

Teacher to Teacher

INTERDISCIPLINARY EXERCISES IN BIOLOGY

Biological knowledge and technology have expanded their realms of influence at exponential rates. The instructor of biology is facing an increasing need to correlate the materials of the life sciences with those of the behavioral, social, and political sciences and of philosophy, ethics, and history. But unfortunately, it is difficult to devote sufficient time to this task within an introductory course and within the framework of compartmentalized education. How, then, can the mingling of biology and other disciplines be accomplished?

A feasible method is to stimulate the student to undertake his own interdisciplinary attempts, via “thought questions”—psychometabolic exercises—that are sufficiently provoking as to motivate the better student toward a desire to correlate his learnings in his own way. The statements below are designed to challenge the mind, in order to develop a personal frame of reference concerning such topics as life, the meaning of man, the evolution and bondage of social structure, and the implications of the “New Biology.”

1. If one is asked to define “Man” or “The Human Person” and then to list all of the body parts and organs that could be removed and still maintain one’s definition, the only structures left would be the frontal lobes of the cerebral cortex.

2. In light of the above, the human properties of awareness, rationalization, and whatever else makes man man, from whatever causation they are derived (whether naturally or spiritually), become functionally operative at the level of the higher brain. Hence, absence of a functioning higher brain results in the absence of a “Human Person.” Similarly, but conversely, absence of all body structures, functions, and behaviors, except those residing in, or emanating from, the higher brain, does *not* eliminate the “Human Person.” Consequently, an isolated, perfused, and functioning higher brain would be a “Human Person.”

3. Most of the structures, functions, and behaviors of *Homo sapiens* have evolved from lower forms. Being only 40,000 years old, most of his emotions and drives are remnants of his ancestry, and he still has very little control over them. His social structure and system of family units are not unique in kind, but only in degree of complexity.

4. There are distinct human social classes, and natural selection acts differentially upon each class (for each lives in a different environment). A class-less human society could not survive; but the classes of a classed society cannot remain static. Because of the

differential action of natural selection (for example, the higher classes having a greater “social conscience,” hence fewer children), the lower classes gradually increase in number, until a revolution occurs and a shift in the proportion of lower to upper class members occurs.

5. Since the human physiology has evolved to be best adapted to a family group density of 12 to 18 people, the modern nuclear family structure, with 4 or 5 family members, poses a threat to the survival of mankind.

6. Since the basis of evolution of the family unit in general has been its need in a hunting-gathering society, there is no longer any justification for the family.

7. It can be assumed that if *H. sapiens* is to evolve further, it is his psyche and his society that will evolve. The future of man’s history rests in his higher mental functions, and the sex, hunger, and survival drives will become vestigial.

8. A society must regulate the antisocial behavior of its people. Therefore, it may force antiaggression pills, or pacifying psychosurgical destruction of parts of the brain, onto prisoners guilty of aggressive crimes, just as it has initiated the custom of forcing these people into incarceration.

9. If we refer to all human technological products and techniques as “engineered matter,” then we can refer to an “evolution of engineered matter” whose mutational forces are called “ideas” and whose sieve is called “human selection.” Furthermore, engineered matter has now evolved a “society” state, such as the complex of global computer networks that track an orbiting spacecraft; the members of this society are interconnected and interdependent as are those of any other form of society.

10. When we say that the arthropods are more highly evolved than the sponges, we mean that they are more capable of surviving. That’s all. The same principle applies to man and the apes.

11. Man has gradually learned that the life process is but a complex extension of the states of matter. In other words, life is merely the combination and interplay of chemical activities attainable at a certain threshold level of complexity.

12. The living cell can be considered a computer, because it can neither operate or modify its internal chemistry, nor respond to external stimuli, without first being programmed to perform these activities. The program consists mainly of the cell’s genetic endowment. The situation is more complex than this, since not only genes can determine the manner of response to stimuli. Yet, it can be stated that a cell cannot perform any activity, in response to either internal

or external stimuli, unless it contains the machinery capable of responding.

Therefore, if the cell is a computer in the strict sense, any accumulation of cells, as in tissues and organs, also can be termed a computer, although a more complex one. Further, just as various types of cells combine to form a "supercomputer" (for example, the human body), and do this without actual contact between all cells in a body—contact being made indirectly via a circulatory system—the society, human or animal, comprises the ultimate computer, again without the need for actual contact between members—contact being made indirectly via communication, culture, and social bonds.

This statement, therefore, is true! "Man is a computer that can program itself."

13. All that a dog can do is determined by its heredity and by its environmental training and learning. In other words, it has no choice but to fetch that stick, or to love and protect the hand that feeds it.

14. A person has a right to his own body, and that includes killing it. Suicide should be legalized. And a patient should legally be allowed to refuse medication or treatment if he so desires.

15. Death has been an evolutionary necessity in all species. Now, however, in the human population death is nearly just another conquerable disease. If this be so, we might someday become able to program our own time of death. This innovation would have a massive impact upon a society in which most people retire at age 65.

16. You may hear occasionally over a hospital's public address system: "Code 99, Room 306." Someone's heart has stopped, and a special team will rush to the patient's bedside, and do all they can to revive the patient's heart. We should never fail to attempt a resuscitation; we should attempt to revive every heart that stops. If the patient does not wish a "Code" to be called on him if his heart ever stops, he should so specify upon admission to the hospital.

A related issue is this: if a person's brain is totally destroyed, it is ethically justifiable to remove his heart, for transplant reasons, even if that heart is still beating.

17. The U.S. government is financing the production of a totally artificial, nuclear-powered heart, to be marketed by 1983. It expects that the "heart" may extend a recipient's life span by ten years. Some problems arise: (i) the recipient should not have the right to "turn off" his own artificial heart, even if he could, for this would constitute suicide; (ii) those who cannot afford the \$25,000 cost for an artificial heart should not get one.

18. There is no difference between passive and active euthanasia. By doing nothing to prevent death we are consciously deciding that a person should die. The decision to do nothing is an active decision.

19. Joseph Fletcher has said: "... the traditional ethics based on the sanctity of life ... must give way to a code of ethics of the quality of life." There are people whose gametes should not be transmitted, and there are fetuses who should not be born. Having

children is not a right but a privilege eventually subject to legislative control.

20. Just as society allows people *not* to have children if that is their wish so should it allow anyone who wants a child to have one. Mentally defective people, single people, homosexual people should be free to rear children.

21. With the availability of sperm and egg banks, and test tube fertilization and development, the human female womb would become vestigial.

22. The planet Earth has some 3 billion years left. It is conceivable that long before its death *Homo sapiens* will have decided to eliminate all forms of life on the planet except himself, that he will be totally free of disease and pain, that he will have initiated cosmic travel and communication, and that he will know everything there is to know about nature.

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ON-CAMPUS OUTDOOR NATURE AREA

The current interest in environmental affairs offers educators the opportunity to help students establish patterns of living that will result in an environmentally concerned citizenry. One approach to this goal which is being used by the Austin (Tex.) Independent School District involves an area of the school campus designated as the Outdoor Nature Area. As a matter of policy, the district's board of trustees agreed to set aside an area of all future high-school campuses for nature study.

At its new L. C. Anderson High School, the Austin district authorized about 1.5 hectares of the campus to be left undisturbed in the state that existed when the site was purchased. Within human limitations, the nature area was protected as site-work and construction of the school were performed.

Ideally, such a plot needs several characteristics: varied levels of elevation, a variety of organisms living and growing on it, and some area containing water. Less ideal is the evidence of man's contamination; however, this can be put to excellent use in designing environment studies.

The Anderson High School site is on the upper side of the Balcones Escarpment in an area that is typical of the hill country of central Texas with respect to geology and vegetation. The nature area on its campus has some ideal characteristics. It is located on the topographically lowest corner of the site and climbs to the level of the playground and school building. The very lowest contour serves as the natural drainage for the area and has water running through it or standing on it during periods of wet weather. Also included (and to be left as they are) are areas containing garbage dumped by persons living in the neighborhood, a pile of rocks, trees bulldozed by someone who at one time was developing the land, fallen trees, and several spots where the residue from concrete trucks has been washed onto the land.