

# *Graphic Design with ggplot2*

## **Working with Labels and Annotations:**

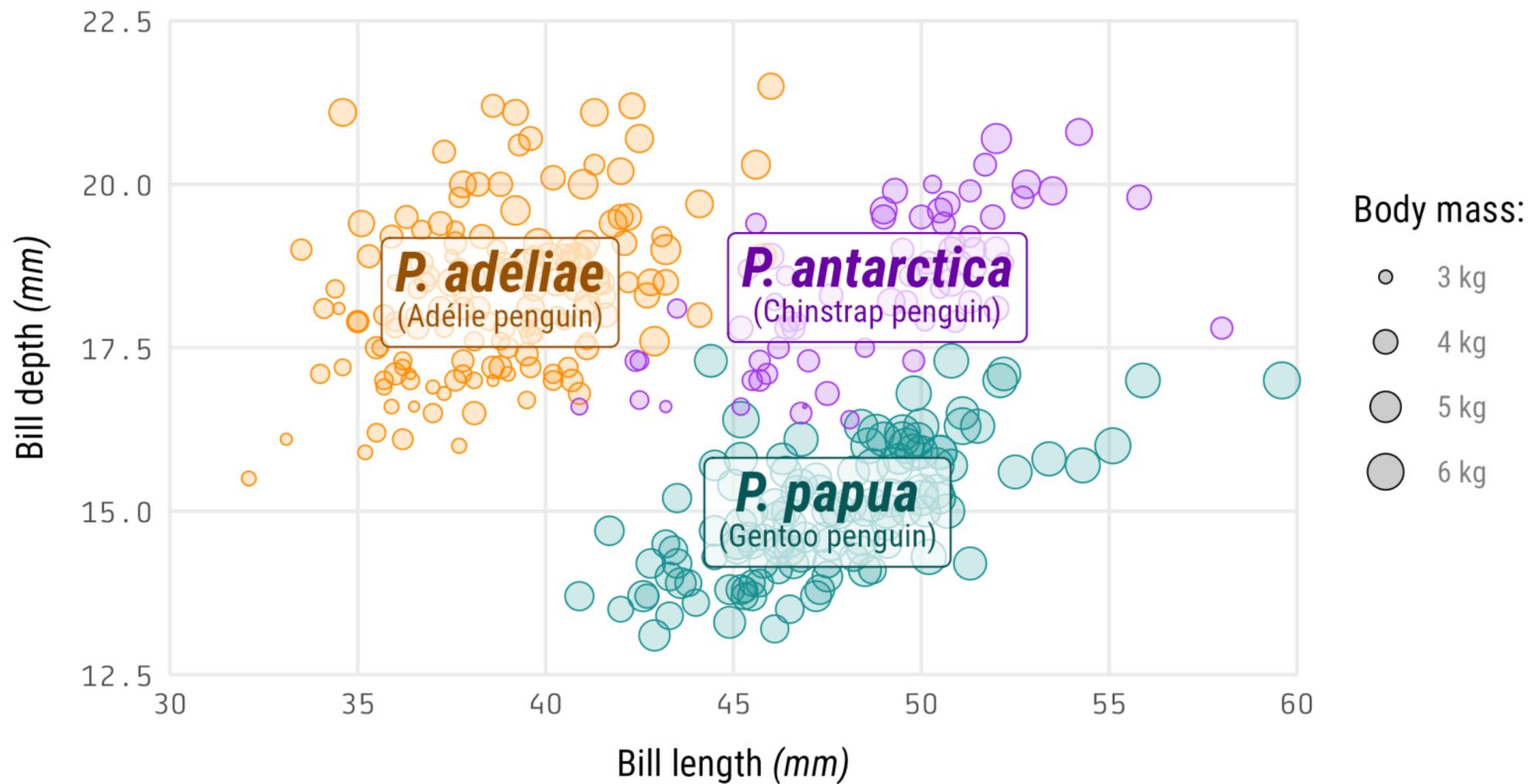
### Solution Exercise 1

Cédric Scherer // rstudio::conf // July 2022

# Exercise 1

- `{ggtext}` also comes with some new geom's. Explore those and other options on the package webpage: [wilkelab.rg/ggtext](http://wilkelab.rg/ggtext).
- **Create the following visualization, as close as possible, with the `penguins` dataset which is provided by the `{palmerpenguins}` package.**
  - For the species labels, you likely have to create a summary data set.
  - Use the `{ggtext}` geometries and theme elements to format the labels.
  - Also, make use of the other components such as scales, original theme, and theme customization.

# Bill dimensions of brush-tailed penguins *Pygoscelis* spec.



Horst AM, Hill AP, Gorman KB (2020). palmerpenguins R package version 0.1.0

# The Data Set

```
1 # install.packages("palmerpenguins")
2 library(palmerpenguins)
3
4 penguins
```

# A tibble: 344 x 8

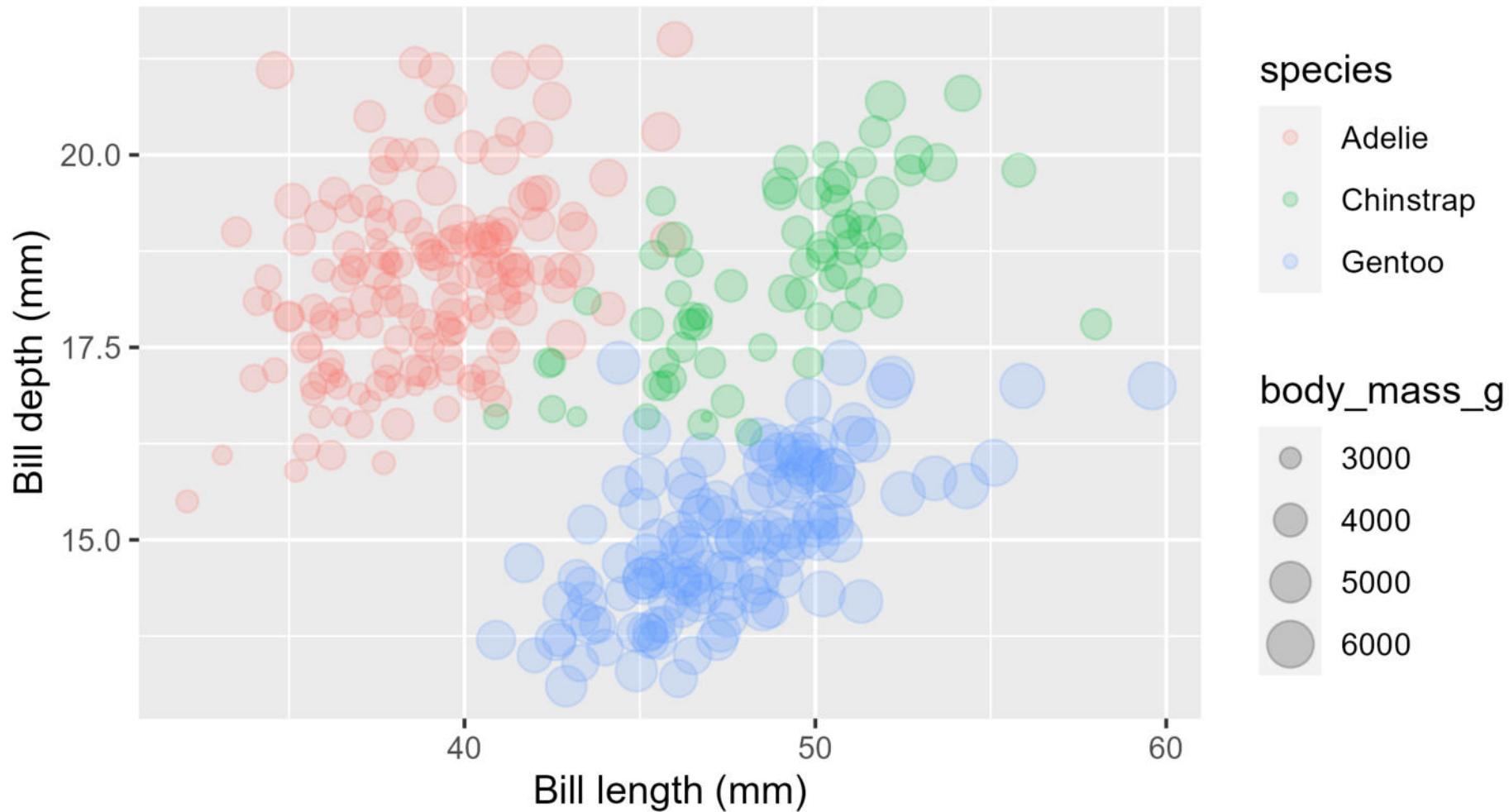
	species	island	bill_length_mm	bill_depth_mm	flipper_length_mm	body_mass_g	<int>
	<fct>	<fct>	<dbl>	<dbl>	<dbl>	<dbl>	<int>
1	Adelie	Torgersen	39.1	18.7	181	3750	
2	Adelie	Torgersen	39.5	17.4	186	3800	
3	Adelie	Torgersen	40.3	18	195	3250	
4	Adelie	Torgersen	NA	NA	NA	NA	
5	Adelie	Torgersen	36.7	19.3	193	3450	
6	Adelie	Magnusson	39.7	19.0	190	3350	

# Create a Labeled Bubble Chart

```
1 ggplot(  
2   penguins,  
3   aes(x = bill_length_mm, y = bill_depth_mm,  
4       color = species, size = body_mass_g)  
5 ) +  
6 geom_point(alpha = .2) +  
7 labs(  
8   x = "Bill length (mm)",  
9   y = "Bill depth (mm)",  
10  title = "Bill dimensions of brush-tailed penguins Pygoscelis spec.",  
11  caption = "Horst AM, Hill AP, Gorman KB (2020). palmerpenguins R package version 0.1.0"  
12 )
```

# A Labelled Bubble Plot

Bill dimensions of brush-tailed penguins *Pygoscelis* spec.



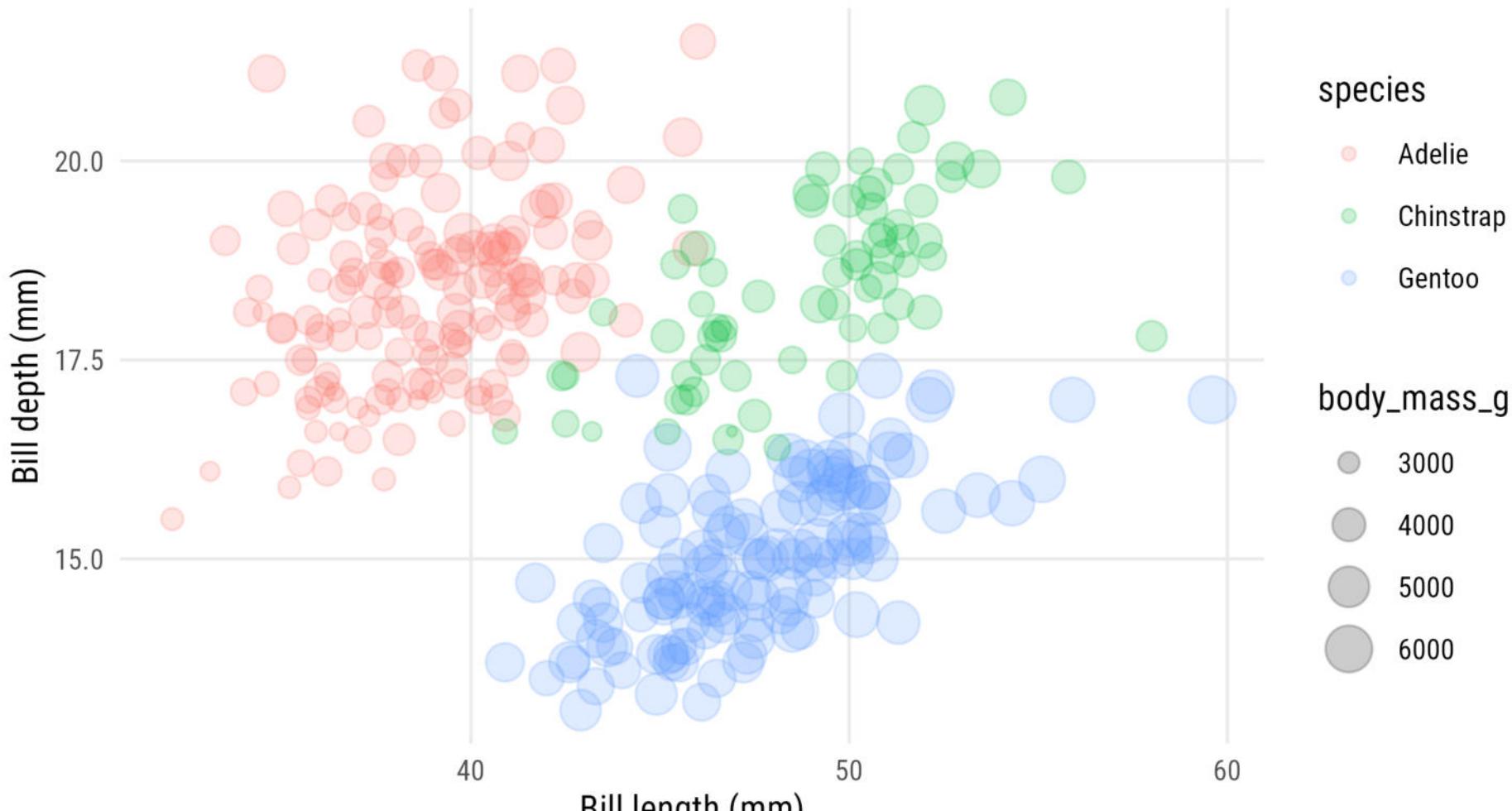
Horst AM, Hill AP, Gorman KB (2020). palmerpenguins R package version 0.1.0

# Add a Custom Theme

```
1 ggplot(  
2   penguins,  
3   aes(x = bill_length_mm, y = bill_depth_mm,  
4       color = species, size = body_mass_g)  
5 ) +  
6 geom_point(alpha = .2) +  
7 labs(  
8   x = "Bill length (mm)",  
9   y = "Bill depth (mm)",  
10  title = "Bill dimensions of brush-tailed penguins Pygoscelis spec.",  
11  caption = "Horst AM, Hill AP, Gorman KB (2020). palmerpenguins R package version 0.1.0"  
12 ) +  
13 theme_minimal(base_size = 10, base_family = "Roboto Condensed") +  
14 theme(  
15   plot.title.position = "plot",  
16   plot.caption.position = "plot",  
17   panel.grid.minor = element_blank()  
18 )
```

# Add a Custom Theme

Bill dimensions of brush-tailed penguins *Pygoscelis* spec.

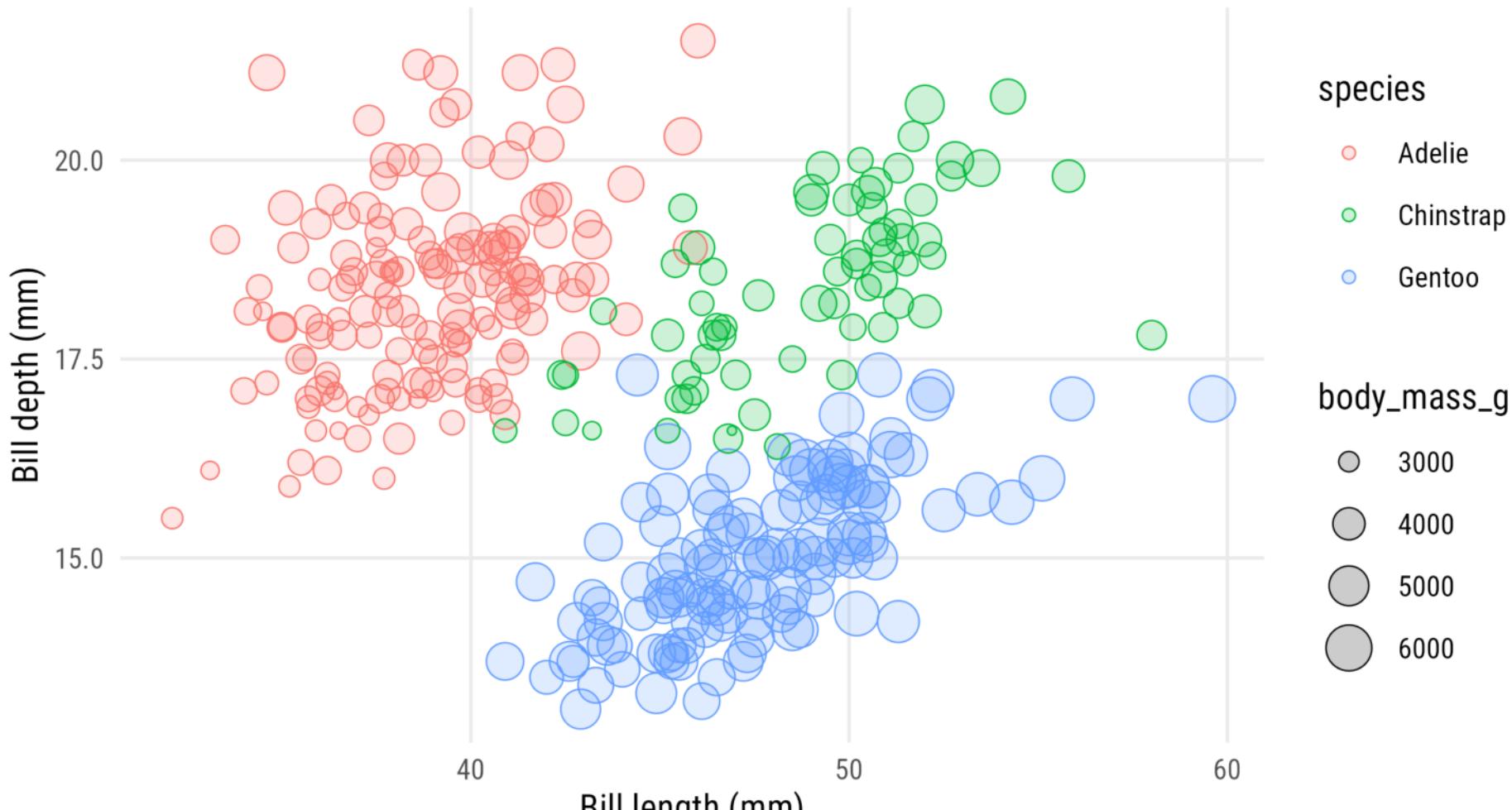


# Add an Outline

```
1 p1 <-
2   ggplot(
3     penguins,
4     aes(x = bill_length_mm, y = bill_depth_mm,
5       color = species, size = body_mass_g)
6   ) +
7   geom_point(alpha = .2, stroke = .3) +
8   geom_point(shape = 1, stroke = .3) +
9   labs(
10     x = "Bill length (mm)",
11     y = "Bill depth (mm)",
12     title = "Bill dimensions of brush-tailed penguins Pygoscelis spec.",
13     caption = "Horst AM, Hill AP, Gorman KB (2020). palmerpenguins R package version 0.1.0"
14   ) +
15   theme_minimal(base_size = 10, base_family = "Roboto Condensed") +
16   theme(
17     plot.title.position = "plot",
18     plot.caption.position = "plot",
19     panel.grid.minor = element_blank()
```

# Add an Outline

Bill dimensions of brush-tailed penguins *Pygoscelis* spec.

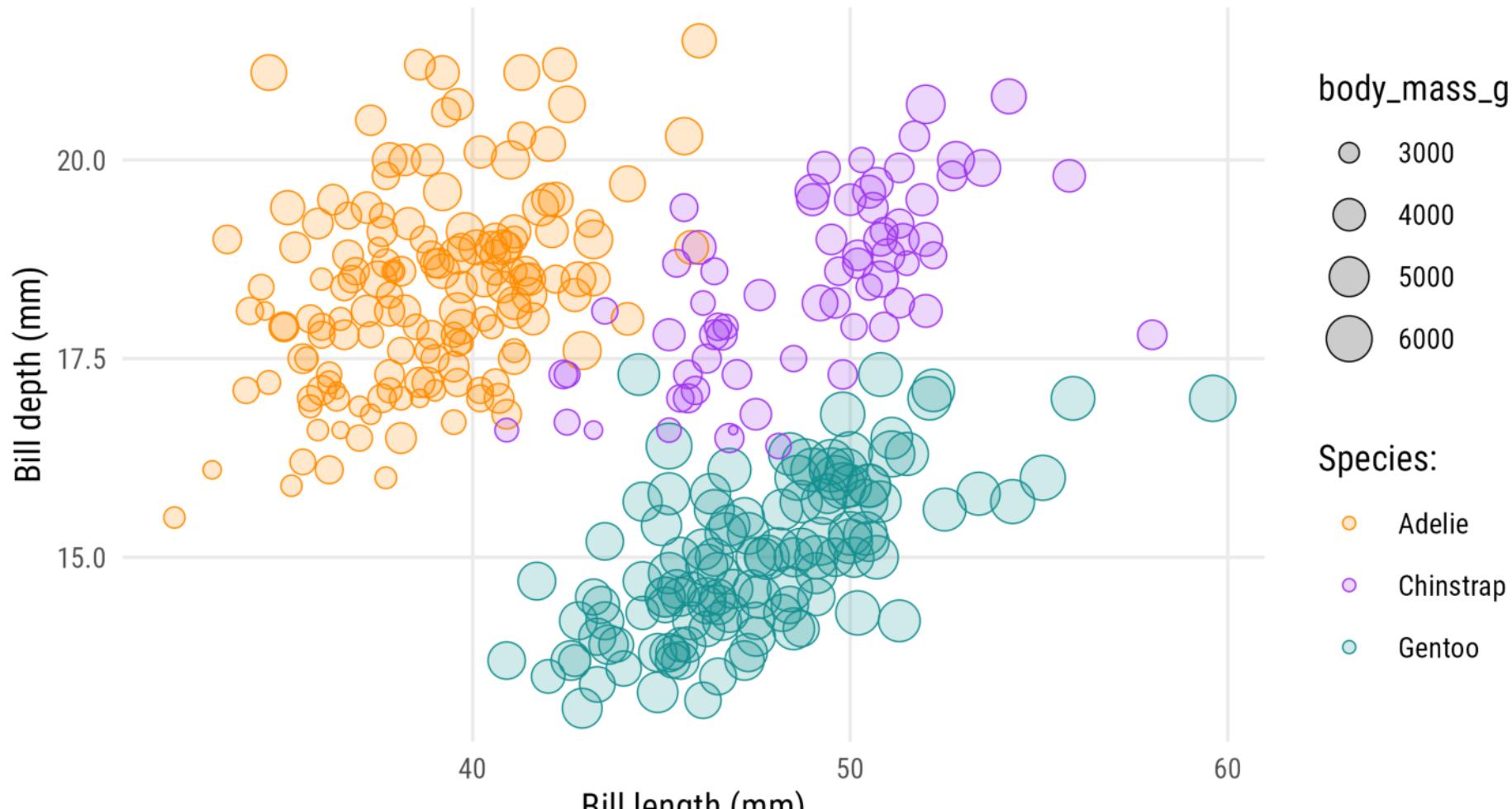


# Style Color Legend

```
1 p1 +  
2   scale_color_manual(  
3     name = "Species:",  
4     values = c("#FF8C00", "#A034F0", "#159090")  
5   )
```

# Style Color Legend

Bill dimensions of brush-tailed penguins *Pygoscelis* spec.



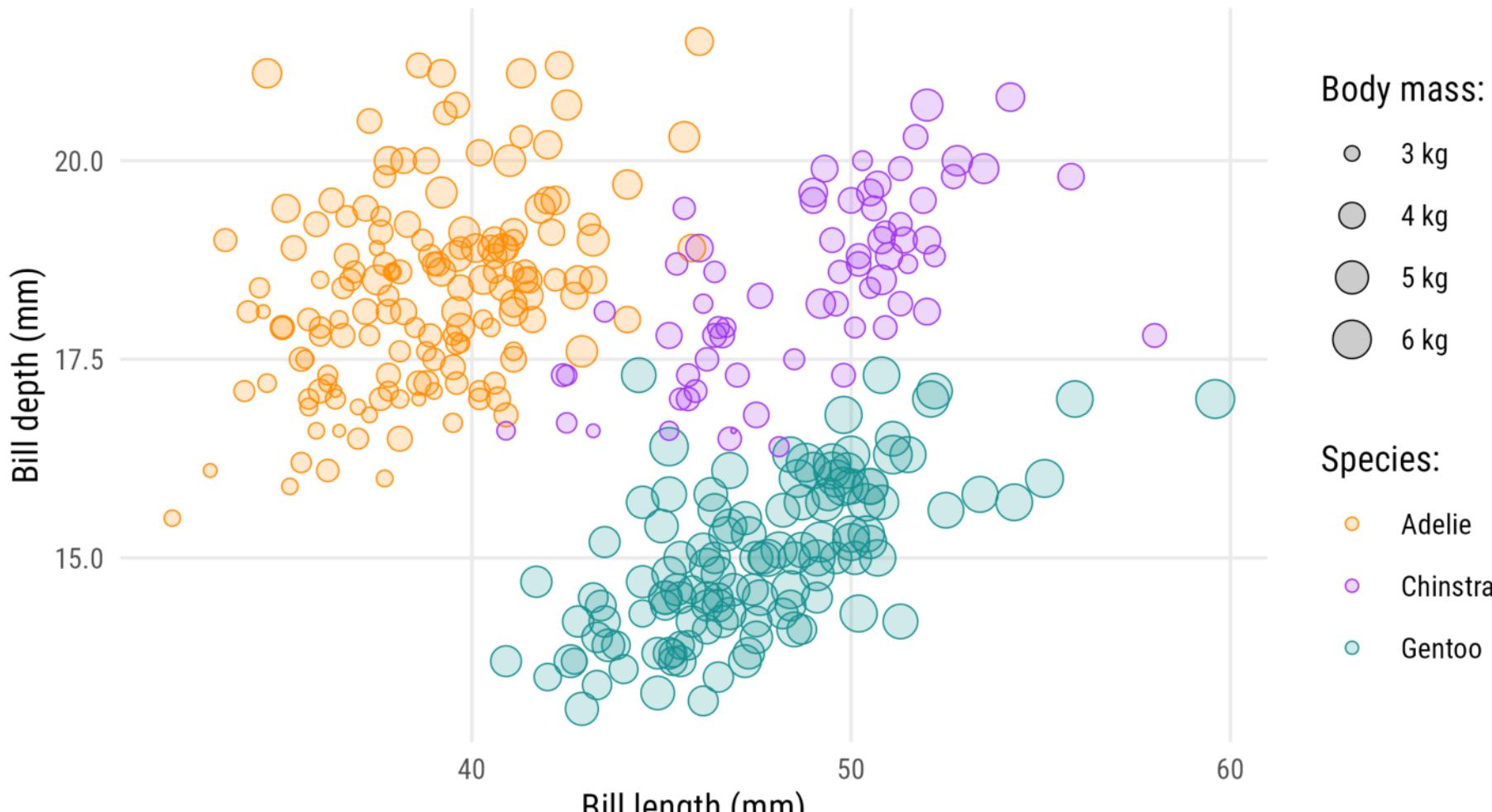
Horst AM, Hill AP, Gorman KB (2020). palmerpenguins R package version 0.1.0

# Style Size Legend

```
1 p2 <- p1 +
2   scale_color_manual(
3     name = "Species:",
4     values = c("#FF8C00", "#A034F0", "#159090")
5   ) +
6   scale_size(
7     name = "Body mass:",
8     breaks = 3:6 * 1000,
9     labels = function(x) paste(x / 1000, "kg"),
10    range = c(.5, 5)
11  )
12
13 p2
```

# Style Size Legend

Bill dimensions of brush-tailed penguins *Pygoscelis* spec.



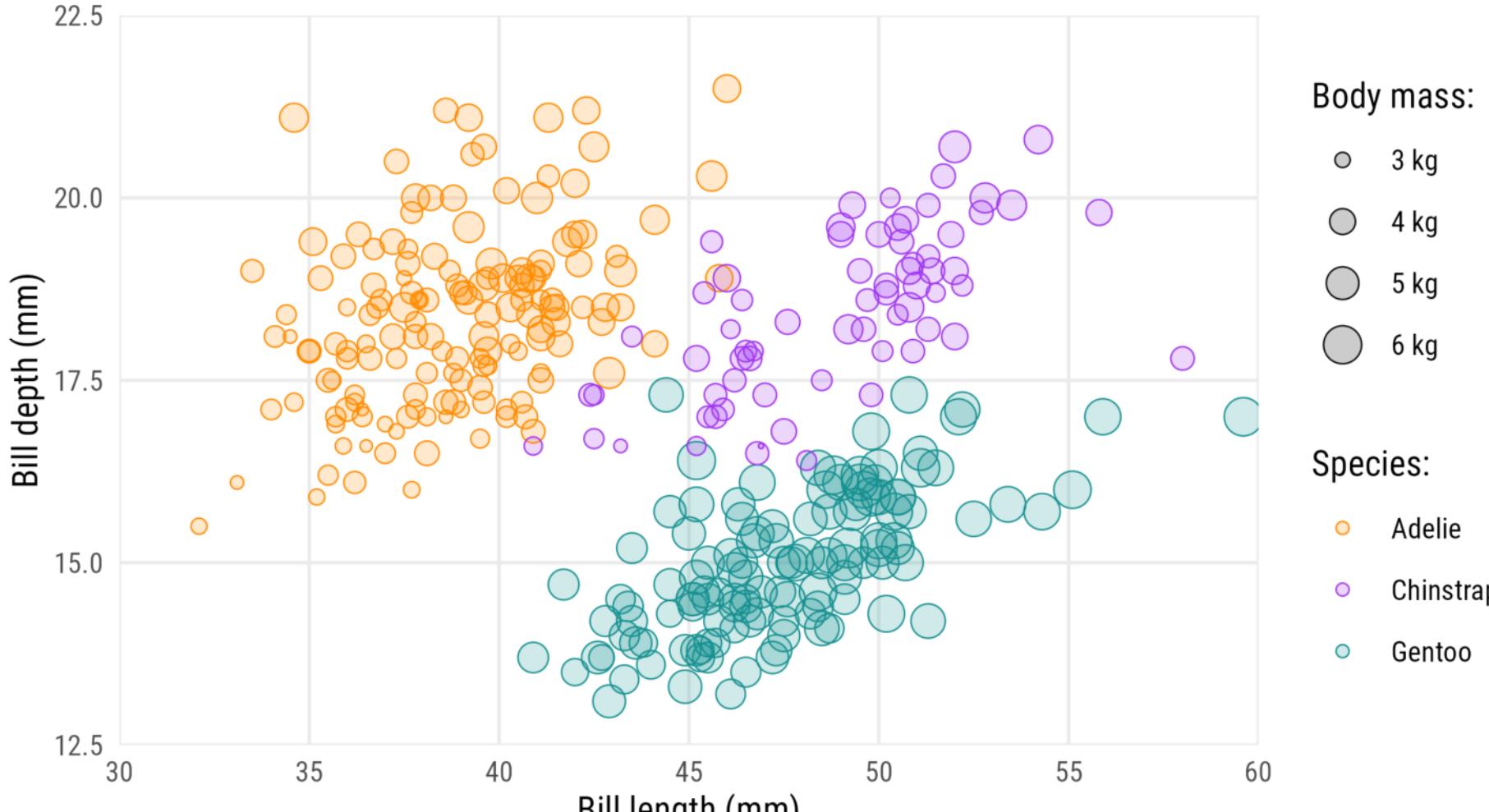
Horst AM, Hill AP, Gorman KB (2020). palmerpenguins R package version 0.1.0

# Adjust Axes

```
1 p2 +  
2   scale_x_continuous(  
3     limits = c(30, 60),  
4     breaks = 6:12*5,  
5     expand = c(0, 0)  
6   ) +  
7   scale_y_continuous(  
8     limits = c(12.5, 22.5),  
9     breaks = seq(12.5, 22.5, by = 2.5),  
10    expand = c(0, 0)  
11  )
```

# Adjust Axes

Bill dimensions of brush-tailed penguins *Pygoscelis* spec.



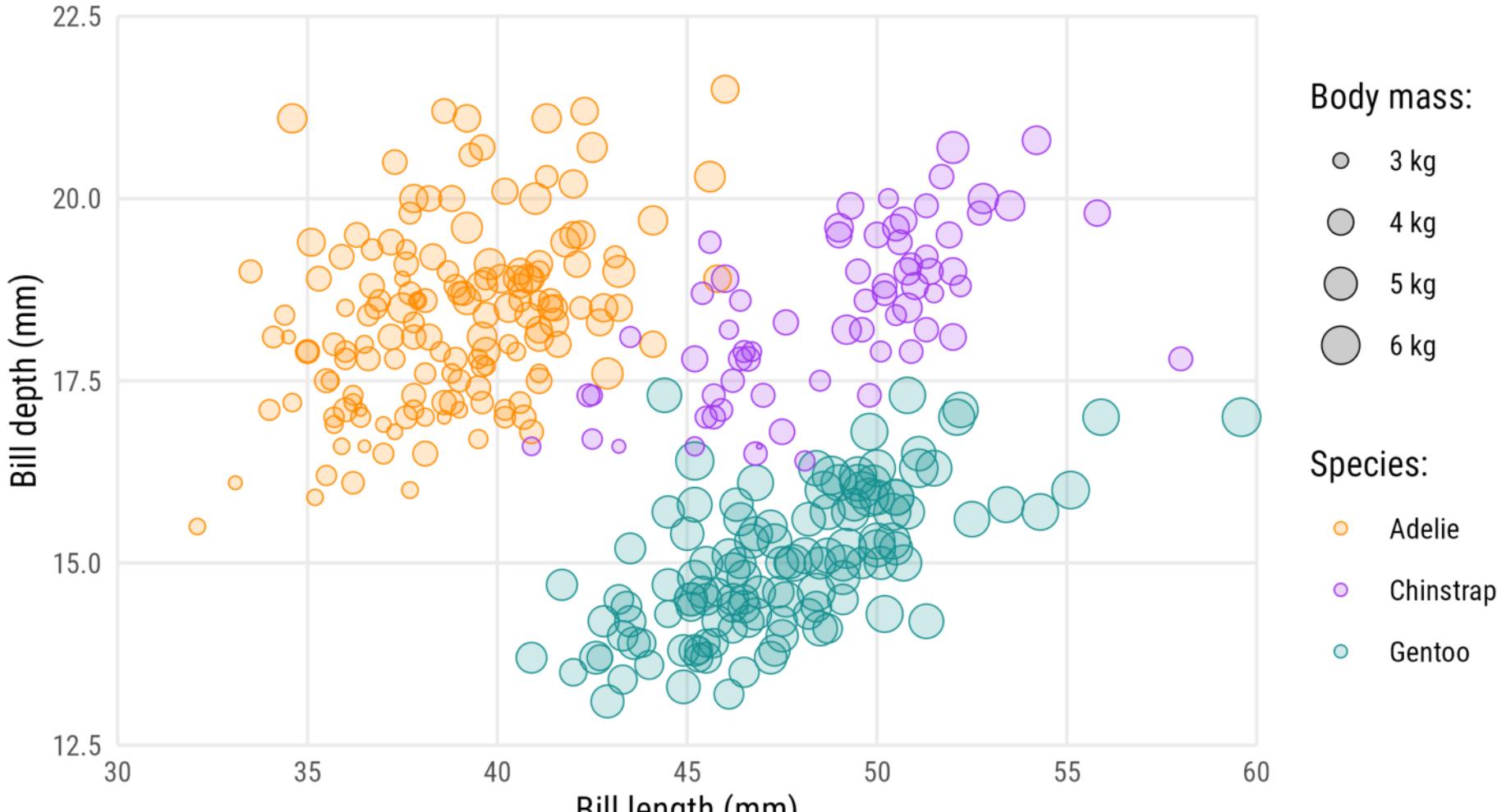
Horst AM, Hill AP, Gorman KB (2020). palmerpenguins R package version 0.1.0

# Adjust Axes

```
1 p3 <- p2 +  
2   coord_cartesian(  
3     expand = FALSE,  
4     clip = "off"  
5   ) +  
6   scale_x_continuous(  
7     limits = c(30, 60),  
8     breaks = 6:12*5  
9   ) +  
10  scale_y_continuous(  
11    limits = c(12.5, 22.5),  
12    breaks = seq(12.5, 22.5, by = 2.5)  
13  )  
14  
15 p3
```

# Adjust Axes

Bill dimensions of brush-tailed penguins *Pygoscelis* spec.



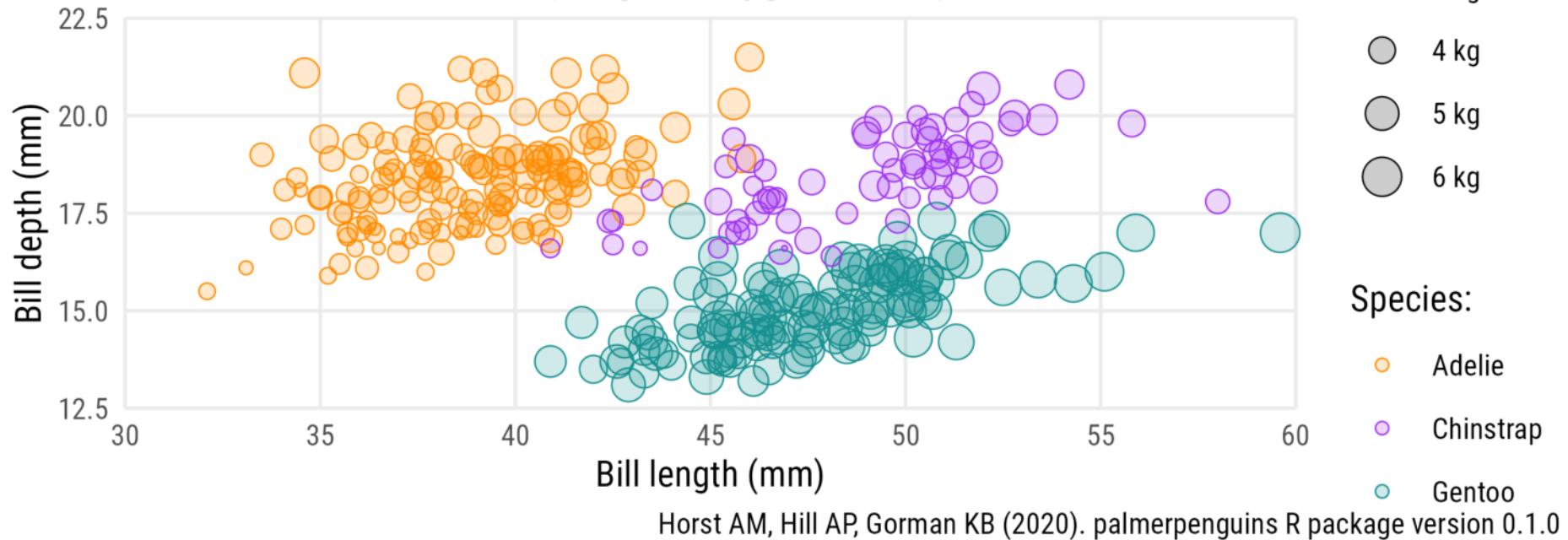
Horst AM, Hill AP, Gorman KB (2020). palmerpenguins R package version 0.1.0

# Fixed Coordinate System?

```
1 p2 +  
2   coord_fixed(  
3     expand = FALSE,  
4     clip = "off"  
5   ) +  
6   scale_x_continuous(  
7     limits = c(30, 60),  
8     breaks = 6:12*5  
9   ) +  
10  scale_y_continuous(  
11    limits = c(12.5, 22.5),  
12    breaks = seq(12.5, 22.5, by = 2.5)  
13  )
```

# Fixed Coordinate System?

Bill dimensions of brush-tailed penguins *Pygoscelis* spec.

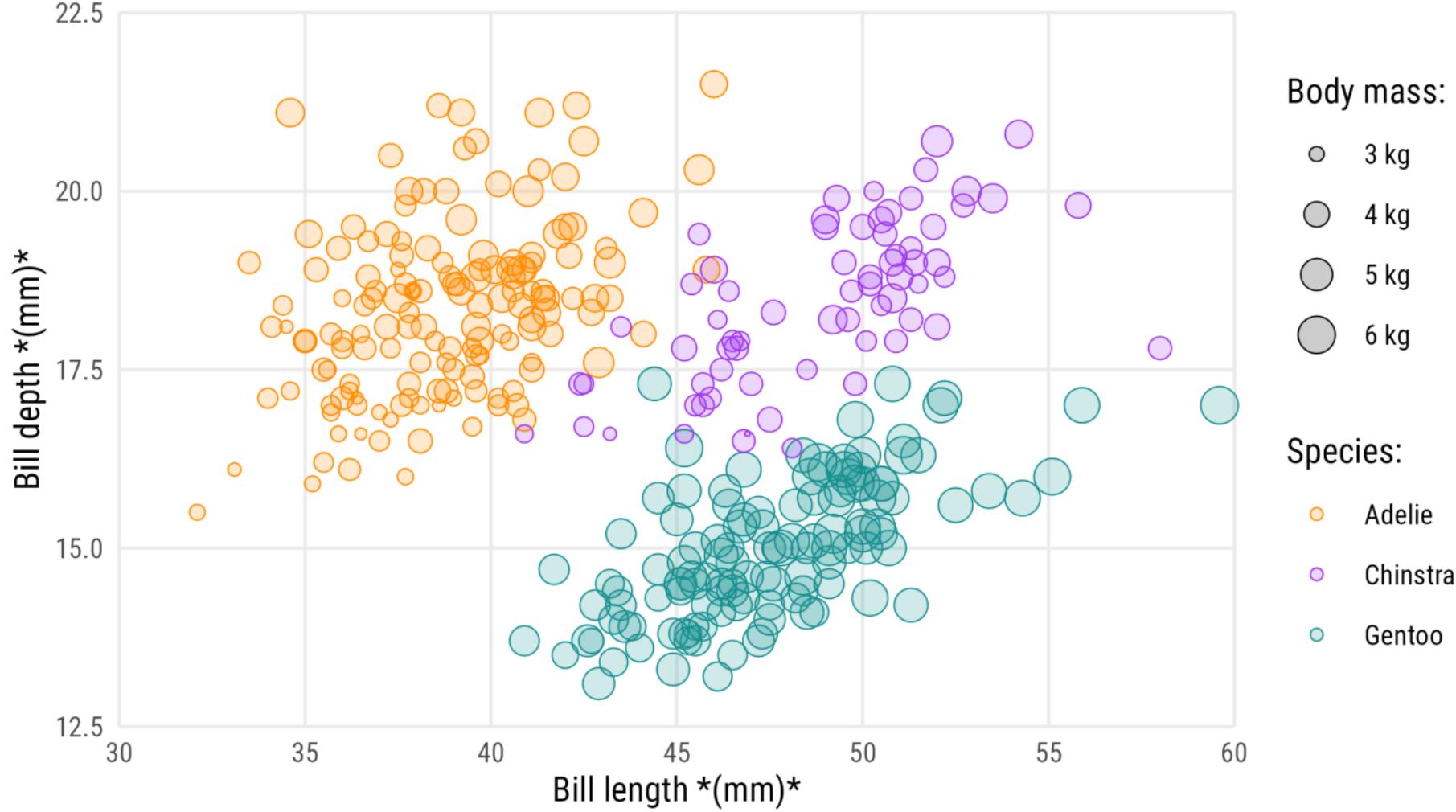


# Format Labels with {ggtext}

```
1 p3 +  
2   labs(  
3     x = "Bill length *(mm)*",  
4     y = "Bill depth *(mm)*",  
5     title = "Bill dimensions of brush-tailed penguins *Pygoscelis spec.*",  
6     caption = "Horst AM, Hill AP, Gorman KB (2020). <span style='font-family:tabular;'>palmerpenguin  
7   )
```

# Format Labels with `{ggtext}`

Bill dimensions of brush-tailed penguins \**Pygoscelis* spec.\*



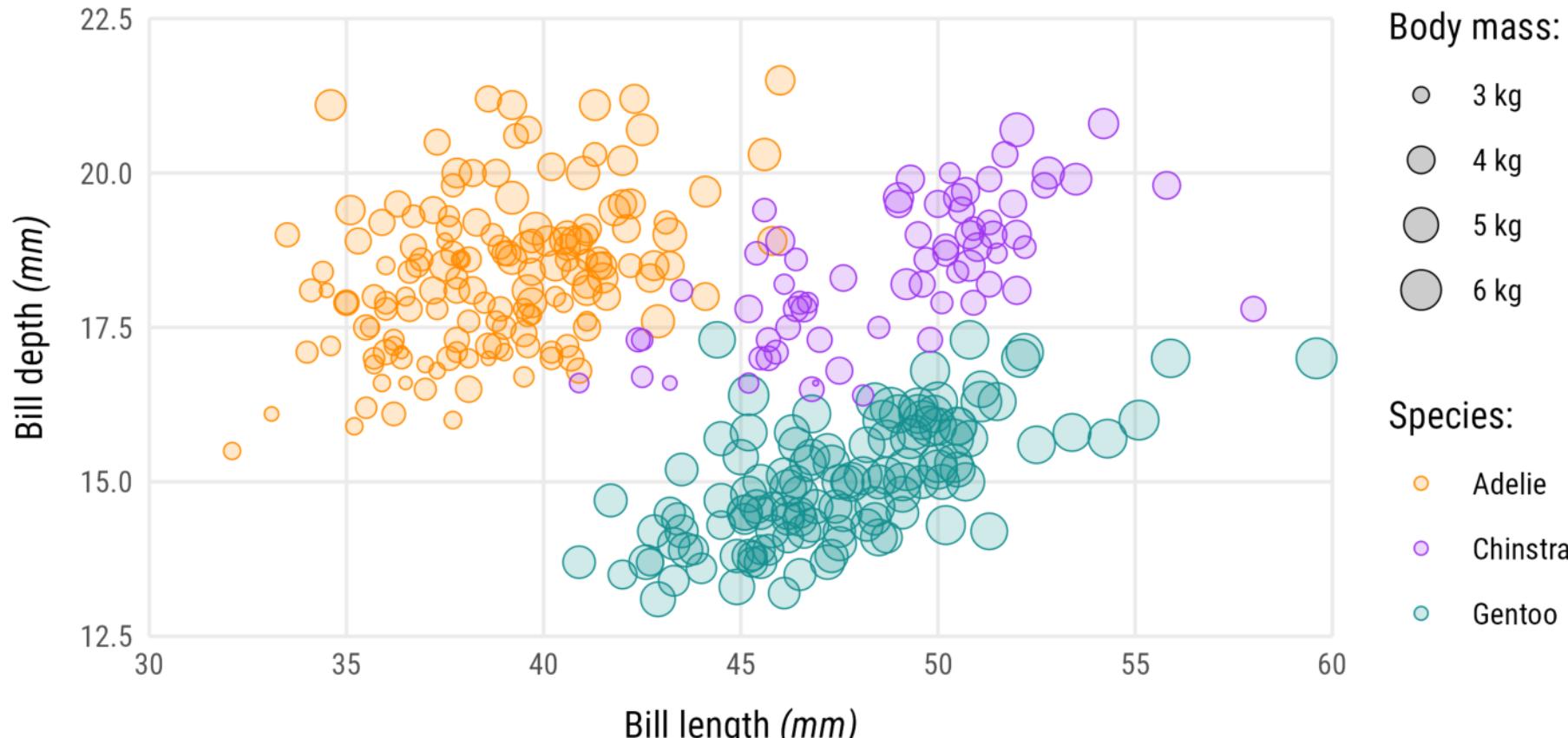
Horst AM, Hill AP, Gorman KB (2020). `palmerpenguins` R package version 0.1.0

# Format Labels with {ggtext}

```
1 library(ggtext)
2
3 p4 <- p3 +
4   labs(
5     x = "Bill length *(mm)*",
6     y = "Bill depth *(mm)*",
7     title = "Bill dimensions of brush-tailed penguins *Pygoscelis spec.*",
8     caption = "Horst AM, Hill AP, Gorman KB (2020). <span style='font-family:tabular;'>palmerpenguin
9   ) +
10   theme(
11     plot.title = element_markdown(
12       face = "bold", size = 16, margin = margin(12, 0, 12, 0)
13     ),
14     plot.caption = element_markdown(
15       size = 7, color = "grey50", margin = margin(12, 0, 6, 0)
16     ),
17     axis.title.x = element_markdown(margin = margin(t = 8)),
18     axis.title.y = element_markdown(margin = margin(r = 8))
19   )
```

# Format Labels with `{ggtext}`

## Bill dimensions of brush-tailed penguins *Pygoscelis* spec.



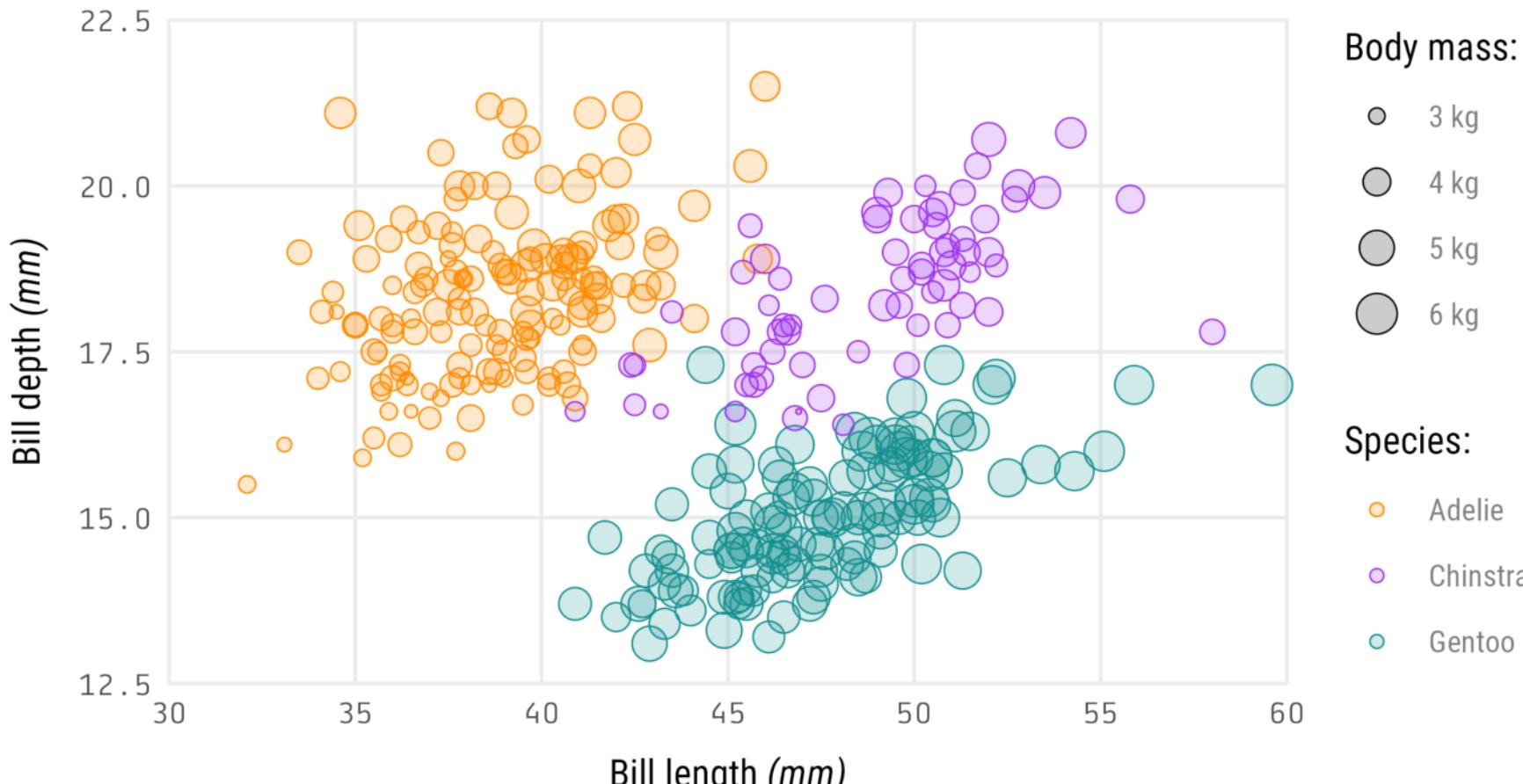
Horst AM, Hill AP, Gorman KB (2020). *palmerpenguins* R package version 0.1.0

# Style Other Theme Elements

```
1 p5 <- p4 +
2   theme(
3     axis.text = element_text(family = "Tabular"),
4     legend.text = element_text(color = "grey50"),
5     plot.margin = margin(0, 14, 0, 12),
6     plot.background = element_rect(fill = NA, color = "grey50", size = 1)
7   )
8
9 p5
```

# Style Other Theme Elements

## Bill dimensions of brush-tailed penguins *Pygoscelis spec.*



Horst AM, Hill AP, Gorman KB (2020). palmerpenguins R package version 0.1.0

# Create the Summary Data

```
1 library(tidyverse)
2
3 penguins_labs <-
4   penguins %>%
5   group_by(species) %>%
6   summarize(across(starts_with("bill"), ~ mean(.x, na.rm = TRUE))) %>%
7   mutate(
8     species_lab = case_when(
9       species == "Adelie" ~ "<b style='font-size:15pt;'>*P. adélieae*</b><br>(Adélie penguin)",
10      species == "Chinstrap" ~ "<b style='font-size:15pt;'>*P. antarctica*</b><br>(Chinstrap penguin",
11      species == "Gentoo" ~ "<b style='font-size:15pt;'>*P. papua*</b><br>(Gentoo penguin"
12    )
13  )
14
15 penguins_labs
```

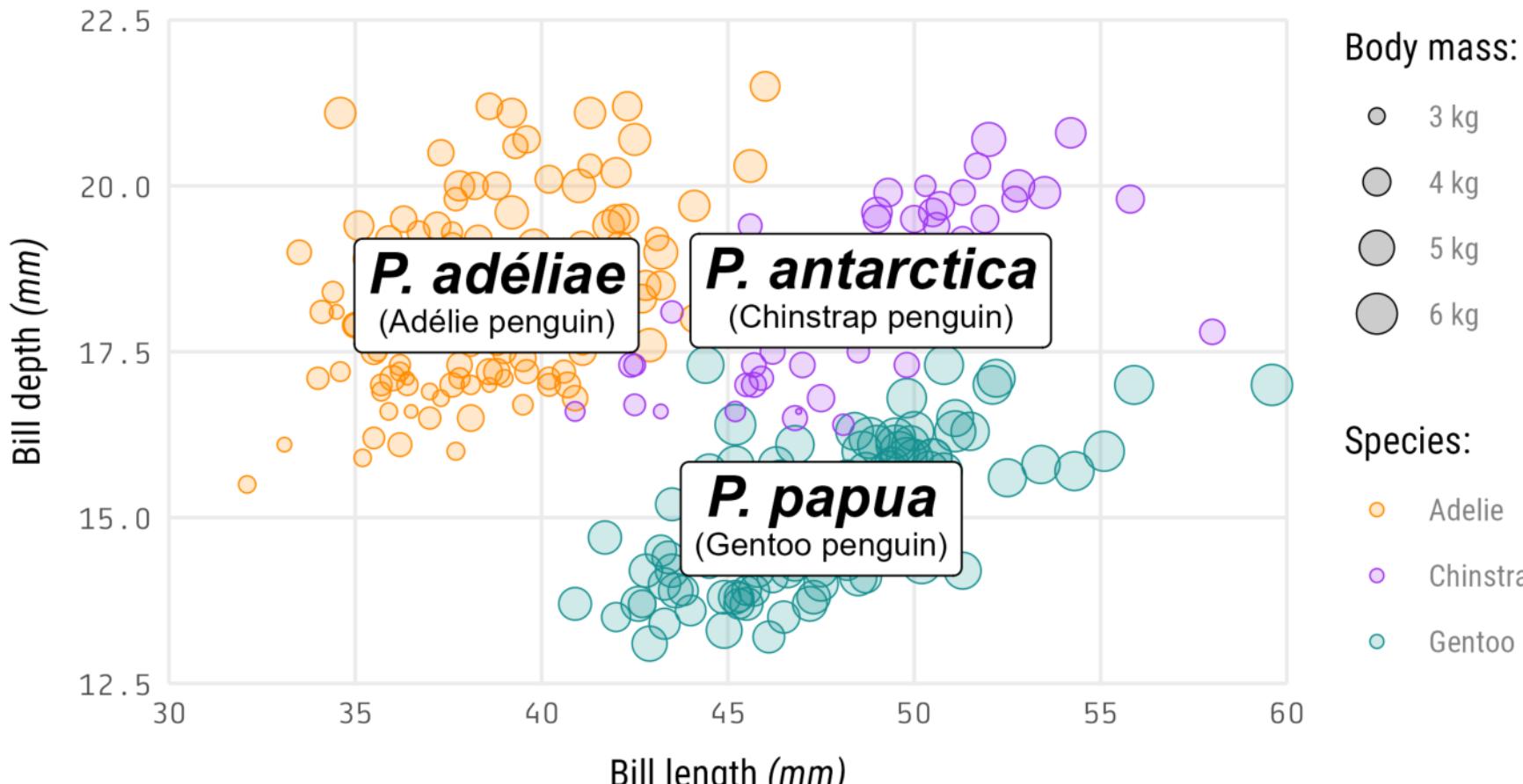
```
# A tibble: 3 x 4
  species    bill_length_mm bill_depth_mm species_lab
  <fct>          <dbl>        <dbl> <chr>
1 Adelie         38.8         18.3 <b style='font-size:15pt;'>*P.
adéliae~                                 
2 Chinstrap      48.8         18.4 <b style='font-size:15pt;'>*P.
antarct~                                 
3 Gentoo         47.5         15.0 <b style='font-size:15pt;'>*P. papua*
```

# Add Species Annotations

```
1 p5 +  
2   geom_richtext(  
3     data = penguins_labs,  
4     aes(label = species_lab),  
5     color = "black", size = 3  
6   )
```

# Add Species Annotations

## Bill dimensions of brush-tailed penguins *Pygoscelis* spec.

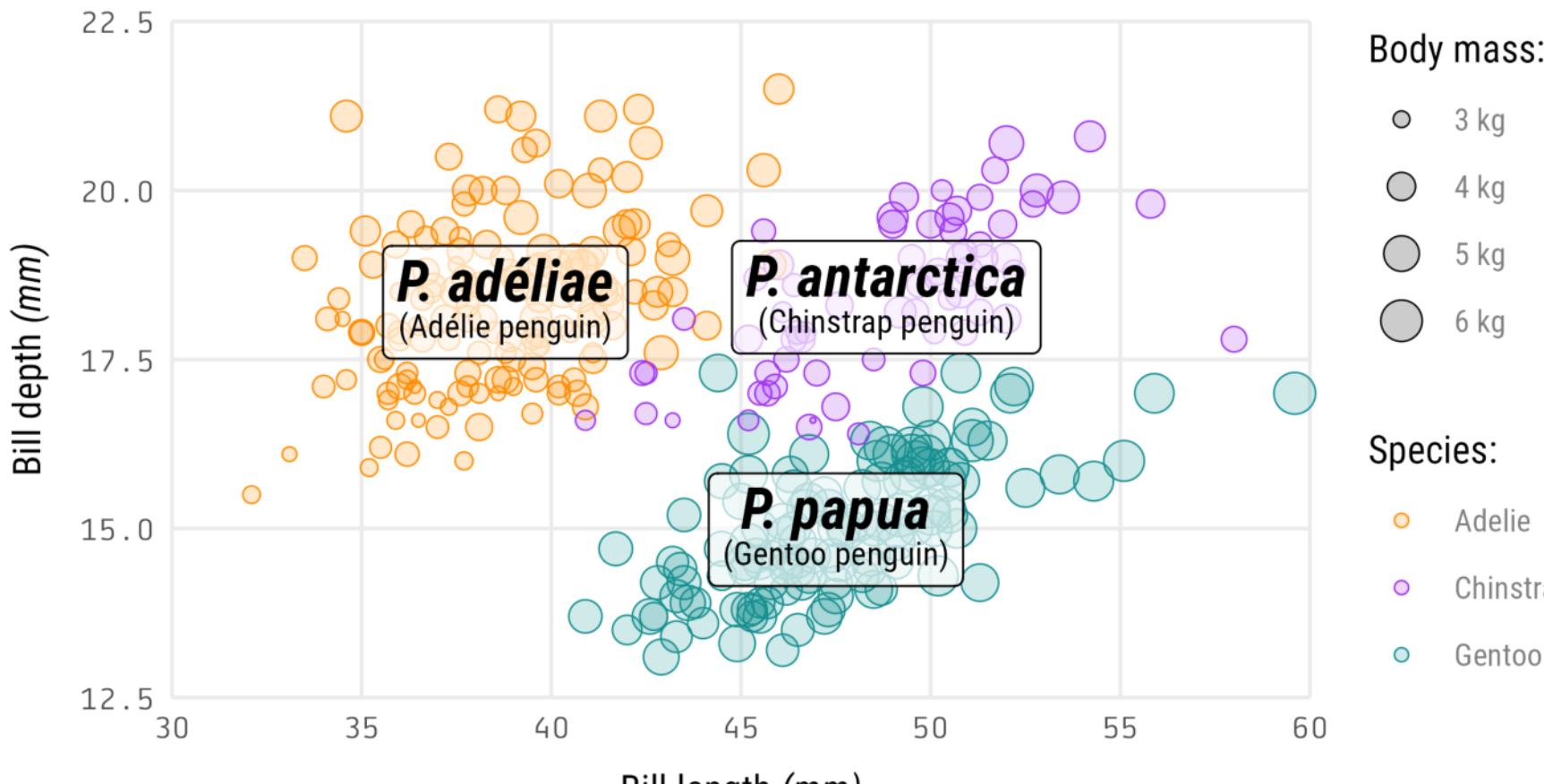


# Style Species Annotations

```
1 p5 +
2   geom_richtext(
3     data = penguins_labs,
4     aes(label = species_lab),
5     color = "black", size = 3,
6     family = "Roboto Condensed",
7     lineheight = .8,
8     fill = "#fffffffab", ## hex-alpha code
9     show.legend = FALSE
10   )
```

# Style Species Annotations

## Bill dimensions of brush-tailed penguins *Pygoscelis* spec.



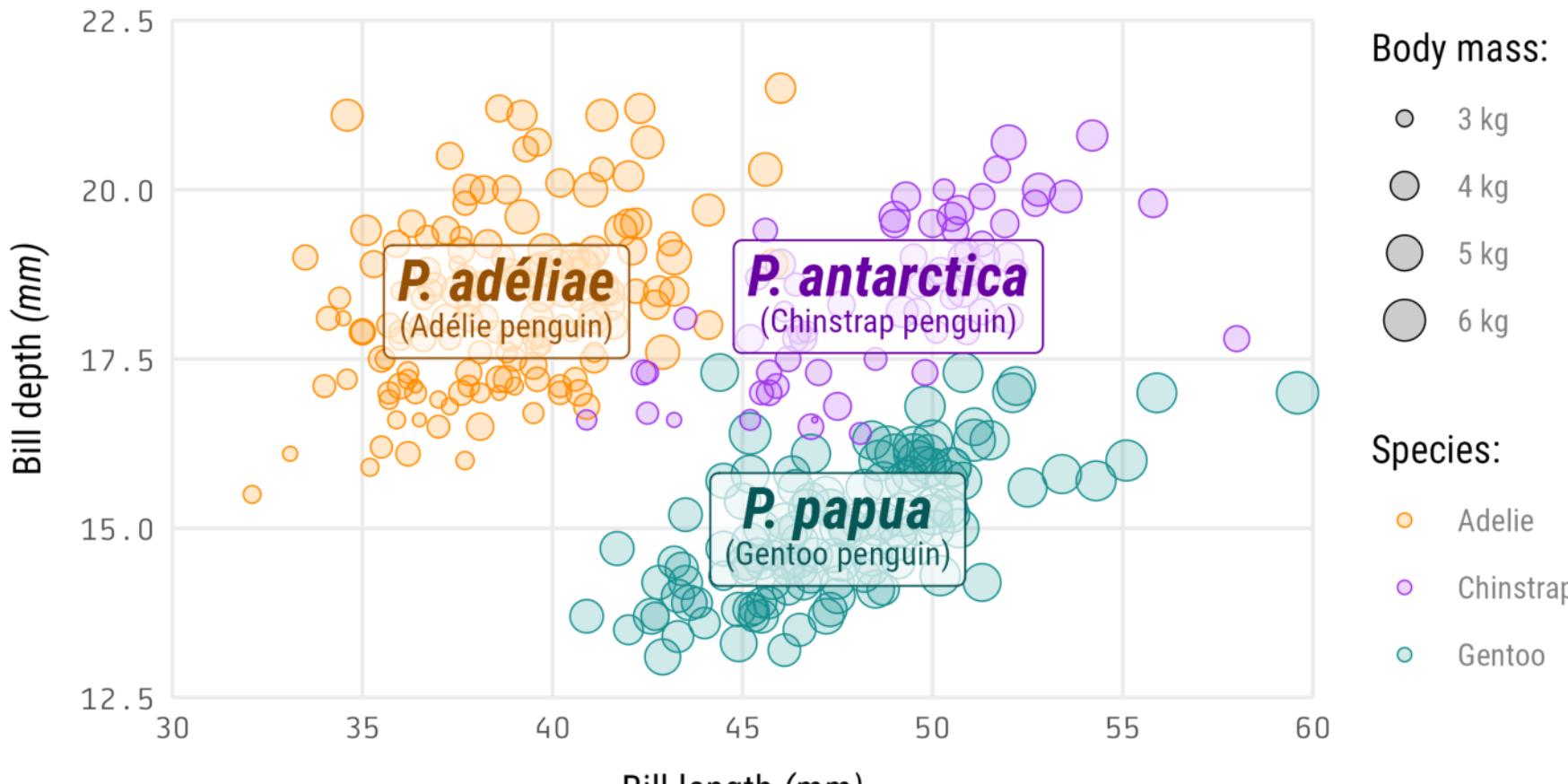
Horst AM, Hill AP, Gorman KB (2020). palmerpenguins R package version 0.1.0

# Style Species Annotations

```
1 p5 +
2   geom_richtext(
3     data = penguins_labs,
4     aes(label = species_lab,
5       color = species,
6       color = after_scale(colorspace::darker(color, .4))),
7     family = "Roboto Condensed",
8     size = 3, lineheight = .8,
9     fill = "#fffffab",
10    show.legend = FALSE
11  )
```

# Style Species Annotations

## Bill dimensions of brush-tailed penguins *Pygoscelis* spec.



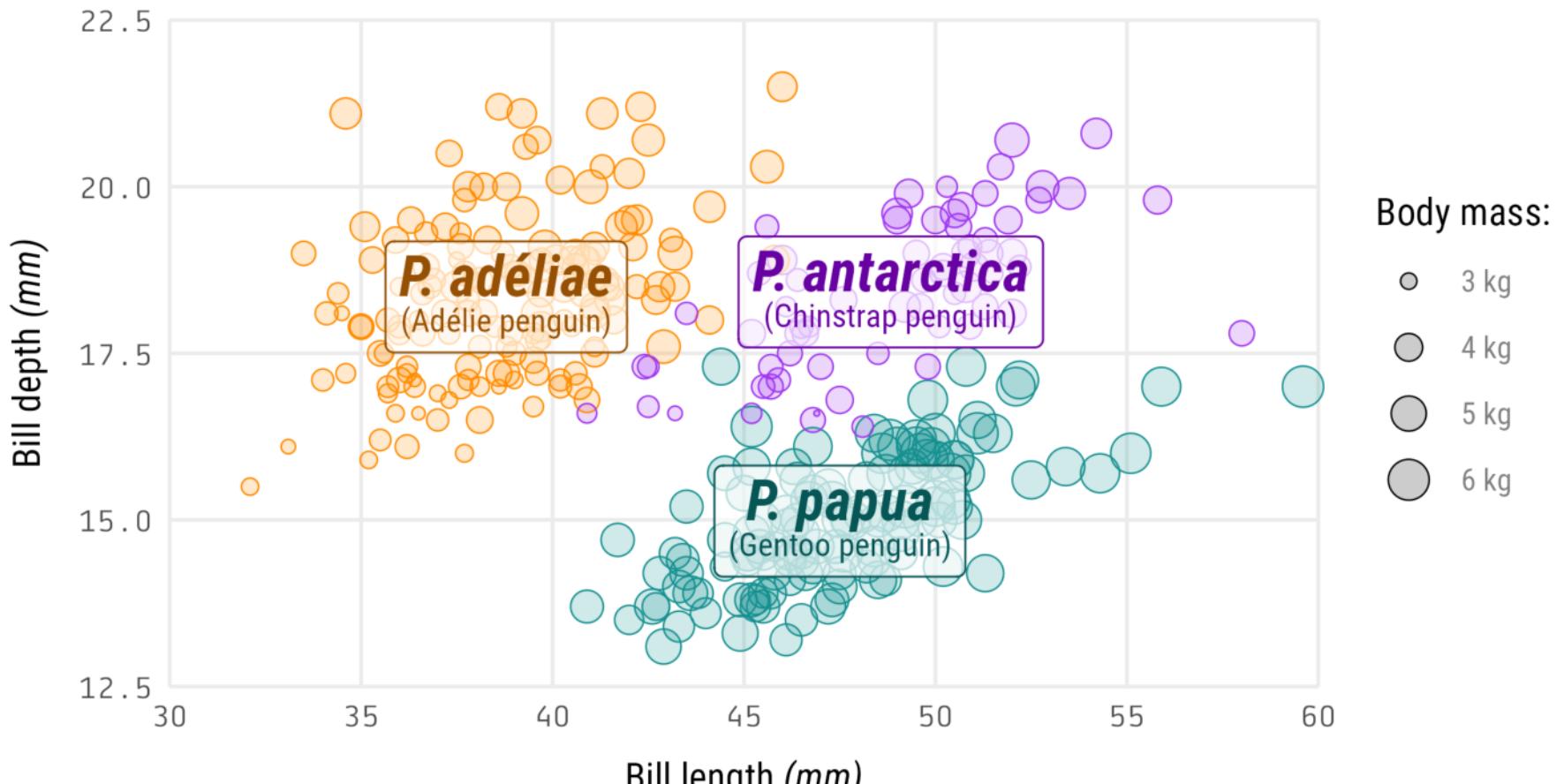
Horst AM, Hill AP, Gorman KB (2020). palmerpenguins R package version 0.1.0

# ... and Remove Color Legend

```
1 p5 +
2   geom_richtext(
3     data = penguins_labs,
4     aes(label = species_lab,
5       color = species,
6       color = after_scale(colorspace::darken(color, .4))),
7     family = "Roboto Condensed",
8     size = 3, lineheight = .8,
9     fill = "#fffffffab", ## hex-alpha code
10    show.legend = FALSE
11  ) +
12  scale_color_manual(
13    guide = "none",
14    values = c("#FF8C00", "#A034F0", "#159090")
15  )
```

# ... and Remove Color Legend

## Bill dimensions of brush-tailed penguins *Pygoscelis* spec.



# Full Code

```
1 library(tidyverse)
2 library(palmerpenguins)
3 library(ggtext)
4
5 penguins_labs <-
6   penguins %>%
7   group_by(species) %>%
8   summarize(across(starts_with("bill"), ~ mean(.x, na.rm = TRUE))) %>%
9   mutate(
10     species_lab = case_when(
11       species == "Adelie" ~ "<b style='font-size:15pt;'>*P. adélieae*</b><br>(Adélie penguin)",
12       species == "Chinstrap" ~ "<b style='font-size:15pt;'>*P. antarctica*</b><br>(Chinstrap penguin",
13       species == "Gentoo" ~ "<b style='font-size:15pt;'>*P. papua*</b><br>(Gentoo penguin)"
14     )
15   )
16
17 ggplot(
18   penguins,
19   aes(x = bill_length_mm, y = bill_depth_mm,
```