Abstract: I begin with an overview of how manifolds have slowly revealed themselves to us over the last 150 years. They are pretty complicated, and part of the story is how the human practice of mathematics has changed to be able to deal with such complication. Manifolds seem to fall into two families. The first includes PL, topological, and homology manifolds. These are intensely different at the technical level but turn out to be more-or-less the same, and there is a powerful global theory. The second family includes smooth and real algebraic manifolds, and are not as well-understood at the global level. I describe progress toward a smooth analog of one of the key topological results.