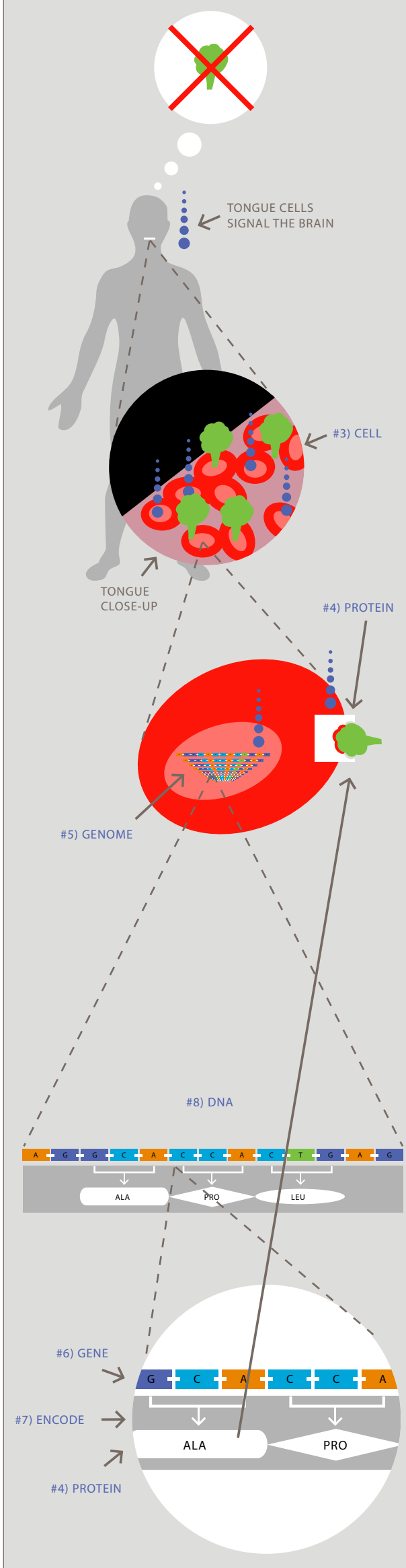
key words for genetics

One of the phenotypes you will learn about when 23andMe genotypes you is whether you can taste a bitter flavor in raw broccoli. Some people's tongue cells make a protein that can detect bitter flavors; others make one that can't. Each of your cells contains a copy of your genome, which is made up of a molecule called DNA. Your genome contains genes, which are blueprints that encode proteins like the one made by your tongue cells. Different people can have different blueprints because of differences in their SNPs. There are two versions of the SNP shown here, and each leads to a different version of the gene, which in turn encodes a different version of the protein. One version of the protein can detect the bitter flavor of raw broccoli, while the other cannot.

phenotype: broccoli tastes bitter
genotype: C



#1) PHENOTYPE
This word refers to the physical and behavioral characteristics of an individual. In most cases, both genes and environment contribute to phenotype. An example of a phenotypic trait is the ability to taste a bitter flavor in raw broccoli, which can affect whether you like it. (We'll assume that if you can taste the bitterness, you don't like raw broccoli.)

#2) GENOTYPE
This word can be used in several ways. It can refer to your DNA sequence at a particular place, like the SNP shown here (either C or G). It can refer to your personal collection of genetic variants. As a verb, it refers to the process of determining your sequence, as in the introductory paragraph.

#3) CELL
Your body contains 50 trillion of these microscopic living units. They are found everywhere, from the surface of your tongue to the inside of your bones. Cells perform specific jobs in your body. The way they perform their jobs affects your phenotype.

#4) PROTEIN
Cells perform their jobs with molecular tools called proteins. Some proteins are used as the building blocks of hair. Others are used to digest your food. In tongue cells, one kind of protein detects bitter chemicals and sends a signal to your brain. The way a protein works—or doesn't—also affects your phenotype.

#5) GENOME
The genome is a master blueprint for making all the different parts of you, and a complete copy can be found in each of your body's cells. The genome contains about 20,000 individual blueprints for different protein tools, plus a whole lot of other stuff whose function is unknown.

#6) GENE
Each kind of protein tool has its own blueprint, or gene, located in the cell's nucleus. Genes can be turned on or off in different cells at different times. The gene for the protein that detects bitter things is on in your tongue cells, but off in your skin cells.

#7) ENCODE
We say that a gene encodes a protein, because it contains specific information your cells read in order to build that protein. If your version of a gene is different from a friend's, it might encode a different protein. All together, you have about 20,000 genes, each encoding a different protein.

#8) DNA
The information a gene uses to encode a protein is stored in a molecule called DNA. There are four "letters" in the DNA alphabet, which make up three-letter "words." Each "word" encodes a single bit of a growing protein chain. The full-length chain will become a working protein. The bits making up the protein affect how the protein does its job.

#9) SNP
A SNP is a site in the genome where a single DNA "letter" often differs from person to person. Some (but not all) SNPs appear to be associated with variation in different people's phenotypes. In this example, a SNP in the gene encoding the protein that responds to bitter flavors can have C or G variants—leading to a big difference in phenotype!

phenotype: broccoli tastes ok
genotype: G