

Visualizing TPC Data (1999 vs. 2024)

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```
# Load Data
getwd()

## [1] "/Users/taylorhatcher/Desktop/Repos/WARP2024/Data"

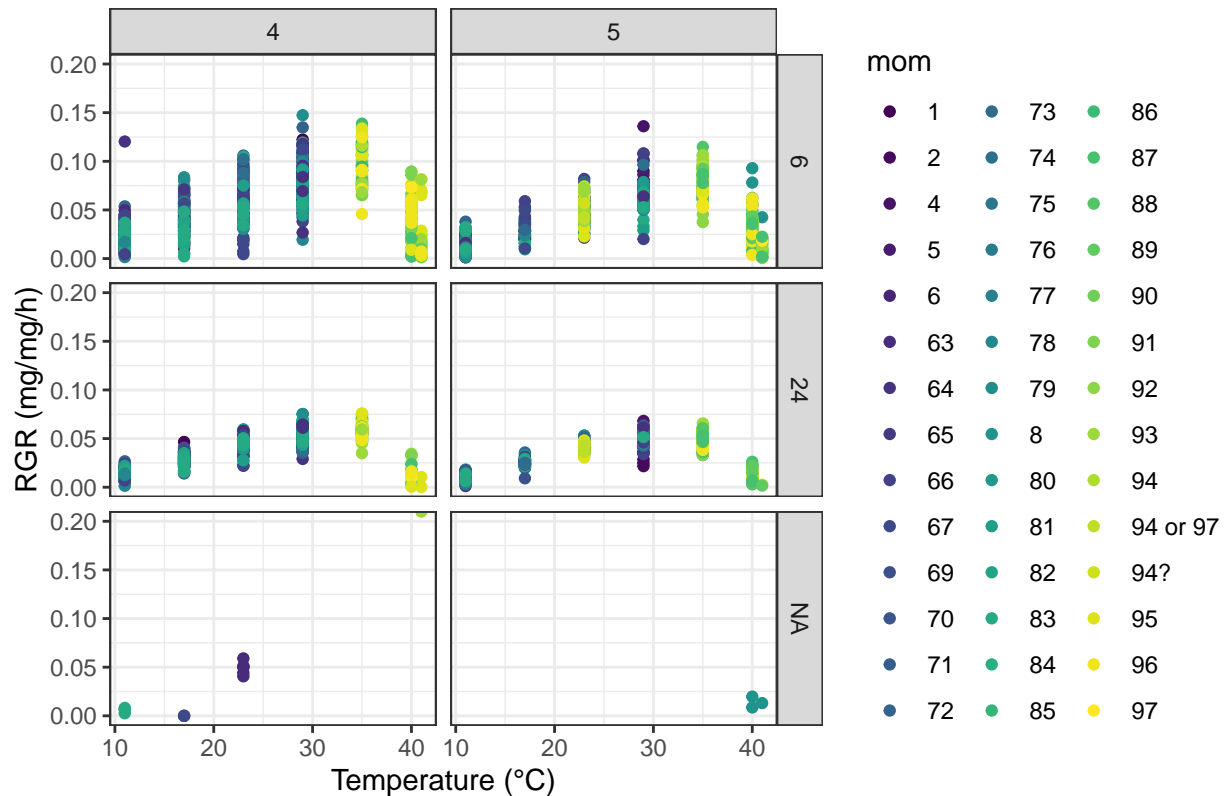
tpcvis <- read.csv("PastPresentFilteredConstantTpc2024.csv")

# Filter Data
tpcvis_current <- tpcvis %>%
  filter(time.per == "current")

# Log Scale Growth Rate Calculation
current_plot_log <- ggplot(tpcvis_current, aes(x = temp, y = rgrlog, color = mom)) +
  geom_point() +
  facet_grid(durbin ~ instar) +
  theme_bw() +
  xlab("Temperature (°C)") +
  ylab("RGR (mg/mg/h)") +
  ggtitle("Present Data (2024): Log Scale") +
  ylim(0, 0.20) +
  scale_color_viridis(discrete = TRUE)
current_plot_log

## Warning: Removed 1132 rows containing missing values (geom_point).
```

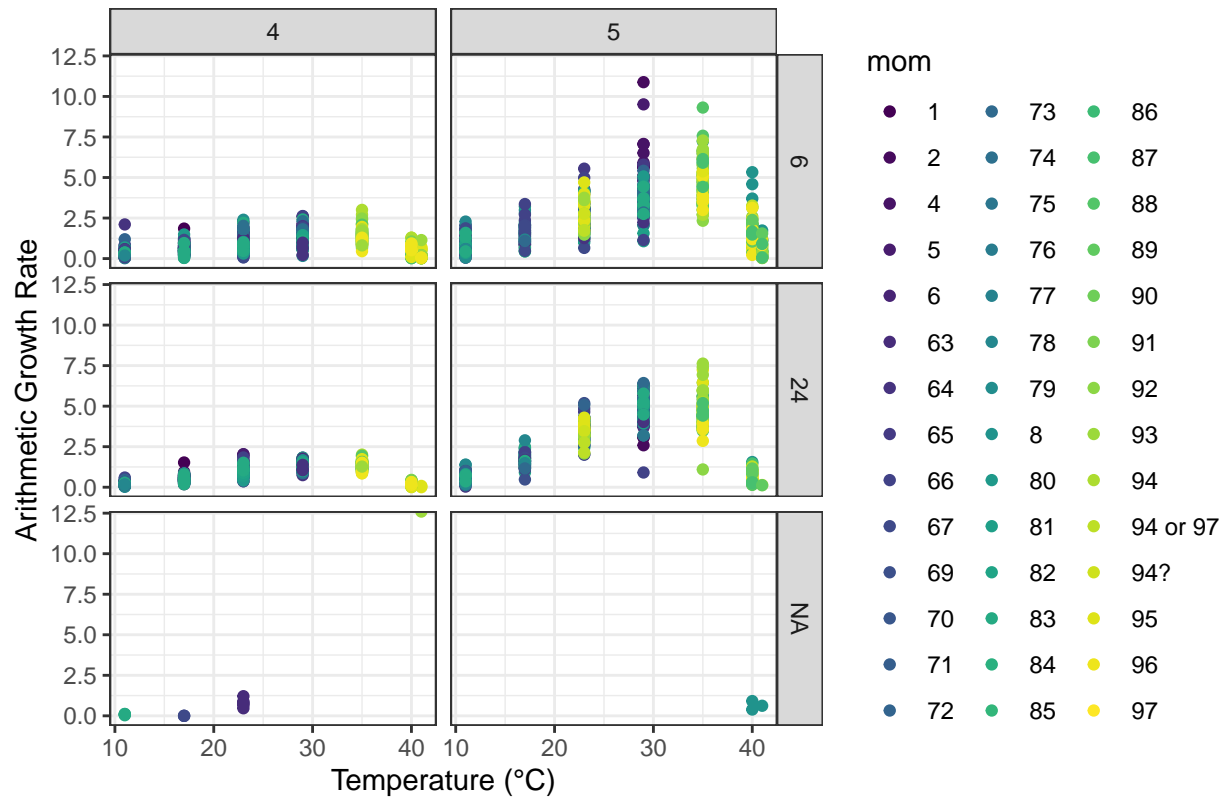
Present Data (2024): Log Scale



```
# Arithmetic Scale Growth Rate Calculation
current_plot_arith <- ggplot(tpcvis_current, aes(x = temp, y = rgrarith, color = mom)) +
  geom_point() +
  facet_grid(durbin ~ instar) +
  theme_bw() +
  xlab("Temperature (°C)") +
  ylab("Arithmetic Growth Rate") +
  ggtitle("Present Data (2024): Arithmetic Scale") +
  ylim(0, 12.00) +
  scale_color_viridis(discrete = TRUE)
current_plot_arith
```

Warning: Removed 1132 rows containing missing values (geom_point).

Present Data (2024): Arithmetic Scale

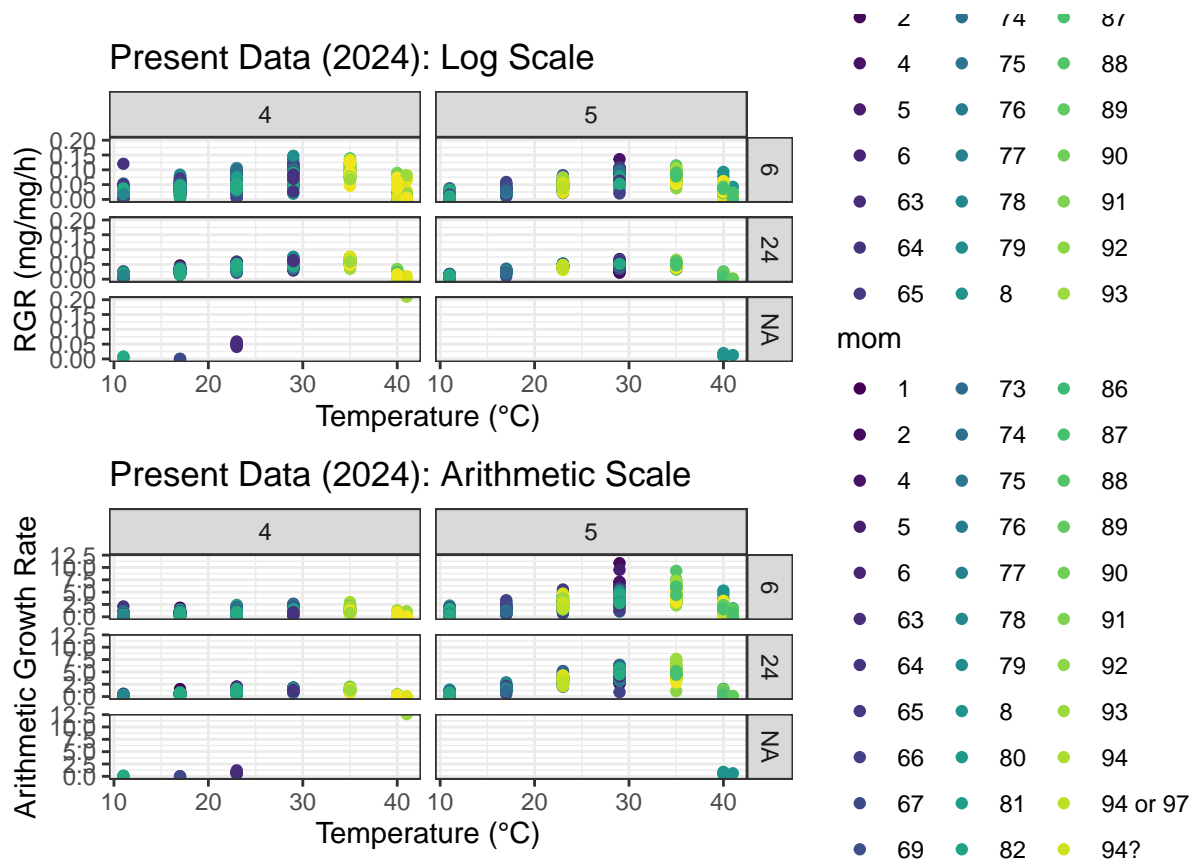


```
# Combined Scale Comparison (Current Data)
```

```
combined_current_scale_comparison_plot <- current_plot_log + current_plot_arith + plot_layout(ncol = 1)
combined_current_scale_comparison_plot
```

```
## Warning: Removed 1132 rows containing missing values (geom_point).
```

```
## Removed 1132 rows containing missing values (geom_point).
```



Historic Data Analysis

Filter Historic Data

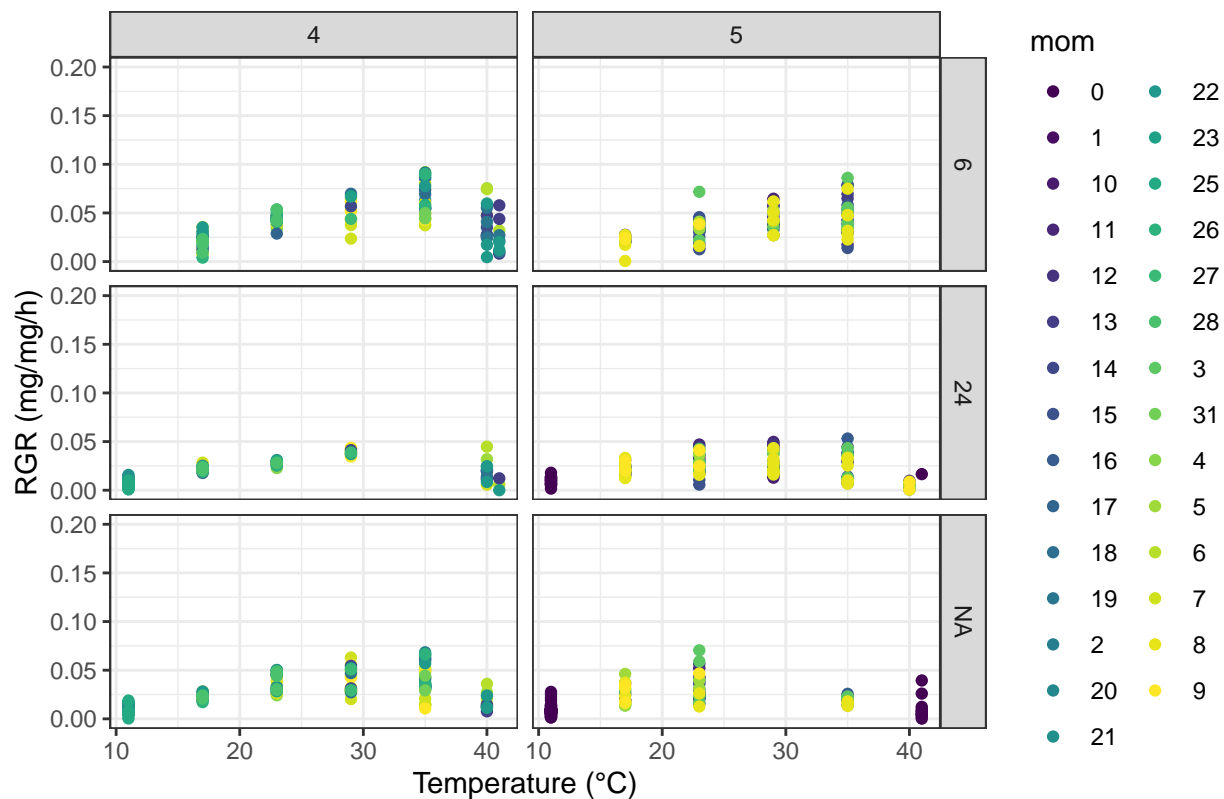
```
tpcvis_past <- tpcvis %>%
  filter(time.per == "past")
```

Log Scale Growth Rate

```
historic_plot_log <- ggplot(tpcvis_past, aes(x = temp, y = rgrlog, color = mom)) +
  geom_point() +
  facet_grid(durbin ~ instar) +
  theme_bw() +
  xlab("Temperature (°C)") +
  ylab("RGR (mg/mg/h)") +
  ggtitle("Historic Data (1999): Log Scale") +
  ylim(0, 0.20) +
  scale_color_viridis(discrete = TRUE)
historic_plot_log
```

```
## Warning: Removed 250 rows containing missing values (geom_point).
```

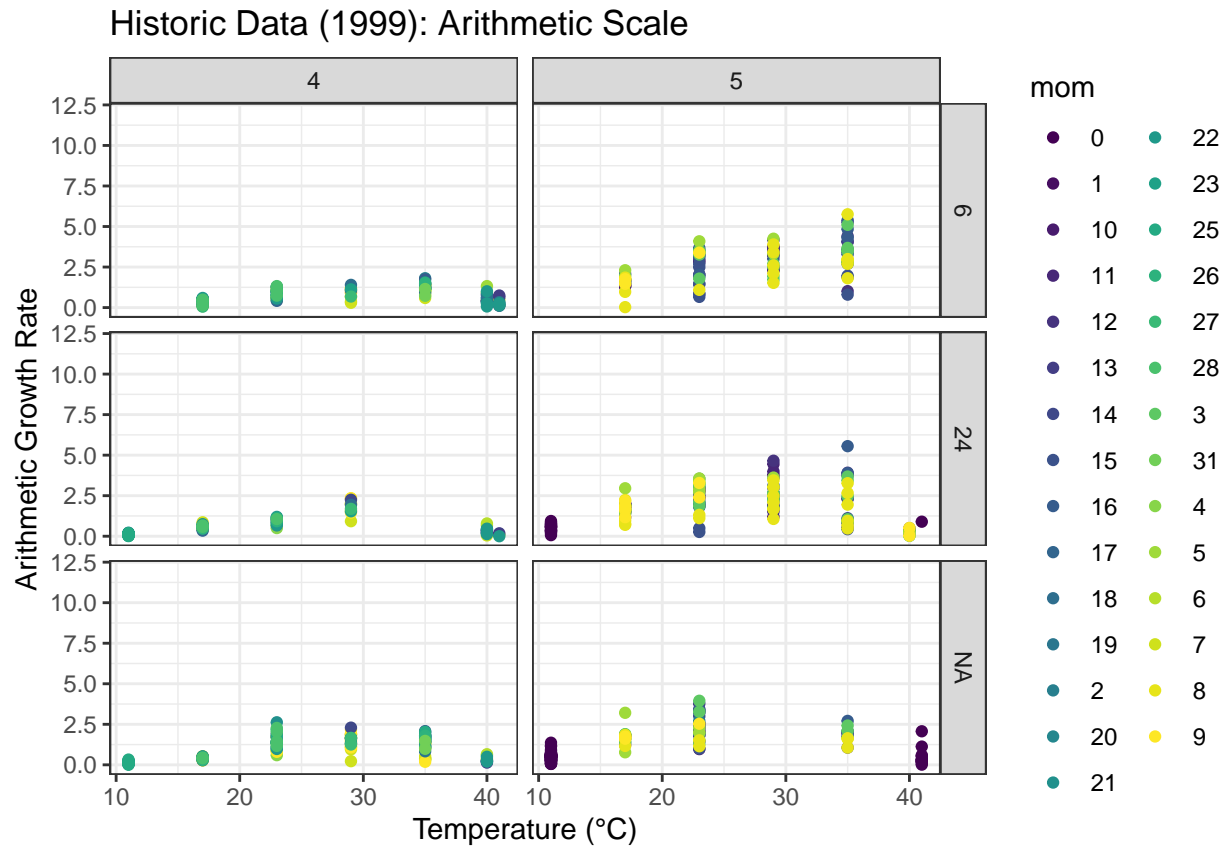
Historic Data (1999): Log Scale



Arithmetic Scale Growth Rate

```
historic_plot_arith <- ggplot(tpcvis_past, aes(x = temp, y = rgrarith, color = mom)) +
  geom_point() +
  facet_grid(durbin ~ instar) +
  theme_bw() +
  xlab("Temperature (°C)") +
  ylab("Arithmetic Growth Rate") +
  ggtitle("Historic Data (1999): Arithmetic Scale") +
  ylim(0, 12.00) +
  scale_color_viridis(discrete = TRUE)
historic_plot_arith
```

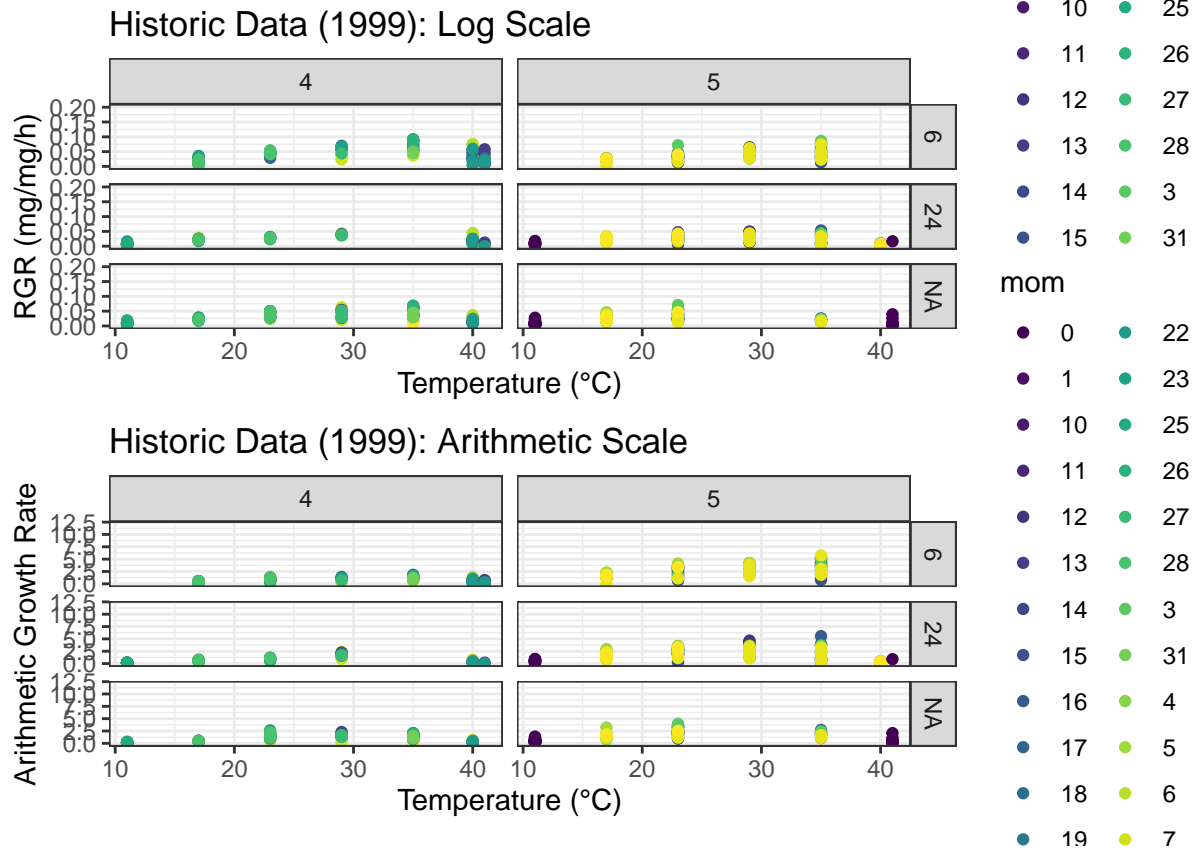
Warning: Removed 250 rows containing missing values (geom_point).



Combined Scale Comparison (Historic Data)

```
combined_historic_scale_comparison_plot <- historic_plot_log + historic_plot_arith + plot_layout(ncol = 2)
combined_historic_scale_comparison_plot
```

```
## Warning: Removed 250 rows containing missing values (geom_point).
## Removed 250 rows containing missing values (geom_point).
```



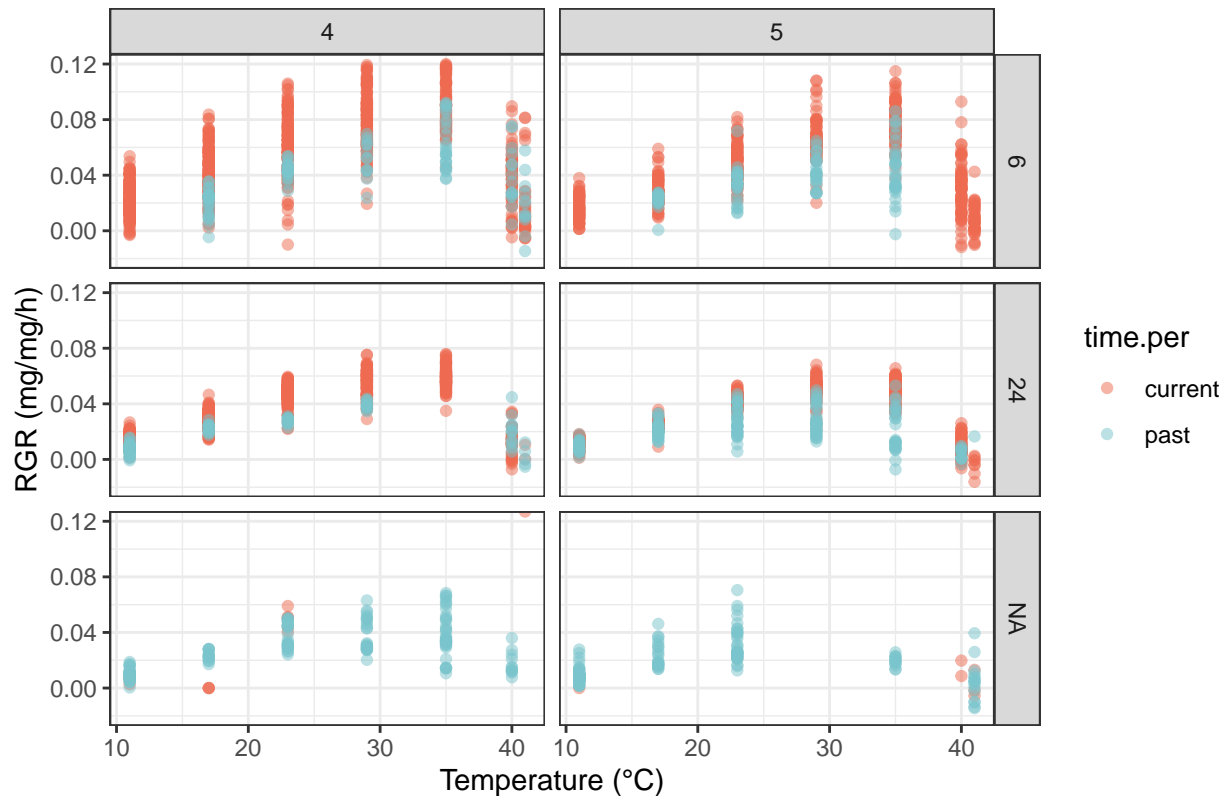
Comparison of 1999 vs. 2024 Data

Logarithmic Scale Comparison

```
tpc.logplot <- ggplot(tpcvis, aes(x = temp, y = rgrlog, color = time.per)) +
  geom_point(alpha = 0.5) +
  facet_grid(durbin ~ instar) +
  theme_bw() +
  xlab("Temperature (°C)") +
  ylab("RGR (mg/mg/h)") +
  ggtitle("1999 vs. 2024: Logarithmic Scale RGR") +
  ylim(-0.02, 0.12) +
  scale_color_manual(values = c("current" = "#EE6A50", "past" = "#7AC5CD"))
tpc.logplot
```

Warning: Removed 1341 rows containing missing values (geom_point).

1999 vs. 2024: Logarithmic Scale RGR

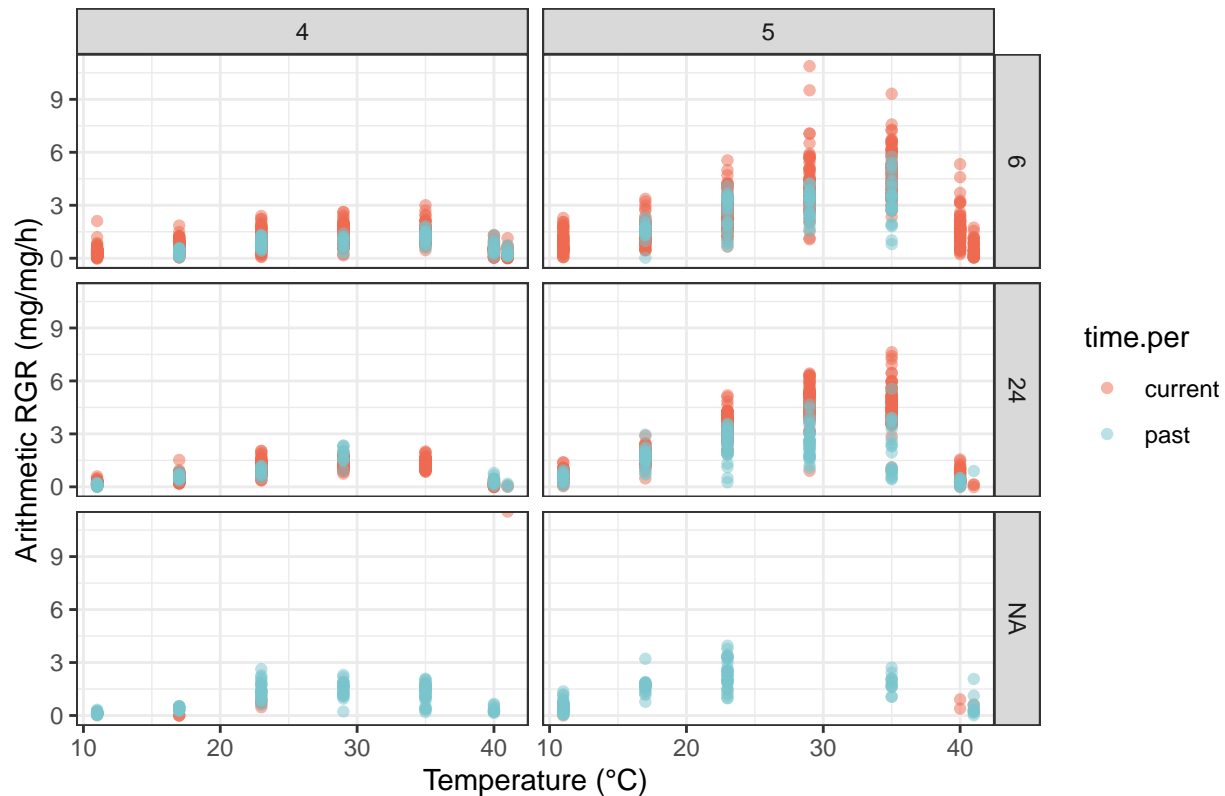


Arithmetic Scale Comparison

```
tpc.arithplot <- ggplot(tpcvis, aes(x = temp, y = rgrarith, color = time.per)) +
  geom_point(alpha = 0.5) +
  facet_grid(durbin ~ instar) +
  theme_bw() +
  xlab("Temperature (°C)") +
  ylab("Arithmetic RGR (mg/mg/h)") +
  ggtitle("1999 vs. 2024: Arithmetic Scale RGR") +
  ylim(-0.02, 11.0) +
  scale_color_manual(values = c("current" = "#EE6A50", "past" = "#7AC5CD"))
tpc.arithplot
```

Warning: Removed 1372 rows containing missing values (geom_point).

1999 vs. 2024: Arithmetic Scale RGR



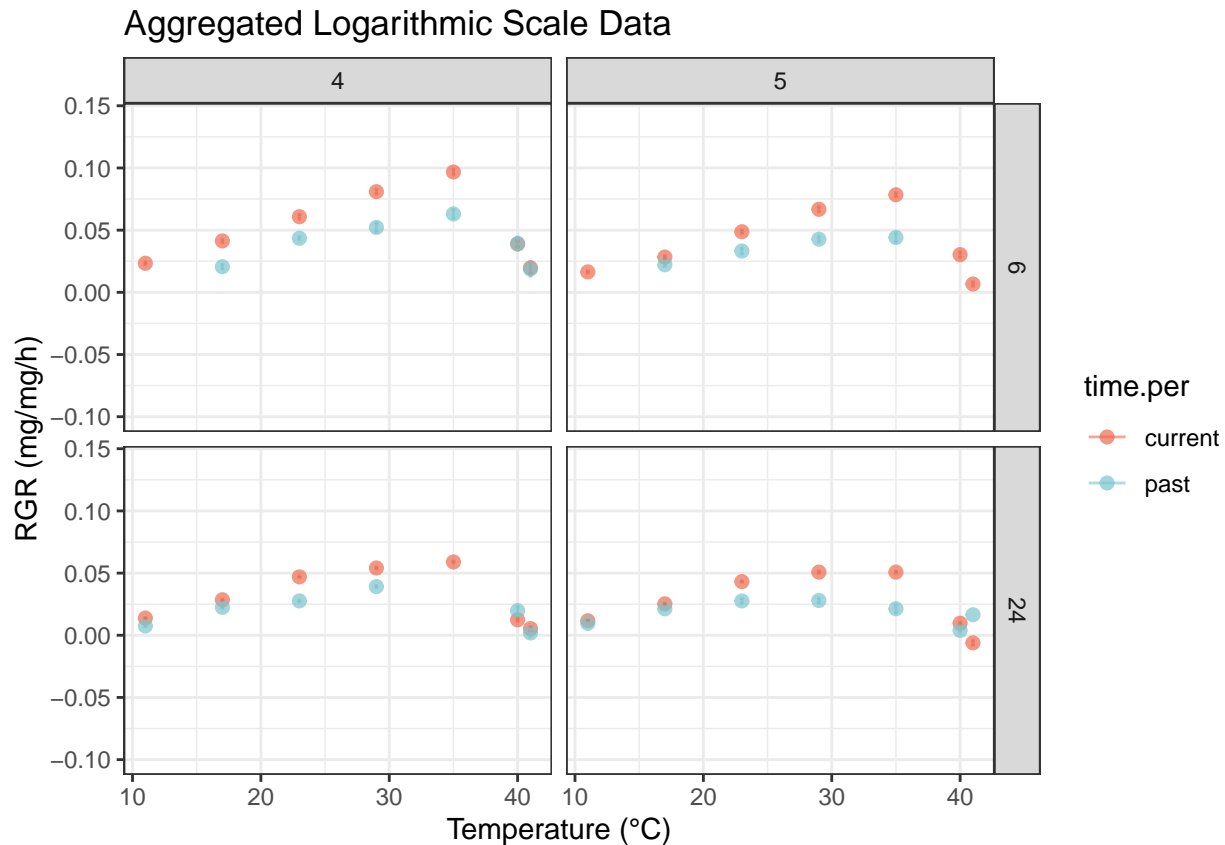
Aggregated Data Analysis

Logarithmic Scale Aggregation

```
tpc.agglog <- tpcvis %>%
  group_by(temp, time.per, durbin, instar) %>%
  summarise(
    mean = mean(rgrlog, na.rm = TRUE),
    se = sd(rgrlog, na.rm = TRUE) / sqrt(n())
  )
```

`summarise()` has grouped output by 'temp', 'time.per', 'durbin'. You can
override using the `.groups` argument.

```
tpc.plotlog <- ggplot(tpc.agglog[tpc.agglog$durbin %in% c(6, 24), ], aes(x = temp, y = mean, color = time.per)) +
  geom_point(alpha = 0.7, size = 2) +
  geom_errorbar(aes(ymin = mean - se, ymax = mean + se), width = 0.3, alpha = 0.6) +
  facet_grid(durbin ~ instar) +
  theme_bw() +
  xlab("Temperature (°C)") +
  ylab("RGR (mg/mg/h)") +
  ggtitle("Aggregated Logarithmic Scale Data") +
  ylim(-0.10, 0.14) +
  scale_color_manual(values = c("current" = "#EE6A50", "past" = "#7AC5CD"))
tpc.plotlog
```



Arithmetic Scale Aggregation

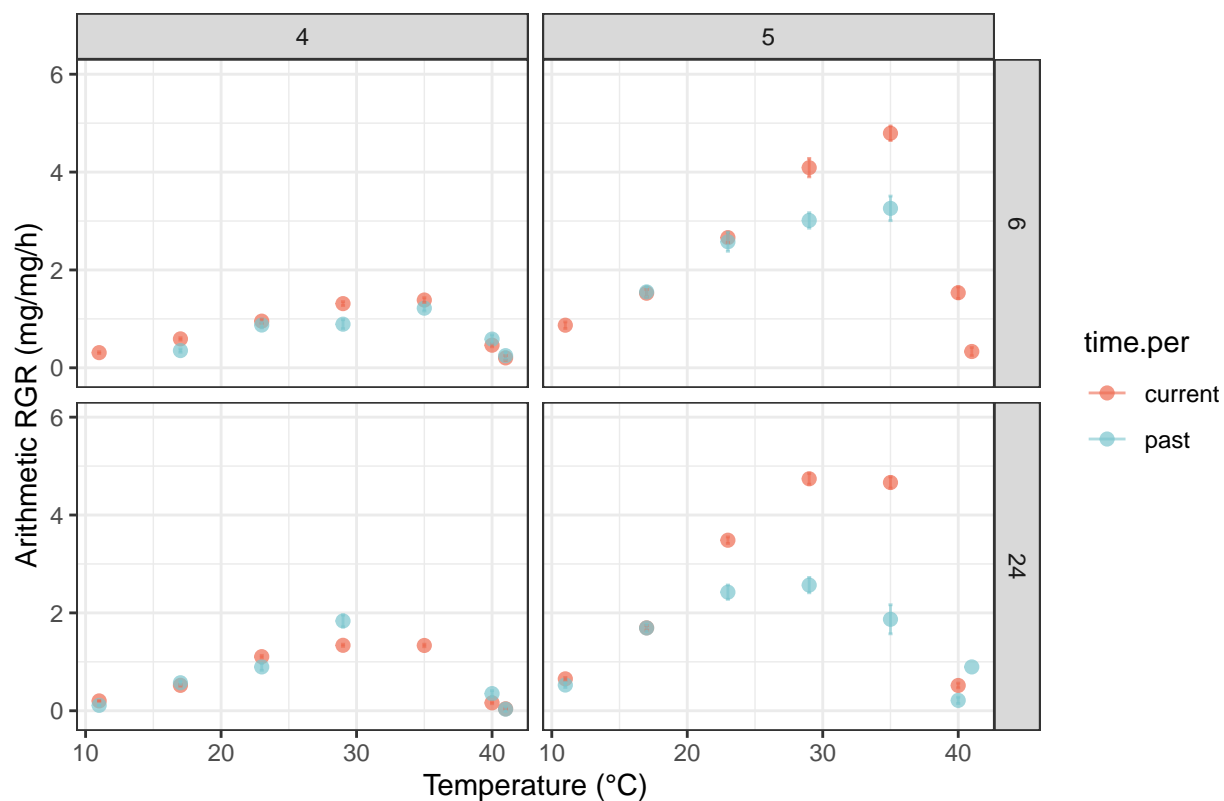
```
tpc.aggarith <- tpcvis %>%
  group_by(temp, time.per, durbin, instar) %>%
  summarise(
    mean = mean(rgrarith, na.rm = TRUE),
    se = sd(rgrarith, na.rm = TRUE) / sqrt(n())
  )
```

`summarise()` has grouped output by 'temp', 'time.per', 'durbin'. You can
override using the `.groups` argument.

```
tpc.plot.arith <- ggplot(tpc.aggarith[tpc.aggarith$durbin %in% c(6, 24), ], aes(x = temp, y = mean, col =
  geom_point(alpha = 0.7, size = 2) +
  geom_errorbar(aes(ymin = mean - se, ymax = mean + se), width = 0.3, alpha = 0.6) +
  facet_grid(durbin ~ instar) +
  theme_bw() +
  xlab("Temperature (°C)") +
  ylab("Arithmetic RGR (mg/mg/h)") +
  ggtitle("Aggregated Arithmetic Scale Data") +
  ylim(-0.10, 6.00) +
  scale_color_manual(values = c("current" = "#EE6A50", "past" = "#7AC5CD"))
tpc.plot.arith
```

Warning: Removed 1 rows containing missing values (geom_point).

Aggregated Arithmetic Scale Data



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.