Chapter 2

Biology and Psychology

RESOURCE GUIDE

I. Evolution and Evolutionary Psychology: "Survivor" Is More Than Just a Game.

LEARNING OBJECTIVES

After exploring chapter 2, students should:

1. Appreciate the life of Charles Darwin and the contributions he made to science.
2. Understand the theory of evolution and its place in science.
3. Understand the field of Evolutionary Psychology.
4. Understand the term heredity and understand the role of genes and chromosomes in heredity.
5. Understand kinship, twin and adoptee studies.

6. Know the parts of a neuron and how neurons communicate.
7. Know the various neurotransmitters used in neural communication.
8. Understand the divisions of the various nervous systems.
9. Know the various brain structures and associated functions.
10. Understand the experience of the split-brain patients.
11. Understand the endocrine system, the various structures and how communication happens within the system.
12. Appreciate the various conditions that women and men experience related to hormone imbalances.

LECTURE OUTLINE

I. Evolution and Evolutionary Psychology: "Survivor" Is More Than Just a Game.

A. Theory of Evolution.

1. Published "The Descent of Man" in 1871.
2. Natural Selection: Survival of the fittest.
3. Biology serves as the material base for our behaviors, emotions and cognitions.

B. "Doing What Comes Naturally".

1. Mutations: differences in individual traits and/or adaptations for survival?
2. Evolutionary Psychology: Applying adaptation and natural selection to mental processes and behavior.
3. Instincts: stereotyped pattern of behavior that is triggered in specific situations
   a. Examples of instincts: The Egg Zone; Stickleback Fish; Song of the Sparrow.

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II. Heredity: The Nature of Nature.

A. Heredity: one's biological structures and processes transmitted from generation to generation.

B. Genetics and Behavioral Genetics.

1. Behavioral Genetics: Bridges the sciences of psychology and biology. Concerned with the genetic transmission of traits that give rise to patterns of behaviors.

2. Molecular Genetics: attempts to identify specific genes that are connected with behavior and mental processes.
    a. Examples of this include: sociability, shyness, aggressiveness, thrill seeking, anxiety, depression, schizophrenia, bipolar disorder, alcoholism, and criminal behavior.

C. Genes and Chromosomes: The Building Blocks of Heredity".

1. Genes: basic building blocks of heredity. 30,000 - 40,000 genes within every cell of a person's body.
2. Chromosomes: strings of genes. Each cell contains 46 arranged in 23 pairs.
3. DNA: Chromosomes are large complex molecules of deoxyribonucleic acid (DNA).
4. Human Genome Project: has learned that the sequencing of your DNA consists of about 3 billion DNA sequences.
    a. Genetic Code: The DNA sequences that "define" each person.
        i. Sperm and Egg: 23 chromosomes from the father's sperm and 23 chromosomes from the mother's egg. When the egg is fertilized by the sperm they form 23 pairs.
        ii. Sex Chromosomes: The 23rd pair of chromosomes which determine a person's sex, male or female. X female; Y male.
        iii. Determined by father.
5. Down Syndrome.
    a. Down Syndrome: an extra chromosome on the 21st pair. Usually contributed by mother.
    b. Characteristics: downward sloping fold of skin at the inner corner of the eyes, a round face, a protruding tongue, broad flat nose, mental retardation, and physical problems that can result in death by middle age.

D. Kinship Studies: Is the Behavior of Relatives Related?

1. Parents and Children: 50% of their genes in common. Aunts and Uncles have a 25% overlap with nieces and nephews. 12.5% overlap with cousins.
2. Kinship Studies: Studies which attempt to compare the presence of traits and behavior patterns in people who are biologically related or unrelated to help determine the role of genetic factors.
3. Twin Studies: Looking Into the Genetic Mirror.
    a. Monozygotic Twins (MZ): Identical twins from the same fertilized egg.

    b. Dizygotic Twins (DZ): Fraternal twins, two separate fertilized eggs.
    c. Twin studies compare the presence of traits in MZ twins, DZ twins and others to help determine the role of genetic factors.

i. If MZ twins show greater similarity on a trait than DZ twins a genetic basis for the trait has been suggested. ii. The case of the Jims.... MZ twins raised apart, both named Jim, both were married and divorced, both trained to be policemen, first sons named James Allen, drove same kind of car, vacationed at the same beach, enjoyed carpentry as a hobby.

4. Adoption Studies.
   a. Adoption studies: look for similarities between children and their natural and adoptive parents.
      i. When children reared by adoptive parents are more similar to their natural parents in a particular trait, strong evidence exists for a genetic role.

E. Selective Breeding: The Nurture of Nature.
   1. Selective breeding: selective breeding to enhance desired physical and behavioral traits.
      a. Examples: cattle, chicken, dogs.
      b. Tryon rat studies: Bred rats to become "maze dull" and "maze bright".
         i. By the seventh generation maze bright rats are making only one error per trial, maze dull are making 9-10 errors per trial.

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III. The Nervous System: On Being Wired.

A. Phineas Gage story: The brain's influence on personality; the nervous system serves as the base for behaviors, emotions, and cognitions. B. Neurons: Into the Fabulous Forest.

1. Neurons: the nerve cells of the body; the metaphoric tree.
   a. Cell Body: contains the nucleus which generates energy
   b. Dendrites: receive incoming messages from adjourning cells (roots).
   c. Axon: carry messages away from the cell body (trunk).
   d. Terminals (terminal buttons): bulb shaped structure at the end of the axon.
   e. Myelin: fatty substance around axons that facilitate conduction.

f. Glial cells: remove dead neurons and waste products from the nervous system.
g. Afferent neurons: sensory input.
h. Efferent neurons: motor output.
i. SAME: Sensory = Afferent, and Motor = Efferent. C. The Neural Impulse: Let Us "Sing the Body Electric".

2. Neural Impulse: message traveling along the neuron; between 2 and 225 miles an hour.
3. An Electrochemical Voyage.
   a. Neuron resting potential: -70 millivolts (negative charge).
   b. Depolarized: action of the cell while it becomes positively charged.
   c. Action potential: positively charged neuron returning to the resting state of being negatively charged. The "message" is sent.
4. Firing: How Messages Voyage from Neuron to Neuron.
   a. Neuron Firing: neurons attempt to transmit messages to other neurons, muscles or glands.
   b. Threshold: Each neuron has a threshold; the cell will not fire until the threshold is reached.
   c. All or None Principle: When the threshold is reached the neuron fires an impulse of the same strength.
   d. Refractory Period: a period of time when the neuron will not fire; period of recovery during which positive sodium is not allowed to pass through the neural membrane.
5. The Synapse: On Being Well Connected.
6. Synapse: junction (fluid filled gap) between neurons.

D. Neurotransmitters: The Chemical Keys to Communication.

1. Synaptic Vesicles: sacs in the axon terminals which contain neurotransmitters.
2. Neurotransmitters: the chemical keys to communication; spilled into the synaptic cleft (synapse) and influence the receiving neuron
3. Receptor Site: specifically tailored site on the receiving neuron where the chemical key (neurotransmitter) fits.
4. Reuptake: reabsorption of neurotransmitters by the sending neuron.
5. Excitatory: neurotransmitter influence on the receiving cell causing it to fire.

6. Inhibitory: neurotransmitter influence on the receiving cell preventing it from firing.

7. Some Key Chemical Keys.
   a. Acetylcholine (ACh): controls muscle contractions; can be both excitatory and inhibitory.
      i. Example of Curare and Botulism both leading to paralysis ii. Hippocampus: ACh is also found in the hippocampus and facilitates memory; decreases with Alzheimer's disease leading to memory problems.
   b. Dopamine: affects voluntary movements, learning, memory and arousal.
      i. Deficiencies are linked to Parkinson's disease in which people progressively lose control over their muscles; Muhammad Ali and Michael J. Fox. ii. Schizophrenia: people with schizophrenia may have more receptor sites for dopamine leading to confusion and false perceptions.
   c. Norepinephrine: produced largely in the brain stem; acts as a neurotransmitter and as a hormone; involved in general arousal, learning and memory, and eating; linked to mood disorders.
      i. Example of cocaine which creates an excess of norepinephrine leading to persistent arousal.
   d. Serotonin: involved in emotional arousal and sleep. Deficiencies have been linked to eating disorders, alcoholism, depression, aggression, and insomnia.
      i. Example: LSD which inhibits this inhibitory neurotransmitter leading to increased brain activity including hallucinations
   e. Gamma-aminobutyric acid (GABA): inhibitory neurotransmitter that may help calm anxiety reactions. Tranquilizers and alcohol may quell anxiety by binding with GABA receptors.
   f. Endorphins: inhibitory neurotransmitter; endogenous morphine. Natural painkiller.
      i. Experienced by runners as the runner's high.
   g. Billions and billions of vesicles pouring neurotransmitters into synaptic clefts at any given time; several hundred times every second. E. The Parts of the Nervous System.

1. Nerve: a bundle of axons.
2. Central Nervous System: brain and spinal cord.
3. Peripheral Nervous System: afferent and efferent neurons which transmit messages from the brain or spinal cord to muscles and glands.
4. The Peripheral Nervous System: The Body's Peripheral Devices.

a. Somatic Nervous System: afferent and efferent neurons that transmit sights, sounds, smells, temperature, body positions, etc. i. Purposeful body movements.

b. Autonomic Nervous System: "Automatic" regulates the glands and internal organ muscles; heartbeat, respiration, digestion, dilation of the pupils, etc.

i. Sympathetic Division: active during processes that involve spending body energy; fight or flight.

ii. Parasympathetic Division: active during processes that replenish reserves of energy.

5. The Central Nervous System: The Body's Central Processing Unit.

a. Spinal Cord: column of nerves transmits messages from sensory receptors to the brain and from the brain to muscles and glands throughout the body

i. Spinal Reflexes: unlearned response to a stimulus that may involve only two neurons: afferent and efferent.

ii. Interneuron: a third neuron that transmits the neural impulse from the sensory neuron through the spinal cord to the motor neuron.

iii. Gray Matter: non-myelinated neurons; found in brain and spinal cord.

iv. White Matter: myelinated neurons; found in brain and spinal cord.

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IV. The Brain: The Star of the Human Nervous System.

A. Gender differences: Men brains are 15% larger than women's brains; Women's brains run hotter (metabolize more glucose).

B. Seeing the Brain Through the Eyes of the Psychologist.

1. Paul Broca: hobby of craniometry or measurement of the skull.

a. Patient named Leborgne who could understand language but could utter only meaningless sounds. After his death Broca performed an autopsy and found a part of his brain had deteriorated.

b. Broca tied this into speech, now called Broca's area.

2. Accidents.
    a. Accidents provide unplanned, uncontrolled opportunities of studying the brain (see Phineas Gage).
3. Experimenting with the Brain.
    a. Lesioning: damaging part of the brain.
4. The Electroencephalograph (EEG).
    a. EEG detects minute amounts of electrical activity in the brain.

5. Brain Imaging Techniques.
    a. CAT (computerized axial tomograph): a scan which passes a narrow X-ray beam through the head and measures brain structures, generating a three dimensional image of the brain.

        ii. Reveals deformities in shape and structure that are connected with blood clots, tumors, and other health problems.

    b. PET (positron emission tomography): computer generated image of the activity of parts of the brain by tracing the amount of glucose used. A harmless amount of radioactive compound (tracer) is mixed with glucose and injected into the blood stream.

        i. Used to see which parts of the brain are most active when we are engaged in various activities (listening to music, working out math problems, etc.)

    c. MRI (magnetic reasoning imaging): the person lies in a powerful magnetic field and is exposed to radio waves that cause parts of the brain to emit signals; relies on subtle shifts in blood flow.

        i. MRI has shown people with schizophrenia have smaller prefrontal regions but larger ventricles. C. A Voyage Through the Brain.

1. Hindbrain: where the spinal cord meets the brain. Contains three structures, the medulla, pons, and cerebellum.
    a. Medulla: regulates vital functions such as heart rate, blood pressure, and respiration.
    b. Pons: transmits information about body movements and is involved in functions related to attention, sleep/alertness and respiration.
    c. Cerebellum: involved in maintaining balance and controlling motor behavior.
2. Reticular Activating System (RAS): vital in the functions of attention, sleep and arousal.
3. Forebrain: forward most part of the brain containing the thalamus, hypothalamus, limbic system and the cerebrum.
    a. Thalamus: relay station for sensory stimulation.

   b. Hypothalamus: vital for the regulation of body temperature, concentration of fluids, storage of nutrients, and various aspects of motivation and emotion.
      i. Also involved in hunger, thirst and sexual behavior. (Pleasure center of the brain see the rat experiment).
   c. Limbic System: made up of several structures including the amygdala, hippocampus, and parts of the hypothalamus.
      i. Involved in memory, emotion and in the drives of hunger, sex and aggression.
      ii. Amygdala: connected with aggression, fear response, and vigilance.
   d. Cerebrum: responsible for thinking and language.
4. Corpus Callosum: a bundle of some 200 million nerve fibers connecting the two hemispheres.

D. The Cerebral Cortex: The "Bark" That Reasons.

1. Cerebral Cortex: outer layer of the cerebrum; about 1/8 of an inch thick.
2. Involved in almost every bodily activity, including most sensations, and most responses.
3. Frontal Lobe: in front of the central fissure, contains the motor cortex, which causes our body to move.
4. Parietal Lobe: behind central fissure, contains the somatosensory cortex which receives messages from skin senses all over the body.
5. Temporal Lobe: lies below the lateral fissure, contains the auditory area (hearing).
6. Occipital Lobe: lies behind the temporal lobe and is involved with vision.
7. Association Areas: areas of the cerebral cortex that are not primarily involved in sensation or motor activity.
   a. Make possible the breadth and depth of human learning, thought, memory and language.
8. Language Functions.
   a. Aphasia: disruption in the ability to understand or produce language.
   b. Wernicke's Area: in the temporal lobe responds mainly to auditory information.
   c. Broca's area: processes information and sends it to the motor cortex.
   d. Wernicke's aphasia: impaired ability to comprehend speech and to think of the proper words to express.
   e. Broca's aphasia: Damage to this area results; people can understand language but will speak slowly in simple sentences. E. Left Brain, Right Brain.

1. Left brain: primarily logical and intellectual.
2. Right brain: primarily intuitive, creative, and emotional.
   a. At best this is exaggerated. The hemispheres do not act independently as they are connected by the corpus callosum. F. Handedness: Is It Gauche or Sinister to Be Left Handed?

1. Lefties: 8-10% of people are left handed; more common in males.
   a. Has been connected with language problems, dyslexia, stuttering, migraine headaches, allergies, and schizophrenia.
   b. On the other side being left handed is associated with artists, musicians, and mathematicians.
2. Handedness runs in families.

G. Split Brain Experiments: How Many Brains Do You Have?

1. Split brain: some people with epilepsy have split brain operations in which much of their corpus callosum is severed.
   a. Characteristics of split brain: each hemisphere has a mind of it's own.
      i. One patient described a situation he encountered, as one hemisphere liking reading and other not. If he shifted the book

from his right hand to his left, his left hand would put the book down.

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V. The Endocrine System: Chemicals in the Blood.

A. Glands: secrete hormones. Two types:

1. With ducts (saliva, sweat, tears).
2. Without ducts (released into the blood stream). B. The Hypothalamus: Master of the Master Gland.

1. The hypothalamus secretes hormones that influence the pituitary.

C. Pituitary Gland: implicated in growth, sometimes referred to as the Master Gland as it influences other glands in the endocrine system.

1. Growth Hormone: regulates growth of muscles, bones and glands.
2. Prolactin: regulates maternal behavior in lower animals such as rats, also produces milk in women.
3. Antidiuretic Hormone (ADH): inhibits production of urine when fluid levels in the body are low.
4. Oxytocin: stimulates labor in pregnant women. D. The Pineal Gland: secretes melatonin.

1. Melatonin: secreted by the Pineal gland and helps regulate the sleep-wake cycle.

E. The Thyroid Gland: The Body's Accelerator.

1. Thyroxin: secreted by the thyroid and affects the body's metabolism.
   a. Hypothyroidism is too little thyroxin and results in being overweight.
   b. Hyperthyroidism is too much thyroxin and is characterized by excitability, insomnia, and weight loss.
   c. Cretinism is a conditioned caused by a deficiency in thyroxin in children which leads to stunted growth and mental retardation.

2. The Adrenal Glands: Coping With Stress.

a. Adrenal glands: release hormones to increase resistance to stress called corticosteroids.
b. Promote muscle development and the release of sugar in the liver making more energy available.
c. Epinephrine: is also known as adrenaline; produced by the adrenal glands.

3. The Testes and the Ovaries.
    a. Testosterone: produced by the testes and in small amounts by the ovaries.
    b. Considered to be the male sex hormone as it aids in the development of male sex organs.
    c. During puberty the release of testosterone promotes the development of primary and secondary sex characteristics.
        i. Primary sex characteristics: those characteristics involved in reproduction: increased penis size, sperm producing ability of the testes.
        ii. Secondary sex characteristics: Not directly related to reproduction: presence of a beard, deeper voice.
    d. Estrogen and Progesterone: produced by the ovaries and in small amounts by the testes.
        i. Fosters female reproductive capacity and secondary sex characteristics. The levels of estrogen and progesterone vary and regulate the woman's menstrual cycle.
    e. Steroids, Behavior, and Mental Processes.
        i. Anabolic Steroids are synthetic versions of the male sex hormone testosterone. Used to enhance athletic prowess.

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VI. LIFE CONNECTIONS: Coping with Premenstrual Syndrome (PMS).

A. Premenstrual Syndrome (PMS): three out of four women report having some psychological and physical problems such as depression, anxiety, and headaches during the four to six days that precede menstruation.

1. However only one in ten has symptoms severe enough to impair academic, occupational, or social functioning.

B. PMS may be a complex interaction between ovarian hormones and neurotransmitters. Once seen as something a woman must tolerate, today there are many treatment options (diet, exercise, hormone treatments). C. How to Handle Menstrual Discomfort.

1. Don't blame yourself.
2. Keep track of your menstrual symptoms to help you and your doctor identify patterns.
3. Develop strategies for dealing with days on which you experience the most distress.
4. Ask yourself whether you harbor self-defeating attitudes that might be compounding distress.
5. See a doctor about your symptoms.
6. Develop nutritious eating habits.
7. If you feel bloated, eat smaller meals.
8. Vigorous exercise.
9. Check with your doctor about herbal, vitamin and mineral supplements.
10. Ibuprofen and other medications available over the counter may be helpful for cramping.
11. Menstruation is triggered by a sharp drop off in sex hormones. Some gynecologists prescribe estrogen replacement though this is not hazard free.
12. Remind yourself that menstrual problems are time limited.

D. Menopause: When the Decline in Sex Hormones Becomes Permanent.

1. Menopause: when the drop off in female sex hormones becomes permanent.

a. Characterized by the cessation of menstruation. Climacteric caused

by the falling off in the secretion of estrogen and progesterone. Loss of reproductive ability.

i. Other characteristics: hot flashes, perspiration, loss of sleep, feelings of anxiety and depression.

ii. The majority of women get through the menopause transition with little or no problems.

iii. Some women do experience physical and emotional problems.

2. Hormone Replacement Therapy (HRT).

a. HRT: consists of synthetic estrogen and progesterone used to offset the effects of declining of naturally occurring hormones.

i. Positives: May help reduce hot flashes, lower the risk of osteoporosis, colon cancer, and age related cognitive declines. Possibly raises the levels of "good" cholesterol and lowers the levels of "bad" cholesterol.

ii. Negatives: Increases in some kinds of cancers including breast and endometrial cancer. No cardiac benefits, possible increased risk of stroke and heart attacks. E. Andropause (Viropause or Manopause).

1. Andropause: suggests a fall off of levels of the male sex hormone androgens.

a. The decline is typically more gradual in men than in women.

b. Characteristics include loss of fertility, problems in achieving and maintaining an erection, loss of bone mass loss of muscle, loss of height, body fat percent nearly doubles and loss of some hearing and vision.

c. To help alleviate the symptoms try:

i. Exercise.

ii. Diet rich in calcium and vitamin D.

iii. Hormone replacement therapy.

2. Irritable Male Syndrome.

a. Characteristics: the drop off of testosterone may lead to anxiety, depression, or irritability in men.

3. Hormone Replacement Therapy (HRT) in Men.

a. Each year 1 million prescriptions are written for testosterone.

i. Positives: May boost strength, energy, and the sex drive.

ii. Negatives: connected with risk of prostrate cancer and cardiovascular disease.

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_ IDEAS FOR INSTRUCTION

I. Evolution and Evolutionary Psychology: "Survivor" Is More Than Just a Game.

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Lecture Topic 1: Evolution Theory.

To help your students understand how evolutionary theory can be applied in various psychological theories, read an article by Peter Gray (1996) titled "Incorporating Evolutionary Theory Into The Teaching of Psychology". This article focuses on integrating evolutionary theory in your lectures, as he suggests how the theory can be applied in various topics covered in an Introductory course including: critical thinking, applications for Piaget's theory, Freud's theory, Maslow and Roger's humanistic theory, social psychology, animal learning, cognitive development, and cross species development.

Lecture Topic 2: The Teaching of Evolution – We Need to do Better.

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Yan B. Linhart (1997) suggests that the teaching of evolutionary theory is important…and not being done real well. In an article that Linhart wrote titled "The Teaching of Evolution-We Need to do Better" (found on InfoTrac) Linhart discusses what evolution is and what it is not. Linhart suggests that even today the theory is not presented accurately. Taken from a biologists view, this article will aid you as you fully prepare to present the theory of evolution to your students.

Lecture Topic 3: Natural Selection in a Bottle.

Students often wonder if there is evidence for natural selection. One way to help them understand that natural selection and evolution can take place is to present to them some of the research conducted with animals that have short life spans. Research has been conducted with rats who are learning mazes, and with flies in bottles. To learn more about the fly study, access an article found on InfoTrac titled "Natural Selection in a Bottle" written by Houle and Rowe (2003). This in-depth look at various generations of flies and how they adapt in bottles, can help your students understand the concept of natural selection. Though the authors have some inconclusive results, the research model used to study natural selection can help researchers study these evolutionary concepts.

Classroom Demonstration 1: The Dates of Evolution.

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To help your students better understand the controversial nature of evolutionary theory, access an article found on InfoTrac titled "Life of an Idea" written for U.S. News & World Report (2002). This brief article discusses nine dates (years) in which the controversy in evolution continued. After discussing the theory of evolution, you can write these dates on the board and discuss each one. These dates begin with Darwin publishing "The Origin of Species" in 1859, to Kansas temporarily dropping evolution from the high school curriculum in 1999.

Classroom Demonstration 2: The Charles Darwin Quiz.

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Preparation: Access the article below and create an overhead with each of the quiz items.

As you begin your lecture on the theory of evolution, one way to get the students involved is to begin with a short quiz to assess their knowledge of Charles Darwin. Present the items on an overhead and have the students answer each one on paper. (you may want to offer extra credit to the person with the highest score to encourage full participation). After presenting the items, go over each question and provide the answers. This can lead to a great classroom discussion focusing on Darwin. The article can be found on InfoTrac and is titled "A Charles Darwin (187th) Birthday Quiz" written by Topoff (1997).

Classroom Demonstration 3: The 3-D gallery.

E

Preparation: You will need to have a computer, Internet access and a projector.

To literally show your students pictures of skulls that illustrate the evolutionary process, access a website found at:
http://www.anth.ucsb.edu/projects/human/#
A link found on this site will start a 3-D gallery of modern primate relatives and fossils of ancestors of humans.

Student Project 1: Biological Evidence for Evolution.

To aid in your understanding of what evolution is and the evidence that exists to support this theoretical approach, access an article found on

InfoTrac titled "Biological Evidence For Evidence" written by Smith (2001). After reading the article answer the following questions: 1) what is the simple definition of evolution as presented in the article? 2) What is the crux of evolution? What does the term "heritable" mean? 3) What is natural selection? 4) There are four things about evolution that the author suggests "need to be clear". What are they?

Student Project 2: A Theory Evolves.

The theory of evolution continues to be controversial in some arenas. Evidence continues to be found that supports the theory. To find out more about this theory, read an article found on InfoTrac titled "A Theory Evolves" written by Hayden, Ruvinsky, Gilgoff, and Sobel (2002). While you are reading the article summarize the information presented in each of the sub-headings. These include: Nuts and Bolts, Master Switches, Making Do, Arms Race, and God and Man. Do these arguments make sense to you?

Student Project 3: Evolution on Trial.

In 1999 the Kansas Board of Education voted to remove the theory of evolution from the state's public-school science curriculum. When this took

place, it reminded many of an earlier trial that happened which came to be known as the Scopes Monkey Trial of 1925. To learn more about this trial, access an article found on InfoTrac titled "Evolution on Trial" written by Beaudoin (1999). After reading this article, answer the following questions: 1) Who was John Scopes? 2) What was the fine for teaching evolution? 3) Who were the two lawyers involved in the court case? 4) What was the outcome of the trial? 5) What happened just 18 months later?

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Journal Prompt 1: Sex and Evolution.

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Have you ever considered that sexual reproduction and evolution may be tied together? Could sexual reproduction have an evolutionary beginning? To find out, access an article found on InfoTrac titled "Factors Causing High Mutations Could Have Led to Origins of Sexual Reproduction" written for Genomics & Genetics Weekly (2001). After reading this article write a journal entry discussing the connections the author attempts to make. Does the author make a convincing argument?

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Journal Prompt 2: Charles Darwin.

For this journal entry, think about the man Charles Darwin and the contributions that he made to science. As you read in your textbook about his upbringing and his later accomplishments, are you impressed that he was able to come up with such a theory? What do you think about the fact that he didn't want his ideas published until after his death? Think back to the first time you heard about Charles Darwin and the theory of evolution. Did the material come with a positive endorsement? Was the material negatively reflected? Perhaps neutrally presented? Did this impact your core belief system?

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Journal Prompt 3: Stickleback Fish.

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An interesting research study, often cited in introductory psychology textbooks, to illustrate evolution, is that of the stickleback fish. Stickleback fish have some interesting mating behaviors. But do they always turn red on their bellies? To learn about some interesting findings in research conducted

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with these fish, access an article found on InfoTrac titled "Fading to Black Doesn't Empower Fish" written by S.M. (2000). After reading this article write a journal entry focusing on the interesting things that humans do to attract mates.

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II. Heredity: The Nature of Nature.

Lecture Topic 1: Genes and Cultures.

Recent literature has focused on the controversy surrounding the mapping of the human genome. Behavioral genetics suggests that we behaviors have been "programmed" into humans through an evolutionary process. In an article that explores other possibilities, Ehrlich and Feldman (2003) explore the differences between genotype and phenotype and expand this notion to include culture. Their article can be found on InfoTrac titled "Genes and Culture: What Creates Our Behavioral Phenome?" This article does an excellent job of explaining the relationship between genes, culture and behavior, evolutionary psychology, behavioral genetics, and the behavioral phenome. This information can help your students understand the complex nature of behavior which lead to the difficulties found in understanding specific behaviors.

Lecture Topic 2: Amniocentesis.

Discuss amniocentesis and the ethical considerations involved for parents. This exercise, with appropriate guidance from the instructor, gives opportunities for students to deal honestly with a controversial issue. Ask questions such as: If one couple found out they were carrying a Down's syndrome child, what would their reactions be? (Remember that they wouldn't know if the IQ allowed them to be functional or trainable.) This type of question allows students to deal with ethical and scientific factors related to amniocentesis.

Lecture Topic 3: Stem Cells.

Stem Cell research continues to be a controversial topic. Should this research continue, as the potential benefits seem miraculous, but at what cost? To further your understanding of this controversial area, access a website found at:
http://www.nature.com/nature/stemcells
This website contains recently written articles discussing stem cell research.

Classroom Demonstration 1: Your Ideal Family.

Noting our modern control over fertility, poll students (perhaps anonymously) on their ideal number, gender, and spacing of children. The model response might be: two children, a boy first a girl second (this pattern has been found in similar polls). If so, follow with a discussion of how an

increase in first-born males contrasted with later-born females could affect the different socialization of our male and female children. Refer to research on the typical differences between first-borns and later-borns to make your point.

Classroom Demonstration 2: Down's syndrome.

Down's syndrome is a chromosomal disorder with the primary characteristic of mental retardation. There are many resources available to individuals with Down's syndrome and their families. One of these resources can be found at:
http://www.ndss.org
This is the home page for the National Down's Syndrome Society which contains information on causes and resources for families.

Classroom Demonstration 3: Genetic Diseases.

Preparation: You will need a computer with Internet access and a projector.

To show your students the number of genetically related diseases there are, access a website found at:
http://www.ncusd203.org/north/research/genetics/disease.htm
This website lists various genetic diseases and provides links for each one.

Student Project 1: Your Career May Be in Your Genes.

Twin studies are conducted in psychology to aid in the understanding of the nature – nurture debate. This rare situation allows researchers to focus indepth on the lives of those with similar genetic makeup. Of even more interest are those situations were identical twins are raised apart. How similar are these individuals who grew up in different environments? Could genetics play a role in the observed similarities? To aid in your understanding of this type of research, access an article found on InfoTrac titled "New Twin Studies Show….The Career of Your Dreams May Be The Career of Your Genes" written by Segal (1999). This article focuses on a study that tracked twins lives and lifestyles. After reading this article answer the following questions: 1) What percent of your satisfaction on the job may be attributable to genetic factors? 2) What percent of your happiness may be attributable to genetic factors? 3) The Shapiro twins both have what occupational title? 4) What is the occupational title that the Swain twins share? 5) After reading this article, report what you personally found interesting.

Student Project 2: Genes and Behavior.

As we think about the many influences on behavior, one that needs to be considered is that of our genes. Do your genes influence the behaviors that you engage in on a daily basis? Can you imagine that some of your quirky behaviors may be partially due to what you inherited? To learn more about the possibility, access an article on InfoTrac titled "Are Your Genes to Blame? For Your Good Looks? Sure. For Your Shyness or Your Temper? Not entirely" written by Pinker (2003). After reading the article answer the following questions: 1) Study after study has show that genes can affect what two areas of our life? 2) Name one of the personal quirks discussed in the article that may be partially influenced by genes? 3) What is the authors argument about genes and legal responsibility? 4) Discuss the author's view on personal improvement.

Student Project 3: Human Genome Map.

A recent discovery in the past few years is that of the human genome map. You may have heard of attempts at mapping the human genome and the exciting possibilities that awaited a complete map. To learn more about the information gained by mapping the human genome, access an article found on InfoTrac titled "The Human Genome Map: The Death of Genetic Determinism and Beyond" written by Ho (2001). After reading this article, answer the following questions: 1) What is the approximate number of genes that a human has? 2) What is the percentage of common DNA that all humans share? 3) What animal has the most concise genome? 4) Who has more mutations, males or females? 5) What is the amount of money spent on mapping the genome in humans (U.S. dollars)?

Heredity: The Nature of Nature.
Journal Prompt 1: Life Code.

For a nice review of some material you learned in your biology class, access an article found on InfoTrac titled "Life Code: The Structure of DNA" written by Spencer (2000). This article discusses the structure of DNA and the associated codes. After reading this article, write a journal entry establishing a link between DNA and psychology. Are the two connected?

Journal Prompt 2: Two Lives Changed.

Heredity: The Nature of Nature.

Two individuals are credited with discovering the structure of DNA. Watson and Crick wrote a simple article that was the beginnings of molecular biology. To learn more about this interesting pair, access an article on InfoTrac titled "Birth of an Icon: Watson and Crick's DNA Discovery: An Epic for Today's Scientists" written for The Scientist (2003). After reading this article, write a journal entry focusing on the article. You may want to include such things as the relatively new discovery this proved to be, the impact that this discover has had on science, etc.

Journal Prompt 3: Controversy.

Perhaps one of the biggest controversies surrounding the study of genetics, is that of selective breeding. Is it possible to "create" the ultimate animal?

Heredity: The Nature of Nature.

To learn how selective breeding is used, access an article on InfoTrac titled "Charleston, S.C. Hog Company Use Selective Breeding to Raise Best Pigs" written by Parker (2000). After reading this article, write a journal article discussing your views on selective breeding.

III. The Nervous System: On Being Wired.

Lecture Topic 1: Serotonin.

Serotonin is a neurotransmitter that has gained the attention of psychologists because of its implication in mood regulation. To better understand this neurotransmitter, access an article written by Kennett (1999) titled "Serotonin-The Brain's Mood Modulator" found on InfoTrac. This article takes an in-depth look at serotonin including the discovery of the neurotransmitter, the relationship that serotonin has with such behaviors as depression, aggression, anxiety, and the relationship of serotonin to hallucinogens and stimulants. This article will aid you as you discuss this influence that serotonin has in human life.

Lecture Topic 2: The Neuron.

After you have discussed how neurons work and how the synapse offers a wide range of variability in the nervous system, have students brainstorm ideas of how the neurons could be explained using real-life analogies. (e.g. The students are receiving information from their instructor. Which part of the neuron would the professor be?)

Lecture Topic 3: Complex Nature of Behaviors.

To aid in your students' understanding of complex behaviors, access a website which contains information about biopsychology. This site can be found at:
http://www.biopsychology.org/biopsychology/links.htm
Explore some of the latest links that tie psychology with such things as narcolepsy, addiction, exercise, and the biological clock. These links can help your students see the relevance in studying these complex systems.

Classroom Demonstration 1: Synaptic Transmission.

Adapted from:

Reardon, R., Durso, F.T., & Wilson, D.A. (1996). Neural coding and synaptic transmission: Participation exercises for introductory psychology. *Teaching of Psychology, 21* (2), 96-99.

Ask for seven volunteers from the class. One of the volunteers will act as a receiving neuron and the other six will be "input paths". The receiving neuron will be positioned by the white board in the front of the class while the six "inputs" will sit in the front row. Each of the six inputs will be given

a card with the letter "E" on it to represent an excitatory message being sent. Each of the inputs are instructed to hold up their card for three seconds with five seconds in between each card flash. (Stagger the start times for each input). The receiving neuron will fire whenever any three "E" cards are viewed simultaneously. To represent firing the receiving neuron will turn their back to the inputs and write on the board "I fire". Having the receiving neuron turn their back represents the refractory period that neurons experience during which time a neuron cannot respond to the inputs signal. The receiving neuron will need to ignore cards that are going up or down so the inputs will need to make their movements distinct and clear. Have the class count how many times the receiving neuron fires.

After doing this first exercise for a minute of two have another volunteer join the inputs. But this volunteer is given a card with an "I" on it representing an inhibitory response. Now when the demonstration begins the receiving neuron will need to notice when the "I" card is up as it will cancel out one other "E" demonstrating the effects of an inhibitory message. Have the class count how many times the receiving neuron fires compared to the first demonstration (should be less).

Classroom Demonstration 2: Motor and Interneurons.

Explain the different functions of the sensory, motor and interneurons. Ask a student to come up front and sit on your desk, with legs dangling. Find the patellar reflex by hitting just below the knee with the side of your hand. Ask the class which type of neuron is receiving the information when you tap the knee, and which type of neuron is making the leg kick. Ask the student who is doing the reflex to close his or her eyes and to tell you when he or she feels you tap the leg, then ask the students to tell you which comes first, the leg kick or the vocalization felt at the tap. You may have to repeat this a few times for all the students to clearly see the timing differences. Next ask the student to imagine you are tapping his or her leg when you say the word tap. Ask the class which is faster: 1. the kick when you actually tap the leg, or 2. the kick when the kickee is responding to your vocal command of tap.

Classroom Demonstration 3: Timing the Neural Impulse.

In order to demonstrate the time it takes for neural impulses to be processed, it is interesting to perform a variation of the "dollar drop." Take a dollar and ask a student to drop it from the thumb and index finger of one hand (holding on to the short side of the dollar) and catch it with the thumb and index finger of the other hand. The student should have no trouble with this part of the exercise. Now, have the student attempt to catch it while a partner drops the bill. Ask the students to explain the difference in results.

Student Project 1: The Neuron.

To more fully understand neurons and how they work, access five video clips on your Connections CD-ROM. These videos are in chapter two, Biology and Psychology. The five short video clips are animations of the parts of a neuron, the action potential, and the synapse. After watching these video clips, summarize the information that you learned.

Student Project 2: Endorphins.

For many students the concept of the Runner's High is easily related to. The Runner's High, which is caused by the release of endorphins, helps the body compensate for pain. To learn more about this interesting experience, access an article found on InfoTrac titled "The Buzz on Exercise" written by Anderson (1995). After reading the article, answer the following questions: 1) What types of exercise tend to facilitate the release of endorphins? 2) How long does a person typically have to exercise before experiencing the release of endorphins? 3) What are the four classifications of exercisers and what differentiates the groups? 4) Have you ever experienced the Runner's High and if so be prepared to discuss your experience in class.

Student Project 3: Essay Assignment.

For this student project, submit a typed, one-page essay in response to the following question: "How is the nervous system like a computer, and how is it different?"

The Nervous System: On Being Wired.
Journal Prompt 1: Everyday activities.

For this journal entry, write a description of what must be going on in your body for you to perform even the simplest activities. Perhaps you are attempting to throw a ball, take notes in class, or sing along to your favorite song. Analyze a particular behavior and attempt to include all of the systems in your body (nervous systems, brain structures, etc.) that make it possible for you to do what you are doing.

The Nervous System: On Being Wired.
Journal Prompt 2: Phantom Limb Pain.

You have learned how neurons communicate in the body and how that process enables us to experience all things including pain. Unfortunately there are some people who, because of injury, have a limb amputated. Often times these individuals continue to experience pain which seems to originate in the limb that was removed. Explain how this experience might be happening focusing on neural communication and the brain.

The Nervous System: On Being Wired.
Journal Prompt 3: Neurotransmitters.

It has been suggested that those who suffer with various psychological disorders may be suffering with a chemical imbalance. Support for this hypothesis (in the case of depression) is the success of antidepressant medications. As you think about those who are suffering with these disorders does the stigma of mental illness still exists in your mind? Or do you now think of these individuals in the same light as those suffering with a medical condition (diabetes)?

IV. The Brain: The Star of the Human Nervous System.

Lecture Topic 1: Brain Imaging.

The resurgence of bio and neuropsychology due to modern brain imagining techniques has lead to some interesting discoveries. These imaging techniques are relatively new and thus our understanding of the brain will continue to improve. For those instructors who are not as comfortable discussing the various brain imaging techniques, an interesting article found on InfoTrac titled "Unlocking The Secrets of the Brain; A survey of the Powerful Tools That Neuroscientists Use to Explore the Living Abode of the Mind, Thought, and Imagination" written by Powledge (1997) can help increase your knowledge. Powledge discusses such techniques as the X-ray, CT scan, MRI, fMRI, PET scan, EEG, post mortem studies, and magnetoencephalography. The author explores these techniques in-depth, in an understandable manner. This can be useful as a needed refresher. For those instructors who are more comfortable with imaging techniques, these articles could be used as a student project. (note: This is a two part series with part I in the June issue and part II found in the July-August Issue)

Lecture Topic 2: Phineas Gage.

No lecture on the brain can be complete without a discussion of Phineas Gage and the experience he had with a tamping iron. This historical experience is found in most introductory psychology textbooks as well as many neurology textbooks. In 1994 researchers were granted access to Gage's skull to determine exactly what happened when the tamping rod passed through his skull. To learn more about what they found, access an article found on InfoTrac titled "What Happened to Phineas?" written by Shreeve (1995). This brief article will aid you as you explain the fascination and the lessons learned from an experience that happened over century ago.

Lecture Topic 3: Brain Structures.

To help your students more clearly understand the influence that brain structures have on various activities, provide the following five scenarios to them and see if they can name which brain structure may have been involved.

1. When a police officer asks you to step out of the car and walk a straight line for a sobriety test, she is testing to see whether alcohol has reached your _____. (cerebellum)
2. Mike gained 50 pounds in one month. There was damage found in his _____. (hypothalamus)
3. Charles Whitman was called the Texas tower murderer. He was a student who went to the University of Texas at Austin in the late 1960s. One day, for unexplained reasons, he climbed the tower in the middle of the campus and began randomly shooting people. He had to be killed.

Upon autopsy, it was found that there was evidence of abnormal activity in his _____. (amygdala)

4. A man reported having skin sensations of spiders crawling on his right leg repeatedly throughout the day; however when he tried to brush the spider away, he found that there was nothing there. Upon neurological examination, it was found that he had abnormal activity in his left _____. (parietal lobe)
5. After a sharp blow to the back of his head, Tim was left unconscious. When he woke up, he found he was blind. Upon examination, it was concluded that the blow must have damaged his _____. (occipital lobe)

Lecture Topic 4: The Amygdala and Happy Faces.

D

The textbook provides information on how the amygdala is activated when individuals look at pictures of people with diverse racial backgrounds. The connection some have drawn from this study is that the brain may be partially responsible for prejudice feelings. Though this connection was found there are many confounds and the results should not be considered conclusive. For another interesting perspective on the amygdala, access an article found on InfoTrac titled "Amygdala Activation Associated with Happy Facial Expression in Adolescence: A 3-T Functional MRI Study" written by Yang, Menon, Reid, Gotlib, and Reiss (2003). This article discusses a study in which adolescents were shown pictures of happy, neutral and sad faces while undergoing an MRI. The results indicate that the amygdala is activated when looking at happy faces but not with neutral or sad faces. This information will help your students understand the multiple functions of the amygdala.

Classroom Demonstration 1: Music and the Brain.

Preparation: Determine if there is a student in your class that plays a musical instrument. For this activity it is helpful if the instrument is one that the student can bring to class and play (for example a guitar). Arrange to have the student(s) demonstrate their musical talent. As part of your preparation, access an article found on InfoTrac titled "Music of the Hemispheres" written for Discover (1994). This article discusses brain differences found in those who are musicians. Begin the class by having the student play a song. Afterwards you can ask the student to report on the age they began playing, how often they practice (now and when they were first learning) and other musical talents they may have. Solicit from the class other student experiences with learning to play an instrument. After sharing some of these experiences, introduce to the class the research reported in Discover which

indicates that those who began learning an instrument prior to age seven have a larger corpus callosum (10-15% larger), and musicians overall tend to have larger auditory processing areas in the left hemisphere. The topic of MRIs can also be introduced as part of this discussion.

Classroom Demonstration 2: Behavioral Effects of the Split-Brain Operation.

Adapted from:

Morris, E.J. (1991). Classroom demonstration of behavioral effects of the split-brain operation. *Teaching of Psychology, 18* (4), 226-228.

Ask for three volunteers from the class, one of which needs to have shoes with laces (volunteer 1) and the other two need to be right handed (volunteers 2 and 3). (The rest of the class should be able to see what will be taking place and may need to move). Have volunteer 1 stand on a table in the front of the classroom and untie one of their shoes. Have volunteer 2 retie the shoe while you explain to the class that a "normal" functioning person has relatively no problem tying a shoe. Explain to the class that what will next happen is a demonstration of how it might be for someone who has experienced a split-brain operation (perhaps to help with their severe case of epilepsy). Have volunteer 1 untie their shoe. Have volunteers 2 and 3 sit on a chair in front of the table. Volunteer 2 and 3 should place their outside arm behind their backs (left hand for the left volunteer and right hand for the right volunteer). Volunteers 2 and 3 should place their inner arms on the table, one crossing over the other (explain to the class to illustrate the crossing over nature of the brain-body connection). The volunteer representing the left hand needs to refrain from speaking from this point on (to demonstrate the localization of brain functioning; specifically the speech areas). Now have volunteers 2 and 3 attempt to retie the shoe.

(For other activities to demonstrate this see the article)

Classroom Demonstration 3: Video of the Brain.

Preparation: You will need a computer and projector and the Digital Video Library (available from Wadsworth).

To help your students better understand the structure of the brain, access video segments from the Digital Video Library. These video segments are actual footage of a person handling a brain and pointing out various structures. The structures include: brainstem, hindbrain, thalamus, limbic

system, longitudinal fissure, corpus callosum, cortex, and the four lobes. These videos can be found in Unit 2, Biology and Psychology.

Student Project 1: Watching the Brain Grow.

In the past few decades a resurgence has been seen in the area of biopsychology because of the advent of more sophisticated brain imaging techniques. In an interesting study which utilizes MRIs researchers tracked the growing brain of children from four years of age through twenty. To learn more about this fascinating study, access an article on InfoTrac titled "Watching How The Brain Grows: MRI Offers New Insight Into Brain Development" written by DeFrancesco (2002). After reading this article answer the following questions: 1) Development in a child's brain proceeds from which area of the brain to where? 2) What is the "isthmus"? 3) What is COS? 4) How much tissue loss is there with children who have COS? 5) Briefly summarize what you found interesting in the article.

Student Project 2: The Brain.

Numerous areas of the brain have specific names and associated functions. Learning about these areas can be a daunting task. It seems that the list of brain structures goes on and on. Putting the time and effort in to learning this information can prove useful (especially on your next exam!). You have to begin somewhere so why not with an article that provides an easy to read description of your brain and how it operates. This article found on InfoTrac is titled "The Brain: What's Going On In There" written by Novitt-Moreno (1995). After reading this article, answer the following questions (the answers may amaze you). 1) How much does the average human brain weight? 2) How many neurons are there in the human brain? 3) How many possible connections are there in the human brain? 4) What is the brain's main source of energy? 5) Name one way in which you can keep you brain functioning well.

Student Project 3: The Brain on the Web.

To enhance your knowledge of the brain, go to www.brain.com and explore this site which is a great source of information about the brain. Explore an area of the site that intrigues you. Please provide the following information: 1) what was the address where you ended up; 2) a brief summary of the site; and 3) why this was important to you?

The Brain: The Star of the Human Nervous System.
Journal Prompt 1: Einstein's Brain.

When asked to name a person that they would consider to be a genius, many name Albert Einstein, the legendary physicist. Einstein is a person who believed that he had no special gift. But research may prove otherwise. To learn more about Einstein and his actual brain, access an article found on InfoTrac titled "Think King" by Neistat (1999). This article discusses some actual research conducted with Einstein's brain. After reading the article write a journal entry discussing what you learned. You may want to address the suggested issue of the brain being similar to a muscle which if exercised bulks up.

The Brain: The Star of the Human Nervous System.
Journal Prompt 2: Gender Difference in Brain Processing.

Research conducted, utilizing modern brain imaging techniques, allows researchers to more fully understand the functioning of the brain. In an

interesting added discovery, it was found that female and male human brains function differently. Could this lead to a greater understanding of the opposite sex? To learn more about gender differences in brain processing, access an article found on InfoTrac titled "S He-brains" written by Richardson (1995). After reading this article write a journal entry discussing differences that you have noticed between males and females. Discuss whether or not you believe that brain differences could account for the observed differences.

The Brain: The Star of the Human Nervous System.
Journal Prompt 3: Life for Lefties.

Approximately 10-15% of the population is left handed a statistic that puts lefties in the minority. This reality can be seen with the lack of products available for those whose dominant hand is left. Also of interest is that fact that the left side of the body is controlled by the right side of the brain and

the right side of the body by the left brain. To understand the difficulties that lefties have (you lefties will be able to relate) access an article found on InfoTrac titled "Life for the Lefties: From Annoying to Downright Risky" written by Shute (1994). This interesting article discusses some of the everyday tasks that are difficult for left handed people. For this journal entry spend one-hour of a normal day using the hand that is not your dominant. For example, try operating the mouse on your computer with your left hand. Then write a journal entry discussing how life would be different if you were left handed. Those of you who are left handed may want to write about some difficulties that you have encountered in life.

V. The Endocrine System: Chemicals in the Blood.

Lecture Topic 1: The Endocrine System: An Overview.

The endocrine system is a complex system which regulates a number of bodily functions. As a nice refresher course on the endocrine system, access

an article found on InfoTrac titled "The Endocrine System: An Overview" written by Hiller-Sturmhofel and Bartke (1998). This article presents information about the endocrine system including hormones, the role of the hypothalamus, the pituitary gland, adrenal glands, gonads, thyroid, parathyroid, and the pancreas. This article does an excellent job of presenting endocrine system in an understandable manner.

Lecture Topic 2: Melatonin and Sleep Disorders.

Sleep disorders are common in young children. Young children spend a great deal of time in sleep. When a child is five years old, they will have spent half of their life sleeping. Common sleep disorders include sleep onset disorder, colic, and obstructive sleep apnea. An article found on InfoTrac titled "Use of Melatonin in Young Children For Sleep Disorders" written by Lin-Dyken and Dyken (2002) discusses the use of melatonin, a sleep promoting hormone, in treating these sleep disturbances. The various sleep disturbances are also discussed.

Lecture Topic 3: Autoimmune Endocrine Disease.

Autoimmune endocrine diseases are diseases where the immune system attacks the hormone-secreting organs. Some of these diseases include type 1 diabetes, thyroiditis, Graves disease, Addison disease, and polyglandular syndromes. To learn more about these diseases and the hormone replacement therapy treatments, access an article found on Infotrac titled "Autoimmune Endocrine Disease" written by Baker Jr. (1997). This article discusses each of the above listed diseases and associated treatments.

Classroom Demonstration 1: Hypothalamus and Pituitary.

Preparation: You will need a computer, Internet access and a projector.

To help your students more fully understand the endocrine system, show them the images which can be found at:
http://arbl.cvmbs.colostate.edu/hbooks/pathphys/endocrine/hypopit/anatomy.html
The images of the hypothalamus and pituitary are images from the Visible Human Project, a real human cadaver.

Classroom Demonstration 2: Thyroid Problems.

Preparation: You will need a computer, Internet access and a projector.

Access a website that discusses various thyroid problems. This website can be found at:

http://www.hsc.missouri.edu/~daveg/thyroid/thy_dis.html This website provides information about various thyroid disorders and provides pictures of individuals with the disorders.

Classroom Demonstration 3: The American Medical Association's Endocrine System.

Preparation: You will need a computer, Internet access and a projector.

Access a website that illustrates the endocrine system with images. This website can help your students understand the location of glands in the endocrine system. The website can be found at: http://www.ama-assn.org/ama/pub/category/7157.html

Student Project 1: Testosterone.

Testosterone is the male hormone responsible for puberty. Found in both males and females, this hormone is what is responsible for babies becoming male. To learn more about this hormone, access an article found on InfoTrac titled "Testosterone: Key to Masculinity and More" written by Flieger (1995). After reading this article answer the following questions: 1) The levels of testosterone found in baby boys is similar to what? 2) Testosterone stimulates the growth of _____ which can lead to urinary disorders and cancer. 3) What is the estimated number of males that are receiving testosterone therapy? 4) What is the percent of testosterone, compared to men, found in female blood? 5) What does the Olympic rules say about testosterone?

Student Project 2: Hormone Replacement Therapy.

Some menopausal women have to deal with the symptoms of low levels of hormones. These include hot flashes, night sweats, and insomnia. Hormone replacement therapy seems to be one of the most effective treatments. To learn about these types of treatments, access an article found on InfoTrac titled "Drug Update: Hormone Replacement Therapy" written by Zoler and MacReady (2003). After accessing this article answer the following questions: 1) When determining the correct hormone replacement therapy, many physicians use what kind of approach? 2) What is one of the risks of using exogenous estrogen by itself? 3) Find three types of replacement pills, list the name of the drug and the price per day for the pill. Also, summarize the comments for the three drugs you chose.

Student Project 3: Anabolic Steroids.

For this student project, conduct a general Internet search focusing on anabolic steroids. The goal of your search is to find information about these various compounds and then to write a one-page essay taking a position on the desirability of steroids. Support your argument with facts from the websites you find and cite the URLs as your sources.

The Endocrine System: Chemicals in the Blood.
Journal Prompt 1: The Ultimate Body.

Many males and females are obsessed with obtaining the ultimate body. This obsession often drives individuals to use various body building chemicals including steroids in spite of the negative side effects. For this journal entry write a response focusing on your knowledge of steroids and those who use them. Do you understand those who feel the pressure to use these substances (professional athletes, etc.)?

The Endocrine System: Chemicals in the Blood.
Journal Prompt 2: Adrenalin.

One hormone experience that many people can relate to is that of adrenalin. People have described the influence of adrenalin as the adrenalin rush. Describe a time in your life when you experienced this adrenalin rush and how it made you feel. How did it affect your performance?

The Endocrine System: Chemicals in the Blood.
Journal Prompt 3: A Greater Understanding.

Each person that teaches and/or learns about the biology of behavior encounters a topic that seems to "hit home" with them. These are topics that seem to make sense or perhaps they finally explain a phenomenon that they have experienced. Choose a topic from the chapter that really made

sense to you and briefly explain the topic and why this topic hit home for you.

VI. LIFE CONNECTIONS: Coping with Premenstrual Syndrome (PMS).

Lecture Topic 1: PMS: New Views.

Premenstrual syndrome (PMS) has its share of controversy. Often characterized by symptoms that occur from a week to 10 days before the menstrual period, PMS has been linked with disturbances of mood. What

are the causes and can women receive help? To learn more about PMS access an article found on InfoTrac titled "The Premenstrual Syndrome: New Views" written by Rosen (1992). Though this article is over a decade old the author suggests that PMS needs to be approached more holistically as PMS is complicated and simple hormone deficiency models do not fully explain the syndrome.

Classroom Demonstration 1: PMS Remedies.

A

Preparation: Purchase some of the products discussed in the article that can be displayed as you discuss each one.

Many products on the market suggest that they can help alleviate the symptoms associated with premenstrual syndrome (PMS). To learn about which products help and which ones may not, access an article found on InfoTrac titled "PMS remedies: What Works…What's Not Worth It" written by Lang (1997). The drugs discussed in the article include Midol, herbal remedies, drink mixes, feminine hormone creams, and homeopathic remedies. Present each option and discuss the "bottom line" about each one. The last part of the article discusses safe solutions that you can present.

Student Project 1: PMS: A Woman's Lot?

Many students have heard of the unfortunate conditions that some women experience in life including premenstrual syndrome (PMS), postpartum psychosis, postpartum depression, and depression associated with menopause. But are these conditions real or just myths? To find out more, access an article found on InfoTrac titled "Depression and Reproduction: A Woman's Lot?" written for The Women's Letter (1990). After reading this article provide the following information: 1) Name the three categories the article suggest postpartum depression be put into? 2) What is the difference between postpartum depression and postpartum psychosis? 3) What are some of the therapies recommended for someone experiencing PMS? 4) Name some of the psychological factors related to PMS.

LIFE CONNECTIONS: Coping with Premenstrual Syndrome (PMS).
Journal Prompt 1: Hormones Get You Down.

A

PMS-related moodiness, post-partum depression and menopausal melancholy are stages in life when women are supposedly more vulnerable to depression. Hormones released by the ovaries seem to influence the neurotransmitters serotonin, norepinephrine and dopamine. When estrogen levels dip, serotonin levels drop as well. An article that focuses on this interesting relationship can be found on InfoTrac titled "Hormones Get You Down" written by Raymond (1999). Raymond reports that 60-70% of women experience symptom relief when taking serotonin boosting antidepressants. For this journal entry discuss the complexity of depression and relate how biological and psychological factors can contribute to these feelings. What would you suggest to a person who was experiencing depression?

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plays in explaining human behavior.

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Richardson, S. (1995). S He-brains. *Discover, 16,* 36. This article discusses research which discovered phonological processing differences in the brains of males and females.

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Journal of the American Medical Association, 268, 1908-1912. This article suggests that PMS be looked at from a holistic standpoint, that PMS may just be a trigger for predisposed moods.

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S.M. (2002). Fading to black doesn't empower fish. *Science News, 157,* 219. This article describes research conducted with Stickleback fish reporting that they don't always turn red on their bellies while mating.

Selle, R. (1998). Darwin in the dock. *World and I, 13,* 78-81. This article presents an alternate view to Darwin's theory of evolution.

Shreeve, J. (1995). What happened to Phineas? *Discover, 16,* 78-79. This article describes a modern day analysis of what happened to Phineas Gage.

Shute, N. (1994). Life for lefties: From annoying to downright risky. *Smithsonian, 25,* 130-142. This article focuses on the life that left handed people experience, being in the minority.

Smith, J.F. (2001). Biological evidence for evolution. *Journal of the Idaho Academy of Science, 37,* 102-104. This article discusses considerations for the biological evidence for evolution.

Spencer, P. (2000). Life code: The structure of DNA. *Catalyst, 10,* 19. This article provides a review of DNA, the structure of DNA and the codes.

Topoff, H. (1997). A Charles Darwin (187th) birthday quiz. *American Scientist, 85,* 104-107. This article presents an eleven item quiz on the life of Charles Darwin.

Yang, T.T., Menon, V., Reid, A.J., Gotlib, I.H., & Reiss, A.L. (2003). Amygdalar activation associated with happy facial expressions in adolescents: A 3-Tfunctional MRI study. *Journal of the American Academy of Child and Adolescent Psychiatry, 42,* 979-985. This article describes a study where adolescents were shown pictures of happy, sad and neutral faces while undergoing an MRI to see investigate brain activity.

Zoler, M.L., & MacReady, N. (2003). Drug update: Hormone replacement therapy. *Internal Medicine News, 36,* 32. This article discusses hormone replacement therapy including average daily costs, dosage levels and specific comments about each option.

VIDEOS/FILMS

The Brain: Our Universe Within. This video focuses on the evolution of the human brain. Case studies of individuals with damaged brains are also presented. Available from Insight Media. (http://www.insight-media.com)

Mind Games (Brain Functions). This video suggests that the brain is both powerful and fragile. Scanning techniques are presented. Available from Insight Media. (http://www.insight-media.com)

Nerve Impulse Conduction. This video explores the electrochemical function of neurons including membrane potential. Available from Insight Media. (http://www.insight-media.com)

The Nervous System. This video explores how neurons communicate at the biochemical level. Examines the differences between central, peripheral, and autonomic systems. Available from Insight Media. (http://www.insight-media.com)

The Neuron and Neural Transmission. This video illustrates the structure of a single neuron, how neurons communicate and how transmission is affected by various disorders. Available from Insight Media. (http://www.insight-media.com)

The Secret Life of the Brain. This video explores the development of the brain throughout the lifespan. Available from Insight Media. (http://www.insight-media.com)

WEBSITES:

Evolution:

1. http://www.aboutdarwin.com
   A website that is dedicated to the life of Charles Darwin.

2. http://www.psych.ucsb.edu/research/cep
   A website that is the homepage for the Center for Evolutionary Psychology.

3. http://www.anth.ucsb.edu/projects/human/#
   A website with a 3-D gallery of modern primate skulls illustrating the evolution progression.

Brain:

4. http://www.brain.com

A website dedicated to understanding the human brain.

5. http://www.biopsychology.org/biopsychology/links.htm
A website that has links tying biopsychology to areas of interest including narcolepsy and addictions.

6. http://arbl.cvmbs.colostate.edu/hbooks/pathphys/endocrine/hypopit/anatomy.html
A website with images of the hypothalamus and pituitary gland from the Visible Human Project.

Body:

7. http://www.nature.com/nature/stemcells
This website contains articles written about controversial stem cell research.

8. http://www.innerbody.com/image.endoov.html
A website with an animated human body illustrating the placement of glands.

9. http://www.ndss.org
A website for the National Down's syndrome society.

10. http://www.hsc.missouri.edu/~daveg/thyroid/thy_dis.html A website designed to provide information about thyroid disorders.

11. http://www.ncusd203.org/north/research/genetics/disease.htm A website listing of various genetic diseases and associated web links.

12. http://www.ama-assn.org/ama/pub/category/7157.html
A website designed by the American Medical Association to illustrate the endocrine system.

LANGUAGE ENHANCEMENT GUIDE

Camouflage-to disguise

Contributed-to give along with others

Endocrine-producing secretions that are distributed by way of the bloodstream

Helix-something spiral in form

Heredity-the qualities and potentials genetically derived from one's ancestors

Immense-very great in size or degree

Instinctive-behavior originating below the conscience level

Lurking-to lie concealed

Mechanisms-a process or technique for achieving a result

Primate-any of order of mammals including humans, apes and monkeys

Answers to Handout 2-1

1) Cerebrum
2) Hypothalamus
3) Pituitary Gland
4) Pons
5) Medulla
6) Reticular Activating System
7) Cerebellum
8) Midbrain
9) Thalamus
10) Corpus Collosum
11) Fissure

Answers to Handout 2-2

1) Pineal
2) Pituitary
3) Hypothalamus
4) Thyroid and parathyroids
5) Adrenals 6) Pancreas
7) Ovaries / Testes

Answers to Handout 2-3

1) Thalamus
2) Cingulate Gyrus
3) Fornix
4) Septum
5) Septal Nucleus
6) Hypothalamus

7) Olfactory Bulb
8) Pituitary Gland
9) Amygdala
10) Hippocampus

HANDOUT MASTERS