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ABSTRACT

Five secondary school biology textbooks were selected for this study: the 1973 edition of the BSCS Blue Version, "Biological Science, Molecules to Man"; the 1973 edition of the BSCS Green Version, "Biological Science, An Ecological Approach"; the 1973 edition of the BSCS Yellow Version, "An Inquiry into Life"; the 1973 edition of "Modern Biology" by J. H. Otto and A. Towle; and the 1973 edition of "Biology, A Search for Order in Complexity." Eleven categories of specific content regarding controversial issues and biosocial problems were selected, and the textbooks were analyzed to determine both the quantity and quality of the content regarding these issues. The major result of the study indicated that the BSCS texts ranked highest in the quantitative and qualitative analyses for content of the identified issues and problems. (MH)

AN ANALYSIS OF SELECTED BIOLOGY TEXTBOOKS FOR THE TREATMENT OF CONTROVERSIAL ISSUES

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Introduction

The need for a citizenry informed on biosocial issues becomes increasingly urgent as virtually every newspaper, news-magazine, or news-cast on radio or television refers to a comtemporary problem related in some way to biology. Sonneborn (1972), emphasizing the importance of presenting biological information on topical problems of our society to high school students, suggested that a high priority of secondary education should be to prepare the generation now in high school for the crucial biological decisions that must be made. Potter (1971) declared that political decisions made in ignorance or defiance of biological knowledge can jeopardize the future of man's existence on earth.

High school biology courses occupy a strategic position in preparing students for intelligent decisions on biosocial problems. More than 90 percent of America's high schools offer biology, and about 80 percent of the secondary school students take biology. These classes, therefore, offer an opportune means of "reaching" a vast number of students (Grobman et al., 1964). For the majority of these students enrolled in high school biology, this will be their last formal science course; thus, it becomes particularly important to focus on material that will be relevant to current problems and will contribute to students' social responsibility and scientific literacy (Lee, 1971).

What determines the subject matter taught in biology classes? Probably the single most important factor is the textbook. Although many instructional aids are available for classroom use, the textbook continues to be considered the most important teaching tool. Black (1964) stated that 75 percent of a student's classroom time is spent working with textbooks, and 90 percent of the time spent on homework is centered around textbooks. According to Grobman (1969), the textbook is such a central feature of courses taught in most schools that one can almost equate the textbook with the curriculum.

Before 1960 high school biology textbooks virtually ignored controversial issues, and contained little, if any, information pertaining to societal problems. Traditionally, topics which tended to arouse strong feelings were considered outside the domain of the school and thus inappropriate in the classroom. Subjects such as evolution, race, and human reproduction were taboo for fear of causing controversy in the school, or between school and community. Recently emerged biosocial problems, such as the use of atomic energy, and biotechnologies, as well as environmental pollution and the issues of human population and industrial growth, have posed new biology-based questions the answers to which involve value judgments and thus tend to generate sharp clashes of opinion. Do current textbooks inform students about these sensitive topics? The consensus among scientists and science educators is that controversial issues and biosocial problems (the terms are used interchangeably in this paper) should be included in high school biology courses if current education is to produce an informed citizenry.

Statement of the Problem

The purpose of this study was to determine the coverage by selected biology textbooks of controversial issues. The specific issues chosen for investigation were identified from recommendations made in the literature by various authorities in science and education. For each category the investigation focused on the following questions: What is the quantitative coverage in number of pages and percentage of total page space? What is the quality of the treatment? Is the presentation of material in each category superficial, adequate, or comprehensive? This research was designed to analyze current textbooks to see what information high school students will encounter in these textbooks pertaining to biosocial problem topics.

The Textbooks

The five textbooks selected for this study represent different types of authorship, different emphasis in material, and different positions in biophilosophy. They were: the 1973 edition of the BSCS Blue Version, Biological Science: Molecules to Man; the 1973 edition of the BSCS Green Version, Biological Science: An Ecological Approach, the 1973 edition of the BSCS Yellow Version, Biological Science: An Inquiry Into Life; the 1973 edition of Modern Biology by Otto and Towle; and the 1970 edition of the Creation Research Society's Biology: A Search for Order in Complexity.

Each of the three versions of the BSCS textbooks, while similar in basic outlook, follow differing approaches to the study of biology. The Green Version is organized around a central theme of ecology. The Yellow Version stresses a cellular approach. The Blue Version emphasizes biological levels of organization and is biochemically oriented. Although these three books have different authors, they were all produced by the Biological Sciences Curriculum Study, an autonomous group of scholars, scientists, and teachers who were selected by the American Institute of Biological Sciences for the purpose of improving secondary school biological education. From the first editions, which appeared about 1960, all three of these books have included material which previously was considered too controversial for high school textbooks by commercial publishers, who feared that such books would not be accepted in some communities (Grobman, 1969). Grabiner and Miller (1974) have suggested that the scientific community's involvement in high school science teaching was an important reason for the BSCS texts' widespread acceptance. Scientists not only participated in the BSCS writing conferences, but also gave their support at hearings in which the BSCS texts were being attacked (as they were in

some localities in the early 1960's), largely because of their coverage of Darwinian evolution and human reproduction.

The 1973 edition of Modern Biology, written by James H. Otto and Albert Towle, and published by Holt, Rinehart and Winston, is the latest version of a long line of popular, well-respected biology textbooks adopted by a large percentage of American high schools as the classroom text. Before 1960, the treatment of controversial issues in this series of successful, commercially published textbooks was minimal or absent (Grabiner and Miller, 1974). Since 1960, however, this text has included material on evolution, human reproduction and other controversial issues. Falk (1971) has attributed this change to the advent of the BSCS books.

The fifth book included in this analysis, Biology: A Search for Order in Complexity, (hereinafter called "Search for Order") was prepared by the Textbook Committee of the Creation Research Society, edited by John N. Moore and Harold S. Slusher, and published by Zondervan Publishing House, Grand Rapids, 1970. This book differs from the other four in its pervasive philosophy of vitalism, and its linking of biological phenomena to Biblical creationism. Its basic position, as set forth in the preface, is that "the most reasonable explanation for the actual facts of biology as they are known scientifically is that of Biblical creationism." The Creation Research Society, the organization which developed and sponsors this book, has been an active spokesman for the inclusion of creationist ideas in the public schools (Wade, 1972). LeClercq(1974) has called the creationist movement both potent in force and national in scope. Members and affiliates of this group have approached state boards of education and textbook commissions for the purpose of having this book adopted for use in the schools.

The Issues

Eleven subject areas were investigated. These subject categories were divided into component parts and the results compiled in tabular form. The specific categories were as follows:

Darwinian evolution: Coverage of the theory of evolution was evaluated by considering the treatment of various subtopics such as natural selection, evidence for evolution, mechanisms of evolution, and adaptation.

Disease states: The diseases included in this investigation were limited to disease conditions of special interest, such as venereal, degenerative, and hereditary.

Drugs: This category was concerned with drugs as dangerous substances. Commonly used drugs, such as cannabis, and types of drugs, such as hallucinogens, were included as subtopics.

Environment: This category focused on the many biosocial problems that have developed from man's exploitation of the environment.

Human genetics: Of particular interest in this category was the treatment of subtopics such as chromosomal abnormalities, inherited mental disorders, and intelligence.

Human reproduction: This topic was examined for the presentation of material such as the male and female reproductive organs, sex hormones, and childbirth. Birth control and abortion were also included. Illustrations, charts, photographs, and diagrams were considered significant here.

Man -- his place in nature: This category was directed toward the question of how man is presented. Is the study limited to his anatomy, or is he shown in broad perspective, including his human characteristics, behavior, evolutionary and cultural development?

The origin of life: The question considered here was whether the textbooks delved into the nature of the forces and sequences of natural processes that probably preceded the appearance of living organisms.

The population explosion: Subtopics here included problem areas such as world-wide overpopulation, food shortages, energy depletion, and the need for limiting population growth.

Biological effects of radiation: The effects on both gametes and somatic cells of radiation from various sources, such as cosmic, industrial, medical, and military, were considered.

Race -- variation in man: How do the textbooks handle the sensitive topic of race? Because of the magnitude of social problems associated with this concept, it was treated as a distinct category apart from the general subject of human genetics.

Procedure of Investigation

The five selected textbooks were analyzed to determine both the quantity and quality of their specific content regarding controversial issues and biosocial problems in the eleven categories given.

Quantitative ratings for each category were based on the total number of pages in the text, calculated to the nearest tenth of a page, for each subtopic within the category. If illustrations were present, they were included in the total if they were considered to have direct learning value. Since the pages covering the treatment of a particular subject were not always consecutive, the quantitative value given could be the total of several pages or fractions of pages scattered throughout the text. If a particular subject was so briefly mentioned that the amount of space was less than one-tenth of a page, an "m" was given rather than a numerical value. In addition to the total number of pages devoted to a

topic, page space for each topic was expressed as a percentage of the total number of pages in the text. The quantitative values as so determined were considered indicative of the relative importance accorded the particular category in each text.

The qualitative ratings assigned in each category were based upon a Likert-type scale. Numerical values ranged from 0, used when there was no treatment, to 5, used when the quality of treatment was judged to be outstanding. Intermediate values, in general, were: 1 meant minimal treatment; 2 was used when the text included some material but the coverage was considered deficient; 3 represented treatment that was generally adequate, but lacking in depth, emphasis or clarity; and 4 was assigned to coverage that was good, clear, and quite complete. The qualitative median rating for each category was calculated on the basis of values assigned to each subtopic within each category. Zero values were taken into account when calculating median ratings since the omission of subtopics was considered significant in evaluating completeness of any category. The quality ratings were not necessarily a function of quantity, although frequently brief coverage was superficial. On the other hand, lengthy coverage sometimes contained irrelevant material or biased discourse, and was rated accordingly.

In addition to the eleven tables giving qualitative and quantitative values obtained for each of the subject matter categories, two other tables were compiled. One was a summary chart showing quantitative coverage and qualitative median ratings for each textbook in each category. The other was a comparative table of the number of key words found in the index of each text. Two numbers for each text were given in this final chart: the first was the number of key words the book contained in its index pertaining to each of the categories investigated; the second

was the percentage that this number represented of the total number of key words for that category contained in a master list which had been compiled from key words found in the indexes of all the texts, comprising a total of 190 words.

Results

The results of the analysis in the eleven categories are set forth in tables, each of which shows how much space was devoted, and what quality rating was assigned, to each of the subtopics into which the particular category was divided.

Table 1 - Darwinian evolution. The three BSCS textbooks and Modern Biology included material on all of the subtopics listed and, in each case, ratings indicated that the quality of treatment was very good (median ratings being: 4.8 in the Blue Version; 4.7 in the Yellow; and 4.5 in the other two texts). Search for Order had 18.3 pages on evolution, which accounted for 3.6 percent of its page space. Although this percentage exceeded that of the other texts, important subtopics were omitted and the quality was generally poor (median rating: 1.0). The apparent thrust was to obscure basic concepts of Darwinian evolution which the authors deem incompatible with Biblical creationism.

Table 2 - Disease states. The BSCS Yellow Version covered more of the disease states listed in the table than the other texts, and its median rating of 3.1, indicating adequate treatment, excelled the other texts. The BSCS Green Version, with a median rating of only 2.0, nevertheless gave the best treatment to venereal diseases. Search for Order had no coverage in this category.

Table 3 - Drugs. BSCS Yellow Version's median rating of 4.7 was the highest. Modern Biology's treatment was also very good (median

rating 4.3) and the most comprehensive in quantity (13.5 pages; 1.6 percent of page space). The BSCS Green Version ably covered half of the subtopics, but its omission of the remainder resulted in a median rating of only 2.5. Search for Order had only minimal coverage, and the BSCS Blue Version contained no information in this category.

Table 4 - Environment. The median ratings in this category ranged from the maximum 5.0 in the BSCS Green Version to 2.8, considered somewhat less than adequate, for the BSCS Blue Version. The quantitative coverage ranged from a high of 95.1 pages and 13.1 percent of page space in the Green Version to a low of 15 pages and 2.0 percent in the Blue.

Table 5 - Human genetics. All of the textbooks had some treatment of this topic, ranging from a high of 4.6 median rating in Modern Biology to a low of 2.5 in Search for Order. Quantitative coverage was highest in the BSCS Blue Version (30.4 pages; 4.1 percent) and lowest in the BSCS Green Version (15.6 pages; 2.2 percent).

Table 6 - Human reproduction. The BSCS Yellow Version devoted the most pages (12.6) and the greatest amount of page space (1.4 percent) to this category, and attained the highest median rating (4.6). The BSCS Green Version was the only text which covered all the subtopics listed, but its overall rating was only 3.5, the same as the BSCS Blue Version's. Modern Biology's median rating of 4.5 was very good, in spite of the omission of information on abortion and birth control. Search for Order had virtually no coverage of human reproduction.

Table 7 - Man, his place in nature. The BSCS Yellow Version devoted 32.3 pages (3.6 percent of page space) to this topic and attained an excellent rating of 4.8. The other BSCS versions and Modern Biology devoted fewer pages to this category but rated well, with identical median scores of 4.3. Search for Order's median rating of 2.0 was poor, the result of inadequate ratings in three of the nine subtopics, as well as the omissions of three other subtopics.

Table 8 - Origin of life. The BSCS Blue Version not only covered every subtopic but also attained the highest possible rating of 5.0 in each. Its quantitative coverage of 15.6 pages (2.1 percent of page space) also exceeded the other texts. The BSCS Yellow Version ranked second (median rating 4.5; 10.3 pages and 1.2 percent page space). Modern Biology fell far below the other books in coverage of this category, with a median rating of only 0.1, and 0.5 percent page space.

Table 9 - Population explosion. All three BSCS versions showed very good coverage in this category, with the Green and Yellow Versions excelling both in quality (4.8 each in median ratings) and in quantity (Green Version, 17.2 pages and 2.4 percent page space; Yellow Version, 20.1 pages and 2.3 percent page space). BSCS Blue Version followed closely in median rating (4.6) but had only 1.1 percent in quantity of page space (8.0 pages). Both Modern Biology and Search for Order failed to include three of the seven subtopics, resulting in poor median ratings of 2.0 each.

Table 10- Radiation. The Blue Version stands alone in its treatment of this category, with a very high median rating of 4.6, and 3.8 pages of coverage. All the other texts showed median ratings of less than 1, indicating only minimal coverage. Quantitatively, Modern Biology ranked second to the Blue Version with 2.7 pages devoted to this topic. The failure to include any material on four of the seven subtopics largely accounts for Modern Biology's low median rating.

Table 11 - Race. All of the BSCS texts provided excellent coverage of this category. The Blue and Green Versions covered all the subtopics with the highest possible median rating, although the quantity was only about two pages in each of these texts. The Yellow Version's treatment was comparable, though not quite as high, with a 4.8 median rating and just 1 page. Modern Biology and Search for Order were both deficient in this category with median ratings of 0.2 and 1.0 respectively.

Table 12 - Summary of evaluation results. A presentation of the qualitative and quantitative values obtained for each text in each category is found in this table. Following are summary statements about each text.

The BSCS Blue Version attained outstanding qualitative ratings of 5.0 in two categories, namely, "Origin of life" and "Race." It also ranked highest of all the texts in the categories of "Darwinian evolution," where the median rating was 4.8, and "Radiation," where the median rating was 4.6. The quantitative coverage of the various categories in this text ranged from 4.1 percent for "Human genetics," where it was the highest of all the texts, to zero coverage of "Drugs," which it alone, of all the texts, failed to give any coverage.

The BSCS Yellow Version was found to be consistently high in qualitative ratings, achieving 4 or higher in nine of the eleven categories. It had median ratings of 4.8 each in "Man in nature," where it excelled the other texts, "Population explosion," where it shared top honors with the Green Version, and "Race," where it ranked nearly as well as the Blue Version. The Yellow Version was also highest in "Drugs" (4.7), "Human reproduction" (4.6) and "Disease states" (3.1). While its median rating of only 3.1 and quantitative value of 0.9 percent page space for "Disease states" were not very high, they were, nevertheless, the best results for all the texts in that category. Other categories where the Yellow Version was found to exceed other texts in quantitative coverage were "Man in nature" (3.6 percent) and "Human reproduction" (1.4 percent). This text's lowest values were found in "Radiation" where the coverage was minimal (median rating of 0.4, and less than 0.1 percent of page space).

The Green Version had the highest possible median rating of 5 in "Environment," which placed it above all of the other texts, and in "Race," where it shared top honors with the Blue Version. In "Population

explosion" its rating of 4.8 was the same as the Yellow Version's, and higher than that of the other texts. The highest of all quantitative values in any category -- 95.1 pages, for 13.1 percent of page space -- was found in the Green Version in "Environment." Lowest ratings for the Green Version were found in "Radiation" where the median rating was only 0.2 and the amount of coverage was only 0.2 percent.

Modern Biology's highest median rating was 4.6 in "Human genetics" where it exceeded the other texts. In "Drugs," the qualitative rating was a very good 4.3, second only to the Yellow Version, and the quantitative values of 13.5 pages and 1.6 percent of page space, were highest of all the texts. Other values for percentage of page space ranged from a high of 5.8 percent in "Environment" to a low of less than 0.1 in "Race." The median rating for treatment of "Race" was only 0.2, also very low. Other categories where median ratings indicated minimal treatment were "Radiation" (0.4) and "Origin of life" (0.1).

Search for Order ranked consistently low in the categories of this study. Its highest values were in "Environment," where the median rating was 3.1 and the page space was 5.6 percent. Lowest values were found in "Disease states," "Drugs," "Human reproduction," "Radiation," and "Race," where coverage was less than a page in each case and median ratings were 0.1, 0.1, 0.5, 0.2, and 1.0 respectively.

The following table sets forth the frequency distribution within each whole number of the rating scale of each text's eleven qualitative median category ratings:

	4 - 5	3 - 3.9	2 - 2.9	1 - 1.9	0 - .9
Blue Version	7	1	2	0	1
Yellow Version	9	1	0	0	1
Green Version	5	2	3	0	1
Modern Biology	6	0	1	1	3
Search for Order	0	1	3	3	4

With respect to quantitative values, the range was from the highest percentage of 13.1, found in the Green Version in "Environment," to less than 0.1 percent found in at least one category in each of the texts. In one category, "Drugs," Modern Biology had the greatest quantitative coverage (13.5 pages; 1.6 percent of total pages). In the other ten categories, the highest number of pages and the highest percentage of text space allocated were found in one or another of the BSCS versions.

Table 13 - Key words in indexes. The results for the tabulation of key words in the indexes of the five texts are set forth in this table. The BSCS Blue Version's index contained 127 of the 190 key words comprising the total key word list, for a score of 66.8 percent. The Yellow and Green Versions followed with 118 words each, resulting in identical scores of 62.1 percent, although the key words included in each were not the same. Modern Biology's index contained 97 of the key words, which was 51.1 percent of the total. Search for Order had only 37 of the key words in the index, for the lowest score of 19.5 percent. As might be expected, this ranking was basically consistent with the overall comparative quality of the texts, although Modern Biology's quality was probably higher than its key word performance would appear to indicate.

Conclusions and Implications

Of the textbooks analyzed in this study, the BSCS books, in general, showed good comprehensive coverage of most of the issues investigated, although no one version excelled in all the categories, and each version showed deficiencies in at least one of the categories. Modern Biology's treatment of the topics studied also was good, occasionally ranking as high or higher than one or more of the BSCS texts.

There was, however, a noticeable tendency to avoid some of the particularly sensitive issues, such as "Race," "Radiation," and "Origin of life," in which it ranked very low. Search for Order was deficient in its treatment of the issues studied here, indicating a general lack of emphasis on biosocial problems. It would seem that this book's basic philosophy of Biblical creationism and vitalism tend to set it apart from the other texts in outlook and attitude toward societal problems.

If today's students are to be informed about the material they will need to know to make intelligent biological decisions, it is of vital importance that current biosocial problems be scientifically investigated and objectively discussed in the classroom, without bias. Biology teachers should make a conscientious effort to expand the study of controversial issues beyond the limitations of the textbooks by the use of well prepared supplementary materials on societal problems. With scientific literacy indisputably a major goal in biological education, the current challenge is for biology courses that have immediate value in our present society and potential benefit for the future.

TABLE 1

DARWINIAN EVOLUTION

	Blue 747 pgs		Yellow 887 pgs		Green 725 pgs		Mod.B. 824 pgs		Search 515 pgs	
	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg
Charles Darwin and his work.....	2.5	5	2.8	4	3.8	5	2.3	4	1.2	2
Fossil evidence.....	2.3	4	3.0	5	3.2	4	3.1	4	4.6	2
Other evidence.....	3.0	5	4.1	5	1.0	4	2.0	4	7.3	2
Natural selection.....	1.8	5	3.4	5	.8	4	1.5	4	3.5	2
Adaptation.....	2.7	5	2.0	5	1.8	5	2.2	5	-	0
Mutation, recombination, and chromosomal changes.	3.0	5	1.3	5	2.2	4	3.5	5	.9	1
Reproductive isolation.....	2.7	5	1.0	4	4.3	5	1.0	4	-	0
Migration.....	.4	4	.5	4	.6	4	1.2	5	-	0
Speciation.....	3.8	5	2.0	4	2.1	5	1.6	5	-	0
Evolution of chordates.....	.6	3	6.5	5	5.5	5	7.2	5	.8	1
Total.....	22.8	46	26.6	46	25.3	45	25.6	45	18.3	10
Percentage of page space....	3.1%		3.0%		3.5%		3.1%		3.6%	
Median rating....	4.8		4.7		4.5		4.5		1.0	

TABLE 2

DISEASE STATES

	Blue		Yellow		Green		Mod. B.		Search	
	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg
Aging.....	-	0	1.0	5	.6	4	-	0	-	0
Cancer.....	.7	4	.8	5	.2	2	-	0	-	0
Allergies.....	-	0	-	0	.2	3	-	0	-	0
Arthritis.....	-	0	-	0	.1	1	-	0	-	0
Cardio-vascular.....	.3	3	1.2	5	.1	2	-	0	-	0
Diabetes mellitus...	1.0	5	1.2	4	.1	1	.6	4	m	1
Schizophrenia.....	-	0	.3	3	-	0	m	1	-	0
Down's Syndrome.....	.5	4	.3	3	.3	3	.3	4	-	0
Turner's Syndrome...	.1	3	.2	3	-	0	.4	4	-	0
Klinefelter's Syndrome	.1	3	.2	3	-	0	.4	4	-	0
Sickle-cell anemia..	1.6	4	3.0	5	4.0	5	.8	4	-	0
Phenylketonuria.....	.2	4	.1	3	-	0	.6	4	m	1
Gonorrhea.....	-	0	m	1	.3	4	-	0	-	0
Syphilis.....	-	0	m	1	.1	3	.3	2	-	0
Total.....	4.5	30	8.3	41	6.0	28	3.4	27	<.1	2
Percentage of page space	0.6%		0.9%		0.8%		0.4%		0%	
Median rating.....	2.8		3.1		2.0		1.5		0.1	

TABLE 3

DRUGS

	Blue		Yellow		Green		Mod. B.		Search	
	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg
Drugs, addiction and dangers in use of..	-	0	3.0	5	.5	4	4.0	4	.4	3
Hallucinogens and psychedelics (LSD)	-	0	.8	5	.3	4	1.3	5	-	0
Alcohol and alcoholism.....	-	0	.5	4	m	2	4.2	5	.5	3
Tobacco.....	-	0	-	0	-	0	1.8	5	-	0
Tranquilizers.....	-	0	.2	3	.2	4	m	2	-	0
Barbiturates.....	-	0	.8	5	-	0	.3	3	-	0
Amphetamines.....	-	0	.6	5	.2	4	.6	4	-	0
Cannabis (marijuana)..	-	0	.5	5	-	0	.3	4	-	0
Opiates (morphine, codeine, heroin)...	-	0	.5	5	.5	4	.5	4	-	0
Methadone.....	-	0	.2	4	-	0	.5	5	-	0
Total.....	0	0	7.1	41	1.7	22	13.5	41	.9	6
Percentage of page space	0		0.8%		0.2%		1.6%		0.2%	
Median rating.....	0		4.7		2.5		4.3		0.1	

TABLE 4

THE ENVIRONMENT

	Blue		Yellow		Green		Mod. B.		Search	
	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg
Biotic community, ecology defined..	.5	3	1.5	4	2.2	5	2.1	5	.8	3
Community relationships....	.9	3	1.4	3	6.5	5	1.3	3	1.4	3
Energy.....	.8	3	3.0	5	3.3	5	.9	3	-	0
Nutritional relationships....	1.2	4	4.8	5	5.8	5	2.7	4	4.2	4
Cycles of matter.....	1.7	3	3.6	4	5.7	5	4.5	5	3.7	4
Population densities and pop. change..	3.1	4	.8	2	14.3	5	1.8	4	-	0
Abiotic environment.....	.8	3	4.0	5	5.3	5	5.1	5	3.4	4
Soil.....	-	0	.5	3	2.6	5	3.5	5	3.4	5
Biogeography (Major biomes)...	-	0	9.4	5	14.3	5	10.5	5	5.5	5
Succession.....	.8	3	3.8	5	2.8	5	2.2	5	1.2	4
Forest as ecosystem.....	-	0	.8	3	4.6	5	3.1	4	-	0
The hydrosphere.....	-	0	2.6	4	15.5	5	.9	3	.3	2
Wildlife.....	-	0	.5	3	1.2	5	3.1	5	.9	3
Fire.....	-	0	.6	3	3.5	5	.7	4	-	0
Insecticides.....	.9	5	.7	4	1.0	5	.6	4	.3	3
Pollution.....	4.4	4	5.0	5	6.5	5	4.8	5	3.5	4
Total.....	15.1	35	43.0	63	95.1	80	47.8	69	28.6	44
Percentage of page space.....	2.0%		4.8%		13.1%		5.8%		5.6%	
Median rating.....	2.8		4.0		5.0		4.5		3.3	

TABLE 5

HUMAN GENETICS

	Blue		Yellow		Green		Mod. B.		Search	
	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg
Probability.....	5.5	5	2.5	4	1.5	3	.2	1	-	0
Mendel's work.....	5.8	5	6.4	5	5.7	5	10.3	5	6.4	4
Chromosome theory and Sutton's work...	1.9	4	1.7	4	2.0	5	2.5	5	-	0
Chromosomal mutation.....	3.0	4	.8	4	.8	4	1.5	5	-	0
Genetic code and gene mutation...	2.5	4	.6	3	1.8	4	1.5	5	1.5	2
Mutagenic agents.....	1.8	5	.3	3	.2	2	1.2	4	.1	1
Inherited abnormalities...	2.8	4	5.0	5	1.2	3	3.4	5	1.1	3
Inheritance of blood type & Rh factor	2.0	4	3.0	5	.9	3	1.9	4	2.7	4
Inheritance of intelligence....	1.2	5	.5	3	-	0	.5	3	1.5	4
Sex-linked traits.....	2.1	5	1.5	4	1.5	3	2.5	5	1.9	3
Twins -- identical and fraternal...	.7	4	.5	4	-	0	1.9	5	.1	1
Environmental influences.....	1.1	4	2.3	5	-	0	1.2	4	.7	3
Total.....	30.4	53	25.1	49	15.6	32	28.6	51	16.0	25
Percentage of page space.....		4.1%		2.8%		2.2%		3.5%		3.1%
Median rating.....		4.4		4.1		3.0		4.6		2.5

TABLE 6

HUMAN REPRODUCTION

	Blue		Yellow		Green		Mod. B.		Search	
	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg
Female reproductive organs.....	.3	3	.7	4	.3	3	.8	5	.2	1
Male reproductive organs.....	1.0	5	.6	3	.7	5	1.0	5	.2	1
Female hormones....	1.6	4	3.0	5	1.5	5	1.0	5	-	0
Male hormones.....	.4	4	.3	3	.5	5	.6	5	-	0
Menstrual cycle....	2.0	5	2.5	5	.6	3	1.0	4	.1	1
Mammary glands, function of.....	.2	3	.6	5	.2	3	.2	2	m	1
Illustrations of developing embryo..	.3	3	.9	5	1.0	5	.6	4	m	1
Placenta, amnion, & umbilical cord..	.5	4	.7	5	.5	4	.4	5	.1	1
Placental hormones.	.2	3	1.0	5	.2	3	-	0	-	0
Childbirth.....	.8	4	1.8	5	.6	3	1.2	5	-	0
Abortion.....	-	0	-	0	.1	3	-	0	-	0
Birth control.....	-	0	.5	3	1.7	5	-	0	-	0
Total.....	7.3	38	12.6	48	7.9	47	6.8	40	.6	6
Percentage of page space.....	1.0%		1.4%		1.1%		0.8%		< 0.1%	
Median rating.....	3.5		4.6		3.5		4.5		.5	

TABLE 7

MAN -- HIS PLACE IN NATURE

	Blue		Yellow		Green		Mod. B.		Search	
	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg
Anthropology, defined.....	.1	3	.1	2	.1	4	.3	5	-	0
Ancestors of modern man....	6.0	5	12.3	5	2.8	5	1.4	4	3.5	2
Darwin's Descent of Man	.2	4	.3	4	.2	3	.9	5	-	0
Work of Louis Leakey...	1.3	5	.8	4	.5	4	1.5	5	.3	3
Early Homo sapiens...	.8	4	1.2	5	.5	3	1.0	4	.5	2
Cultural evolution.....	.5	3	12.0	5	5.0	5	.2	2	.5	2
Human characteristics physiological and cultural.....	.7	4	1.0	5	2.8	5	2.5	5	2.2	4
Human behavior.....	1.3	5	1.5	5	.7	4	.5	3	.3	3
Future of the human species?...	1.0	5	3.2	5	2.0	5	-	0	-	0
Total.....	11.9	38	32.3	40	14.6	38	8.3	33	7.3	16
Percentage of page space.....	1.6%		3.6%		2.0%		1.0%		1.4%	
Median rating.....	4.3		4.8		4.3		4.3		2.0	

TABLE 8

ORIGIN OF LIFE

	Blue		Yellow		Green		Mod. B.		Search	
	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg
Abiogenesis, biogenesis and Pasteur.....	6.5	5	5.5	5	2.5	3	4.0	3	4.0	3
Origin of the earth.....	.8	5	1.3	5	.2	3	-	0	-	0
Primitive atmosphere....	1.5	5	1.0	5	.3	3	-	0	.2	3
Oparin's work....	.8	5	-	0	.2	3	-	0	.5	1
Miller's experiment....	.9	5	.6	5	.2	3	-	0	.3	2
Synthesis of complex molecules	2.4	5	1.4	4	.1	1	-	0	.7	2
Pre-cell aggregates (coacervates)...	1.5	5	.3	4	.1	3	-	0	-	0
Heterotroph hypothesis.....	1.2	5	.2	3	-	0	-	0	-	0
Total.....	15.6	40	10.3	31	3.6	19	4.0	3	5.7	11
Percentage of page space.....	2.1%		1.2%		0.5%		0.5%		1.1%	
Median rating.....	5.0		4.5		2.8		0.1		1.5	

TABLE 9

THE POPULATION EXPLOSION

	Blue		Yellow		Green		Mod. B.		Search	
	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg
People pollute.....	3.0	5	9.2	5	2.9	5	4.2	5	1.5	3
Malthus' population theory.....	1.4	5	.3	2	.4	3	-	0	-	0
Food: supply, demand prod. problems....	.8	3	6.4	5	2.4	4	.8	4	.8	3
Growth of human population.....	1.6	5	1.4	5	4.9	5	1.2	5	.2	2
Limiting population growth.....	.2	2	1.6	5	1.7	5	.2	2	.4	3
Depletion of energy.....	1.0	5	.2	3	1.8	5	-	0	-	0
Death, causes of in U.S.....	-	0	1.0	5	3.1	5	-	0	-	0
Total.....	8.0	25	20.1	30	17.2	32	6.4	16	2.9	11
Percentage of page space.....	1.1%		2.3%		2.4%		0.8%		0.6%	
Median rating.....	4.6		4.8		4.8		2.0		2.0	

TABLE 10

BIOLOGICAL EFFECTS OF RADIATION

	Blue		Yellow		Green		Mod. B.		Search	
	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg
The sun and radiation.....	.9	5	-	0	-	0	-	0	-	0
Damage to somatic cells by radiation.	.2	4	m	1	-	0	-	0	-	0
Radiation as mutagenic to gametes.....	2.0	5	.2	2	.2	3	2.0	5	.1	2
Nuclear weapons and atomic fall-out...	.2	5	-	0	-	0	.6	5	.1	2
Radiation sickness.....	.3	5	-	0	-	0	-	0	-	0
Radioactive wastes.....	-	0	-	0	1.0	5	-	0	-	0
Medical use of radioactivity.....	.2	4	m	1	-	0	.1	3	-	0
Total.....	3.8	28	.2	4	1.2	8	2.7	13	0.2	4
Percentage of page space.....	0.5%		<0.1%		0.2%		0.3%		<0.1%	
Median rating.....	4.6		0.4		0.2		0.4		0.2	

TABLE 11

VARIATIONS IN MAN -- RACE

	Blue		Yellow		Green		Mod. B.		Search	
	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg	pgs	rtg
Variety in human species...	.2	5	.3	5	.3	5	.2	4	.1	1
Illustrations of typical phenotypes	1.0	5	-	0	.8	5	-	0	.6	2
Biological and cultural bases for variety.....	.8	5	.5	5	.6	5	-	0	-	0
Names of races...	.2	5	.1	5	.2	5	-	0	.1	1
Total.....	2.2	20	0.9	15	1.9	20	0.2	4	0.8	4
Percentage of page space.....	0.3%		0.1%		0.3%		<0.1%		0.2%	
Median rating....	5.0		4.8		5.0		0.2		1.0	

TABLE 12

SUMMARY OF EVALUATION RESULTS

	Blue			Yellow			Green			Mod. B.			Search		
Category	pgs	%	mdn	pgs	%	mdn	pgs	%	mdn	pgs	%	mdn	pgs	%	mdn
Darwinian evolution	22.8	3.1	4.8	26.6	3.0	4.7	25.3	3.5	4.5	25.6	3.1	4.5	18.3	3.6	1.0
Disease states.....	4.5	0.6	2.8	8.3	0.9	3.1	6.0	.8	2.0	3.4	0.4	1.5	<0.1	0.0	0.1
Drugs.....	0.0	0.0	0.0	7.1	0.8	4.7	1.7	.2	2.5	13.5	1.6	4.3	0.9	0.2	0.1
Environment.....	15.1	2.0	2.8	43.0	4.8	4.0	95.1	13.1	5.0	47.8	5.8	4.5	28.6	5.6	3.3
Human genetics....	30.4	4.1	4.4	25.1	2.8	4.1	15.6	2.2	3.0	28.6	3.5	4.6	16.0	3.1	2.5
Human reproduction.	7.3	1.0	3.5	12.6	1.4	4.6	7.9	1.1	3.5	6.8	0.8	4.5	0.6	<0.1	0.5
Man in nature.....	11.9	1.6	4.3	32.3	3.6	4.8	14.6	2.0	4.3	8.3	1.0	4.3	7.3	1.4	2.0
Origin of life.....	15.6	2.1	5.0	10.3	1.2	4.5	3.6	0.5	2.8	4.0	0.5	0.1	5.7	1.1	1.5
Population explosion	8.0	1.1	4.6	20.1	2.3	4.8	17.2	2.4	4.8	6.4	0.8	2.0	2.0	0.6	2.0
Radiation.....	3.8	0.5	4.6	0.2	<0.1	0.4	1.2	0.2	0.2	2.7	0.3	0.4	0.2	<0.1	0.2
Race.....	2.2	0.3	5.0	0.9	0.1	4.8	1.9	0.3	5.0	0.2	<0.1	0.2	0.8	0.2	1.0

TABLE 13

KEY WORDS IN INDEXES

Category	Total number of key words	Number of key words and percentage of total in each text									
		Blue		Yellow		Green		Mod. B.		Search	
		No.	%	No.	%	No.	%	No.	%	No.	%
Darwinian evolution.....	14	13	92.9	12	85.7	13	92.9	12	85.7	6	42.9
Disease states.....	21	12	57.1	13	61.9	11	52.4	7	33.3	2	09.5
Drugs.....	12	0	00.0	10	83.3	6	50.0	9	75.0	0	00.0
Environment.....	37	19	51.4	21	56.8	33	86.5	22	59.5	6	16.2
Human genetics.....	22	18	81.8	15	68.2	7	31.8	14	63.6	7	31.8
Human reproduction.....	29	20	69.0	21	72.4	20	69.9	17	58.6	2	06.9
Man in nature.....	16	14	87.5	12	75.0	12	75.0	8	50.0	8	50.0
Origin of life.....	14	13	92.9	6	42.9	3	21.4	3	21.4	5	35.7
Population explosion.....	11	6	54.5	6	54.5	7	63.5	2	18.2	0	00.0
Radiation.....	8	6	75.0	1	12.5	1	12.5	3	37.5	1	12.5
Race.....	6	6	100.0	1	16.7	5	83.3	0	00.0	0	00.0
Total	190	127		118		118		97		37	
Percent of total			66.8		62.1		62.1		51.1		19.5

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