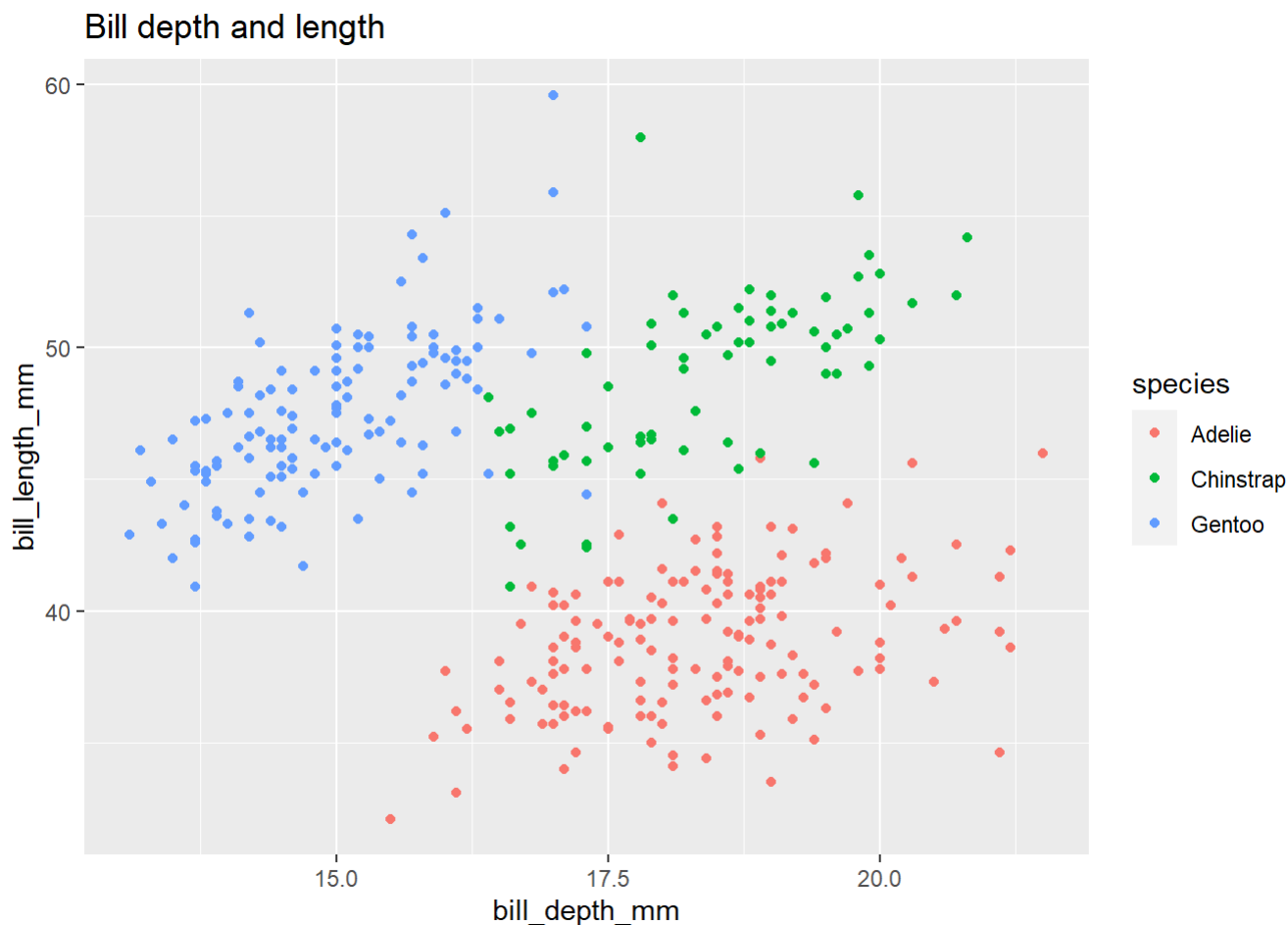
```
# Map species to the colour of each point
ggplot(data = penguins,
mapping = aes(x = bill_depth_mm,
y = bill_length_mm,
colour = species)) +
geom_point()
```

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



```
# Title the plot "Bill depth and Length"
ggplot(data = penguins,
mapping = aes(x = bill_depth_mm,
y = bill_length_mm,
colour = species)) +
geom_point() +
labs(title = "Bill depth and length")
```

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



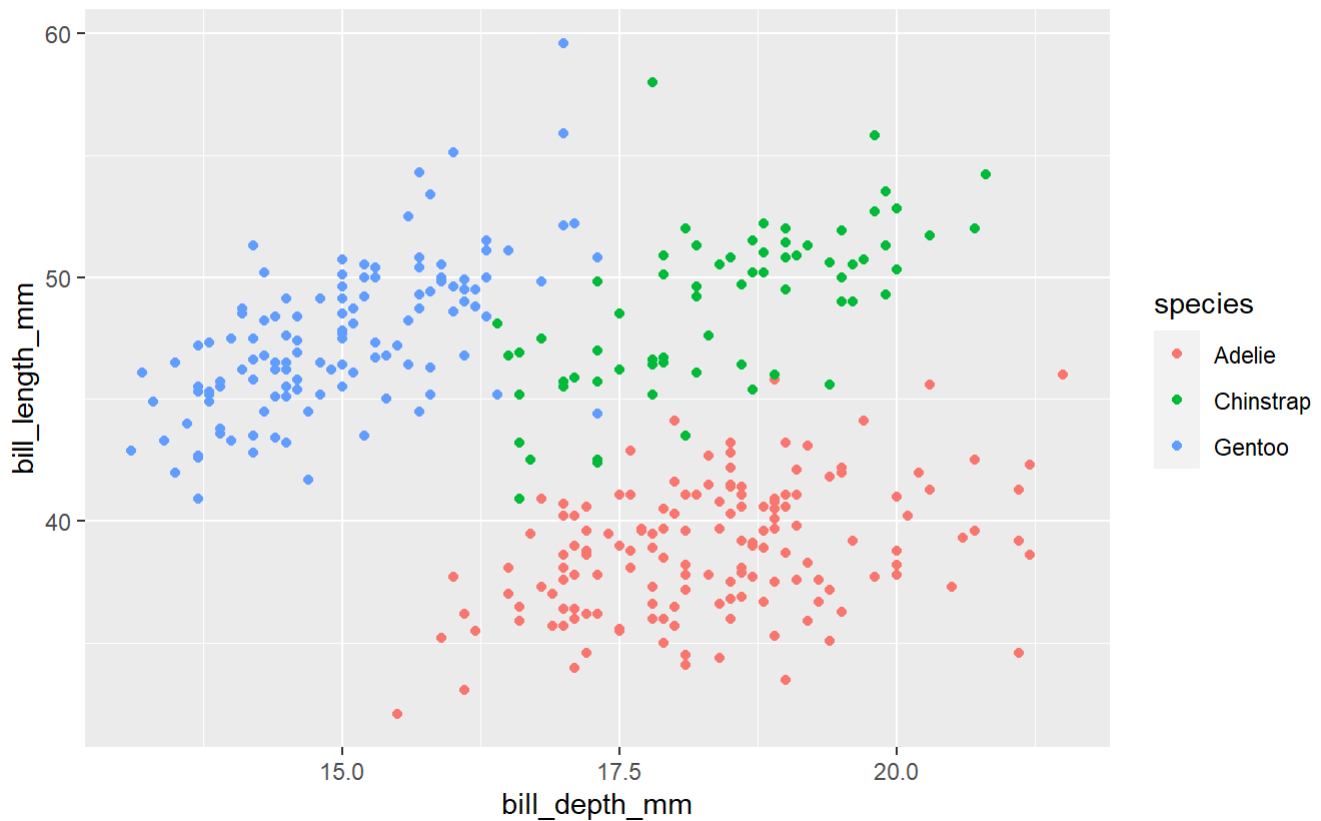
```
# Add the subtitle "Dimensions for Adelie, Chinstrap, and Gentoo Penguins"
```

```
ggplot(data = penguins,  
mapping = 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")
```

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

Bill depth and length

Dimensions for Adelie,
Chinstrap, and Gentoo Penguins



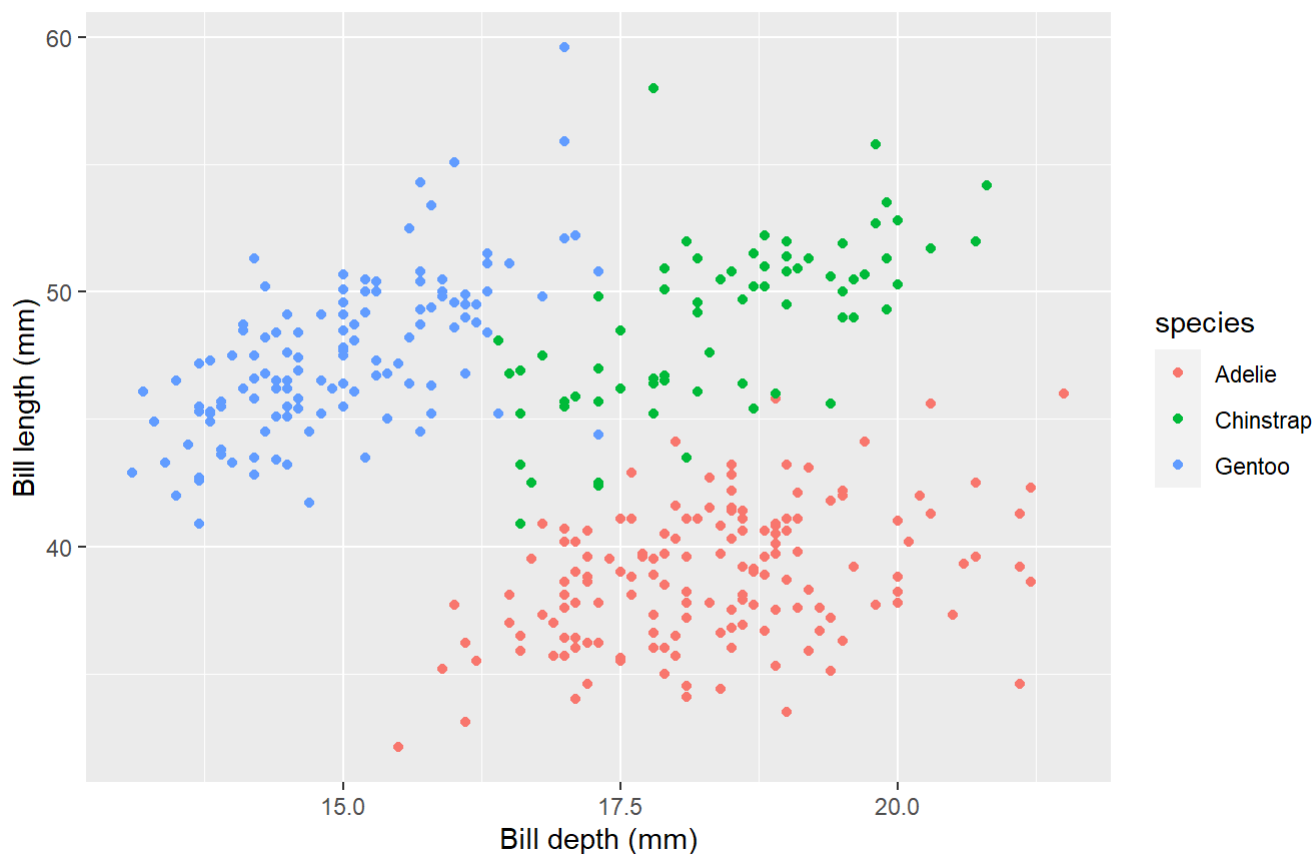
```
# Label the x and y axes as "Bill depth (mm)" and "Bill length (mm)", respectively
```

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

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


Bill depth and length

Dimensions for Adelie, Chinstrap

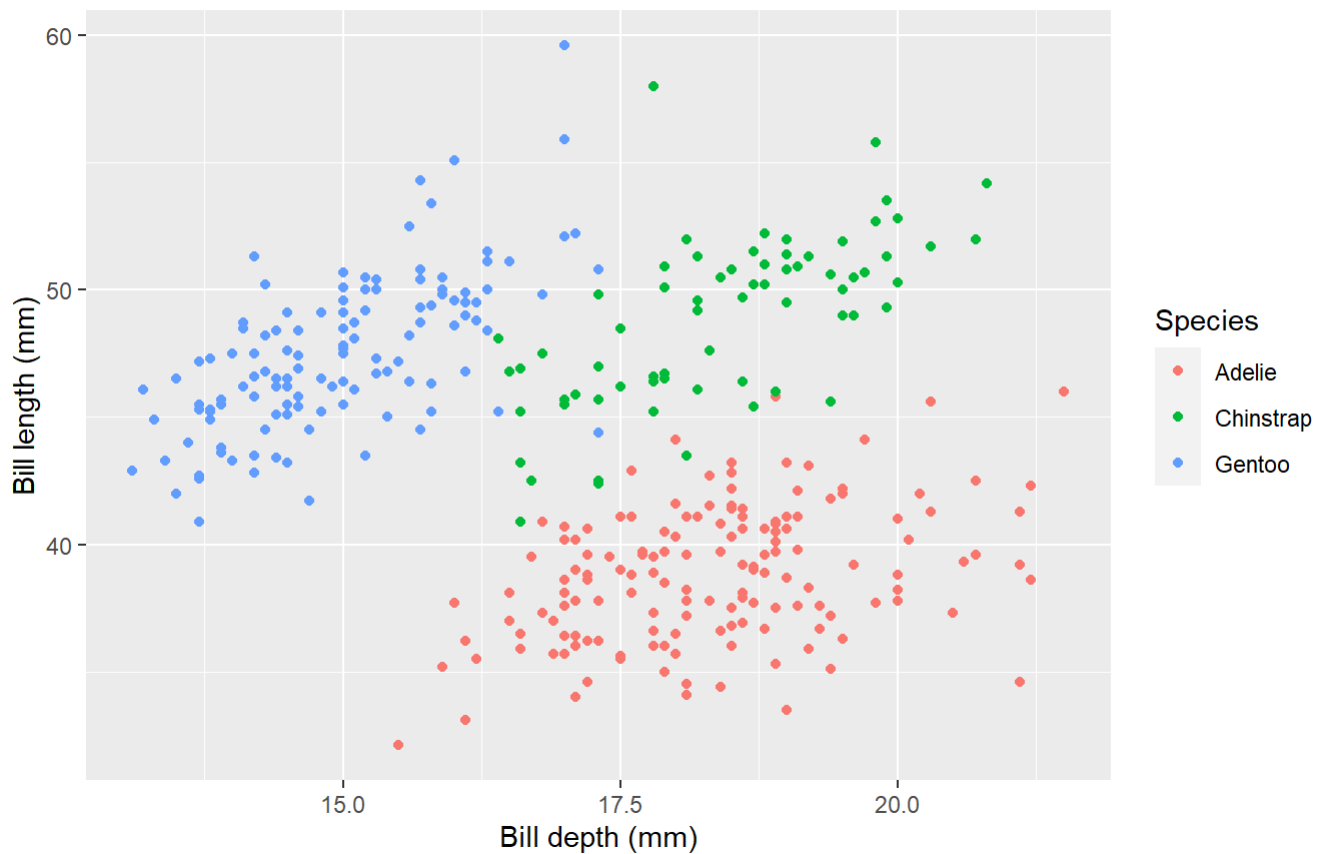


```
### Label the Legend "Species"
ggplot(data = penguins,
mapping = aes(x = bill_depth_mm,
y = bill_length_mm,
colour = species)) +
geom_point() +
labs(title = "Bill depth and length",
subtitle = "Dimensions for Adelie, Chinstrap",
x = "Bill depth (mm)", y = "Bill length (mm)",
colour = "Species")
```

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

Bill depth and length

Dimensions for Adelie, Chinstrap

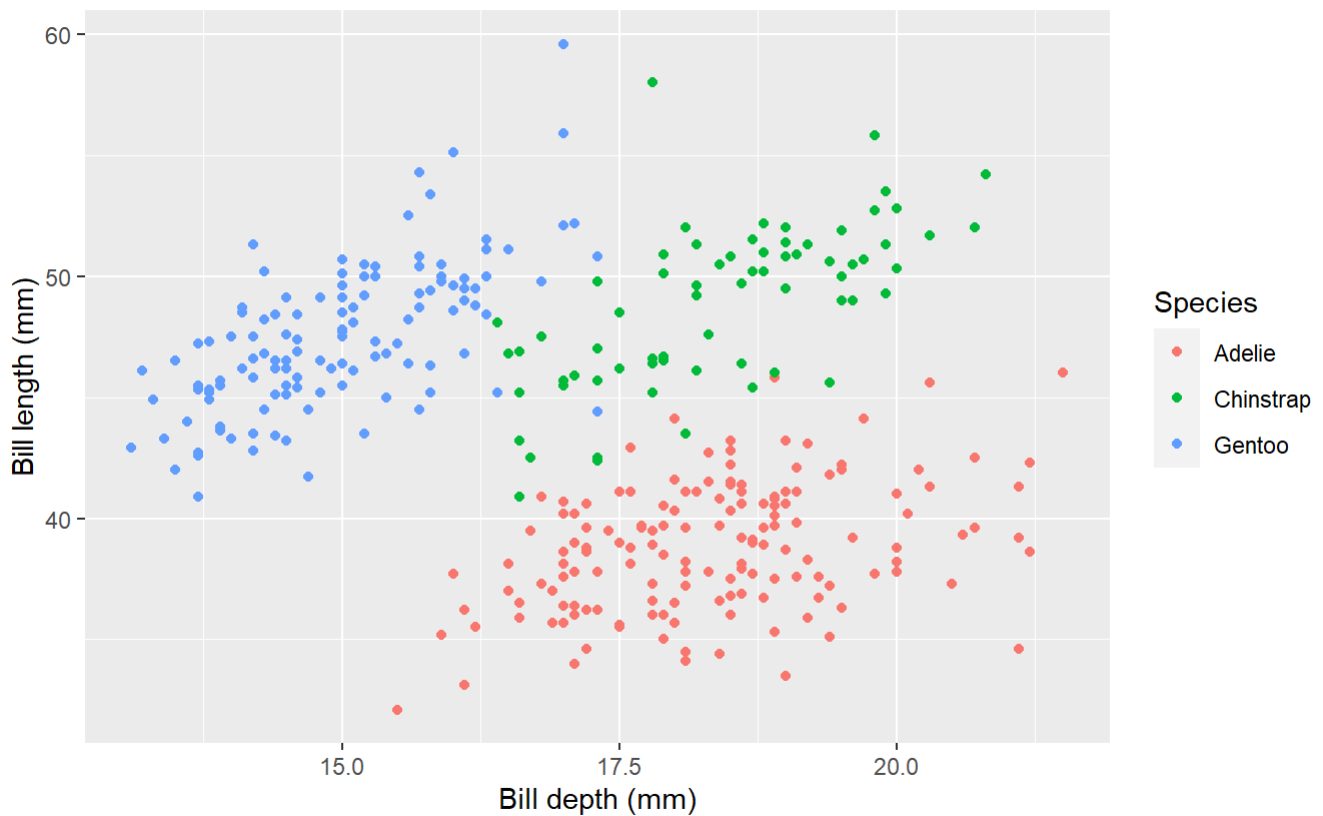


```
### Add a caption for the data source
ggplot(data = penguins,
mapping = aes(x = bill_depth_mm,
y = bill_length_mm,
colour = species)) +
geom_point() +
labs(title = "Bill depth and length",
subtitle = "Dimensions for Adelie, Chinstrap",
x = "Bill depth (mm)", y = "Bill length (mm)",
colour = "Species",
caption = "Source: Palmer Station LTER")
```

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

Bill depth and length

Dimensions for Adelie, Chinstrap



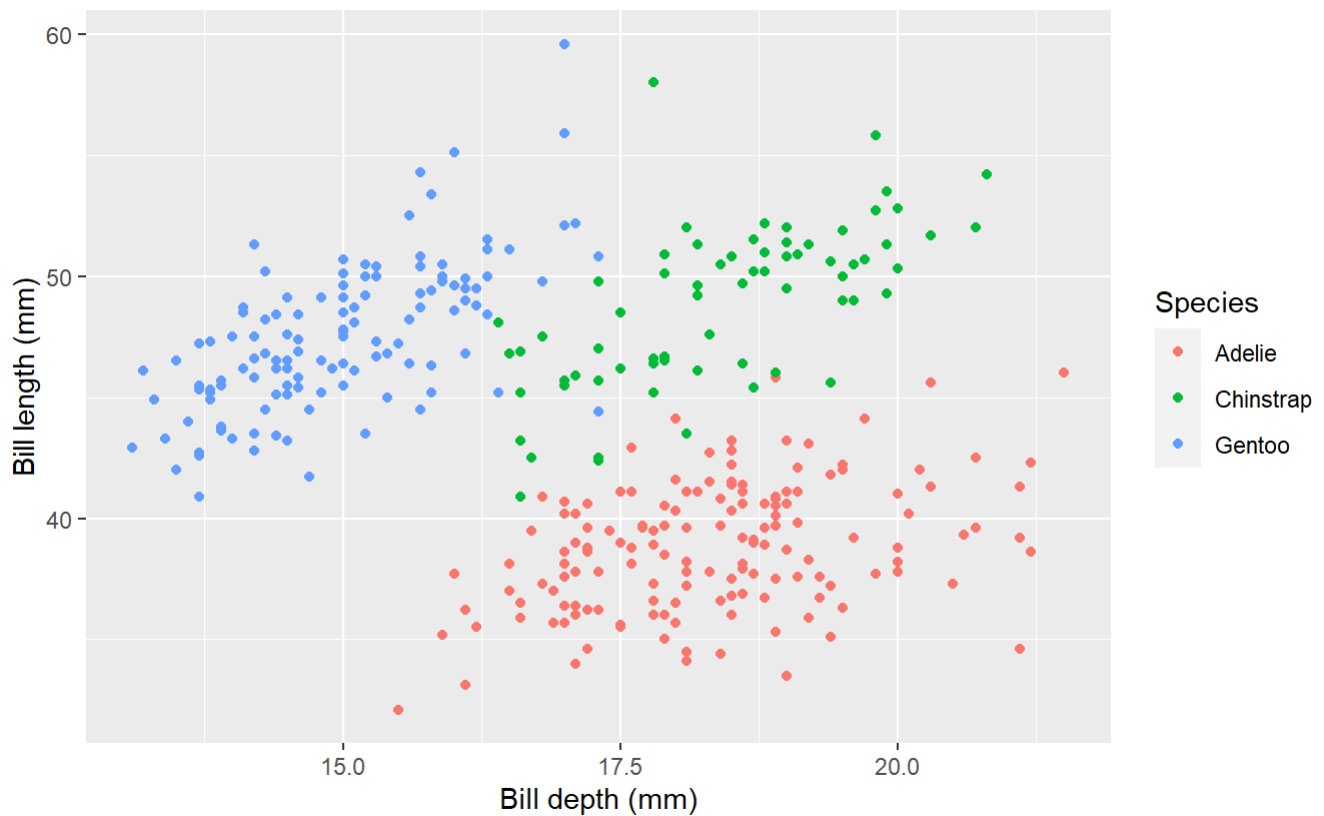
Source: Palmer Station LTER

```
### Finally, use a discrete colour scale that is designed to be perceived by viewers with common forms of colour blindness.
ggplot(data = penguins,
mapping = aes(x = bill_depth_mm,
y = bill_length_mm,
colour = species)) +
geom_point() +
labs(title = "Bill depth and length",
subtitle = "Dimensions for Adelie, Chinstrap",
x = "Bill depth (mm)", y = "Bill length (mm)",
colour = "Species",
caption = "Source: Palmer Station LTER")
```

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

Bill depth and length

Dimensions for Adelie, Chinstrap



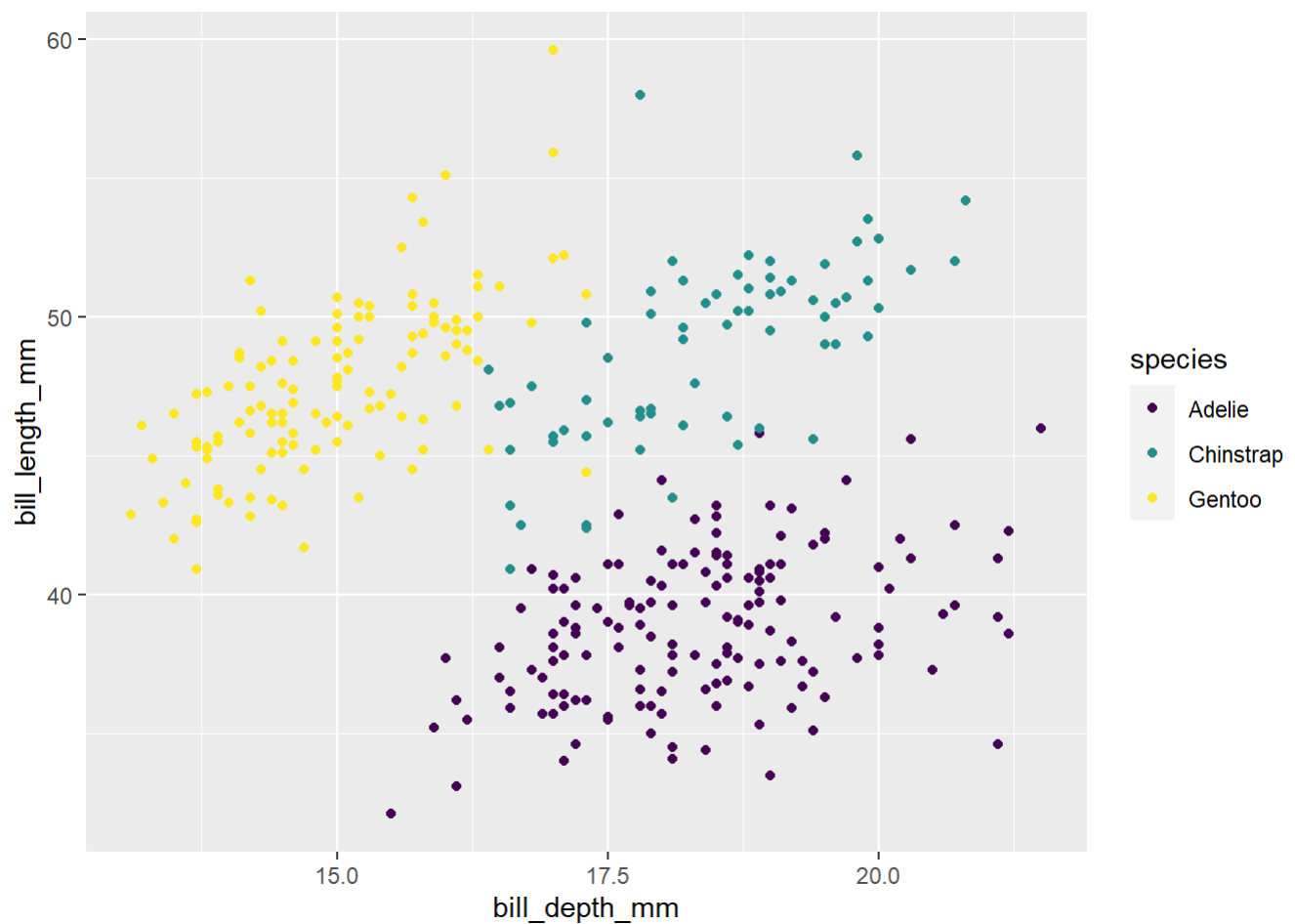
Source: Palmer Station LTER

```
scale_colour_viridis_d()
```

```
## <ggproto object: Class ScaleDiscrete, Scale, gg>
##   aesthetics: colour
##   axis_order: function
##   break_info: function
##   break_positions: function
##   breaks: waiver
##   call: call
##   clone: function
##   dimension: function
##   drop: TRUE
##   expand: waiver
##   get_breaks: function
##   get_breaks_minor: function
##   get_labels: function
##   get_limits: function
##   guide: legend
##   is_discrete: function
##   is_empty: function
##   labels: waiver
##   limits: NULL
##   make_sec_title: function
##   make_title: function
##   map: function
##   map_df: function
##   n.breaks.cache: NULL
##   na.translate: TRUE
##   na.value: NA
##   name: waiver
##   palette: function
##   palette.cache: NULL
##   position: left
##   range: environment
##   rescale: function
##   reset: function
##   scale_name: viridis_d
##   train: function
##   train_df: function
##   transform: function
##   transform_df: function
##   super: <ggproto object: Class ScaleDiscrete, Scale, gg>
```

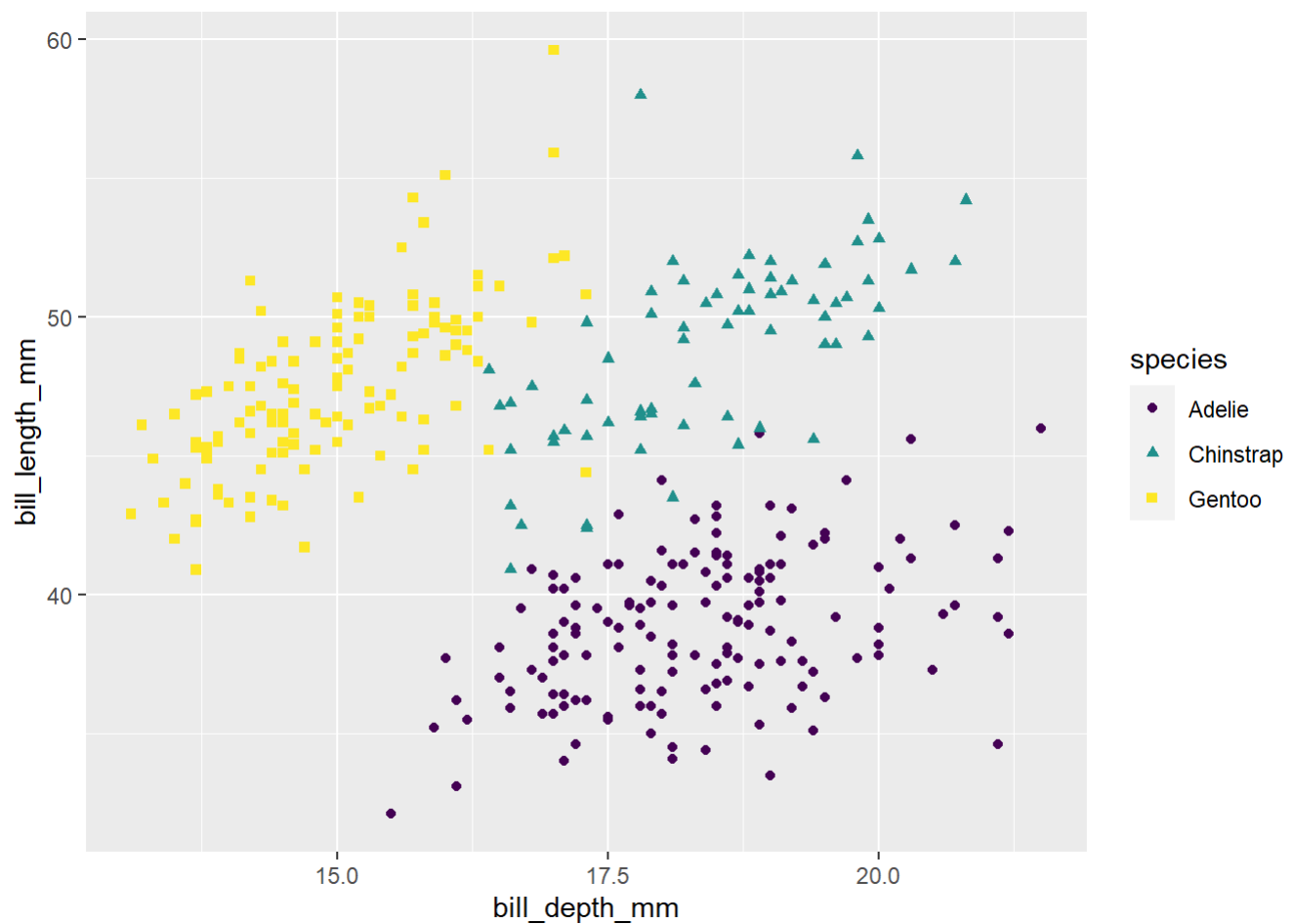
```
ggplot(penguins) + aes(x = bill_depth_mm, y = bill_length_mm,
  colour = species) +
  geom_point() + scale_colour_viridis_d()
```

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



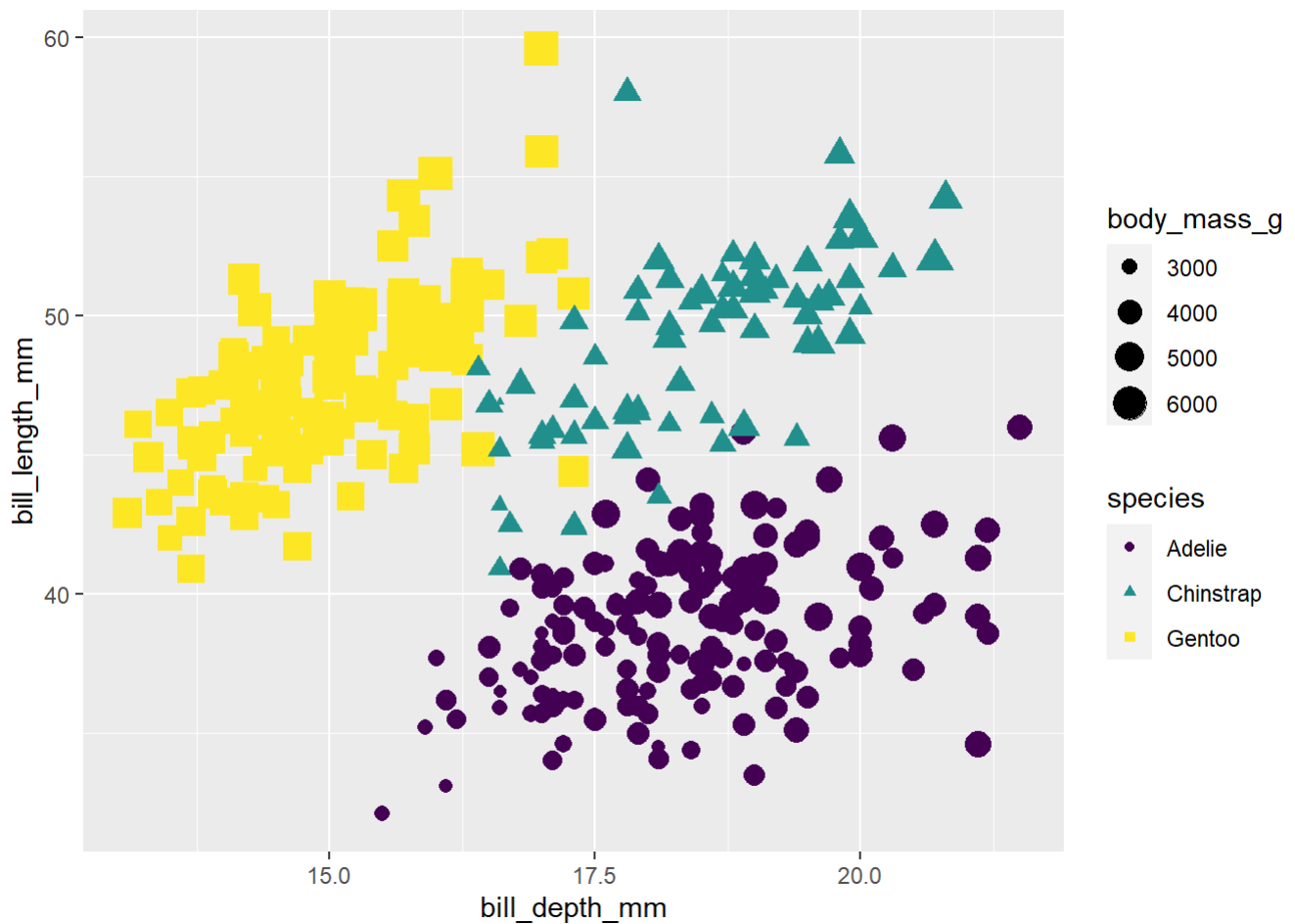
```
ggplot(penguins) + aes(x = bill_depth_mm, y = bill_length_mm,  
  colour = species, shape = species) +  
  geom_point() + scale_colour_viridis_d()
```

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



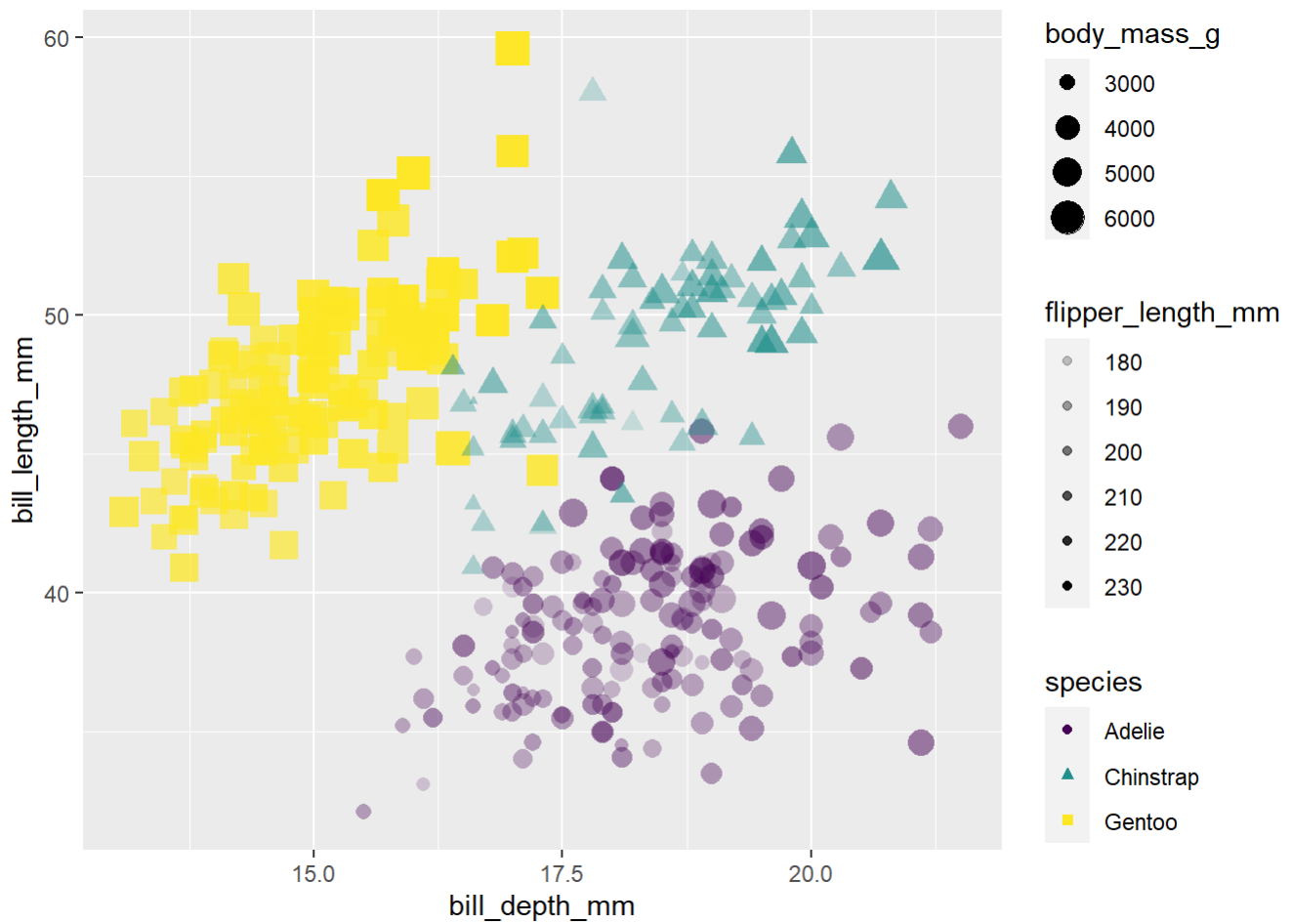
```
ggplot(penguins, aes(x = bill_depth_mm, y = bill_length_mm, colour = species, shape = species,  
size = body_mass_g)) +  
geom_point() + scale_colour_viridis_d()
```

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



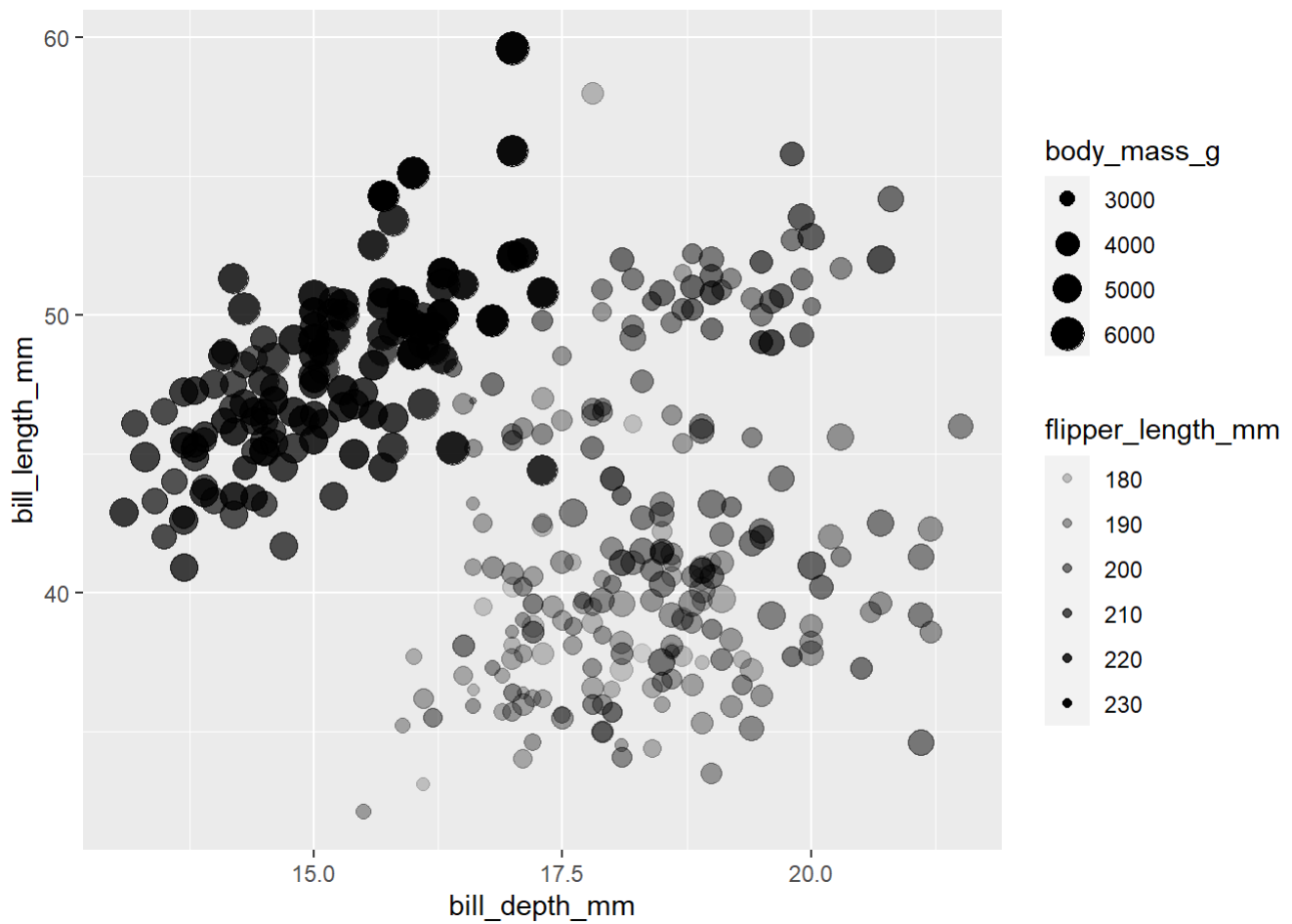
```
ggplot(penguins, aes(x = bill_depth_mm, y = bill_length_mm, colour = species,  
  shape = species, size = body_mass_g, alpha = flipper_length_mm)) +  
  geom_point() + scale_colour_viridis_d()
```

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

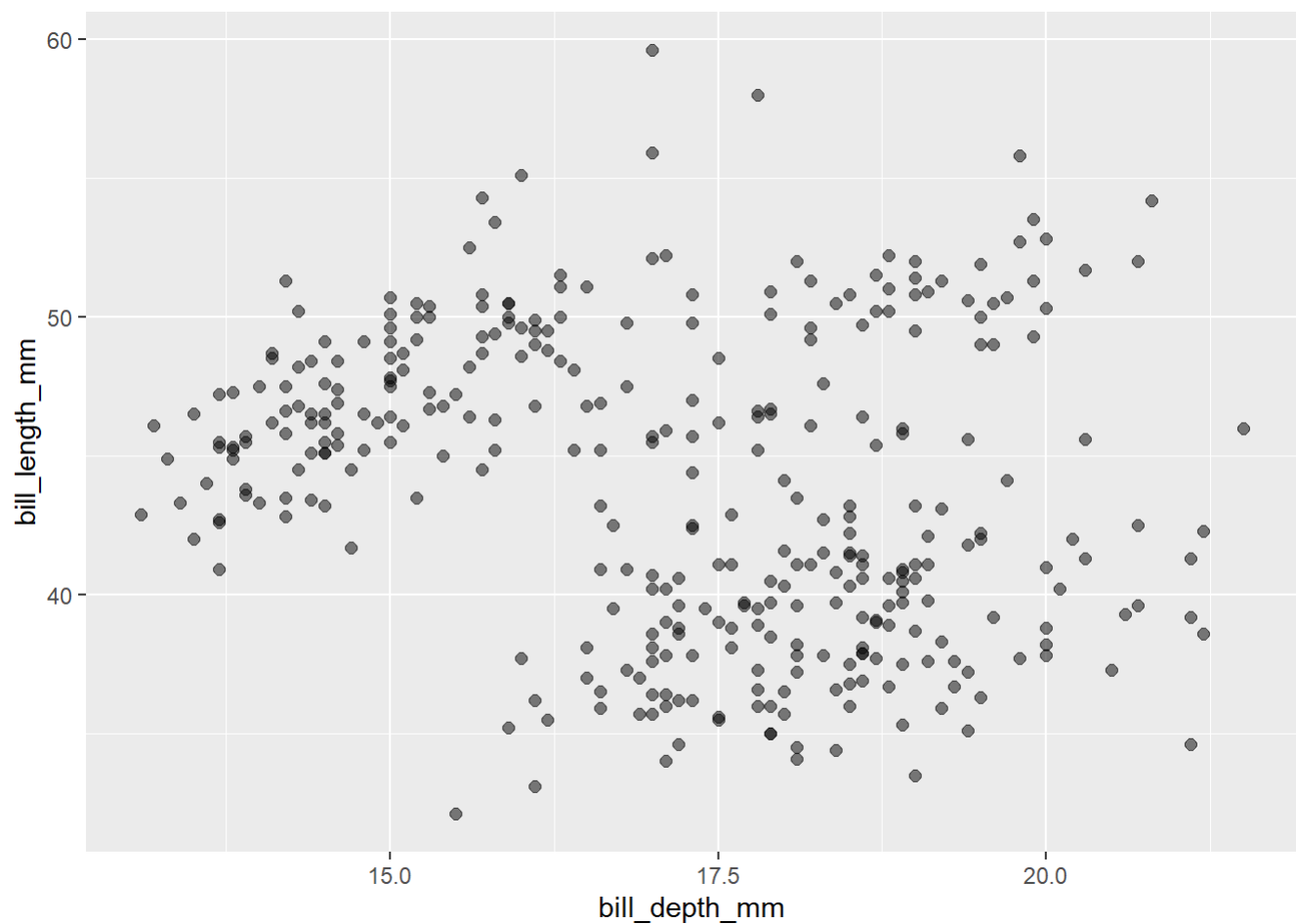
```
ggplot(penguins) +  
  aes(x = bill_depth_mm,  
      y = bill_length_mm,  
      size = body_mass_g,  
      alpha = flipper_length_mm) +  
  geom_point()
```

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



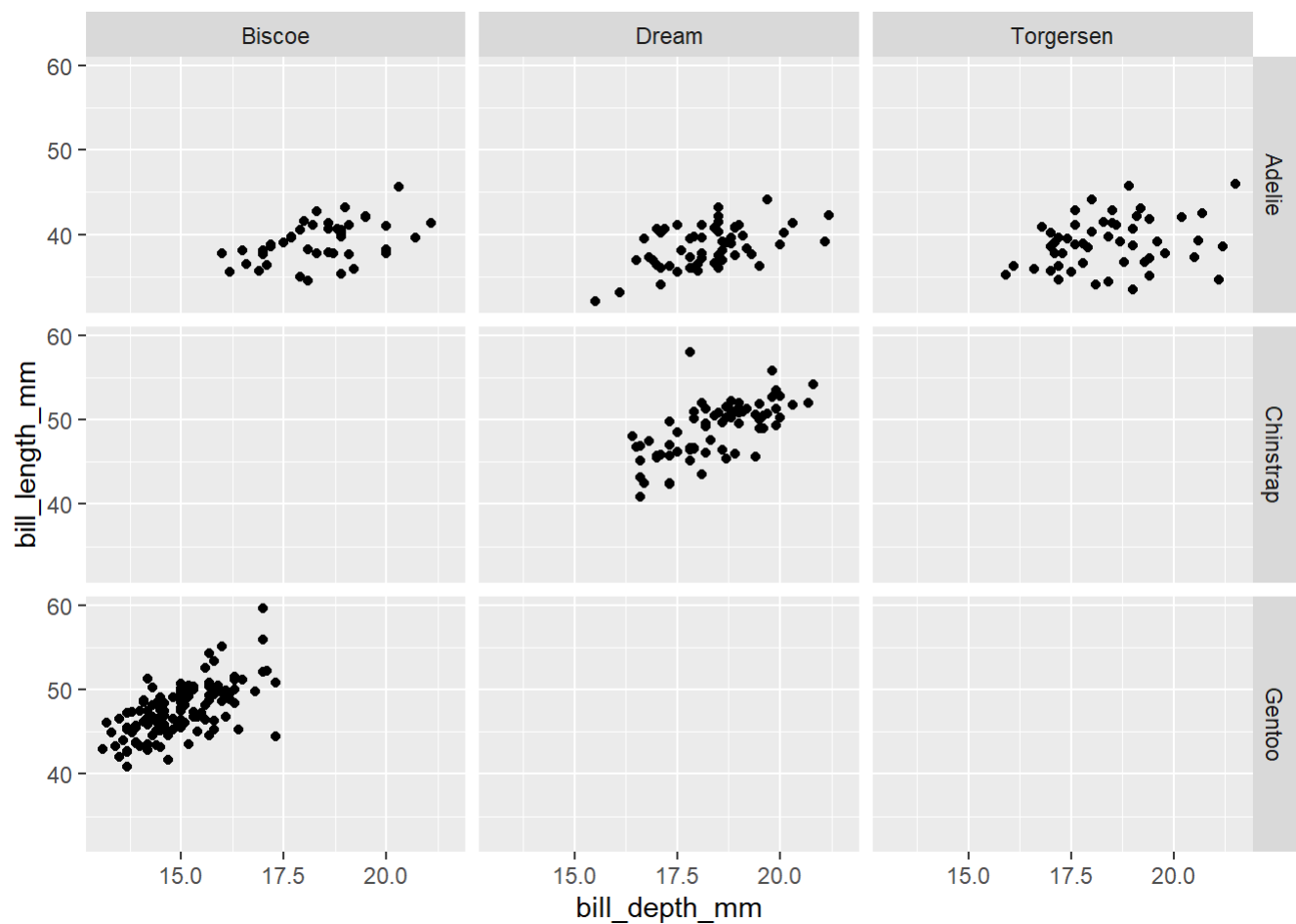
```
ggplot(penguins) +  
  aes(x = bill_depth_mm,  
      y = bill_length_mm) +  
  geom_point(size = 2, alpha = 0.5)
```

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



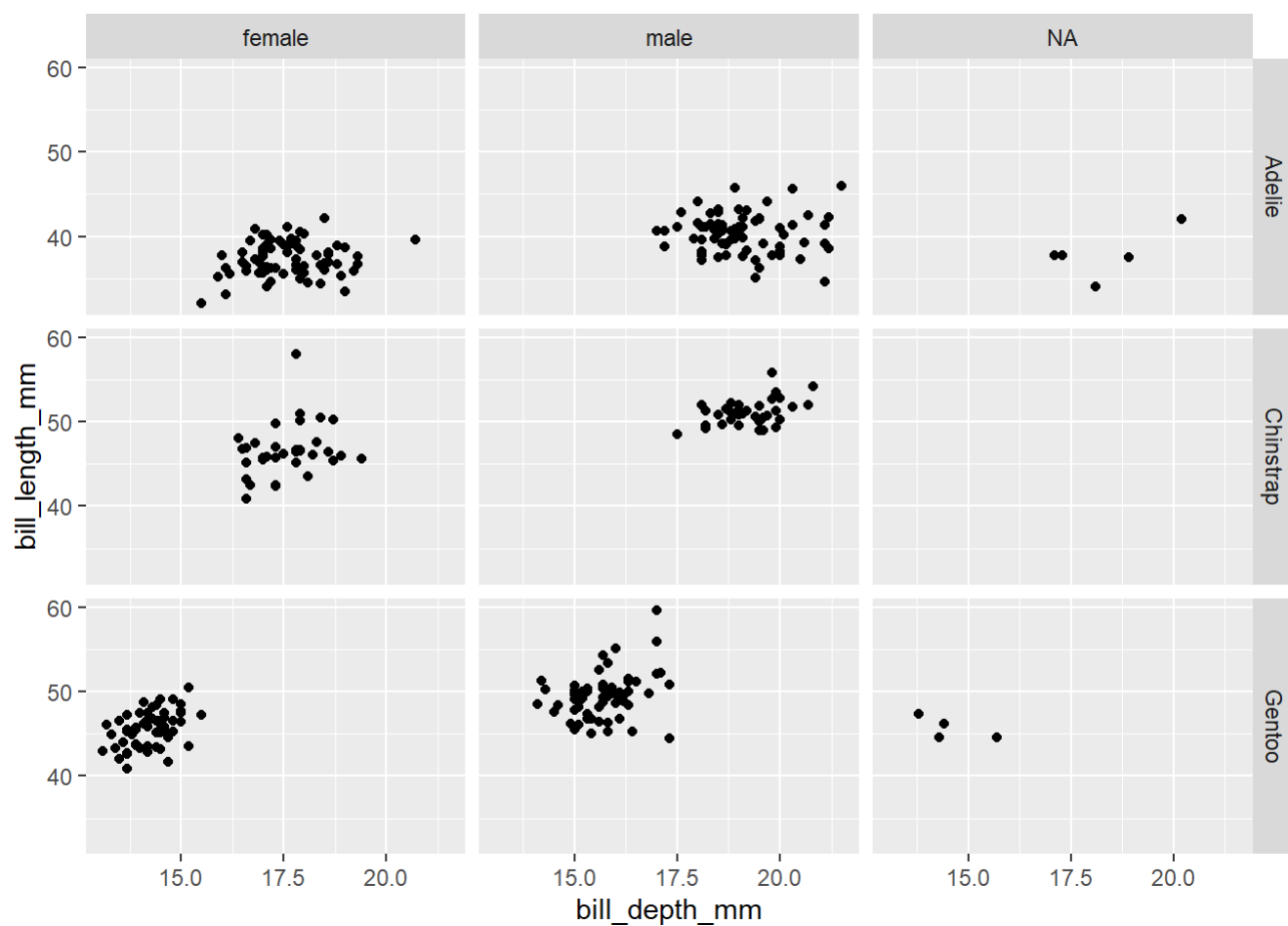
```
ggplot(penguins) +  
  aes(x = bill_depth_mm,  
      y = bill_length_mm) +  
  geom_point() +  
  facet_grid(species ~ island)
```

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



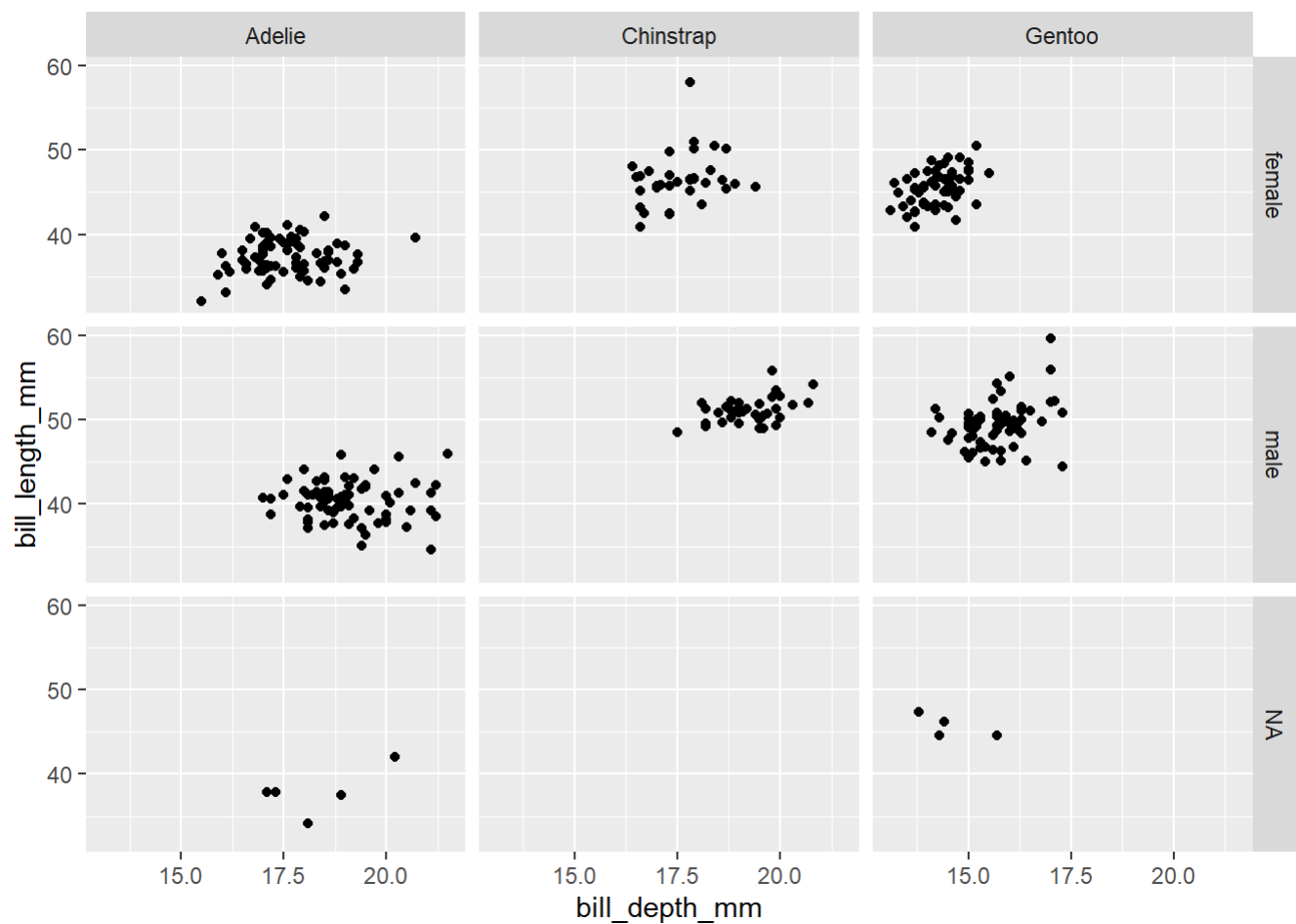
```
ggplot(penguins, aes(x = bill_depth_mm, y = bill_length_mm)) + geom_point() +  
facet_grid(species ~ sex)
```

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



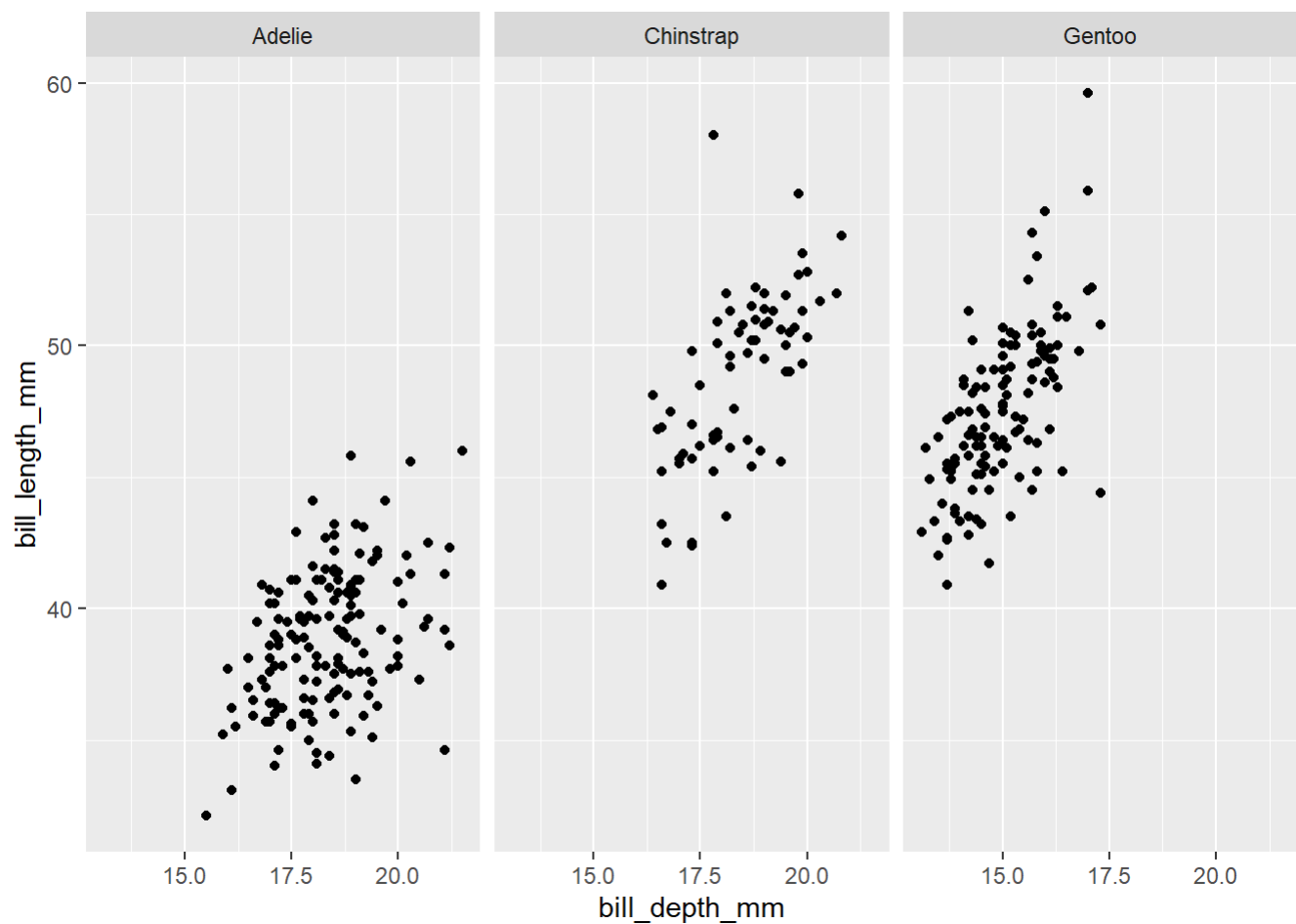
```
ggplot(penguins, aes(x = bill_depth_mm, y = bill_length_mm)) + geom_point() +  
facet_grid(sex ~ species)
```

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



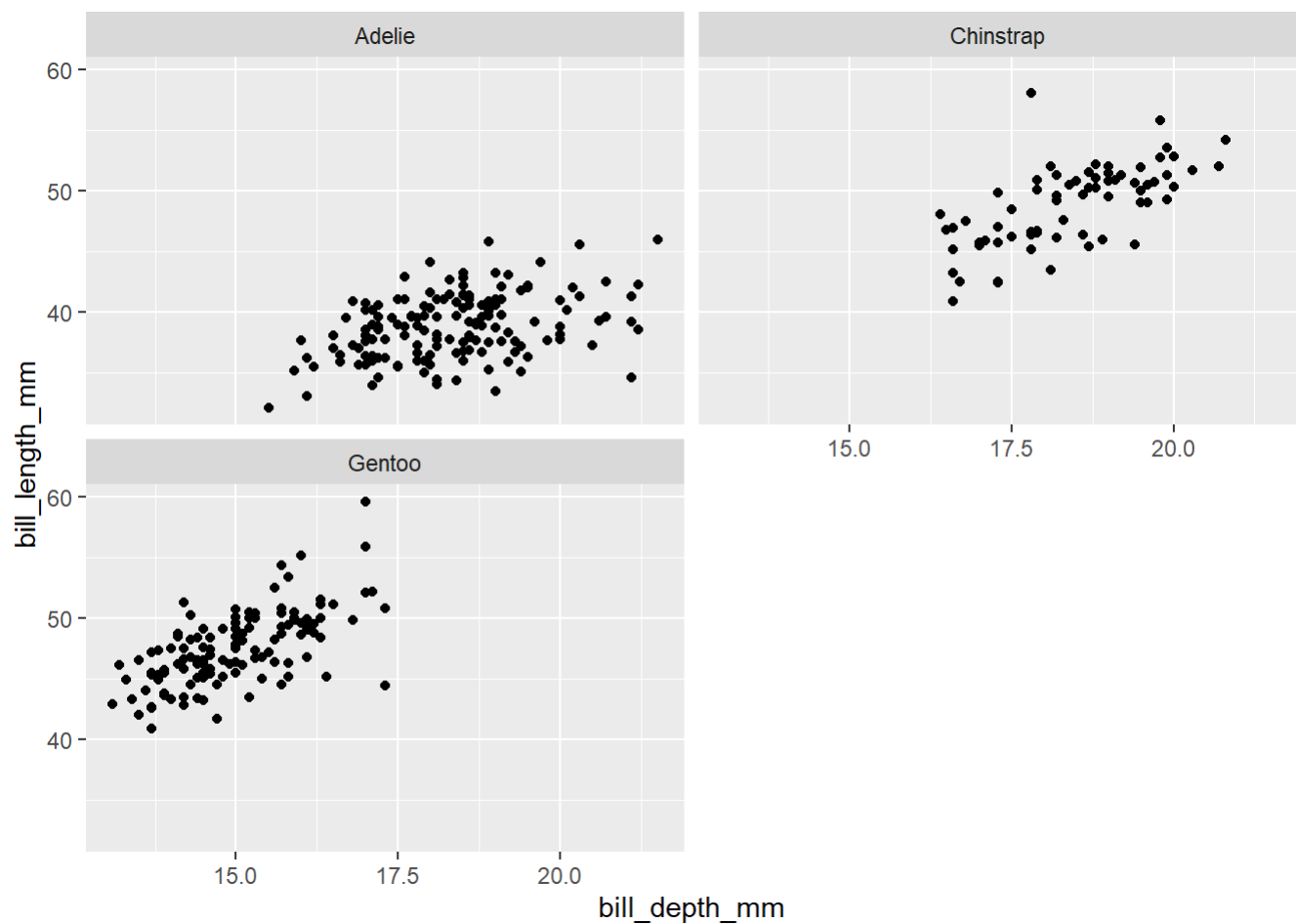
```
ggplot(penguins, aes(x = bill_depth_mm, y = bill_length_mm)) + geom_point() +  
facet_wrap(~ species)
```

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



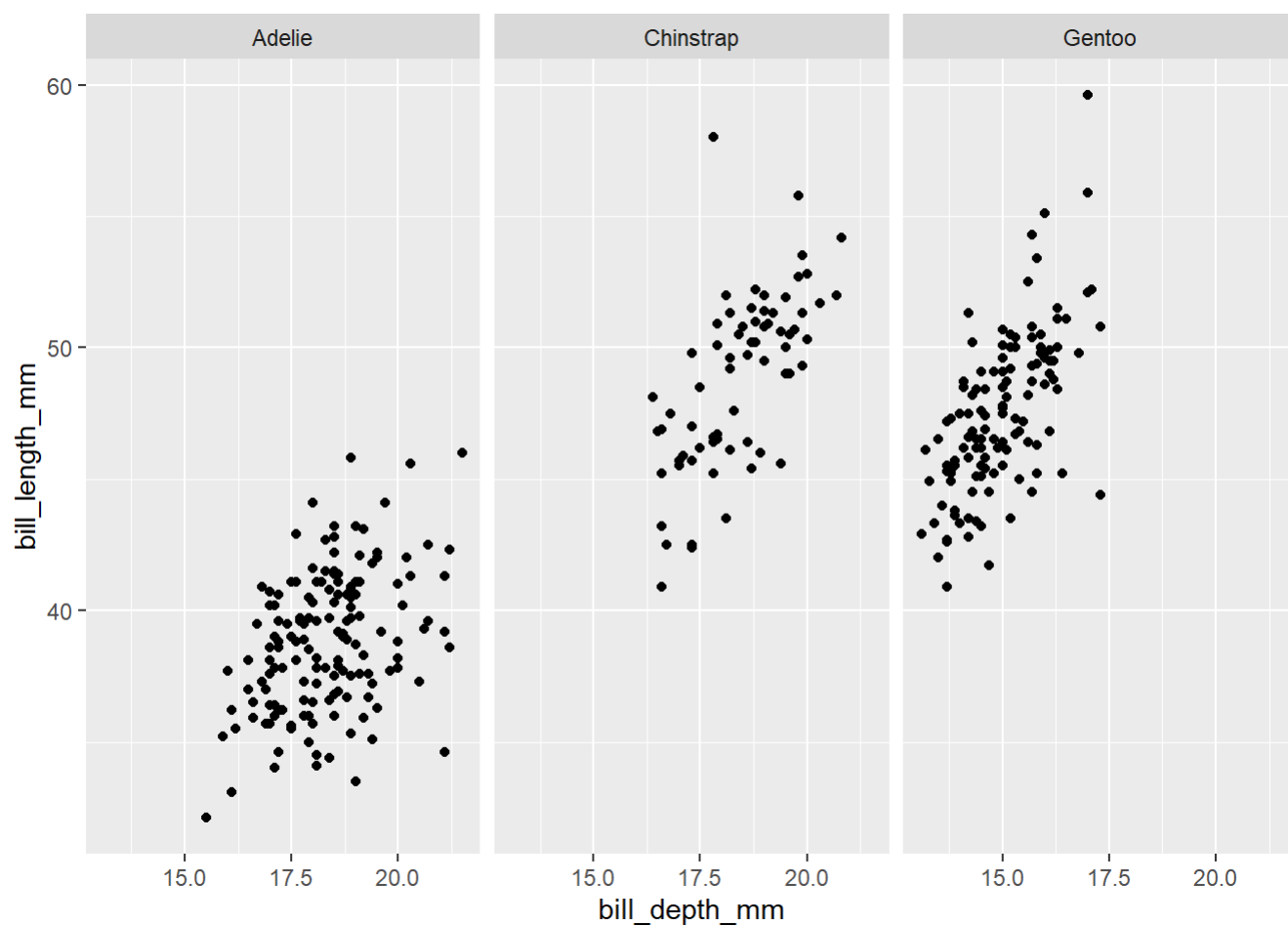
```
ggplot(penguins, aes(x = bill_depth_mm, y = bill_length_mm)) + geom_point() +  
facet_wrap(~ species, ncol = 2)
```

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



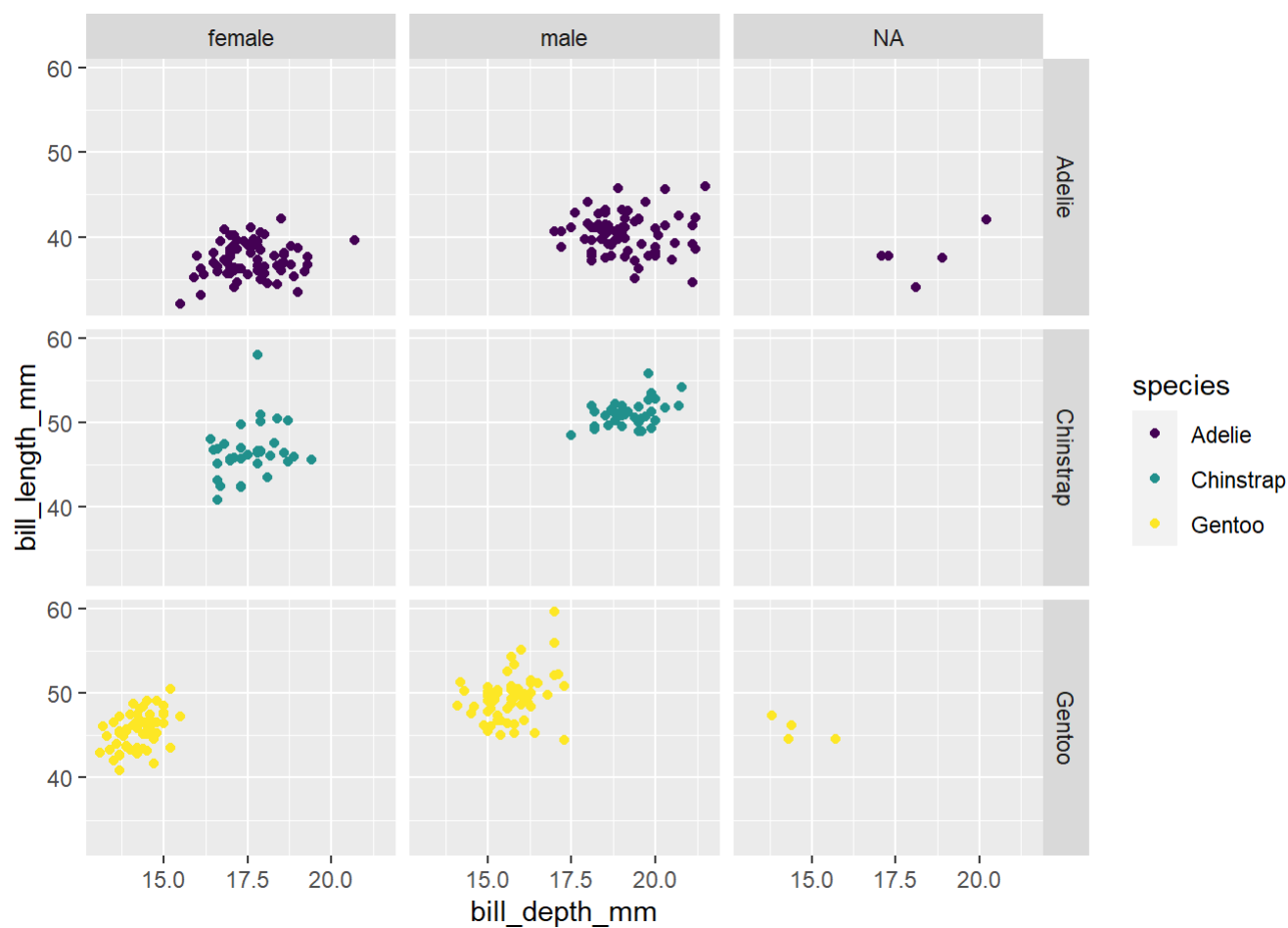
```
ggplot(penguins, aes(x = bill_depth_mm, y = bill_length_mm)) + geom_point() +  
facet_grid(. ~ species)
```

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

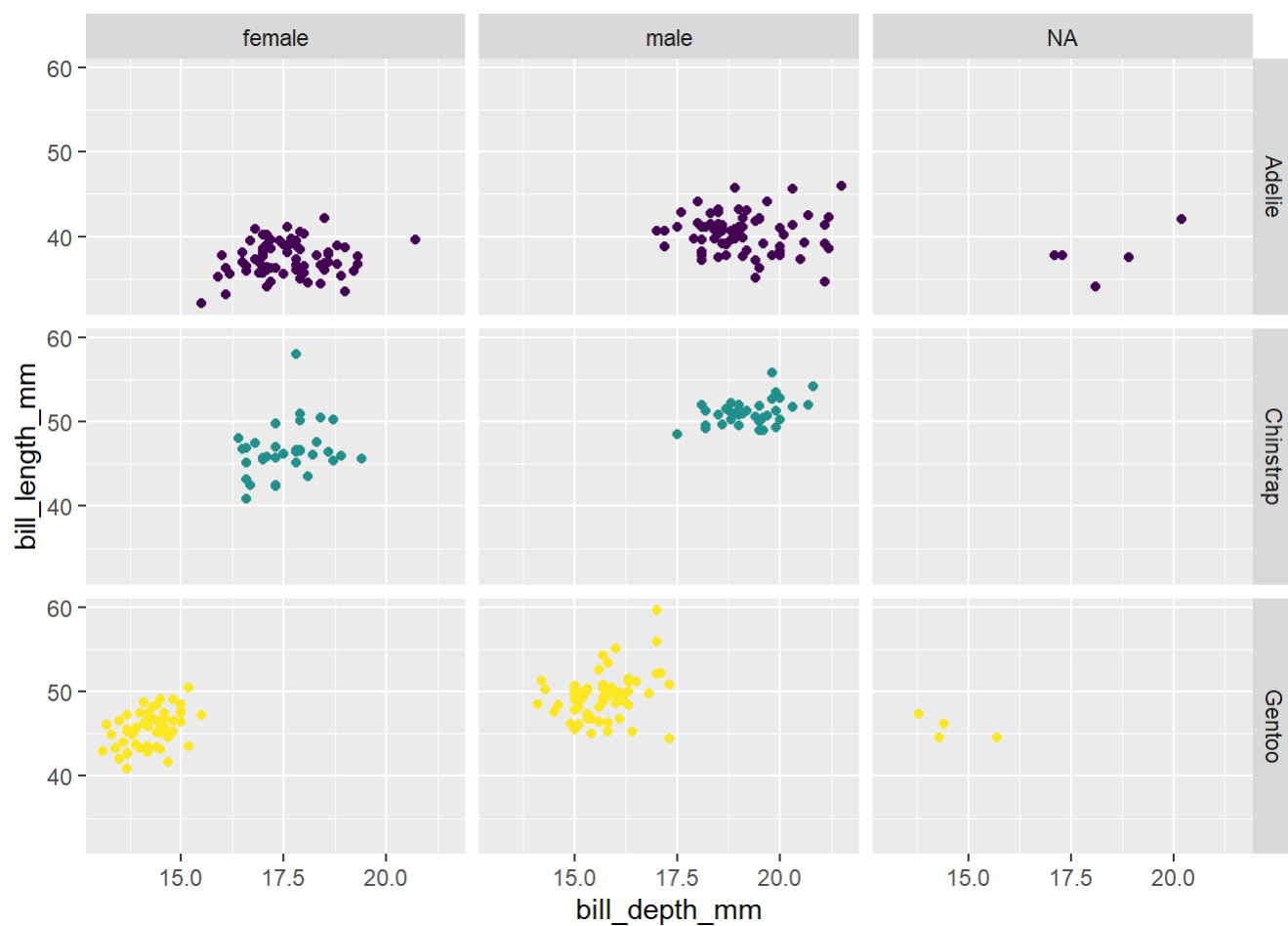
```
ggplot(penguins, aes(x = bill_depth_mm, y = bill_length_mm, color = species)) +  
geom_point() + facet_grid(species ~ sex) + scale_color_viridis_d()
```

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



```
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()`).
```



```
library(openintro)
```

```
## Warning: package 'openintro' was built under R version 4.2.3
```

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

```
## Warning: package 'airports' was built under R version 4.2.3
```

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

```
## Warning: package 'cherryblossom' was built under R version 4.2.3
```

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

```
## Warning: package 'usdata' was built under R version 4.2.3
```

```
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...

```

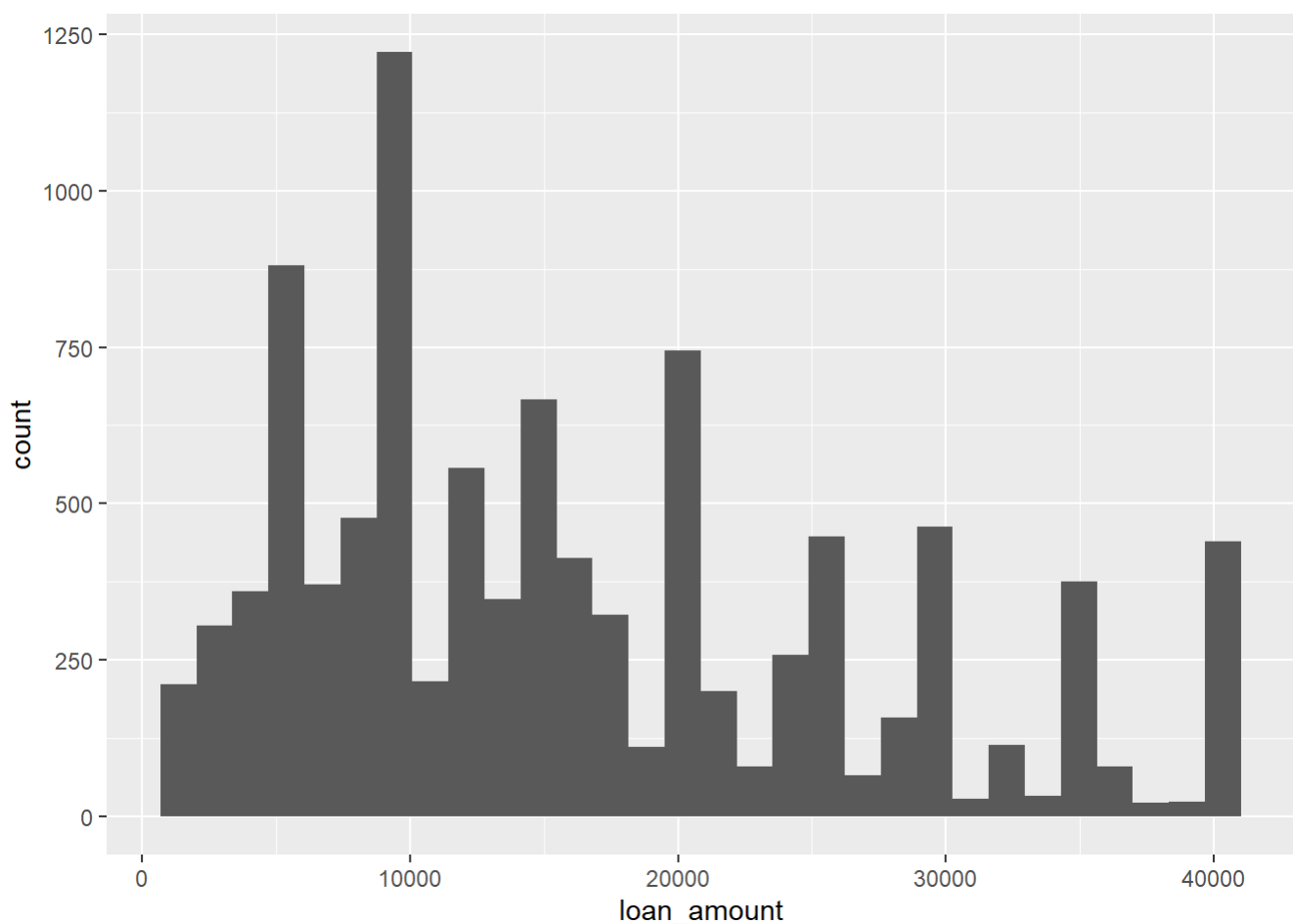
```
## $ paid_interest      <dbl> 1015.19, 150.49, 106.43, 566.15, 754...
## $ paid_late_fees      <dbl> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...
```

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

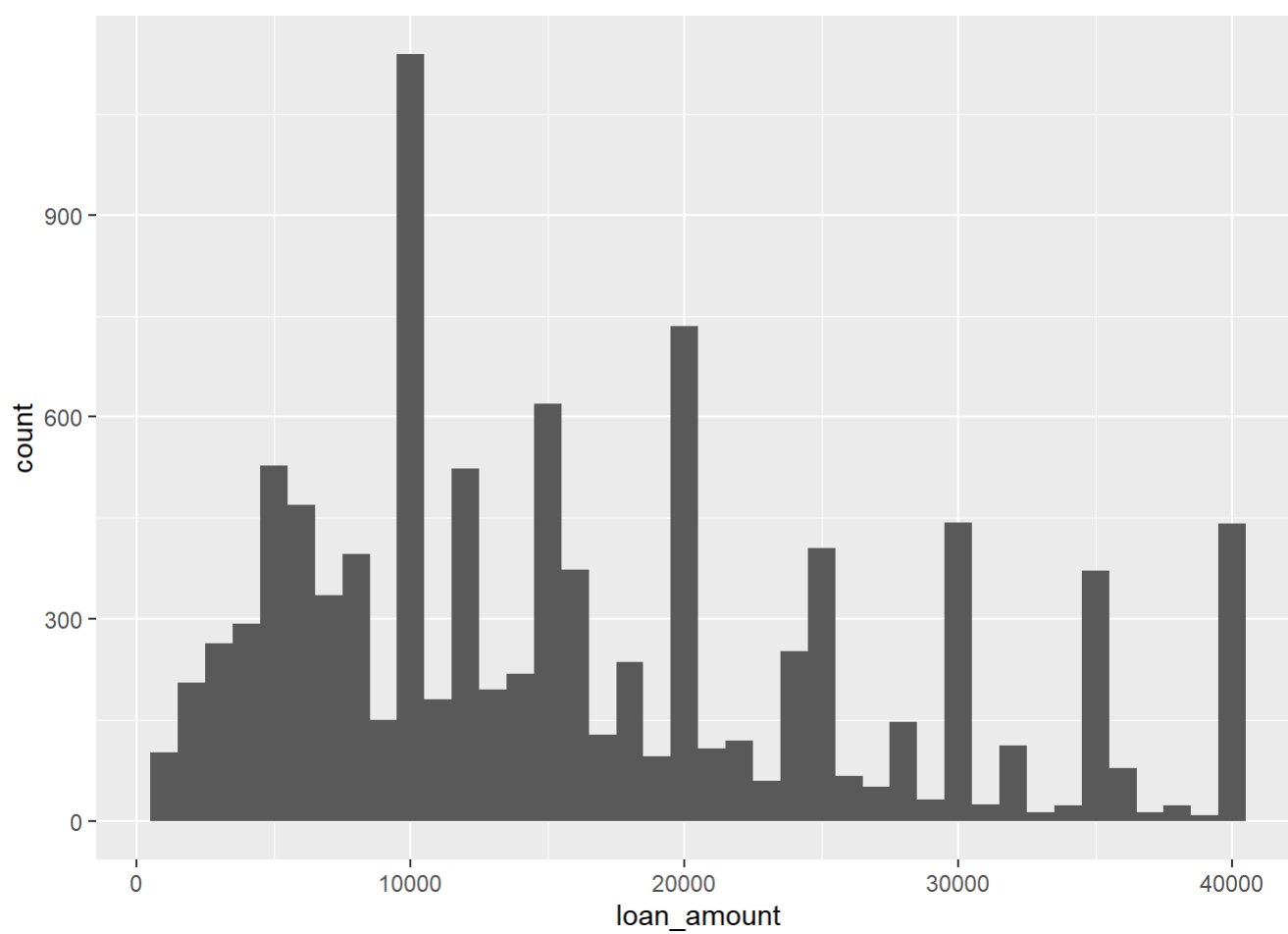
```
## Rows: 10,000
## Columns: 8
## $ loan_amount      <int> 28000, 5000, 2000, 21600, 23000, 5000, 24000, 20000, 20...
## $ interest_rate    <dbl> 14.07, 12.61, 17.09, 6.72, 14.07, 6.72, 13.59, 11.99, 1...
## $ term             <dbl> 60, 36, 36, 36, 36, 36, 60, 60, 36, 36, 60, 60, 36, 60,...
## $ grade            <fct> C, C, D, A, C, A, C, B, C, A, C, B, C, B, D, D, D, F, E...
## $ state            <fct> NJ, HI, WI, PA, CA, KY, MI, AZ, NV, IL, IL, FL, SC, CO,...
## $ annual_income    <dbl> 90000, 40000, 40000, 30000, 35000, 34000, 35000, 110000...
## $ homeownership    <fct> MORTGAGE, RENT, RENT, RENT, RENT, OWN, MORTGAGE, MORTGA...
## $ debt_to_income   <dbl> 18.01, 5.04, 21.15, 10.16, 57.96, 6.46, 23.66, 16.19, 3...
```

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

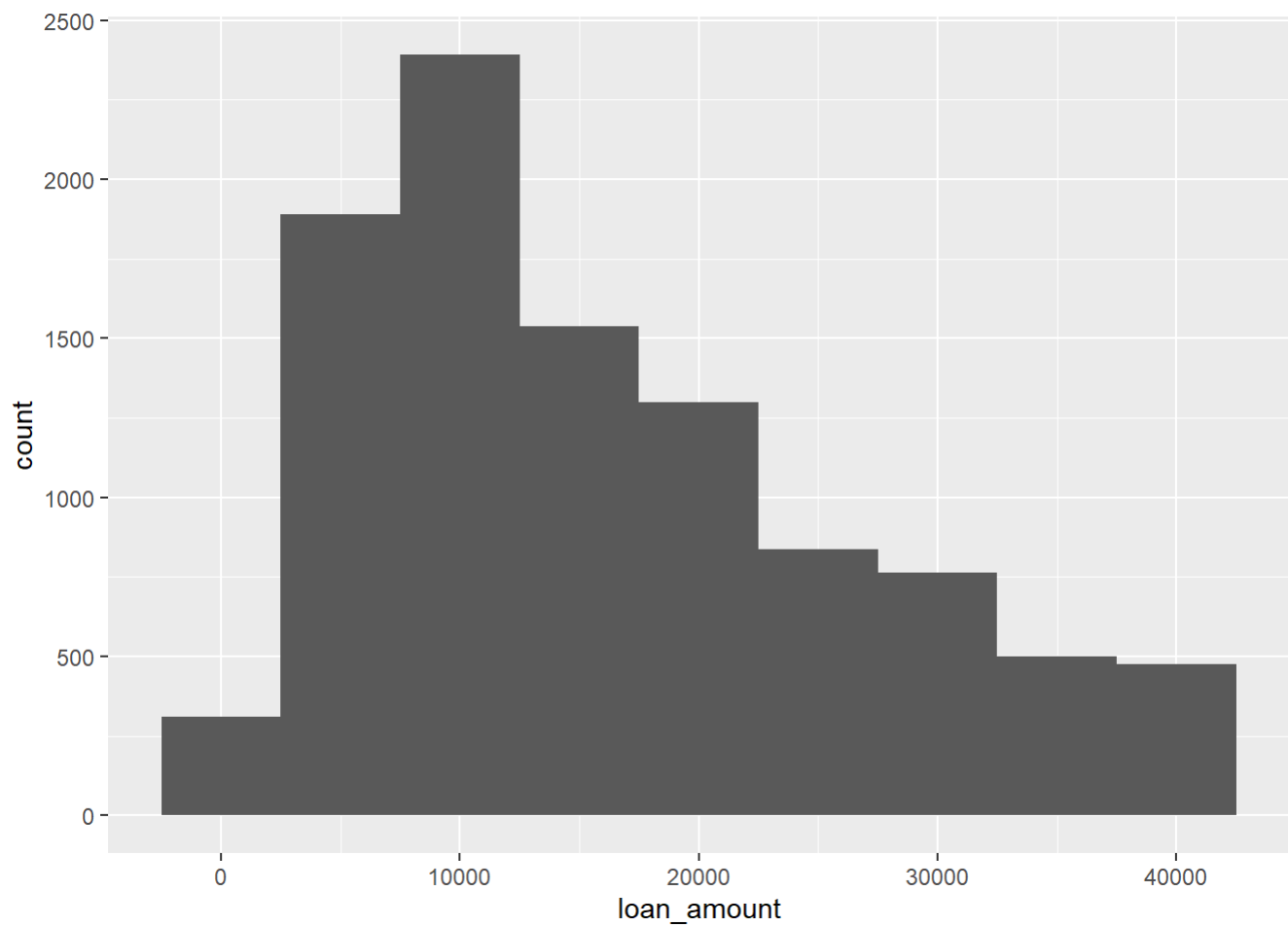
```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



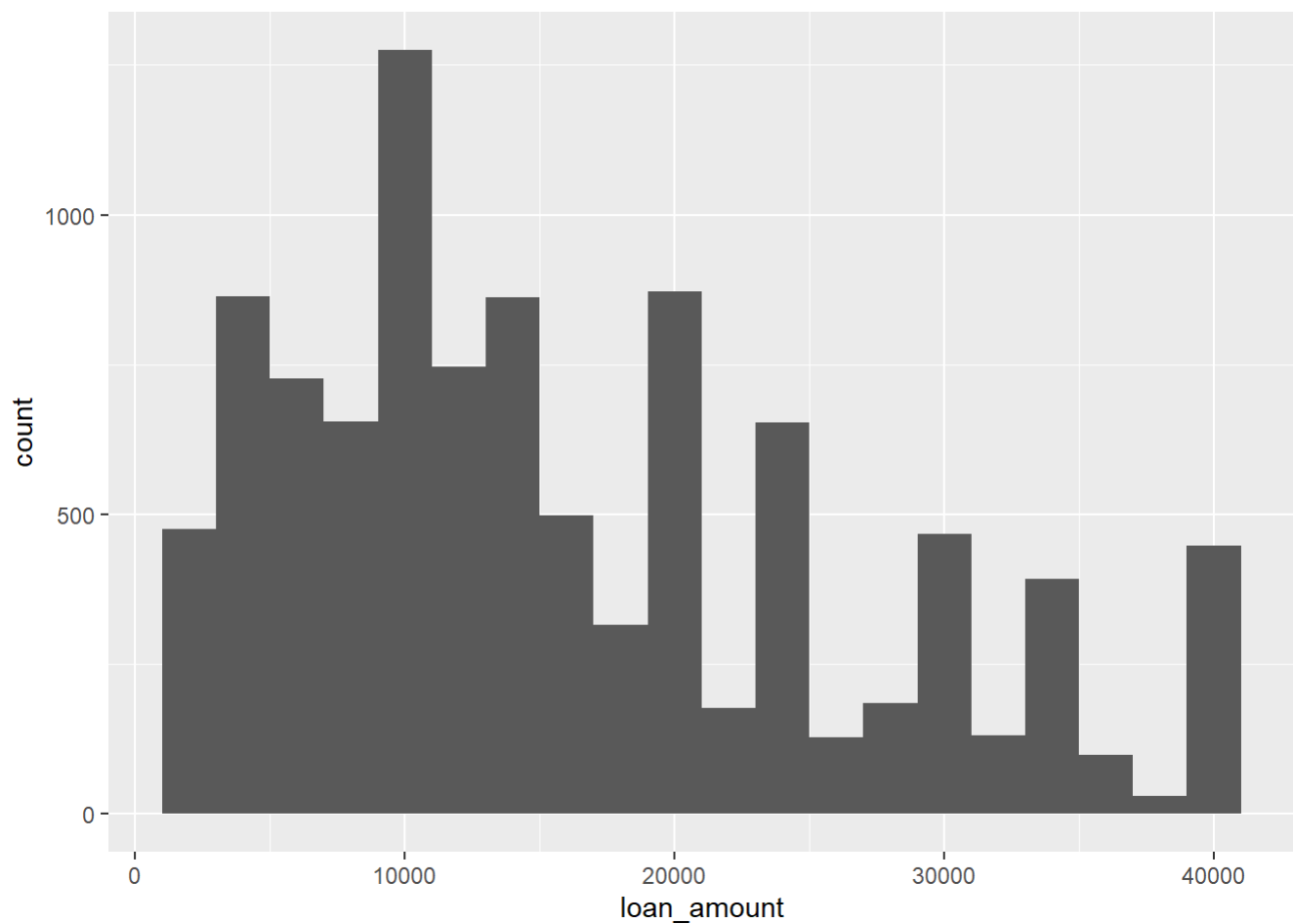
```
# binwidth = 1000  
ggplot(loans, aes(x = loan_amount)) +  
  geom_histogram(binwidth = 1000)
```



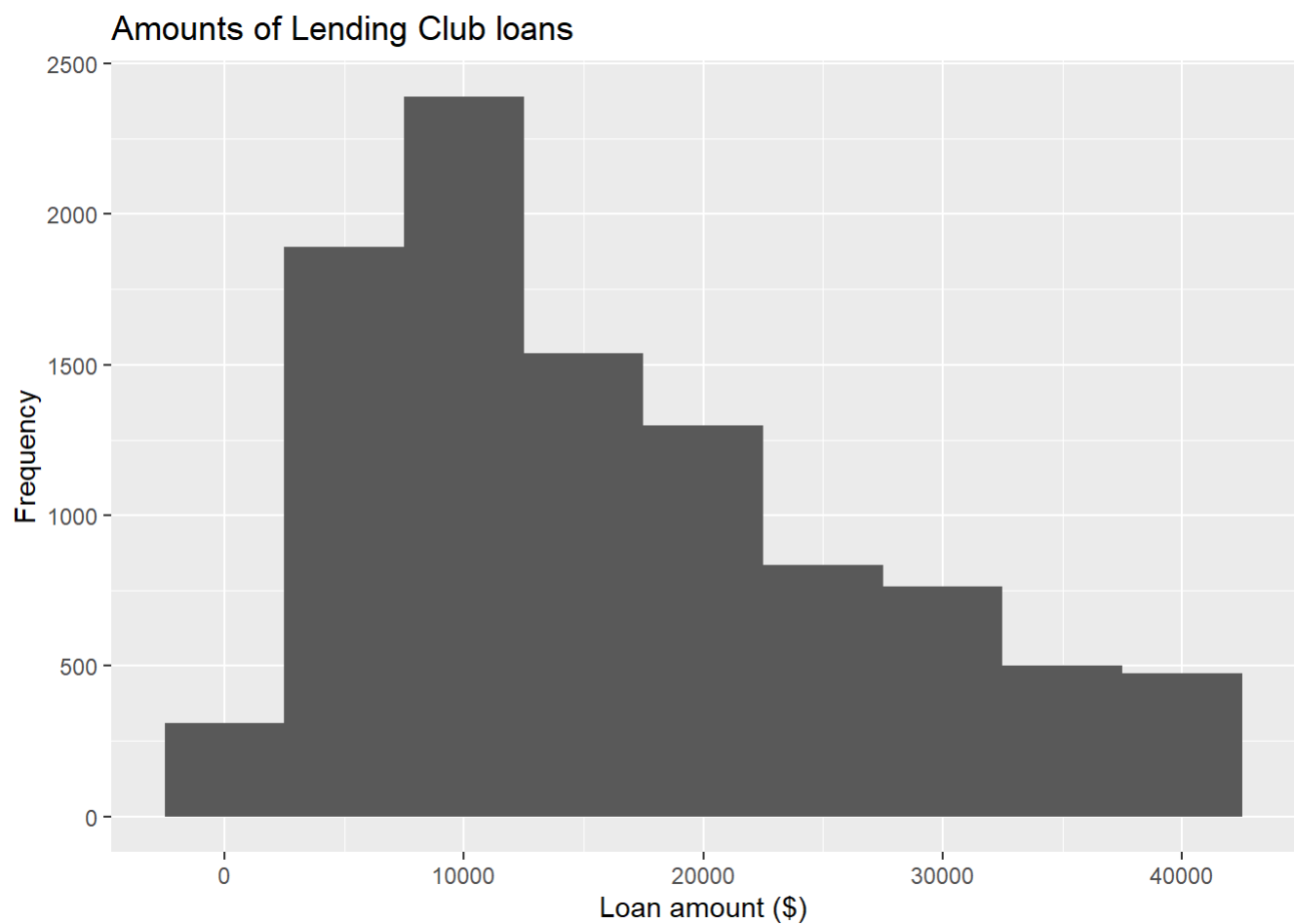
```
# binwidth = 5000  
ggplot(loans, aes(x = loan_amount)) +  
  geom_histogram(binwidth = 5000)
```



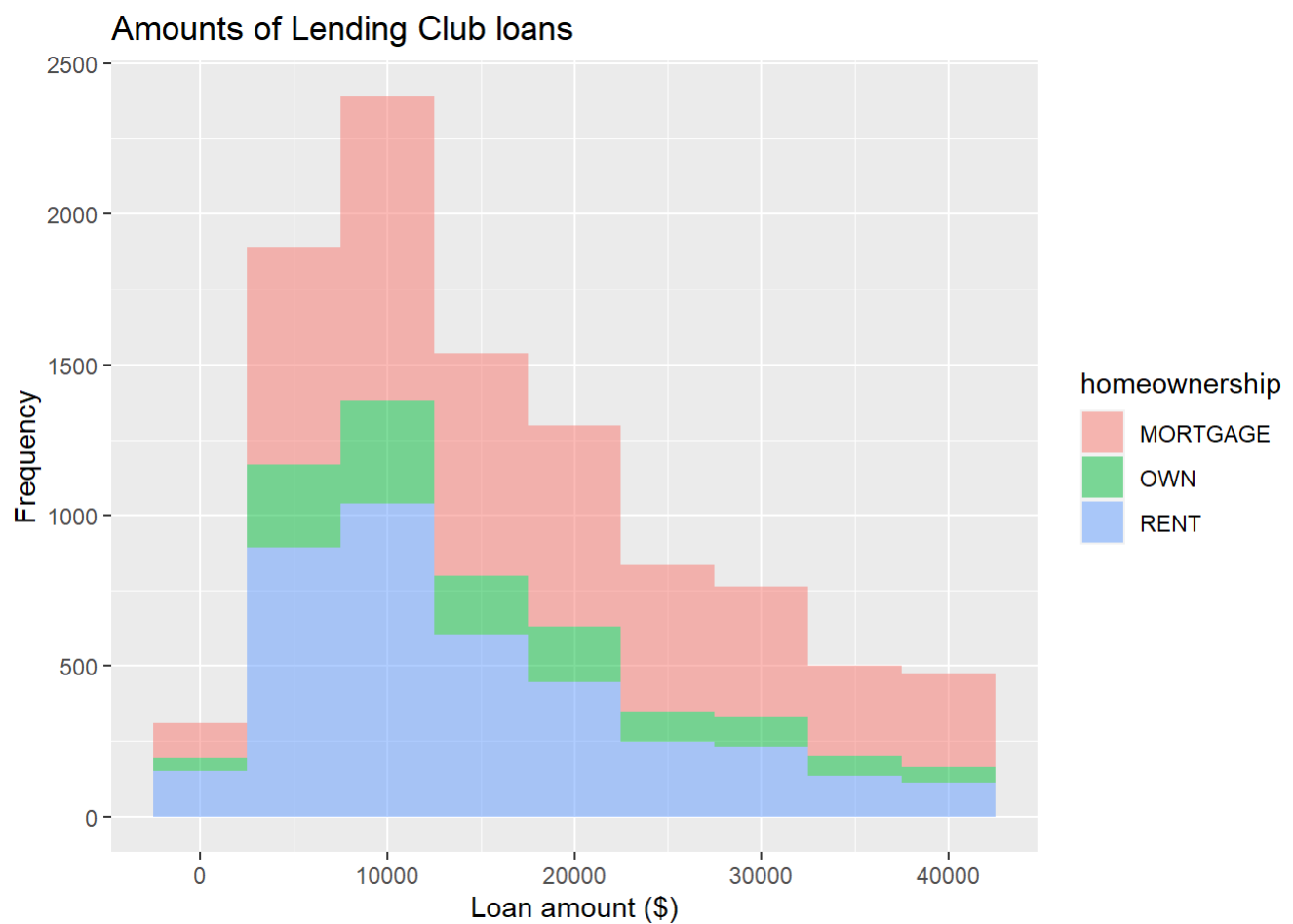
```
# binwidth = 2000  
ggplot(loans, aes(x = loan_amount)) +  
  geom_histogram(binwidth = 2000)
```



```
# Customising Histograms
ggplot(loans, aes(x = loan_amount)) + geom_histogram(binwidth = 5000) +
labs(x = "Loan amount ($)", y = "Frequency", title = "Amounts of Lending Club loans" )
```

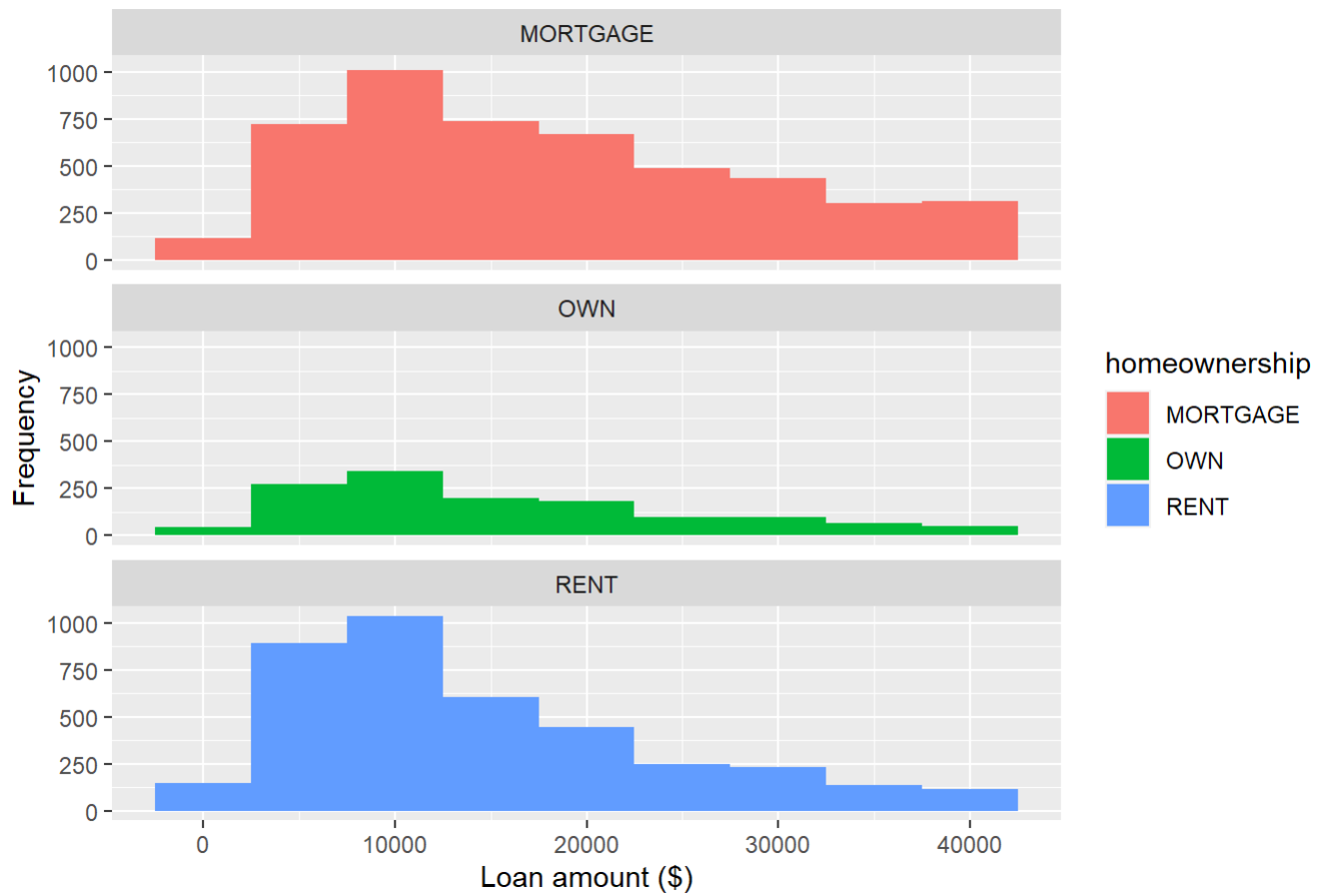



```
ggplot(loans, aes(x = loan_amount, fill = homeownership)) +  
  geom_histogram(binwidth = 5000, alpha = 0.5) +  
  labs(x = "Loan amount ($)", y = "Frequency", title = "Amounts of Lending Club loans")
```

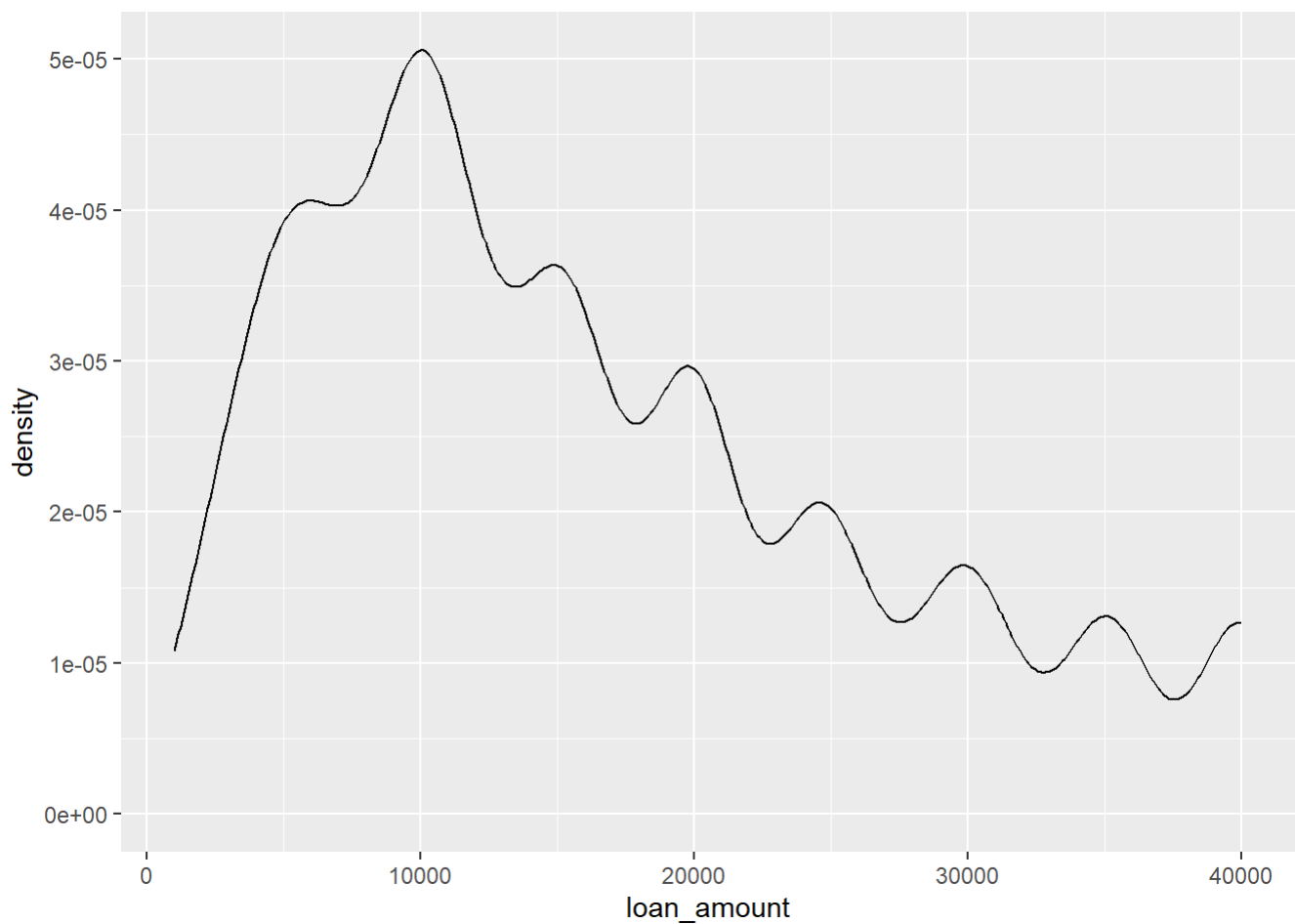


```
ggplot(loans, aes(x = loan_amount, fill = homeownership)) + geom_histogram(binwidth = 5000) +  
labs(x = "Loan amount ($)", y = "Frequency", title = "Amounts of Lending Club loans") +  
facet_wrap(~ homeownership, nrow = 3)
```

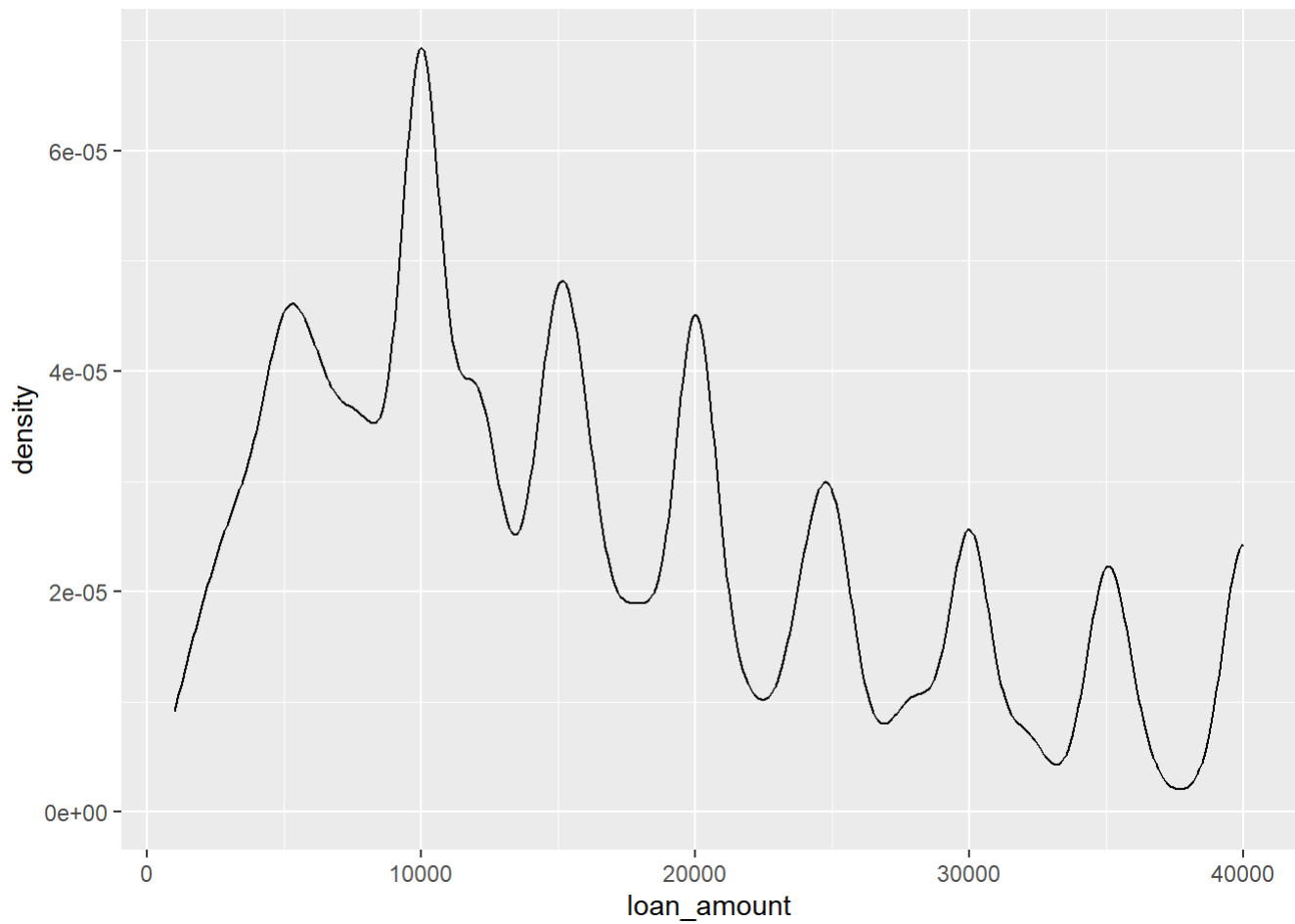
Amounts of Lending Club loans



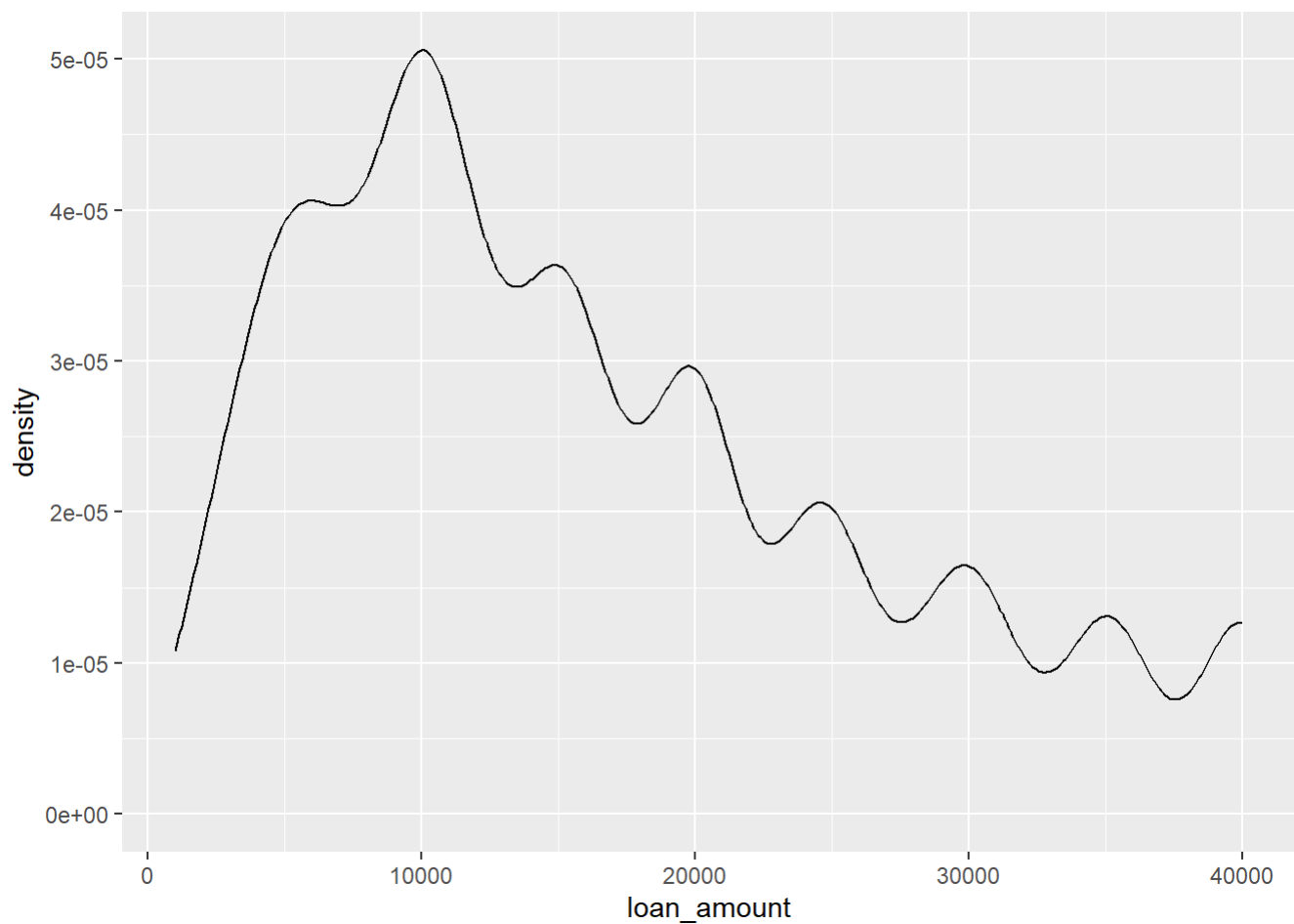
```
ggplot(loans, aes(x = loan_amount)) +  
geom_density()
```



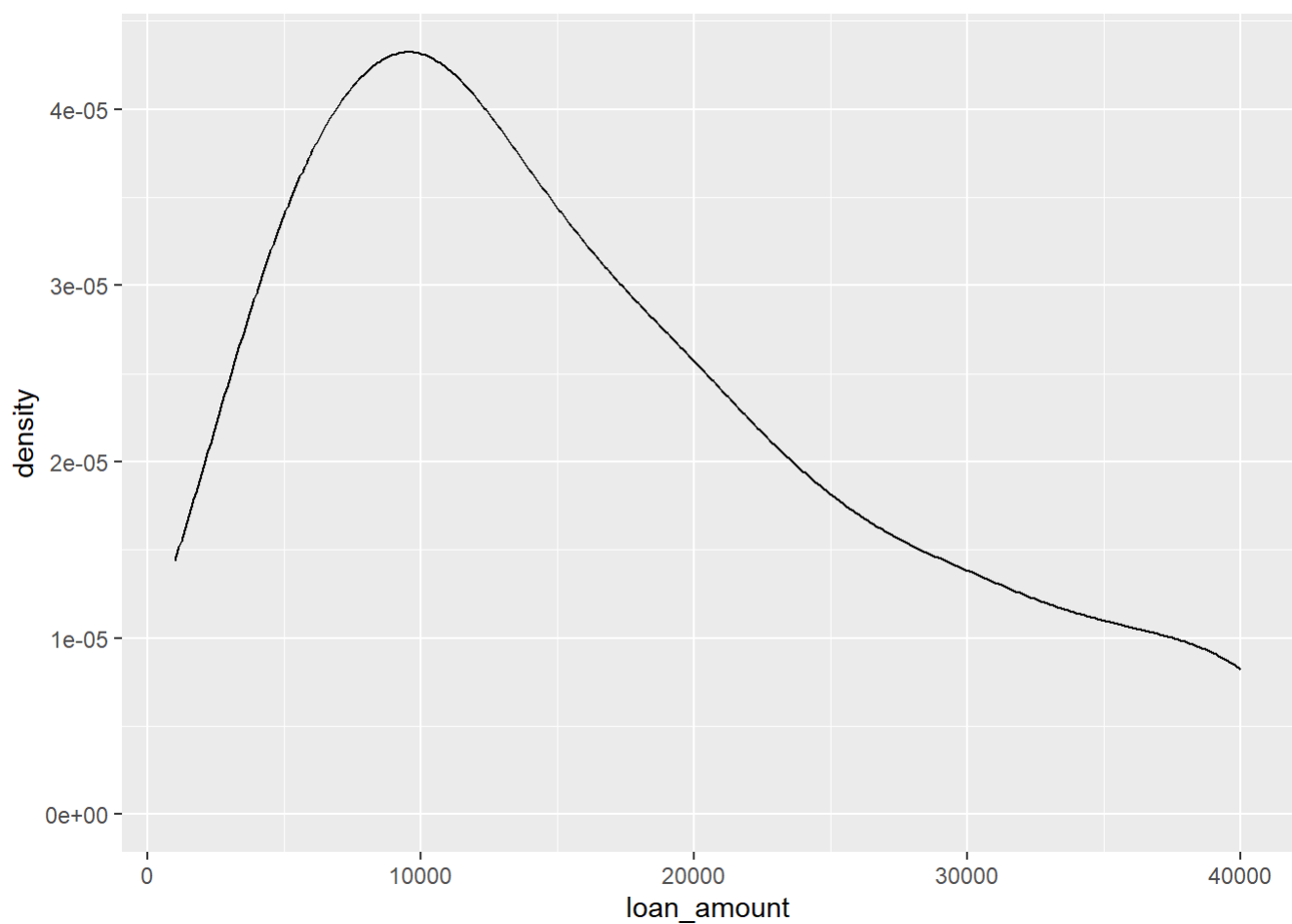
```
ggplot(loans, aes(x = loan_amount)) +  
geom_density(adjust = 0.5)
```



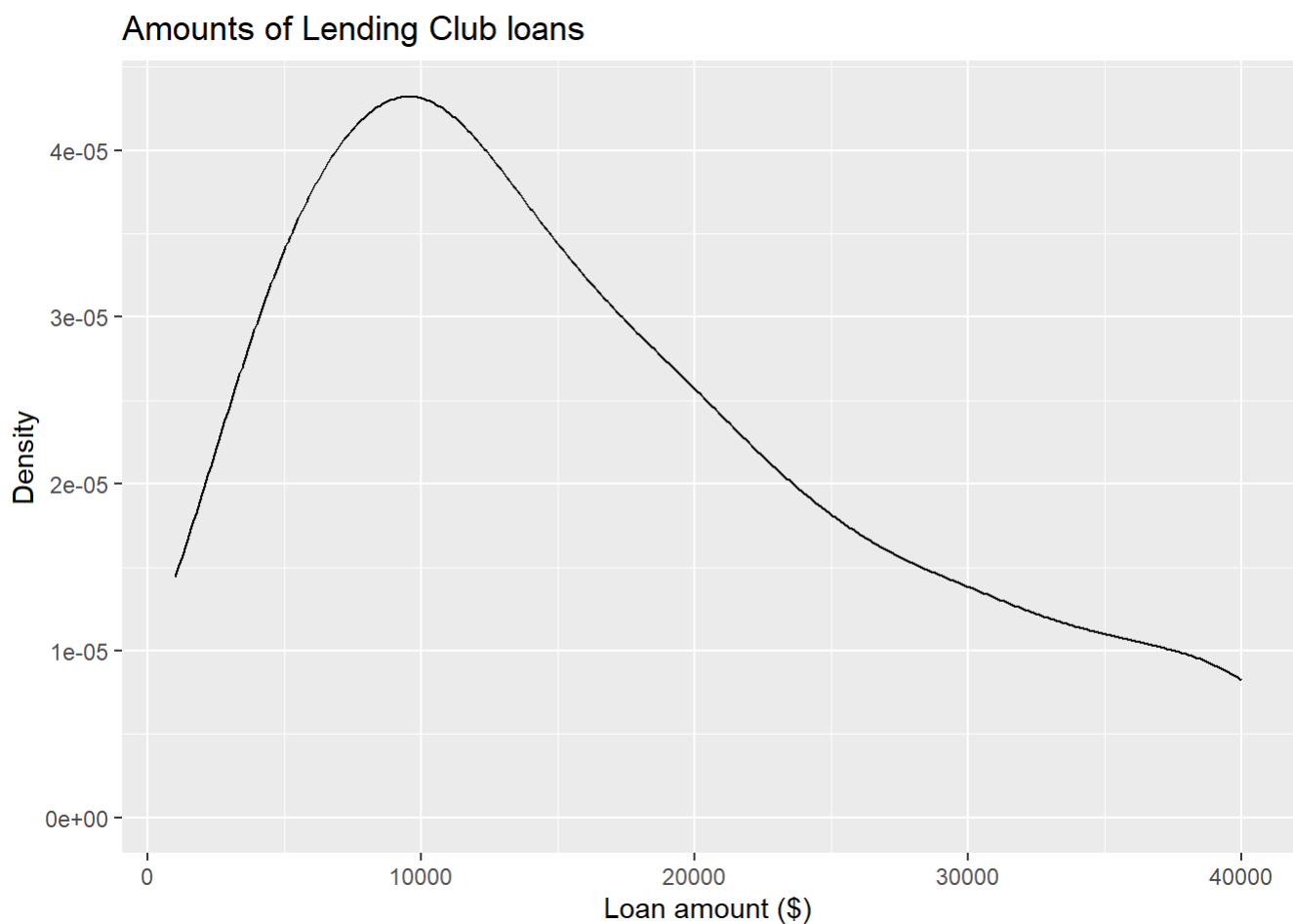
```
ggplot(loans, aes(x = loan_amount)) +  
geom_density(adjust = 1) # default bandwidth
```



```
ggplot(loans, aes(x = loan_amount)) +  
  geom_density(adjust = 2)
```



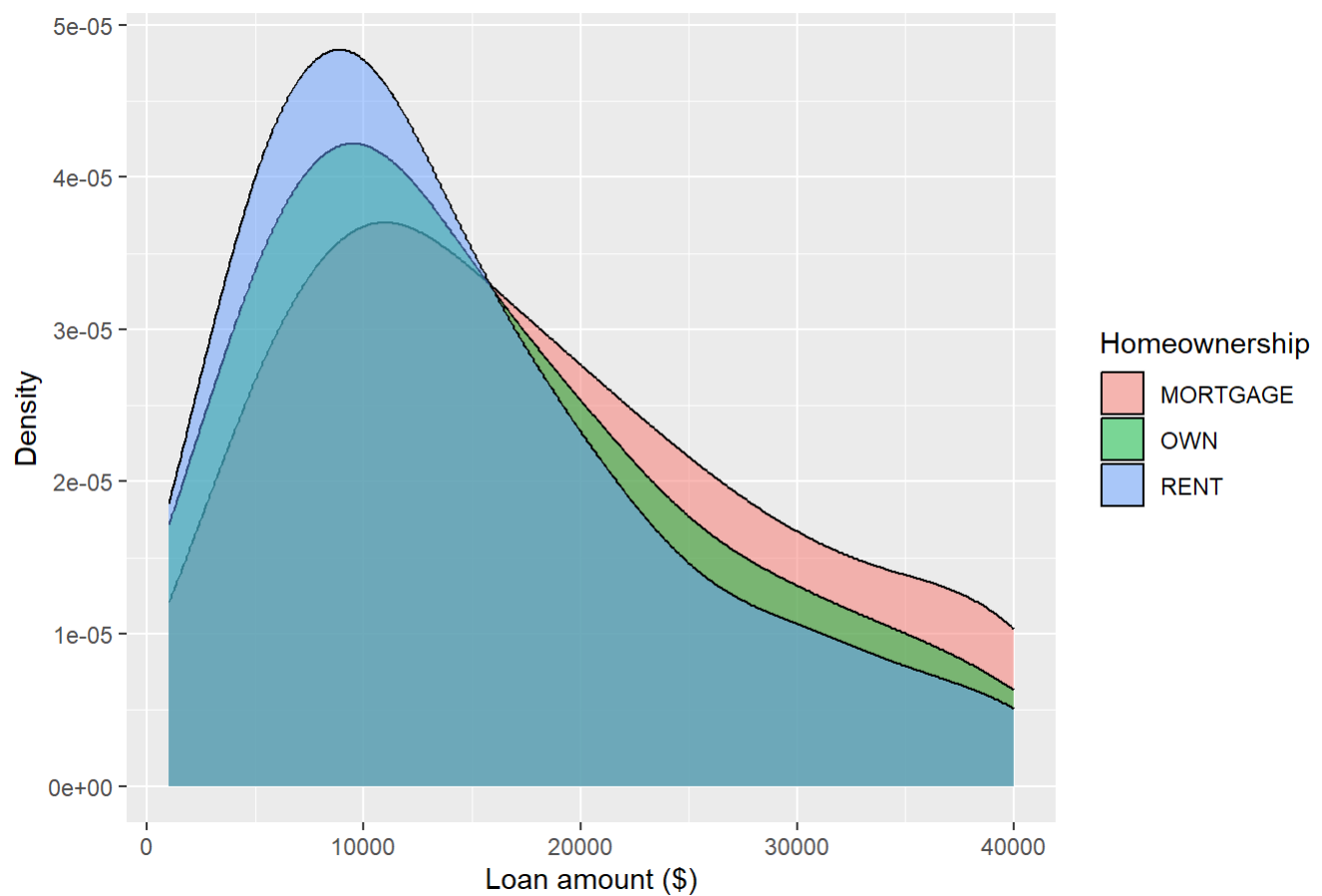
```
ggplot(loans, aes(x = loan_amount)) +  
geom_density(adjust = 2) +  
labs( x = "Loan amount ($)", y = "Density", title = "Amounts of Lending Club loans" )
```



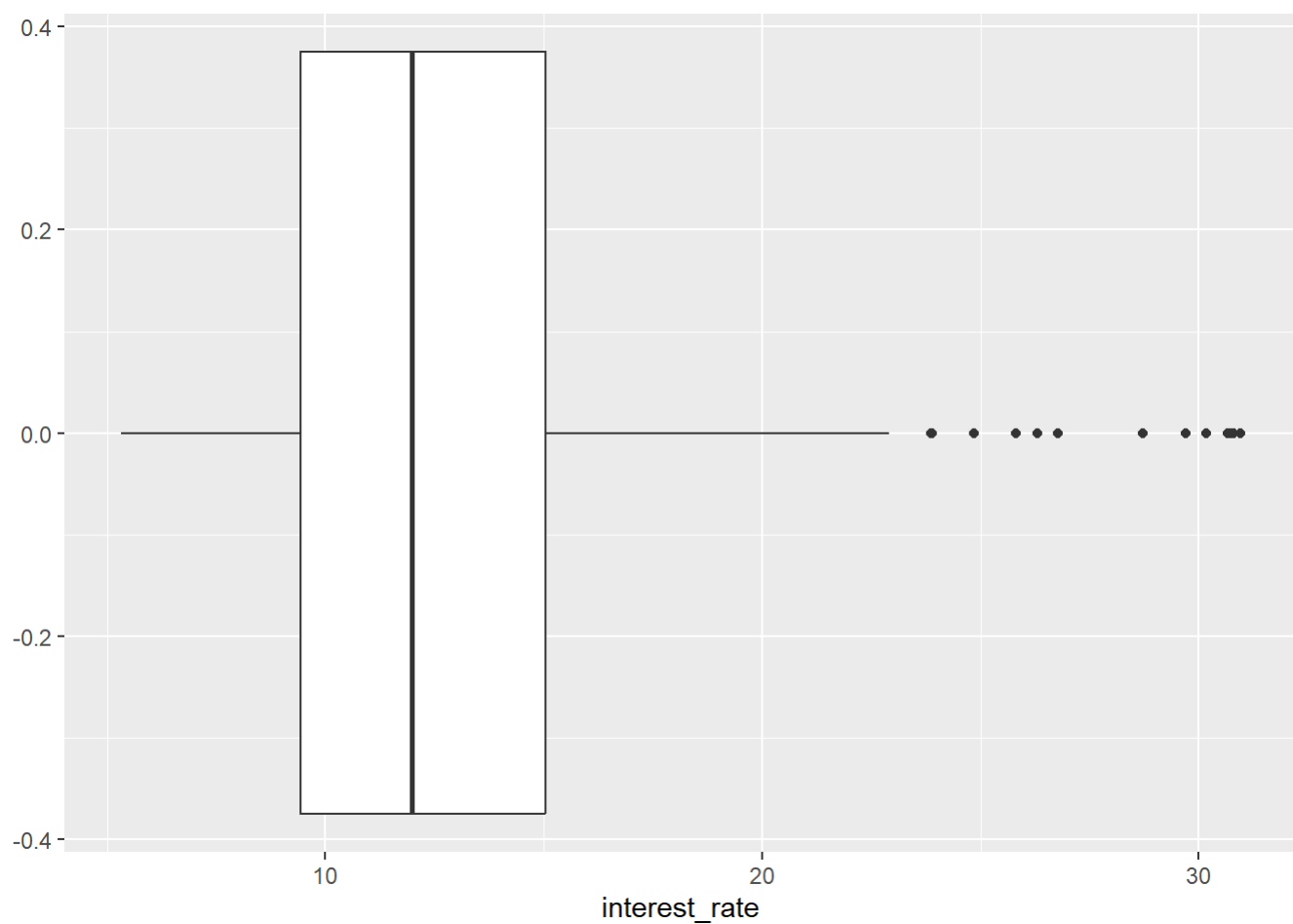
Adding a categorical variable

```
ggplot(loans, aes(x = loan_amount, fill = homeownership)) +  
geom_density(adjust = 2, alpha = 0.5) +  
labs(x = "Loan amount ($)", y = "Density", title = "Amounts of Lending Club loans", fill = "Homeownership")
```

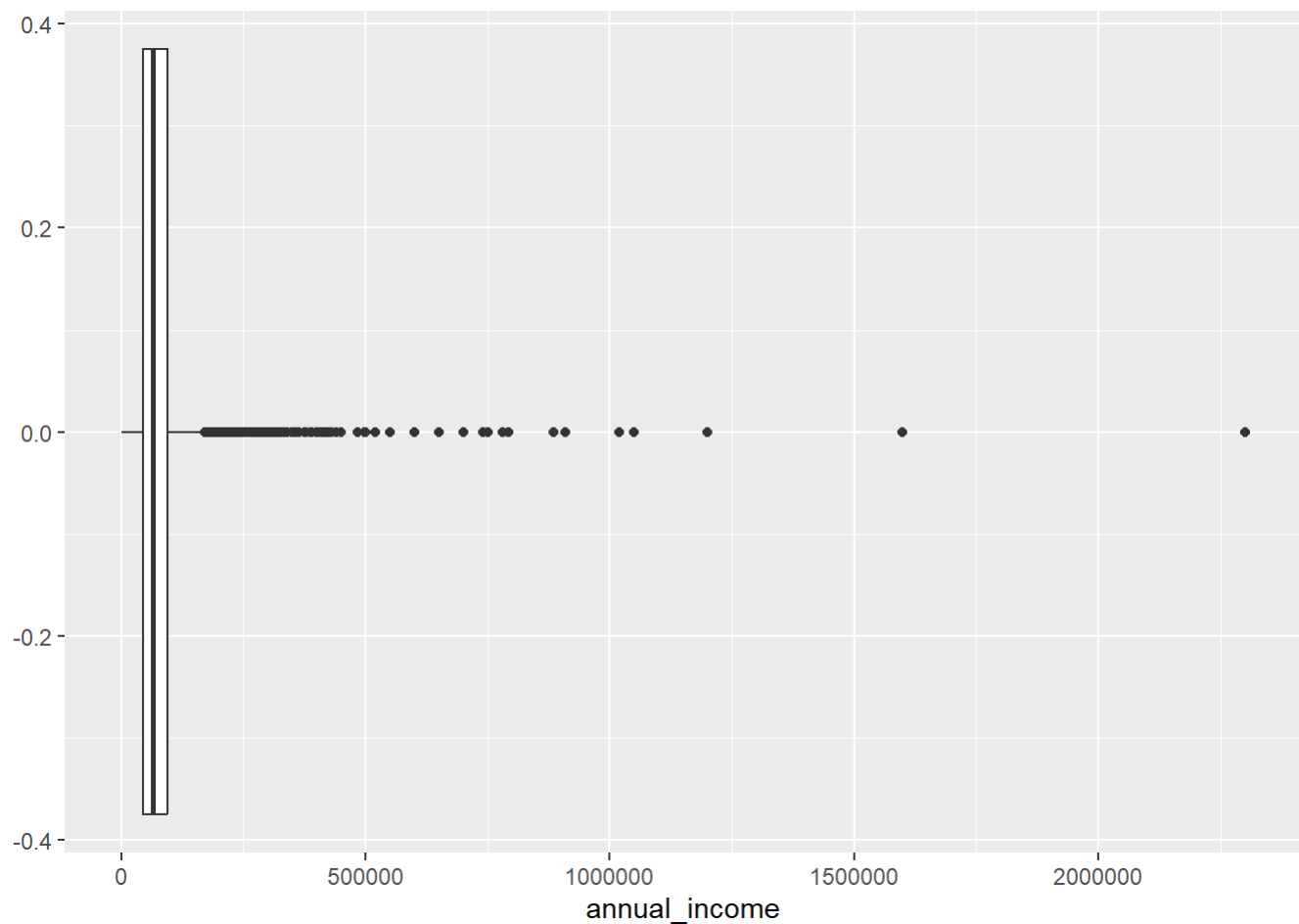
Amounts of Lending Club loans



```
ggplot(loans, aes(x = interest_rate)) +  
geom_boxplot()
```

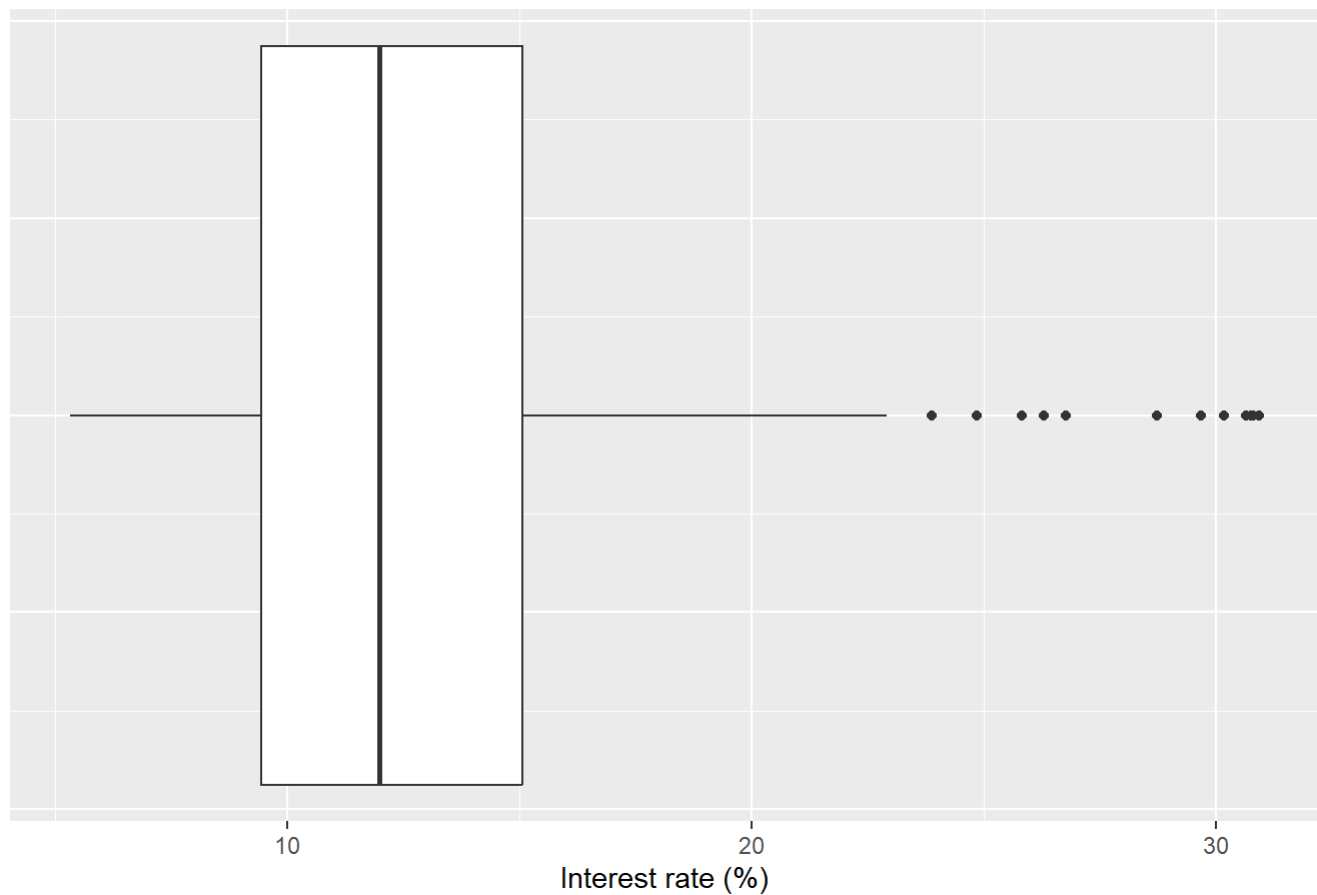


```
ggplot(loans, aes(x = annual_income)) +  
geom_boxplot()
```



```
ggplot(loans, aes(x = interest_rate)) +geom_boxplot() +labs(x = "Interest rate (%)",y = NULL,  
title = "Interest rates of Lending Club loans") +  
theme( axis.ticks.y = element_blank(), axis.text.y = element_blank() )
```

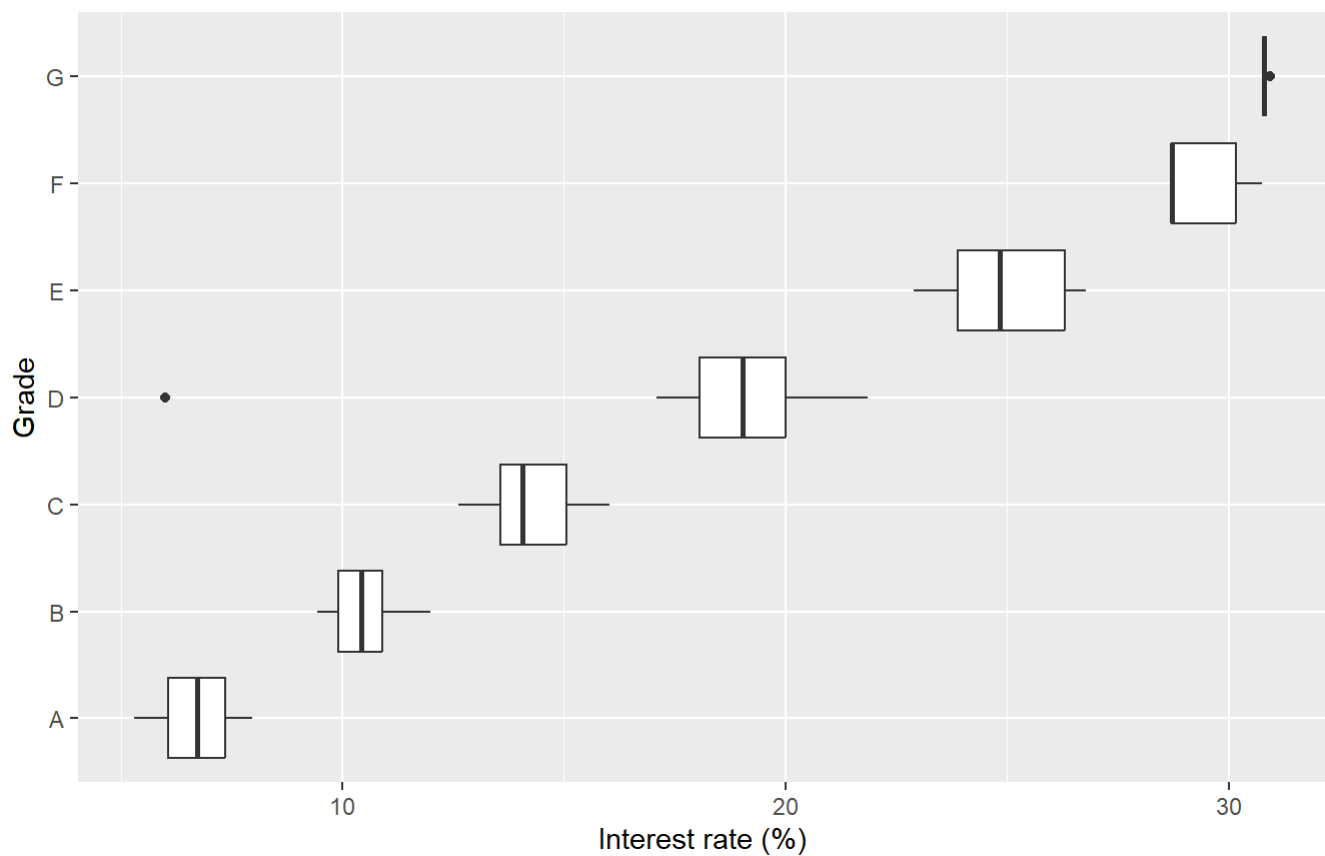

Interest rates of Lending Club loans



```
ggplot(loans, aes(x = interest_rate,  
y = grade)) +  
geom_boxplot() +  
labs(x = "Interest rate (%)", y = "Grade", title = "Interest rates of Lending Club loans", subtitle = " By grade of loan")
```

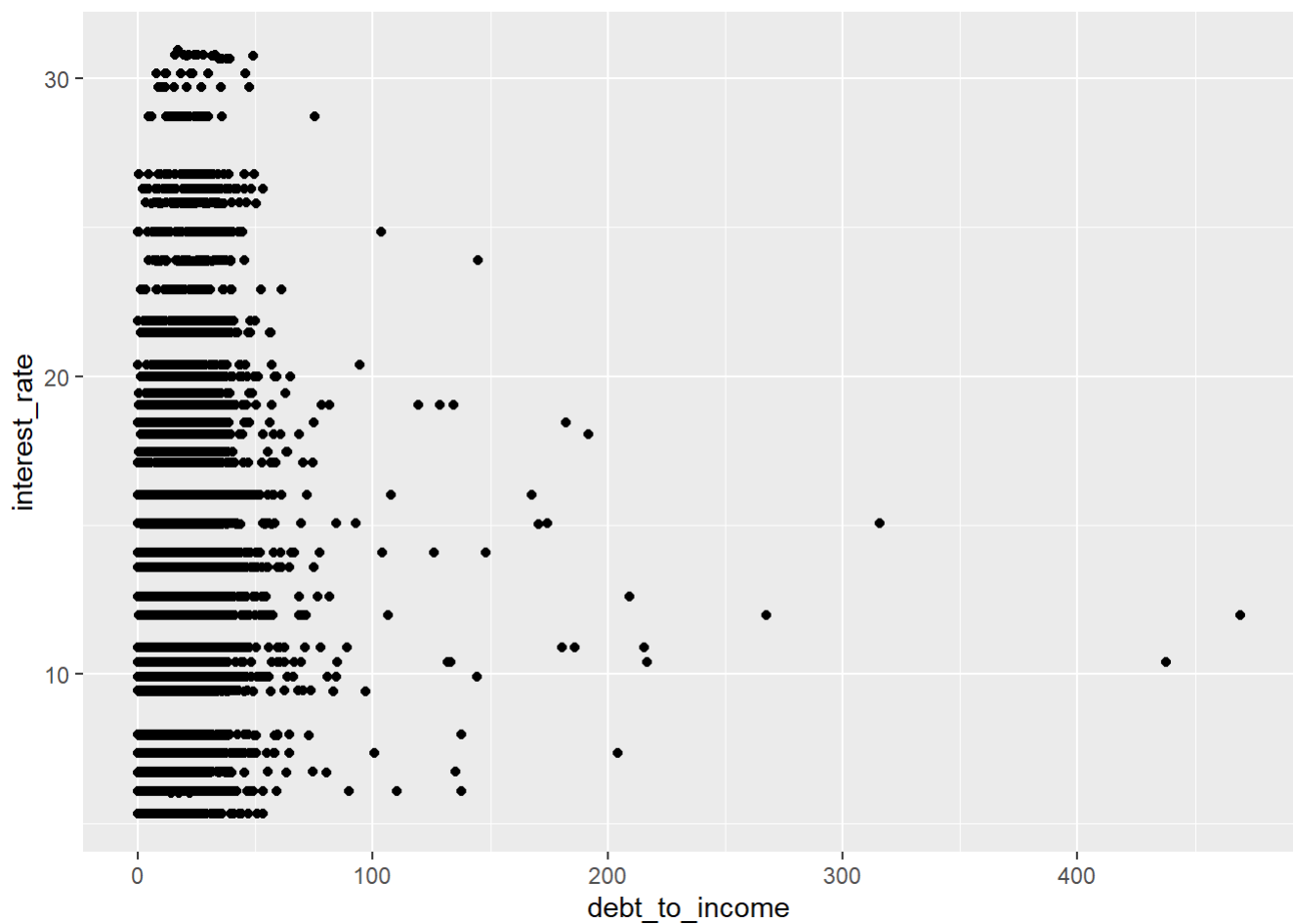
Interest rates of Lending Club loans

By grade of loan



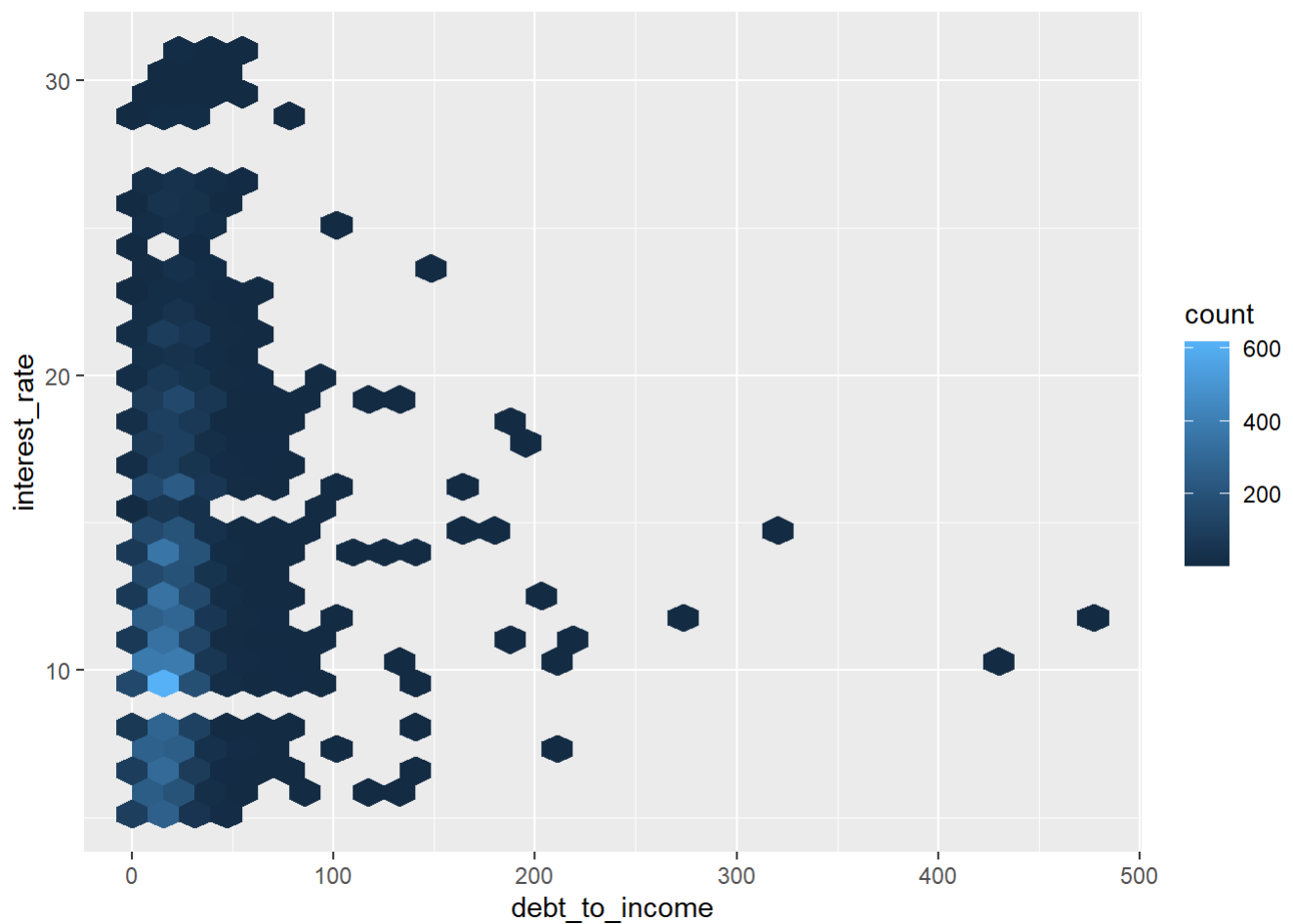
```
ggplot(loans, aes(x = debt_to_income, y = interest_rate)) +  
geom_point()
```

```
## Warning: Removed 24 rows containing missing values (`geom_point()`).
```

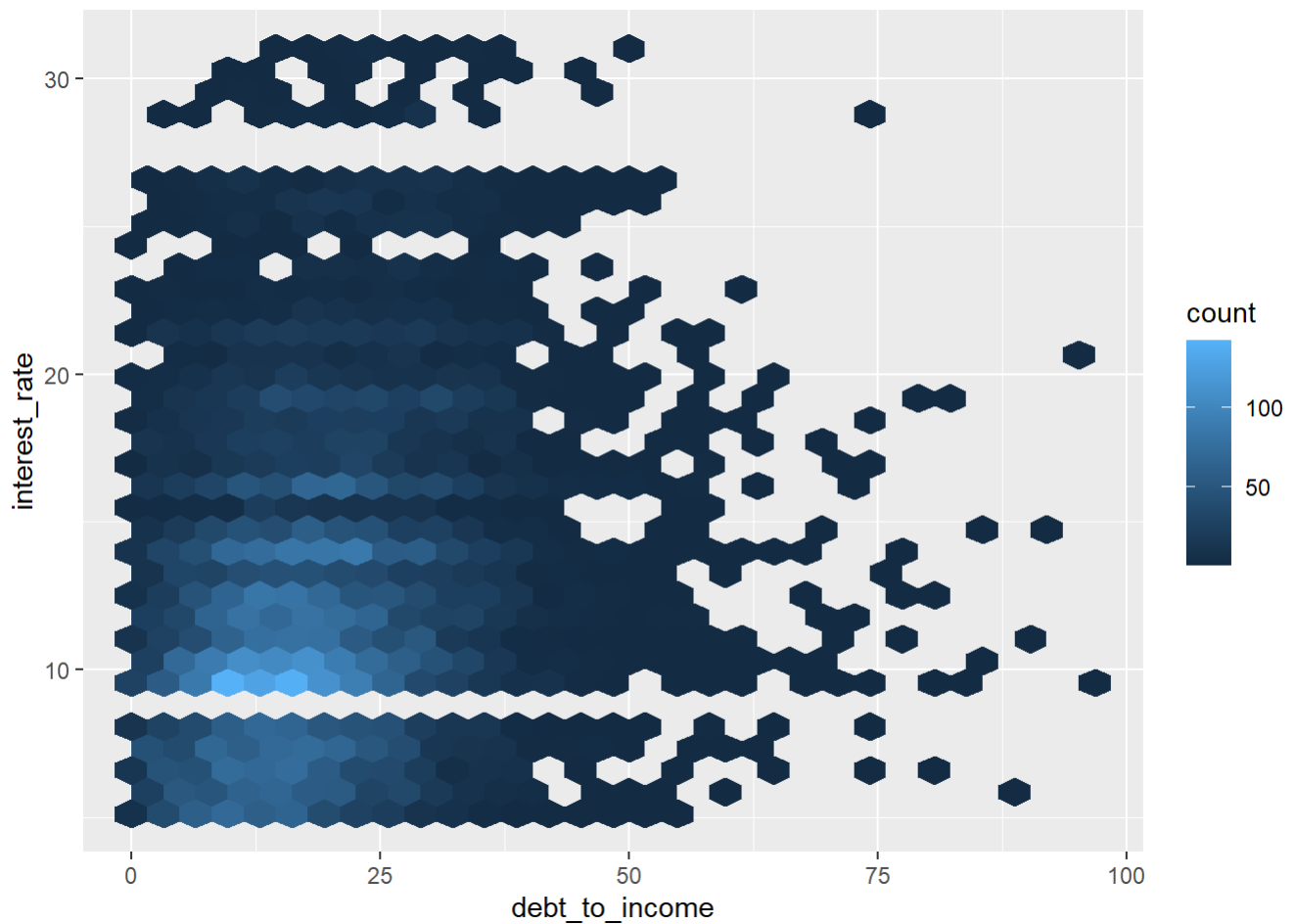


```
ggplot(loans, aes(x = debt_to_income, y = interest_rate)) +  
geom_hex()
```

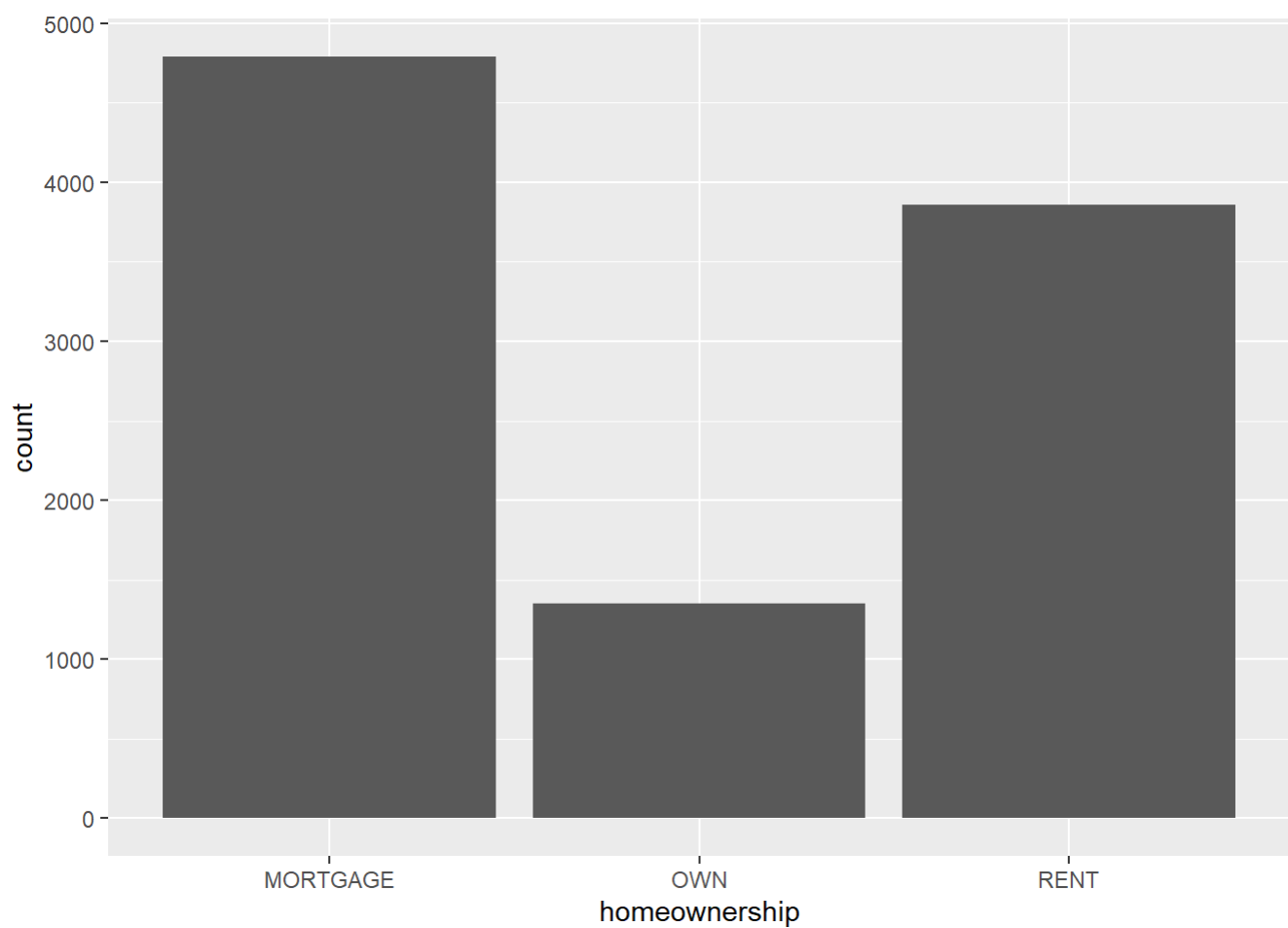
```
## Warning: Removed 24 rows containing non-finite values (`stat_binhex()`).
```



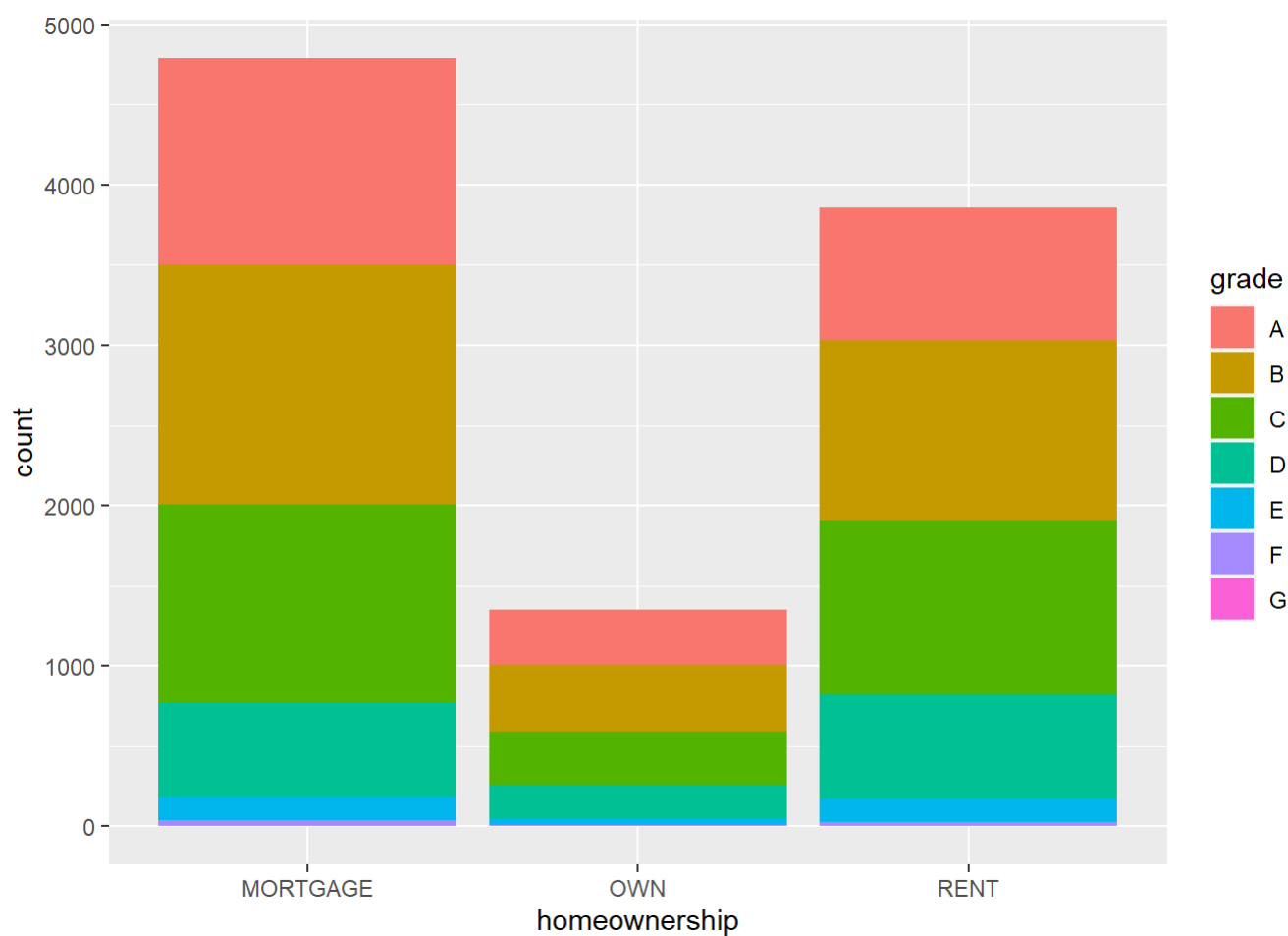
```
ggplot(loans %>% filter(debt_to_income < 100),  
  aes(x = debt_to_income, y = interest_rate)) +  
  geom_hex()
```



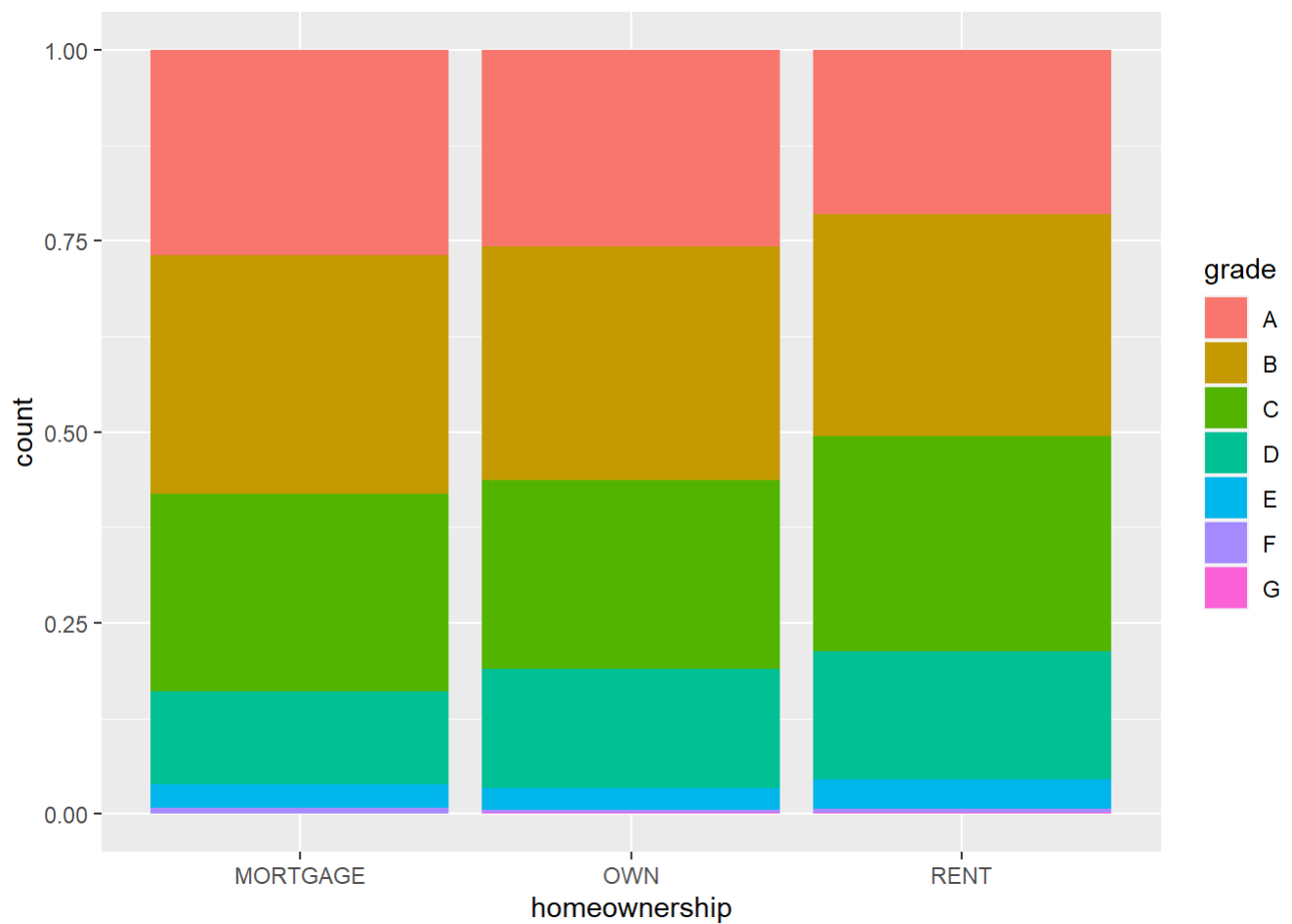
```
ggplot(loans, aes(x = homeownership)) +  
  geom_bar()
```



```
ggplot(loans, aes(x = homeownership,  
fill = grade)) +  
geom_bar()
```

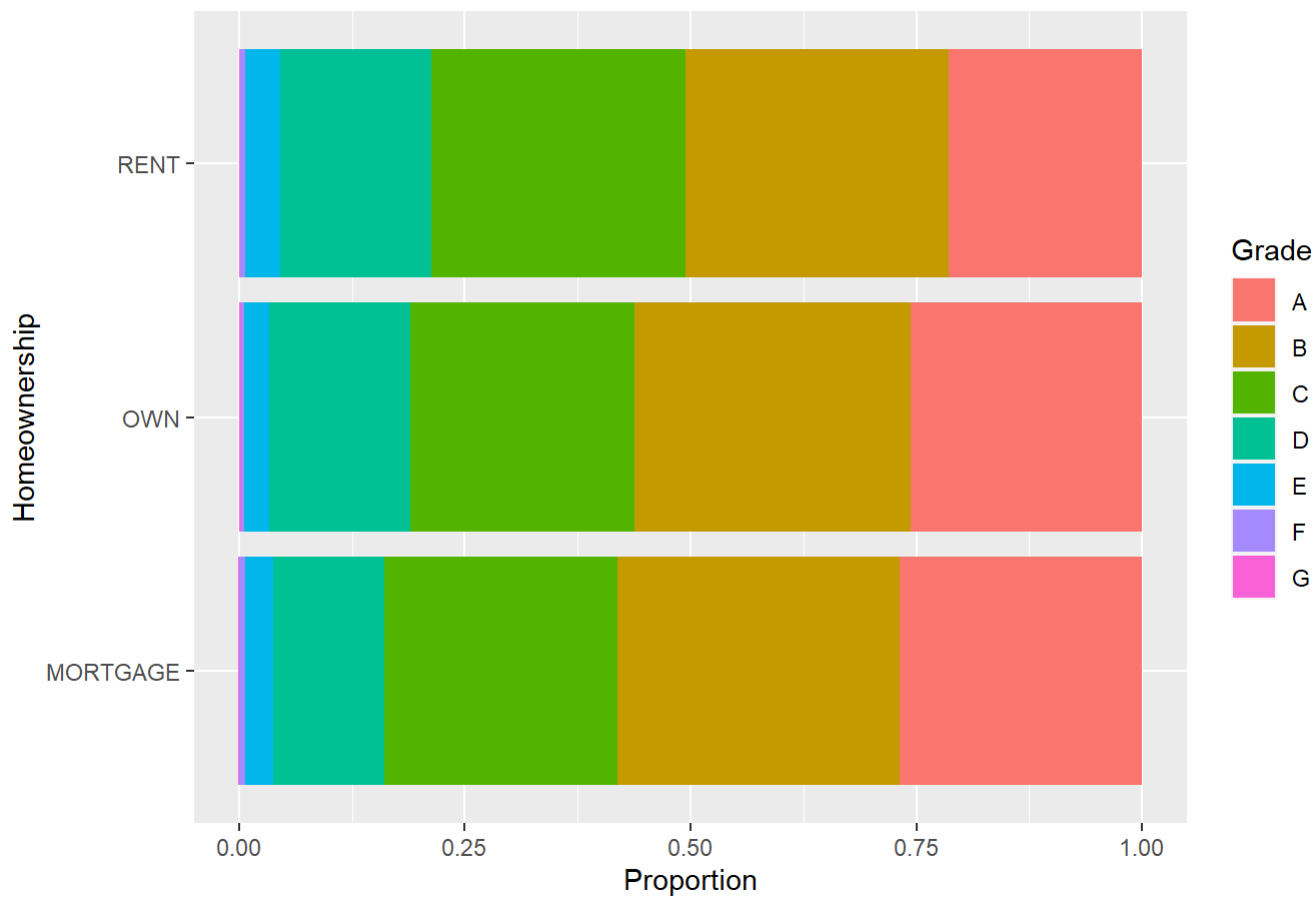


```
ggplot(loans, aes(x = homeownership, fill = grade)) +  
geom_bar(position = "fill")
```

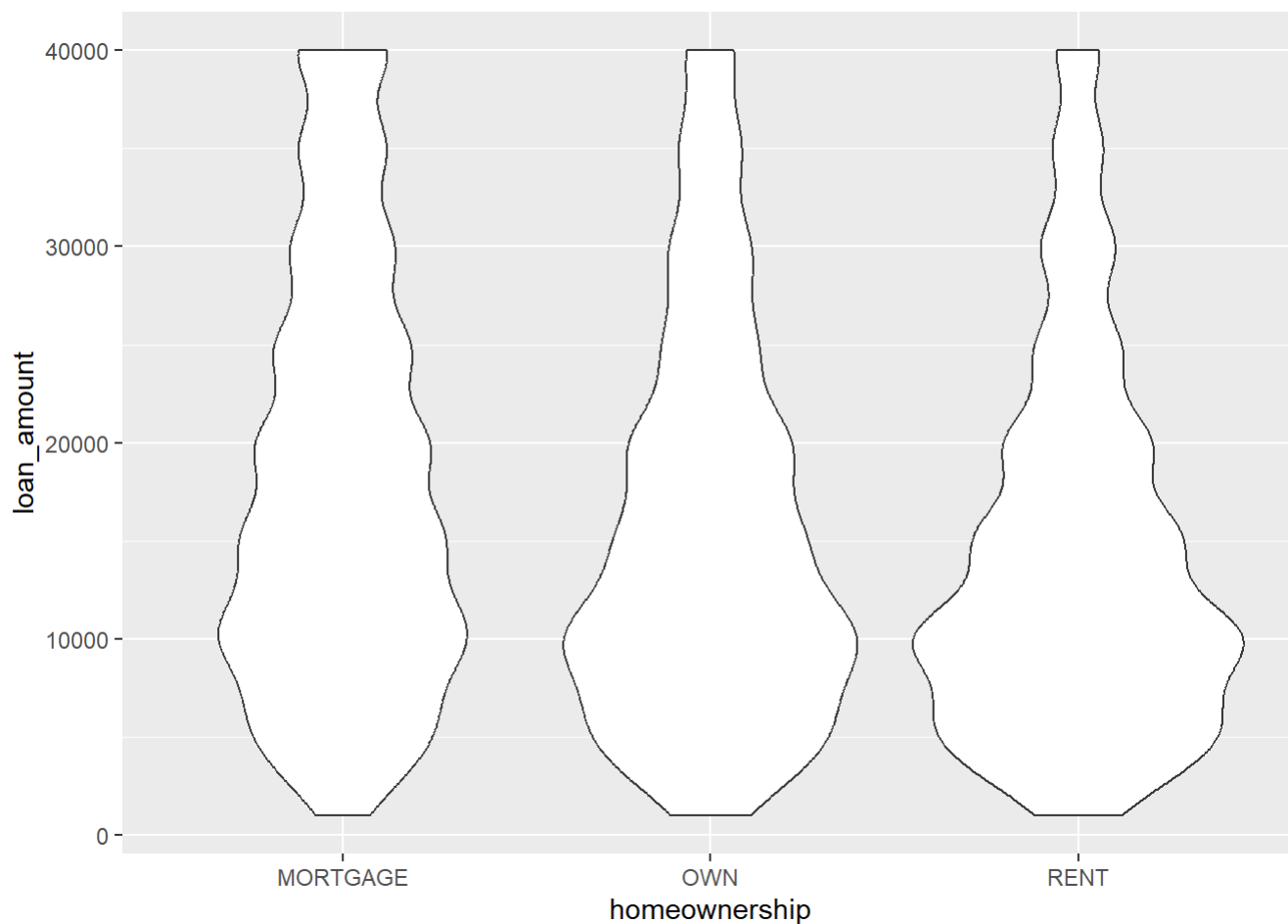


```
ggplot(loans, aes(y = homeownership, fill = grade)) + geom_bar(position = "fill") +  
labs( x = "Proportion", y = "Homeownership", fill = "Grade", title = "Grades of Lending Club  
loans")
```

Grades of Lending Club loans



```
ggplot(loans, aes(x = homeownership, y = loan_amount)) +  
  geom_violin()
```




```
#install.packages("ggribes")  
library(ggribes)
```

```
## Warning: package 'ggribes' was built under R version 4.2.3
```

```
ggplot(loans, aes(x = loan_amount, y = grade, fill = grade, color = grade)) +  
  geom_density_ridges(alpha = 0.5)
```

```
## Picking joint bandwidth of 2360
```

