



Definition

Upon hearing that philosophers in Plato's Academy had defined man as "a featherless biped," Diogenes, the cynic, presented them with a plucked chicken. "Behold! Plato's man!" he said.

Like a Rabbit

On a trip to visit relatives in France, I had the occasion to practice my bad French. My relatives spoke no English apart from "Le Weekend" or "hot dog." One night after we had dinner, I asked my grandmother what was in the *ragoût* (stew). She said it was a *lièvre*. I asked her, "What is a *lièvre*?"

She looked at my uncle. My uncle looked at her. He said, "A *lièvre*—I shot it for dinner." "Yes," I asked, "But what IS a *lièvre*?" My uncle scratched his head, and then he said, "A *lièvre* is like a rabbit but not a rabbit." "How is it like a rabbit?" I asked. He said that it had feet like a rabbit, and ears like a rabbit, but it wasn't a rabbit. Sensing my growing confusion, my grandmother found a French-French dictionary; the dictionary citation said, "*Lièvre*: like a rabbit but not a rabbit." In the English dictionary, a *lièvre* is "Any of various mammals of the family Leporidae, and esp. of the genus *Lepus*, related to and resembling the rabbits but characteristically having longer ears, large hind feet, and long legs adapted for jumping"—like a rabbit but not a rabbit.

A *lièvre* is a hare.

Words as Concepts: Description versus Definition

A description paints a picture of an object. A definition says what the object is. While description and definition seem superficially alike—each renders or represents something—they are conceptually different. A definition says

that you *know* what something is: A word can be classified, put in a set, situated within a context. The term locates the concept within a body of knowledge.

Description, in contrast, offers a picture or a representation of something you do not necessarily know. Description creates a picture—or a representation or a model made of words. While descriptions may proceed on the basis of some general knowledge, a term *asserts* a definite identity. While descriptions are built of words, a term is a specialized word which specifies or stipulates the name of a given object, event, or phenomenon.

Chapter 1 made the distinction between (1) what you see and (2) what you think you see. That distinction applies to the difference between description and definition. Description renders *what you see*. Definition identifies *what you think you see*.

In ordinary language, we tend not to pay attention to the strict meanings of words because, in conversation, gestures or facial expressions can supplement language to carry the point, or meaning can be clarified by spoken interchange: "Did you mean this?" "No, I meant that." But in scientific writing, only the words stand before the reader's eyes. Language must therefore be demarcated by the strictest borders of meaning. In the presence of a new concept, old words may have to be redefined. Strictly speaking, to give an object a name is to assert some kind of understanding about the nature of that thing. Further, a term does more than identify a thing, phenomena or event; a term also indicates what the element is NOT. To specify that a creature is a hare is not simply to identify the animal positively, as such; this identification simultaneously conveys the information that the hare is not a rabbit, not a guinea pig, not identical with other things it resembles. In the anecdote above, "Like but not" created a circle of meaning with no center; while the reference to specific parts of the animal might seem to have offered sufficient information, the descriptive detail differed from the specification of an identity. The term *hare* centered the circle of meaning.

Limiting Alternative Meanings

Scientific terminology should be defined so thoroughly that no other word could match the definition. The definition must fit only the term being defined; a definition must be limiting. *Limiting* means that no other term will satisfy that definition; that definition limits by exclusion all other options. The obverse is also true. No other word can satisfy the definition.

The definition fits only the word; the word fits only the definition; this property of definition is called *reversibility*. Consider the Platonic Academy's definition of man (above).

Man is (=) the only featherless biped.

The term defined is *man*. The definition is “featherless biped.” Could *man* be anything other than a featherless biped? Could a featherless biped be anything other than a man? Diogenes, cited in the opening to this chapter, challenged the reversibility of the definition. By producing a chicken, he showed that the definition was not sufficiently limiting. Man is not the only featherless biped. A plucked chicken also matches that definition.

- Write to exclude alternative meanings.

Kinds of Definitions

A definition may make one of two assertions; a definition may assert: (1) “This is how everyone uses the word” or (2) “This is how I am now using the term.” The historic-authoritative definition¹ (1) emerges from a common language of science, through its use by authorities in the field to indicate what the generally conceived meaning is. The stipulative definition (2) offers a meaning that an individual proposes. A stipulative definition is specific to context; it does not have a universal meaning commonly recognized by all who share the scientific body of knowledge. When one coins a new term or provides a new meaning to an old term, one provides a stipulative definition. The historic-authoritative definition specifies: “This is *what is meant* by the word.” The stipulative definition asserts “This is *what I mean* by the word.”

As you read scientific papers or other kinds of writing, be alert to the nuances in the status of meaning: whether the definition is being reported as factually true or whether the writer offers a provisional or assigned meaning. Be aware of this distinction when you write definitions as well. Note, however, that the distinction between a historically received definition and a stipulated definition may not be so clear cut as represented here.

The following points apply to all kinds of definition. However they may vary in form or use: (1) because you want to make yourself understood, your definition should be less complicated than your term; (2) your definition should in some way define the thing by noting its attributes (if a substance, its color, matter, form, material, etc., or, if a process, the conditions under which the process takes place); (3) you should always write in plain English; (4) a definition should not use figurative language; (5) the definition should be stated in positive terms.

While there are many ways to define words, the rest of this chapter will explain the function and method of writing three kinds of definition. The *form* of these definitions can be used for both stipulative and historic-authoritative situations of use. They are (1) *parenthetical* definition, (2) *sentence* definition (Aristotelian definition), and (3) *extended* definition.

Each type of definition has a different form and a different use. The

parenthetical definition is a word or phrase, expressed at the same level of generality as the term, which is integrated with the sentence. It is short, frequently synonymous, and does not disrupt the flow of the writing. A *sentence* definition gives a longer explanation expressed in a complete sentence or explanatory phrase. It is found in the body of your report or in a glossary. It may be the basis of further discussion or the foundation for an extended definition. If your paper gives greater emphasis to a word, or if a word needs to receive more explanation because the idea is important and you want to show that importance, the *extended* definition, which may range from a paragraph to one or more pages may be the best choice.

Parenthetical Definition

The term *parenthetical definition* is precisely descriptive; you place a parenthetical definition within the parenthesis in the body of your text. *Parenthetical* is the adjective form of *parenthesis*. This type of definition refers to a synonym in parenthesis immediately following the term it defines; it can also be a phrase or explanation stated at the same level of generality. It may sometimes be the word in Latin, the genus species name, or units of measurement. The parenthetical definition is integrated with the text. For punctuation purposes, you should consider it as part of the term it explicates and punctuate after the parenthesis.

Sample Parenthetical Definitions

1. Unlike the thread of the silk moth larvae (*Bombyx mori*), spider silk has not yet been harnessed for mass production.
2. We are often aware of the rhythm of the heart. It works hard, pumping about 70 barrels of blood a day, alternating rhythmically between dilation (diastole) and contraction (systole).
3. One volunteer lived in the luxurious underground apartment for eight days in dim illumination (40 lux) and showed an activity-sleep cycle with a 24.5-hour period.
4. People lacking vision from early youth have shown disorder in water balance (nycturia) and glucose balance.
5. The spacecraft belonged to the National Aeronautics and Space Administration (NASA); NASA also sent up the Jupiter probe.
6. The effervescent (bubbling) mixture was quickly discarded.
7. The leaching field (sieve-like drainage area) needs fifteen inches of crushed stone.

Sentence Definition

Sentence definitions are more expanded than synonyms. Sentence defini-

tions are used (1) in the introduction of your paper, (2) and/or in a glossary, which may accompany your paper, and (3) they may be also form the foundation for an extended definition. Unlike a parenthetical definition, which does not disturb the flow of your writing, a sentence definition gives the term greater emphasis (because it is a whole sentence rather than a synonym). If you wanted to assign even greater priority to the term—if your entire paper or a segment of your paper were devoted to it—you could use an extended definition.

The word to be defined is called the *term*. The group of like items to which it belongs is called the *class* (category). The name of the class derives from the common traits belonging to the members of the class. The *differentiae* tell how the term differs from other items in the class. To write a sentence definition, specify the term, classify it (the class tells what the items have in common), and then specify the differences (tell how the item is different).

Formula for Sentence Definition

Term	= Class (is)	+	Distinguishing features (differentiae)
tepee	= a form of portable dwelling	+	cone-shaped (with a hole in the top); made of skins and sticks; used by Plains Indians; transported by pack animals
vibrato	= a musical embellishment	+	that depends primarily on periodic variations of frequency which are often accompanied by variations in amplitude and waveform
charm	= a quantum number	+	which has been proposed to account for an apparent lack of symmetry in the behavior of hadrons relative to that of leptons, to explain why certain reactions of elementary particles do not occur, and to account for the longevity of the J particle.

To Make a Sentence Definition . . .

1. Put the term in a group with other items or concepts like it. In other words, classify your term.
2. Name the class.

3. Explain, in positive terms, how your term differs from every other item in the class.

Discussion

1. All sentence definitions must include classification. No single classification is intrinsically "right"; a classification may be appropriate or inappropriate, the definition of propriety hinging upon the writer's purpose and audience. Further discussion of classification follows (below).

The *audience* and context define how general or how particular your classification should be. You can decide how to classify a term on the basis of your purpose.

2. Your term must be completely distinguished from every other item in the class. In other words, your definition *excludes* alternative meanings. It must apply to that term and that term only. It must satisfy the principle of reversibility. If another term could be defined by that definition, your definition is incomplete.
3. Be objective. Use a category your audience will recognize. If you rely upon a personal system of categories which derive from your value system, the communication scene will be compromised. Avoid classifying a term by highly subjective criteria, as in *favorite* or *important*. For example, "Free enterprise is the best economic system" expresses an opinion.
4. The differentia must sufficiently distinguish the term from every other item in the class. If the selected category is very general, the distinguishing detail will be extensive. If a horse is classified as belonging to the category of animate beings, the detail carry the burden of specifying how the horse differs from a zebra, from a bird, from a fish, from an amoeba, from a flower, from a fungus. In this case, a more limiting category—odd-toed herbivores for instance—will also limit the amount of detail needed to distinguish the horse from other beings.
5. Explain the difference in positive terms. When you explain how the term differs from other elements in the class, do not express this in negative terms. Consider the definition of tepee (above). To state that a tepee is a form of portable dwelling which is not a tent fails to provide adequate differentiation. State the positive attributes of the terms which distinguish it from others in the class: The tepee is

composed of animal hide and sticks (versus the tepee is not made of metal).

The Significance of Classification

Many words possess more than one meaning; the specific meaning is governed by context. For example, *mouse* can refer to the computer mouse which belongs to the set of manipulating devices [mouse, joy stick, keyboard], or *mouse* can refer to a biological organism included in the set of rodents [mouse, rat, guinea pig].

Classification answers the question: *what kind of?* Classification imposes a context by specifying the category of things. Context (classification) rules out the alternative meanings of the word; thus, specifying the context (class) enables you to limit alternative meanings. The *McGraw-Hill Dictionary for Scientific and Technical Terms* (2d edition) provides the following series of definitions for *shift*.

[Automatic data processing] A movement of data to the right or left, in a digital-computer location, usually with the loss of characters shifted beyond a boundary.

[Geology] The relative displacement of the units affected by a fault but outside the fault zone itself.

[Industrial engineering] The number of hours or the part of the day worked. Also known as tour.

[Mechanical Engineering] To change the ration of the driving to the driven gears to obtain the desired rotational speed or to avoid overloading and stalling an engine or motor.

[Metallurgy] A casting defect caused by malalignment of the mold parts.

While the term (*shift*) remains the same for all these definitions, the various contexts—data processing, geology, industrial engineering, mechanical engineering, metallurgy—make the word mean different things.

Possible Pitfalls: Do Not Fall into the Fallacy

Genetic Fallacy: Eggs to Chickens

A genetic fallacy is an error in reasoning (fallacy) in which one defines a term by its origin or genesis. This fallacy is called *genetic* because *genetic* is the adjective form of *genesis*. Only in special cases (medical textbooks, for instance) is it appropriate to specify a medical pathology by reference to the organism that causes it. In most cases, it is insufficient to identify a term

solely by its origin. (This problem is a type of incomplete differentia.) For example, the statement

- A chicken is a creature which hatches from an egg

offers an insufficiently limiting definition. Among its problems, the generality of the class requires more differentiae to distinguish the chicken from other creatures similarly hatched. The origin is not sufficiently differentiating because other creatures hatch from eggs: reptiles, amphibians, other birds. Even if the class were modified—"A chicken is a flightless bird which hatches from an egg"—the problem of insufficiently limiting differentia remains, as the definition does not exclude all alternative meanings.

Tautology or Circular Definition

In your sentence definition, the term should not appear twice in the definition. Never use the term, a version of a term, or a synonym for the term within a sentence definition. *Tautos* means the "same": A tautology or tautological reasoning means (1) the term appears on both sides of the equals sign, or, more broadly, (2) you assume or take for granted the idea you want to define. For example, "The Carnot cycle is a cycle named for Carnot" defines the term in terms of itself. It is circular.

The best definition frames the term from within a context or class more general than the term; the specifying detail is phrased more particularly than the term itself.

Whole arguments are vulnerable to circular reasoning. When this fallacy is extended throughout an argument, the point is presented as evidence of itself, or the point which requires support is used to support itself.

Phrasing

The definition must be grammatically correct and grammatically parallel. If the term is phrased as a noun, the class must be phrased as a noun. For example, the definition—"Skiing is when you ski down a hill"—is not only circular, it is also grammatically incorrect. "When you ski down hill" is a subordinate clause which, by the rules of grammar, cannot serve as the predicate noun. The classification should read "skiing is a sport" not "skiing is when . . ."

Summary of Criteria for Good Sentence Definitions

1. A good sentence definition contains all three elements: term, class, and differentiae.
2. The definition must be logically consistent, employing several levels of generality; it must not be circular.
3. The definition must be objective, not subjective.
4. The definition must be suited to audience and purpose.

5. A sentence definition is exclusive. It defines the specified term and no other.

Exercises in Sentence Definitions

1. Incomplete definitions

Many of the following are not complete definitions. (1) *Identify* the problem in each of the following and then (2) *rewrite* the definitions to complete them.

1. A fish-finder finds fish.
2. A point is that which has no part.
3. The icosahedron is a Platonic solid.
4. The wings form an important part of an airplane.
5. A pandemic is like an epidemic.
6. Rain is made by liquid water drops with diameters greater than 0.5 millimeter; or if widely scattered, the drops may be smaller.

2. Write your own definition

a. Write a sentence definition for one of the following: *desert, pipet, torque, contract, tension, concrete, byte, hypertext, screw*.

b. Without a dictionary, write as many sentence definitions for the word *file* as you can think of. Then list one synonym for each of those terms. Try the same exercise with *stress, work, field*.

3. Definition for Glossary

Read the following passage. As part of the glossary which will accompany your formal report, write a sentence definition for *whole mouse fluorography*.

A variety of established methods was employed in exploring this issue, and a new method for the analysis of the patterns of DNA synthesis in sectioned whole mice was developed, termed whole mouse fluorography. This newly developed protocol involving thin sections of whole mice, previously treated with tritiated thymidine, was used to establish the patterns of cellular DNA synthesis in the organ system of a newborn mouse. Our results indicate that acute polyoma virus infections appear to have no substantial effect on these patterns. The absence of tritium signal from bodily fluids (blood, urine, etc.) further indicates that the images present by whole mouse fluorography do correspond to patterns of cellular DNA synthesis resulting from the incorporation of ³H-thymidine. —Juan Moreno, *Journal of Undergraduate Research in the Biological Sciences* 21 (1991).

Extended Definition

In the body of a report, you may find that you need to give your audience more information than simply a sentence or parenthetical definition. You may, in fact, want to focus your entire report on offering a definition, either of a new technology or procedure, or of an organism.

How to extend your definition THROUGH . . .

1. Negative Definition

Negative definition names what a thing is not. It makes explicit what is normally taken for granted.

Topology (a branch of mathematics) studies the properties that remain unchanged when shapes are deformed by twisting or stretching or squeezing. Whether a shape is square or round, large or small, is *irrelevant* in topology because stretching can change those properties. Topologists ask whether a shape is connected, whether it has holes, whether it is knotted. They imagine surfaces *not* just in the one-, two-, three-dimensional universes of Euclid but in spaces of many dimensions, impossible to visualize.²

2. Etymology

Etymology means the origin of the word (the history of the *word* is different from the history of the *thing*.) Frequently the history of the word (its origin, change, development) will give you information about the term to which it applies. When you explicate the letters in an acronym (a word made from the first letter of other words), you will learn more about the thing. SCUBA comes from Self Contained Underwater Breathing Apparatus. NASA refers to the National Aeronautic and Space Administration. The word *vaccination* comes from *vacca*, the Spanish word for cow; the history of this word will open up the history of the process since it began with Jenner and his cowpox vaccine. *Cytokinesis* means "movement of the cytoplasm." Humoral immunity results in the production of antibodies which circulate in the bloodstream; *humor* comes from the Latin word for fluid.

3. History

A history or the background of the item provides your reader with additional information. If writing about a mechanism or procedure, you might supply information about its discovery, development, method of manufacture, changing applications, and possibilities for use in other fields. A discussion of genetics might lead you to discover an abbey garden, where in the 1860s, an Augustinian monk, Mendel, discovered the principles of inheritance. The following paragraph describes the history of influenza epidemics.

The highly contagious acute respiratory illness known as influenza appears to have afflicted humans since ancient times. The sudden appear-

ance of epidemics of respiratory diseases that persist for a few weeks and equally suddenly disappear is sufficiently characteristic to permit identification of a number of major epidemics in the distant past. One such epidemic was recorded by Hippocrates in 412 B.C., and numerous episodes were described in the Middle Ages. Webster (646) and Hirsch (266) collected historical data from 1500 until 1800.³

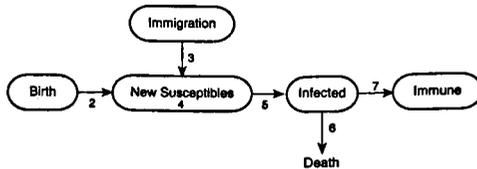
4. Example

An example offers a way to extend your definition through particular instances. The example offers a concrete embodiment of the principle or general point. Examples should be geared to the interests of your audience.

- *Shamu* and *Orca* are both particular instances of killer whales.
- The order Perissodactyla are herbivores; they possess hooves with an odd-number of toes on each foot; the *horse* and *zebra* are examples of the order Perissodactyla.

5. Graphic Illustration

A graphic could be a photograph or a diagram which shows the object from a specified point of view: cross-section, lateral, exploded. A graphic organizes information visually. Some graphics encode a dense amount of information, for instance, a sine wave chart; other graphics handle less dense quantities of information: A pie chart spatializes the division of a whole into parts in order to illustrate relative size. Your graphic should be labeled; if it is borrowed, credit your source at the bottom left corner of the frame. Make sure that you integrate the graphic with the text; the graphic does not stand by itself but is included within the body of your definition. Refer to the graphic in your writing. If you need to explain your graphic, put the explanation after it. See Chapter 7, Graphics, for further elaboration. An example of a graphic⁴ follows.



6. Description/Analysis of Parts

Static objects, moving objects, concepts or processes are comprised of component parts. An effective way to extend a definition is to break the object into parts and then (1) describe the parts and (2) explain how the

parts fit together. If you deal with a static object, use a consistent pattern of spatial description: from whole to part; part to whole; top to bottom, inside to outside, most important to least important. If explaining a process, be consistent about organizing the temporal pattern: from first to last, last to first, most important to least important. See Chapter 8, Description, for further elaboration.

An antibody molecule is made up of four proteins that are bound together: Two of these proteins are identical and are called *heavy chains*; the other two are also identical and are called *light chains*. A protein is a linear chain of building-block molecules called *amino acids*—much like beads on a string. There are 20 possible amino acids, and the nature of a protein is determined by the particular sequence of the amino acids it contains. In the case of antibodies, the two heavy chain proteins are larger than the two light chain proteins. These proteins are held together by chemical bonding in a Y-shaped molecule. . . . Each antibody molecule is specific for one particular antigen, and this specificity is determined by the sequence of amino acids in the heavy and light chains.⁵

7. Comparison/Contrast

Comparison refers to the resemblance or similarity between things; contrast refers to differences. Comparison/contrast extends a definition by clarifying what things your term resembles or differs from. See Chapter 9, Comparison/Contrast, for further discussion.

There is no comparison without contrast; there is no contrast without comparison.

Likeness

(1) Spider and silkworm are not at all closely related, yet *their silks are similar. Both use keratin, a protein that is found in hair, horn, and feathers.*

Difference

(1) Yet the silk of the spider's web has many fabulous qualities. *It is much stronger than the silk of a silkworm. Moreover, it is variable: Spiders can produce different kinds of silk for different functions.*⁶

8. Operating Principle/How It Works

Mechanisms, static or dynamic, work according to a principle whose explanation should be part of your definition. For example, a paper clip is a form of compressed spring; a bow, too, works on the principle of a spring by which energy is stored and released through mechanical means. Even biological or chemical processes can operate by a general guiding mechanical, energetic, or physical principle.

Capillarity is the action by which the surface of a liquid where it contacts a solid is elevated or depressed, because of the relative attraction of molecules of the liquid for each other and for those of the solid. —*McGraw-Hill Dictionary of Scientific and Technical Terms*, 2d. ed.

9. Special Conditions or Qualifications

A detailed definition should include information about special circumstances, as they obtain. It qualifies the information by specifying conditions, limitations, or qualifications.

Ultimately it may be possible to use these [blood cell] growth factors to stimulate and regenerate the immune system in AIDS patients. Of course, it will be important to use these growth factors in conjunction with antivirals. Otherwise, continued HIV infection would destroy the immune system again.⁷

Examples of Extended Definitions

In the following passages, study the use of the different ways to extend a definition.

Example: Arch Dams

[Sentence Definition] An arch dam is a curved dam that carries a major part of its waterload horizontally to the abutments by arch action. [Special case: exception] Massive masonry dams, slightly curved, are usually considered as gravity dams, although some parts of the loads may be carried by the arch action. [History] Many early dams were built of rubble, ashlar, or cyclopean masonry. [Contrast] However, practically all arch dams constructed during recent years have been built of concrete.

[History] Arch principles have been used in bridges and buildings since about 2000 B.C. [Examples] Apparently Ponal dam, built in Austria in 1611 A.D., was the first arch dam recorded in engineering history. The 64-ft Bear Valley Dam, built in the San Bernardino Mountains in southern California in 1883, was the first arch dam constructed in America. It was followed by the 95-ft Sweetwater Dam, in 1888, and the 88-ft Upper Otay Dam, in 1900, both built near San Diego, California. Since 1904, many arch dams have been built in the United States and abroad. —Ivan E. Houk and Roman P. Wengler, *Handbook of Applied Hydraulics*, 3d ed., ed. by Victor Calvin Davis (New York: McGraw Hill, 1969), section 14.

Example: Variable
 Student-Authored Extended Definition
 Definition of "Variable"

Audience: Lay audience

Purpose: To give an extended definition of the word *variable*

[**Sentence definition**] A variable is a value, constant, condition, or set of conditions that are subject to change and are often assigned to a particular letter or word. A variable is characterized by the variable itself and its equivalent of the constant, condition, or set of conditions that it represents. [**Etymology**] The word "variable" derives from its root word "vary" which means change or changing. [**Purpose**] The main use of a variable is to simplify the process of manipulating and monitoring a constantly changing value or condition(s). [**Negative definition/comparison/contrast**] A variable, by definition, is not a constant (remaining the same without change); it is a continuously updated (changed) according to the alterations made by the system in which the variable is used. [**Analogy**] A variable, in an abstract analogy, is similar to the wind. As the wind constantly changes in both velocity and direction, a variable constantly changes to represent an updated or changed value or condition(s). [**Division into parts**] There are several varieties and types of variables. One type is a string (a sequence of letters such as a password); the other is a single letter variable (like the letter *v*). [**Special conditions**] Special conditions apply to the word variable when it is being used in the context of computer programming. For example, a computer can be told to interpret (understand) a variable, manipulate a variable, assign a new variable to present the outcome of manipulations (such as calculations). In this case, a hierarchy of variables is formed and a new variety of variables is born. Variables are then the means through which a computer, or any other such interpreting device, can keep itself updated to current conditions, thereby making itself more applicable to present problems and conditions. See example.

[**Application**] An example of variables used in math:

Let x =time to travel from point A to point B.

Let y =time to travel from point B to point A.

$x + y$ = total time traveled.

—Andy Burchett, CAMP student, UCI, summer, 1992.

Definition and Introductions

A definition offers a solid contact point between the reader and the writer.

To start a paper with a definition is to take control of specifying the context for your topic. Notice in the following excerpts how the writer starts with a definition in the introduction and then moves from general discussion, set out by the definition, to the particular objective of the paper. The following were taken from student papers prepared for an upper division writing course.

1. Photodynamic Therapy (PDT) is a promising modern experimental technique used for the treatment of various malignancies (1, 2, 5, 17). The process of PDT involves the utilization of a photosensitizing dye which selectively localizes in cancerous tissue (2, 1, 4); the tumor is destroyed when laser light with sufficient energy is tuned to the appropriate wave-length of the photosensitizer (3, 1, 3). When photosensitizer molecules become excited by the energy of the laser light, high reactive singlet oxygen is generated (111). Singlet oxygen plays a major role in the tumor destruction of PDT by interacting with cellular components and tumor vasculature (111). —Cesar Zamora, "Phototoxicity Comparison of Phthalocyanines."
2. Zoopharmacognosy is the scientific study that describes the process by which wild animals select the use of plant-derived properties (i.e., leaves, stems, roots, resins, etc.) with medicinal properties for treatment and prevention of disease. Coatis (*Nasua Narica*) of the island of Baro Colorado have been observed utilizing a resin from the tree *Trattinnikia Aspera* as a topical agent. —Arturo Pelayo, "The Chemistry of Resins used by Coatis in Fur Rubbing."
3. Artificial intelligence (AI) is part of computer science that deals with symbolic representations of knowledge. AI tries to build intelligent machines which interact with the environment. It is used mainly in robotics, natural language understanding, speech understanding, vision, general problem-solving, and other areas. —Martin Raymundo, "Artificial Intelligence and Its Applications," paper prepared for CAMP, 1995.
4. Superoxide dismutases are the metalloenzymes identified as part of an endogenous antioxidant system present in various eukaryotic organisms. —Linda Tesoriero, from abstract to "Resistance of Adult *Drosophila Melanogaster* Females with Different Superoxide Dismutase Genotypes to Irradiation."
5. The nucleus of the optic tract (NOT) is part of the pretectal complex and involved with the detection of retinal slip, a gaze resulting in

an involuntary movement of the eye to follow an object detected by the retina, which is the stimulus for generating horizontal optokinetic nystagmus (hOKN) (Simpson, 1988). The hOKN is a set of eye movements caused by motion of the entire visual field and stabilizes the eyes when the subject itself is moving. —Evelyn Tom, "Cortical Projections in guinea Pig, to the NOT, Area responsible for Optokinetic Nystagmus."

Exercises

1. Analysis of Extended Definition

Read the following extended definition. Then (a) locate the sentence definition, (b) identify elements of the extended definition, (c) make a reasonable interpretation about the audience level.

The propionibacteria are pleomorphic, nonsporeforming, gram-positive rods that frequently form irregular clumps with "Chinese-character" arrangements. They are nonmotile, anaerobic to aerotolerant mesophiles that form small raised colonies that are cream, yellow, orange, or deep red. The overriding characteristic that gives them their name is the production of large amounts of propionic and acetic acids. These acids can be produced by fermentation not only of various sugars, but also of lactic acid. Yields of ATP are low in these pathways, and growth is slow, particularly on solid media. This characteristic of slow growth is of practical significance in the laboratory and industrial applications; visible colonies may take from 5 to 14 days to appear, depending on the composition of the medium. —Bonnie Glatz, "The Classical Propionibacteria: Their Past, Present, and Future as Industrial Organism," *ASM (American Society for Microbiology)* 58, No. 4 (April 1992): 197–201.

2. Definition of Contagion

Turn to Girolamo Fracastoro's "The Germ Theory of Disease" in the appendix and analyze Fracastoro's use of extended definition.

3. Stipulative Definition: Hippocrates

Turn to Hippocrates' "Epidemics, Book I" in the Reading Selections and write a stipulative definition for *causus*. Further instructions are located at the end of that reading.

References

- Corbett, Edward. *Classical Rhetoric for the Modern Student*. Oxford University Press, 1990.
- Fan, H., Conner, R., Villarreal, L. *The Biology of AIDS*, 3d edition. Jones and Bartlett Publishers, 1989, 1991, 1994.
- Glatz, Bonnie. "The Classical Propionibacteria: Their Past, Present, and Future as Industrial Organism." *ASM (American Society for Microbiology)* 58, No. 4 (April 1992): 197–201.

- Hanson, N. R. *Perception and Discovery: An Introduction to Scientific Inquiry*. Freeman, Cooper, and Company, 1969.
- Jason, G. *Introduction to Logic*. Jones and Bartlett Publishers, 1994.
- Lannon, J. *Technical Writing*. Little, Brown, and Company, 1979.
- Daniel Lapedes, ed. *McGraw-Hill Dictionary of Scientific and Technical Terms*, 2d ed. McGraw-Hill, 1974, 1976, 1978.

Notes

1. This term is taken from Norwood Russell Hanson's *Perception and Discovery: An Introduction to Scientific Inquiry* (San Francisco: Freeman, Cooper, and Company, 1969). Other philosophers and logicians may propose other terms. For instance, Gary Jason, in *Introduction to Logic* (Boston, London: Jones and Bartlett Publishers, 1994) calls this kind of definition *reportive* (p. 180).
2. James Gleick, *Chaos* (New York, London: Penguin Books, 1987), p. 46.
3. Brian R. Murphy and Robert G. Webster, "Influenza Virus," *Virology*, edited by B. N. Fields, et al. (New York: Raven Press, 1985), p. 1179.
4. Hung Fan, Ross Connor, and Luis Villarreal, *The Biology of AIDS* (Boston, London: Jones and Bartlett Publishers, 1994), p. 10.
5. Fan, et al., *The Biology of AIDS*, pp. 33-34.
6. Fritz Vollrath, "Spider Webs and Silks," *Scientific American* (March 1992): 70-76.
7. Fan, et al., *The Biology of AIDS*, p. 154.