A HYPOTHESIS IS:
(Chiappetta & Koballa Jr., 2006, pp. 97-98)

- A generalization to be tested by additional observation, experimentation, or prediction.”
- A generalization that relates to a class of objects or events.
- An untested condition to be examined.
- A concise statement that attempts to explain a pattern or an outcome.
- Tentative, and can be rejected or modified.
- A “setting of the stage” for challenging an idea in order to determine if it merits at least a temporary place in the fabric of scientific knowledge.
- Falsifiable (Sagan, 1996).

A HYPOTHESIS IS NOT:

- An “educated guess”: An “educated guess” about what (McComas, 1996, p. 11). A hypothesis is much more than this. A prediction or a quick tentative explanation might better be called an “educated guess.”

- A mere prediction: When students are asked to propose a hypothesis during a laboratory experience before a phenomenon is illustrated, the term actually means a “prediction” (McComas, 1996, p. 11).

- A step in the “scientific method” during a science fair: “With many science fair projects, it is doubtful that students create statements [for hypotheses] that apply to a general class of objects and events to be tested” (Chiappetta & Koballa, 2006, p. 98).

CAREFUL! YOUR STUDENTS MAY USE “THEORY” WHEN THEY MEAN “HYPOTHESIS”

- They get this from common non-scientific usage.
- Example: “My theory is that the metal object floats in water because it has a wooden core.”
THE TERM “HYPOTHESIS” SHOULD BE USED WITH CAUTION, BECAUSE IT HAS AT LEAST THREE DIFFERENT DEFINITIONS (McComas, 1996, p. 11)

1. Tentative law or trial law: Perhaps we should call this a “speculative law.”

2. Immature theory or provisional theory: “For example, when Newton said that he framed no hypothesis as to the cause of gravity, he was saying that he had no speculation about an explanation of why the law of gravity operates as it does. In this case, Newton used the term hypothesis to represent an immature theory” (McComas, 1996, p. 11).

3. Forecast: Some so-called hypotheses are really forecasts, and might be better called “predictions.”

A HYPOTHESIS MUST BE FALSIFIABLE—A DRAGON IN CARL SAGAN’S GARAGE (Sagan, 1996, pp. 171-172)

“A fire-breathing dragon lives in my garage.”
“Show me,” you say. I lead you to my garage. You look inside and see a ladder, empty paint cans, an old tricycle—but no dragon.
“Where’s the dragon?” you ask.
“Oh, she’s right here,” I reply, waving vaguely. “I neglected to mention that she’s an invisible dragon.”
You propose spreading flour on the floor of the garage to capture the dragon’s footprints.
“Good idea,” I say, “but this dragon floats in the air.”
Then you’ll use an infrared sensor to detect the invisible fire.
“Good idea, but the invisible fire is also heatless.”
You’ll spray-paint the dragon and make her visible.
“Good idea, except she’s an incorporeal dragon and the paint won’t stick.”
And so on. I counter every physical test you propose with a special explanation of why it won’t work.
Now, what’s the difference between an invisible, incorporeal, floating dragon who spits heatless fire and no dragon at all?

REFERENCES

