Quantitative Health: More than a Category

While the Tail Volume Index (TVI) tells us about energy reserves, the physical **weight (kg)** of a platypus gives us a more precise look at individual growth. Quantitative data like weight isn't grouped into "boxes" like health categories—it exists on a continuous scale.

1. The Snowy River Weights ($n = 30$)

Below are the weights of 30 specimens captured near the Snowy River headwaters.

```
0.82, 0.95, 1.04, 1.12, 1.18, 1.25, 1.29, 1.33, 1.38, 1.41,
1.45, 1.48, 1.52, 1.55, 1.59, 1.62, 1.68, 1.74, 1.79, 1.85,
1.92, 1.98, 2.05, 2.11, 2.18, 2.22, 2.29, 2.34, 2.38, 2.45
```

Task A: Create a Stem and Leaf Plot
Use the whole numbers as the *stem* and the first decimal digit as the *leaf*. This will help us see the shape of the weights before we draw a single bar.

Stem	Leaves
0	
1	
2	

Bill the Statypus says: This is actually kind of satisfying. It's like sorting my sock drawer, but with biology. The "1" stem is getting pretty crowded.

Sally the Statypus says: Bill does enjoy his tactile experiences from time to time. Stem and Leaf plots are a valuable tool for qualitative data and there are a number of variants. See section 3.3 and read through the examples to see examples of split-stems and double-stems.

Statypus Insight: An Older Tool

Stem and Leaf plots are a bit of a holdover and represent a type of plot that could even be made on a typewriter. This doesn't devalue them, but it is clear that modern computers can produce nicer graphics than this. Our tool for this will be the **Histogram**.

CHAPTER 3

2. Building the Histogram

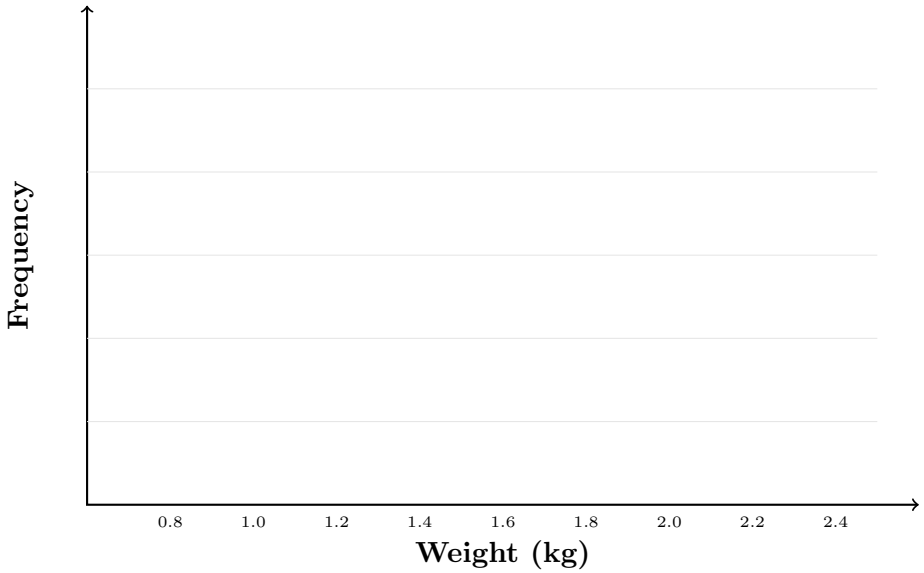
A bar plot would fail here because almost every platypus has a unique weight. To see a pattern, we must **bin** the data into ranges.

Task B: Frequency Table (The Bins)
Tally your Stem and Leaf plot into these pre-defined bins.

Weight Bin (kg)	Tally	Frequency (f)
0.8 – 1.0		
1.0 – 1.2		
1.2 – 1.4		
1.4 – 1.6		
1.6 – 1.8		
1.8 – 2.0		
2.0 – 2.2		
2.2 – 2.4+		

Bill the Statypus says: Unlike a bar plot, the bars in a histogram must touch to show that weight is continuous. There are no values 'between' the bars and they can't be reordered like for qualitative data.

Task C: Sketch the Histogram
Draw your histogram below.



Sally the Statypus says: Notice how your Stem and Leaf plot and your Histogram have the same basic shape. One uses numbers, the other uses bars, but the story of the Snowy River population is the same in both.

3. R and the Power of Breaks

Binning by hand for 259 animals would take all day. R uses the `hist()` function to handle this instantly.

Coding Corner: The Regional Histogram

Load your Chapter 3 data and run the basic histogram command:

```
hist( PlatypusData2$weight )
```

Sally the Statypus says: Bill said you should know where to find the chapter data by now... let's not uspet him, he's been working hard recently.

Statypus Insight: What are Breaks?

R automatically decides how many bins to use. However, you can use the `breaks` argument to change the resolution. If you have too many breaks, the graph looks like noise; too few, and you lose the detail.

Coding Corner: The AI Mission: Customizing the Binning

Ask Copilot: "How do I use the `breaks` argument in the Base R `hist()` function to force it to use exactly 15 bins?" Run the code and observe how the shape of the distribution changes.

Bill the Statypus says: If you use too many bins, it looks like a pile of toothpicks. I think R's default is usually pretty smart, but it's nice to be the boss of the bars once in a while.

Coding Corner: Best Version

Work with AI to find what you find to be the best version of the histogram using `breaks` and any other argument you find interesting. When you are finished, make a sketch of your histogram below.

CHAPTER 3

Executive Field Analysis

Reflection: The Regional Shape

Look at the regional histogram ($N = 259$) with 15 bins.

1. Is the distribution perfectly symmetrical, or does it lean (skew) to one side?

2. Where is the "peak" of the weights for the entire population?

4. Final Research Conclusion

Replication Report: Quantitative Distribution

1. **Continuous vs. Discrete:** Why can we not use a bar plot to summarize the raw weights of 259 platypuses?

2. **The Stem-and-Leaf Advantage:** What information do you lose when you move from a Stem and Leaf plot to a Histogram?

3. **Environmental Link:** If a river system showed a weight distribution heavily skewed to the left (mostly very light animals), what might that suggest about the population's health compared to the Bino et al. (2021) study?