2.1: Cutting gold until you get atoms

Take a block of solid gold. Cut it in half. Now there are two smaller pieces of gold. Cut one of the pieces in half again. Cut one of those smaller pieces in half again. Continue cutting, making smaller and smaller pieces of gold. It should be obvious that the pieces are still gold; they are just becoming smaller and smaller. But how far can this exercise be taken, at least in theory? Can one continue cutting the gold into halves forever, making smaller and smaller pieces? Or is there some limit, some absolute smallest piece of gold? Thought experiments like this—and the conclusions based on them—were debated as far back as the fifth century BC by Democritus and other ancient Greek philosophers (Figure 2.1.1).

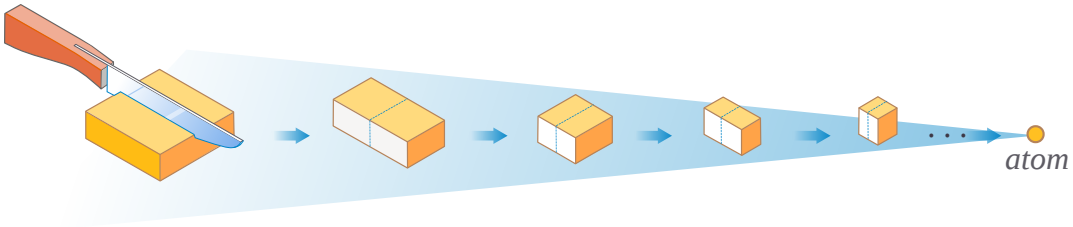

Figure 2.1.1: Democritus argued that matter, like an gold block, cannot be repeatedly cut in half perpetually. At some point, a limit is reached before the substance can no longer be called "gold"; this is the atomic limit. (CC BY-NC; Ümit Kaya via LibreTexts)