IMPLICATIONS FOR THE TEACHING OF SCHOOL SCIENCE ARISING FROM CERTAIN RELIGIOUS ATTITUDES TOWARD SCIENTIFIC FACTS AND THEORIES

by

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III

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CHAPTER I

INTRODUCTION

The decision to undertake a study of this kind grew out of an effort to help pupils understand the relationship between science and religion. Pupils were confused and were inclined to discredit science. They quoted glibly from the Bible with little understanding of the meaning of scientific facts and theories or the true significance of the Biblical quotations. Some of the questions asked and objections presented came from the beliefs of the religious group to which the pupil belonged and some from a seeking after knowledge. In either case, the teacher of science in the public schools of the United States needs to have both religious and scientific material to help answer these queries.

In contacting science teachers, it was found that many have this problem. Many of the same problems were encountered in periodicals for teachers, scientists and religious workers.

At first this study was limited to materials that might be used in rural Virginia but as the problem was more thoroughly studied, it was found to apply to urban as well as rural areas.

Still later facts were found which applied to such states as New York. In the research for presenting material, it was found that some viewpoints were based on portions of the Bible accepted by Christians, Jews, and Mohammedans.

Since the pupils in the public schools of the United States have the prospect of being called into the armed services where they may be sent into Jewish, Mohammedan and other Christian countries, it seemed that a

basic understanding of their respective views on the creation was worthy of inclusion in this study. However, only the basis for their belief is included. No effort has been made to pursue the study into commentaries from these groups.

The minority groups mentioned in this study include the groups listed in the World Almanac of less than a million membership. There are thirty groups listed with less than 100,000 members, and only ten of the seventy-seven Christian organizations listed have a membership of more than one million. One minority group whose objections are set forth in this study does not allow statistics of its membership to be published. It should be kept in mind that some individual churches or groups of churches listed under the larger denominational names have broken with the original organization and are really minority groups. The membership in the minority religious groups whose statistics are available number about six and one half million members. Not all of these groups have objections, but it appears that many groups or individuals within the groups do have objections.

This study cannot be considered exhaustive or even up to date. Some archeological discovery may give new evidence that the story of creation in the Christian Bible has evolved to its present form. Additional lines may be found to add to the Babylonian Epic of Creation which will add new impetus to the theory that it influenced the writing of Genesis.

New scientific facts are coming to light so fast that it appears that no research in this field can be up to date much less complete. By the time

books have gone through the process of publication, they are often outmoded in some respect.

The material collected is, with a few exceptions, material that is not found in textbooks for public school pupils. It is presented with the hope that it will be of help to science teachers whose pupils have religious beliefs themselves or whose parents hold beliefs that appear to conflict with the teaching of science or with the material in the science textbooks.

Literature has been searched and information has been compiled in the simpliest and most understandable form possible for presentation in the classroom, if a teacher should so desire.

In order to give an adequate idea of the objections or viewpoints of minority religious groups one must of necessity use Biblical quotations both for the objections and for the help that one may give teachers in meeting this problem. With few exceptions the version of the Bible that is preferred by the minority religious groups is the King James Version. Therefore, the research and the quotations used will be from this version.

It seemed necessary to examine the Jewish scriptures and for the quotations and references made to this work The Holy Scriptures according to the masoretic text, a new translation, was used. This was published by The Jewish Publication Society of America. It is the twenty-ninth edition copyrighted in 1917 in Philadelphia. The Jewish date is given as 5712 and the Christian date follows 1952.

This explanation seemed necessary since no footnotes are used for Biblical references. This applies to both the Christian and Jewish scriptures and since there are numerous translations an explanation seemed advisable.

CHAPTER II

BASES FOR OBJECTIONS

In order to find the viewpoints and/or objections of minority religious groups to the teaching of science in the schools, periodicals, church literature, and books were examined. It was found that few religious groups mentioned any specific objections. However, some ministers and individual members did voice their objections, but they appeared to be an individual's interpretation of either the Bible itself or of some stated theology.

The religious periodicals and teachers' publications both showed evidence that a problem does exist and teachers voiced their opinions as well as scientists and churchmen.

John Sterling, a teacher in Glencoe, Illinois, expresses it thus:

> . . .Truth can never conflict with itself. Hence the Bible and science cannot conflict, though the complexity of the Bible interpretation may sometimes make it seem so, especially to the layman.[1]

John E. Merrill, a professor of astronomy at Ohio Wesleyan writes:

> The finished sky of primitive religion becomes the workshop of an unending creation. Man insignificant as he is dimensionally becomes associated with and a part of such a system, vitally conscious of his enrivronment, and yet daring to think his acts are of lasting consequence and monetary presence a part of a Supreme Plan.

In the same article Merrill quotes Henry Norris Russell:

> 'Our fathers saw in mountains and valleys a six days' work of a master craftsman. We see the operation of a Power so

1. John Sterline, "Matching Genesis with Geology," School Science and Mathematics, L (November, 1950) p. 642

potent, that not a mere thousand, but a million years are but one day in the accomplishment of its design.'[1]

Bryan M. Reed, an English clergyman, in speaking of what he considered fundamentalism states:

> I do not object to their fundamentalism—we are all entitled to our beliefs—but I greatly deplore their intellectual intolerance.[2]

Such ideas were expressed frequently whenever the subject was discussed.

No effort was made to do a statistical analysis of the findings but the objections we noted and all of those found appeared to be included in the three viewpoints or objections set forth in Chapter III.

It has not been the purpose of this study to criticise the views of any individual or group that is designated as a minority religious group. Therefore, no group or individual has been named. The following chapter enumerates such objections and presents material for the use of teachers of science who have such problems in the classroom.

1. John E. Merrill, "Religion in the Teaching of Astronomy," Christian Education, XXV (September, 1952) p. 191

2. Roanoke Times, March 10, 1954, p. 10

CHAPTER III

CERTAIN RELIGIOUS OBJECTIONS TO THE TEACHING OF SCIENCE AND MATERIALS RELEVANT TO MEETING THESE OBJECTIONS

OBJECTION 1

OBJECTION: The schools should not teach that the earth is round since the Bible states that it has four corners.

In many classes in general science and in geography teachers find pupils who quote this objection to the global or spherical theory of the earth's shape. The most quoted objection is that using Revelation 7:1, "And after these things I saw four angels standing on the four corners of the earth, holding the four winds of the earth that the wind should not blow on the earth nor on the sea, nor on any tree." A similar quotation comes from Isaiah 11:2, "He will give the signal to the nations and gather the outcasts of Israel, collecting the scattered of Judah from the four corners of the earth."

Another phase of this same objection comes from a small religious group. Their objection stems from the fact that the maps included in the Bible are flat. Since this group believes that everything in the Bible is true, this is used to prove that the earth is flat.

One must respect the faith of these people but this is one objection that can be proved false. The teacher must have proofs and yet meet these objections with simplicity and facts that are understandable to elementary students.

Since the Bible is the basis for the objection, the first way one may answer this objection is with a quotation from the Bible. Isaiah 40:22

states, "It is he that sitteth upon the circle of the earth and the inhabitants thereof are as grasshoppers; that stretcheth out the heaven as a curtain, and spreadeth them out as a tent to dwell in."

If he can sit on the circle of the earth, then it must be circular in shape. From a scholar's viewpoint portions of both the book of Isaiah and Revelation are symbolic and are not meant to be taken literally.

From the scientific point of view one can actually prove that the earth is an oblate spheroid. Ever since the voyage planned by Magellan and completed on September 6, 1522 by Juan Sebastian del Cano on the ship "Victoria," one has had proof that the earth can be circumnavigated.[1] The earth is not a perfect sphere since the polar diameter is 27 miles less than the equatorial diameter and the variation in elevation ranges from six or more miles below sea level to about five and one half miles above sea level.[2]

The earth has been circumnavigated from east to west and from west to east. Both poles have been passed over but as yet no one has circumnavigated the earth from north to south or south to north.

This proves that the earth is a sphere but there are other observable phenomena that give additional proof to the scientist. In any seaport one may observe the top of the ship's mast before one sees the ship itself. When the ship sails out of port the lower part of the ship

1. Webster's Biographical Dictionary, p. 243

2. J. Riley Staats and George Elberson Harding, Elements of World Geography, p. 7

3. Ibid., pp. 7-9

disappears first. This occurs anywhere in the world regardless of the direction in which the ship is traveling. This could only be true if the earth is a sphere.

In a lifetime the eclipse of the moon may be observed many times and in all parts of the world. The shadow on the moon's surface is circular. Since this phenomena only occurs when the earth is between the sun and the moon, the shadow one observes must be the shadow cast by the earth. Only a circle or a sphere can cast such a shadow, therefore this is further proof that the earth is a sphere.

The fixed stars appear to rise and set at a uniform rate anywhere on the earth's surface. This, also, only is possible with a revolving sphere.

The rotation of the earth from west to east on an imaginary axis is the only obvious movement. A rotation is completed in twenty-three hours and fifty-seven minutes which is what one calls a sideral day. Thus each point on the earth's surface is turned toward and away from the sun each twenty-four hours. This will only happen if the earth is a sphere.

The invention of television also substantiated the spherical theory. The impulses are transmitted in a straight line and the range was very limited at first since the impulses went so far above the earth after a while that they could not be picked up by stations. Now relay stations are placed at intervals to take care of the trouble caused by the curvature of the earth's surface.[1]

All of these proofs validate the fact that the earth is a sphere and not flat.

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1. J. Riley Staats and George Elberon Harding, Elements of World Geography, pp. 7-9

OBJECTION 2

OBJECTION: No scientific facts that relate to resistance to disease, health and sanitation problems, spread of disease or transmission of disease by bacteria or insects should be taught in the public schools.

Many individuals and groups of individuals object to facts relating to any type of illness or injury being taught. Sickness or disease may either be considered a judgment of God or unreality. Therefore in the latter incident there are no scientific facts about disease or in the former case it is evil and should be ignored by Christian people.

The people who have these objections are impossible to enumerate since the most powerful and best known objectors do not allow the statistics on membership of their group to be published.[1] In New York State the group is so powerful that in 1950 the legislature amended the laws relative to this matter thus:

> Subject to rules and regulations of the Board of Regents, a pupil may be excused from such study of health and hygiene as conflicts with the religion of his parents or guardian.[2]

> According to the New York Times the State Board of Regents, as a result of this legislation, decided to omit from its examinations questions which deal with such topics as how to build up resistance to disease, understanding the current health problems, measures to prevent the spread of communicable disease, and the role of insects and bacteria in transmission of disease.[3]

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1. Harry Hansen, The World Almanac and Book of Facts for 1953, p. 705

2. Liston Pope, "Religion and Our Schools," American Magazine, CLIII (May, 1952) pp. 24, 110-114

3. Maurice L. Hartung, "Health Education and Minority Groups," The School Review, LX (February, 1952), pp. 74-75

It has even been suggested that since such teaching is objectionable to the minority, it should not be taught to anyone. The law and this suggestion lead to vigorous reactions by the medical associations and the health authorities but the law to date is still in force.[1]

Virginia does not have such a law but there are many people who try to get such exemptions for their children and are putting pressure on the school boards to delete from the science and physical education courses material to which the New York law would apply.

In dealing with this objection the teacher is dealing with a constitutional right, that of religious freedom. Since science has borne the brunt of the religious fervor in the past, perhaps it is easier to make such objections into law even in this enlightened age. Many people fear science because the observable phenomena are not easy to understand and others think probing into the unknown is dangerous.

The very religious groups who exert the most pressure to prevent such teaching in the schools are the groups who quote this statement, "Know the truth and the truth shall make you free." Can truth really be sought when one accepts just the knowledge that one wants to recognize?

One must, however, respect the religious faith that allows one to suffer and deny the suffering rather than accept scientific aid. When faith is that strong legislatures and teachers bow before its strength.

Teachers have given evidence that excusing pupils from classes in accordance with the law at the request of parent or guardian does not appear

1. Liston Pope, "Religion and Our Schools," American Magazine, CLIII (May, 1952), pp. 24, 110-114

best for the pupil. Young people become confused and bewildered by this different treatment. One teacher expresses it thus: "But do you suppose these 15 and 16 year olds stay ignorant? The other students tell 'em all they hear--and probably more, too."[1]

Another attitude of pupils seems to be that the religion of their parents is trying to hide something from them. With young people's varied interests, these children may easily become non-religious and belittle the religion of their parents as a religion that cannot stand against the facts of science.

The stand that the majority have taken on prevention of disease is a protection for the minority group as well as for the majority. There are very few cases of smallpox or diphtheria because of the widespread use of inoculation as a preventative. Science found the cause of these diseases and has saved many lives by using the preventatives mentioned above. This is the scientific information that this minority group would prevent being taught to their children.

By the inoculation of the majority, these diseases are so rare that the minority is in less danger of contracting them. This would also apply to sanitation and public health practices. These minority groups imitate the sanitation practices of the majority groups although they may not acknowledge them as preventive measures.

In the Old Testament the children of Israel were given health laws called the Laws of Purification. These included laws dealing with food that was clean and unclean, things that cause uncleanness, purification

1. Hanor A. Webb, "Johnny, You Must Leave the Room," The Science Teacher, XIX, (September, 1952), pp. 170-172

after childbirth, the cleansing of leprosy, bodily issues and their cleansing. These are discussed in detail in Leviticus, chapters 11 through 14.

Since the Bible is acknowledged as the Word of God by these groups, one cannot see how they substantiate their views. The sanitary laws outlined for the camp of the Israelites is still good practice and rural areas as well as cities recognize this and use large scale scientific means to accomplish the same purpose.

In the thirteenth chapter of Leviticus the Lord gave Moses and Aaron laws concerning leprosy. In order to show that the modern scientific approach to disease does not go contrary to the Bible, one may compare the rules or laws for leprosy with the scientific approach to tuberculosis.

The symptoms of leprosy are given as "in the skin of the flesh a rising, a scab, or a bright spot." The priest was to examine the person and if the bright spot had white hair and white beneath the skin, he was pronounced unclean. If the hair was not white then he was to be put away seven days and then examined again. If further symptoms of leprosy had not appeared but the spot remained, then another seven days of quarantine were required. If the disease did not develop in this time, the person was to wash his clothing and go his way. If the symptoms had developed, he was pronounced unclean and must keep away from others.

Today if a person feels tired and has recurring colds he goes to the doctor. The doctor examines him, gives him a chest X-ray and either says he has tuberculosis or sends him home.[1]

1. Milton J. Roseneu, Preventive Medicine and Hygiene, pp. 55-56

The leper was put outside the camp and declared unclean. Today the person with tuberculosis is sent to a sanitorium and kept away from people who might contract the disease.

The garments of the leprous person were to be burned. The clothing and all of the things that a tuberculosis patient has handled are disinfected in some way to make them pure.

When the person was pronounced free of leprosy by the priest, he was ordered to wash his clothing and shave off all of his hair and wash his body. Today one is more careful about the cleanliness of a person cured of tuberculosis. This is done by using a disinfectant added to the wash water.

When a house was thought leprous, everything was to be taken out of it. The stones that were contaminated were to be removed and the walls scraped. Then the dust and the stones were to be emptied outside the city. The whole house was then plastered anew. If the leprosy still remained in the house after this, then the house must be destroyed.

Even the people who had stayed in the house or eaten in the house were requested to wash their clothes. Similar precautions are taken today with persons who nurse tuberculosis patients.

With modern means of fumigation it is not necessary to do all of the above things to a house but the people who live in the house where a person develops tuberculosis are requested to wash and disinfect everything with which the patient has come in contact.

The chapter ends (Leviticus 14:54-57) with these words: "This is the law for all manner of plague of leprosy, and scale, And for the

leprosy of a garment, and of a house, and for a rising, and for a scab, and for a bright spot: To teach when it is unclean and when it is clean: this is the law of leprosy.

Not only is this a law for public health and the prevention of the spread of disease but is specifically states the law is "to teach when it is unclean and when it is clean."

With this evidence a teacher should be well armed to combat this objection.

OBJECTION 3

OBJECTION: No phase of evolution should be taught in the schools; how the earth, plants, animals or man evolved.

There are many minute objections made to the teaching of evolution in the schools. In order to give science teachers the broad picture from which one may pick any particular part, this objection is being treated as inclusively as possible.

In this discussion evolution is taken to mean, "the process of developing from rudimentary to a mature or complete state."[1] The greatest portion will of necessity be theory and this will be understood to mean, "a scheme or system of ideas or statements held as an explanation or account of a group of facts or phenomena."[2]

Most of the minority religious groups base their objections on the first and a portion of the second chapter of Genesis. Since all Christian faiths, Jewish adherents, and the followers of Mohammed accept these chapters as a basis for creation the writing of each group were examined.

According to the 1952 statistics there are 741,985,482 Christians, 315,699,103 Mohammedans, and 11,303,350 Jews in the world.[3] This makes 1,068,987,935 people in the world who accept the Genesis creation. Since the number in all of the religious groups mentioned was only

1. The Oxford English Dictionary, Vol. III, p. 354
2. Ibid., Vol. XI, p. 278
3. John Kieran, Information Please Almanac 1952, p. 647

2,319,019,000 this means that about half of the people in the world who profess any religion are interested in the creation story of Genesis.

The following is a comparison of the King James Version of the Bible with the Jewish Holy Scriptures. The Jewish Holy Scripture is quoted first and the Christian Bible follows this in each pair of quotations. Only the parts of the verses that are different are quoted so that one can see at a glance the change in wording. In Genesis 1:2 the Holy Scriptures says, "Now the earth was unformed and void" and the Christian Bible used the words "without form" in place of "unformed." In the same verse "hovered over" is replaced with "moved upon."

Genesis 1:5 "And there was evening and there was morning one day."
"And the evening and the morning were the first day."

1:8 ". . . . a second day."
". . . . were the second day."

1:11 ". . . . its kind, wherein is the seed thereof."
". . . . his kind, whose seed is in itself."

1:12 ". . . . its kind and tree bearing fruit wherein is the seed there after its kind."
". . . . his kind and tree yielding fruit, whose seed was in itself after his kind."

1:13 ". . . . And there were evening and there were morning, a third day."
"And the evening and the morning were the third day."

1:16 ". . . . he made the stars."
". . . . He made the stars also."

1:19 ". . . . a fourth day."
". . . . were the fourth day."

1:20-21 "And God said: 'Let the waters swarm with swarms of living creatures, and let fowl fly above the earth in the open firmament of heaven!' And God created the

great sea-monsters, and every living creature that creepeth, wherewith the waters swarmed, after its kind; and every winged fowl after its kind; and God saw that it was good."
"And God said, 'Let the waters bring forth abundantly the moving creature that hath life, and fowl that fly above the earth in the open firmament of heaven.' And God created great whales, and every living creature that moveth, which the waters bring forth abundantly after their kind, and every winged fowl after his kind: and God saw that it was good."

1:23 ". . . . a fifth day."
". . . . were the fifth day."

1:24 ". . . . its kind."
". . . . his kind."

1:28 "creepeth"
". . . . moveth"

1:29 "yielding seed" "food"
"bearing seed" "meat"

1:30 "wherein there is a living soul" "food"
". . . wherein there is life." "meat"

1:31 "And there was evening and there was morning, the sixth day."
"And the evening and the morning were the sixth day."

2:2 "And on the seventh day God finished His work."
"And on the seventh day God ended his work."

2:3 "And God blessed the seventh day, and hallowed it. . . which God in creating had made."
"And God blessed the seventh day and s anctified it. . . which God created and made."

Genesis 1:5 which has a difference in the translation from the Jewish "and there was evening and there was morning one day" seems a significant change as well as the use of the indefinite "a" for the second, third, fourth, and fifth day where the Bible uses the definite "the."

The Koran is entirely different from either of the above but it states on page 68,

> We believe in God, and that which hath been send down unto Abraham, and Ishmael, and Isaac, and Jacob and the tribes, and that which was delivered unto Moses, and Jesus, and that which was delivered unto the prophets from their Lord: We make no distinction between any of them, and to God we are resigned.

This appears to be the basis for their acceptance of the Genesis creation.

In addition to this, the Koran also gives the following significant statements:

> It is he who hath sent down unto thee the book, wherein are some verses clear to be understood, they are the foundation of the book; and others are parabolical.[1]

> Unto God belongeth the kingdom of heaven and earth; and unto God shall be the return at the last day. Dost thou not see that God gently driveth forward the clouds, and gathereth them together and then layeth them on heaps? Thou also seest the rain which falleth from the midst thereof; and God sendeth down from heaven as it were mountains, wherein there is hail; he striketh therewith whom he pleaseth, and turneth the same away from whom he pleaseth; the brightness of his lightning wanteth but little of taking away the sight. God shifteth the night and day; verily herein is an instruction unto those who have sight. And God hath created every animal of water one of them goeth on his belly and another of them walketh upon two feet, and another of them walketh upon four feet; God created that which he pleaseth, for God is almighty.[2]

> Say, Do ye indeed disbelieve him who created the earth in two days, and do ye set up equals unto him? He is the Lord of all creatures. And he placed in the earth mountains firmly rooted,

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1. George Sale, The Koran, p. 86

2. Ibid., p. 68

rising above the same and he blessed it; and provided therein the food of the creatures designed to be the inhabitants thereof, in four days; equal for those who ask. Then he set his mind to the creation of heaven and it was smoke and he said to it, and to the earth, come either obediently or against your will. They answered, We come, obedient to thy command. And he formed them into seven heavens, in two days; and revealed unto every heaven its office. And we adorned the lower heaven with lights and placed therein a guard of angels.[1]

It is he who created the heavens and the earth in six days, and then decended his throne.[2]

Read, in the name of thy Lord, who hath created all things; who hath created man of congealed blood.
By the fig, and olive; and by Mount Sinai and there territory of security; verily we created man of most excellent fabric; afterward we rendered him the vilest of the vile, except those who believe, and work righteousness; for they shall receive an endless reward.[3]

Al Zamakhahari says this smoke proceeded from the waters under the throne of God (which throne was one of the things created before the heavens and the earth) and rose above the water; that the water being dried up, the earth was formed out of it, and the heavens out of the smoke which mounted aloft.[4]

With the excerpts from the scripture as a background, the opinion of the Talmudi rabbis as to Genesis or the creation seemed pertinent. They believed that the Torah was created before all other things and that God used it as a blueprint for creating the world. The contrasting narratives in the first and second chapters were declared to be first a blueprint and in the second chapter the actual creation. They also believed that the heavens and the earth were created simultaneously and explained the heavens as a combination of fire and water.

1. George Sale, The Koran, p. 285
2. Ibid., p. 414
3. Ibid., p. 369
4. Ibid., p. 521

> According to Bible critics, these two stories come from two of the sources of which the Pentateuch is composed. The second story is regarded as the older and is assigned to the Jahvist source. It is more primitive in nature and is a folk story intended to explain the existence of various forms of life in the world, and the fact of love between the sexes, causing a man to be closer to his wife than to his parents, (Gen. 2:24). The first story which is assigned to the Priestly Code, is held to be of later origin, and to be to some extent dependent upon the Babylonian creation myths, ... It has been suggested, therefore, that there were originally two narratives which were fused. In one, which was perhaps the earlier, the creation was not divided into days, but took place as the result of ten commands of God, in each case, as God speaks, the earth, the plants, animals and the like came into being. In the other account, God actually makes everything in the course of six days, the story being organized so as to emphasize the institution of the Sabbath. It is interesting to note that the sequence of creation as given in the story of Genesis 1 is almost identical with the story of the origin of the universe, of the world and of life as envisioned by modern geology and the theory of evolution.[1]

For further information one may need to go to the Babylonian Epic of Creation. It is also called the Babylonian Genesis and Enuma Elish which means "when above." These are the first two words in the poem.

The poem was written on seven clay tablets. These tablets were found in the ruins of the library of King Ashurbanipal at Ninevah by Austen H. Layard, Hormuzd Rassam and George Smith between the years 1848 and 1876. It may have been composed between 2057 and 1758 B. C. during the First Babylonian Dynasty.[2]

It is believed that the priests were responsible for the composition of this hymn or epic. It appears to honor Marduk and the story

1. "Creation," The Universal Jewish Encyclopedia, Vol. 3, p. 394

2. Alexander Heidel, The Babylonian Genesis, p. 1

of creation is told to 'enhance the glory of Marduk and help to justify his claim to sovereignty over all things visible and invisible.'[1]

The clay tablets were not all in perfect condition and there are portions of the lines that appear to be supplied by the translators. It is thought that there may have been additional lines to some of the tablets on creation but they have not been found so far as is known.

Alexander Heidel, Research Assistant on the Assyrian Dictionary Project of the Oriental Institute of the University of Chicago made the translation from which excerpts are quoted.

In the poem the first three tablets tell how Ti'Amat tried to take over the rule of all the gods and Marduk defeated her after several others had failed. Marduk used an evil wind and an arrow in her mouth to kill her. Beginning with Tablet IV line 135, one reads:

> The lord rested to look at her dead body, (to see)
> 136. How he might divide the colossus (and) create wondrous things (therewith).
> 137. He split her open like a mussel (?) into two parts
> 138. Half of her he set in place and found the sky (therewith)
> 139. He fixed the bar (and) posted guards;
> 140. He commanded them not to let her water escape.
> 141. He crossed the heavens and examined (its) regions.
> 142. He placed himself opposite the Apsu, the dwelling of Nudummud.
> 143. The lord measured the dimension of the Apsu,
> 144. And a great structure, its counterpart, he established (namely), Esharra,
> 145. The great structure Esharra which he made a canopy.
> 146. Anu, Enlil, and Ea he (then) caused to establish their residue. Anu occupies the sky, Enlil the air, and Ea the deep waters underneath the earth.[2]

1. Alexander Heidel, The Babylonian Genesis, p. 3

2. Ibid., p. 32

Tablet V

3. He determined the year (and) defined the divisions;
4. (For the twelve months he set up three constellations apiece.)
5. After he had de(fined) the days of the year (by means of) constellations
6. He founded the stations of Nibiru to determine all (?) of them
7. That none might exceed (or) fall short,
8. He set the stations of Enlil and Ea together with it.
9. He opened gates on both sides
10. And he made strong locks to the left and the right.
11. In the center thereof he fixed the zenith.
12. The moon he caused to shine forth; the night he entrusted (to her).
13. He appointed her as a being of the night to determine the time;
14. And monthly without ceasing he magnified (?) (her) with a tiara.
15. At the beginning of the month (that is at the beginning of) the rising over the land,
16. Thou shalt shine with horns to determine six days.
17. On the seventh day with (hal)f a tiara.
18. At the full moon thou shalt stand in opposition (to the sun),
19. in the middle of each (month).
19. When the sun has (overtaken) thee on the foundation of heaven,
20. Diminish the disk (?) and form it backwards.
21. At the period of the invisi(bility) draw near to the way of the sun,
22. And on (the twenty ninth) thou shalt stand in opposition to the sun a second time.[1]

Tablet VI

5. Blood I will form and cause bone to be;
6. Then I will set up lullu, Man shall be his name.
7. Yes, I will create lullu: Man!
8. (Upon him) shall the service of the gods be imposed that they may rest.

32. Punishment they inflicted upon him by cutting open (the arteries) his blood.
33. With his blood they fashioned mankind;
34. He imposed the service of the gods (upon them) and set the gods free.[2]

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1. Alexander Heidel, The Babylonian Genesis, p. 33

2. Ibid., p. 35

In Tablet VII Asaru is named as the "bestower of arable land, and establishing granaries. He also created grain, legumes and green herbs."[1]

These excerpts are not complete but they serve to give one an idea of the myths of creation by the Babylonians. Heidel himself says:

> I personally fail to see why it should be incompatible with the doctrine of inspiration to assume that Genesis 1:1 - 2:3 might in a measure be dependent on Enuma elish. But I reject the idea that the Biblical account gradually evolved out of the Babylonian Epic: for that the differences are far too great and the similarities far too insignificant.
>
> If certain features of the biblical account were derived from the Babylonian, this was done in conformity with the will of Him who according to Hebrews 1:1 revealed Himself "in divers manners."[2]

Sir James George Frazier in The Dying God a part of the series The Golden Bough says of the Babylonian myth:

> In language which its authors doubtless understood literally but which more advanced thinkers afterward interpreted figuratively, it describes how confusion was reduced to order, how a cosmos emerged from chaos. The account of creation given in the first chapter of Genesis, which has been so much praised for its simple grandeur and sublimity, is merely a rationalized version of the old myth of the fight with the dragon, a myth which for crudity of thought deserves to rank with the quaint fancies of the lowest savage.[3]

The Encyclopedia Britanica says of the same poem:

> In its present form it cannot antidate the period of the first Babylonian dynasty (2169-1870) when it was probably written. The epic had more influence upon the ritual and

1. Alexander Heidel, The Babylonian Genesis, p. 42

2. Ibid., p. 116

3. James George Frazier, "The Dying God," The Golden Bough, Part III, p. 106

theological views of the Semitic races of Western Asia than any other Babylonian literary work.[1]

The battle has raged between theologians and scientists in the past and the opinions of some of these may give useful material. To the Greeks one turns for philosophy of cosmology and from them came a cosmology which replaced the creative idea of personal causes acting arbitrarily, with impersonal causes acting according to law.[2] Aristotle is said to have taught that there had been a gradual but continuous process whereby older and less perfect animal forms gave rise to younger and more perfect forms. This was attributed to an Efficient Cause.[3]

The members of some religious groups would perhaps be surprised to know that so eminent a Christian as Origen said that before the creation of our world God had created others, as He will create others after ours, without beginning or end, that matter or the substance underlying all the sucessive world, was eternally created.

Augustine of Hippo, who is described in church history as the master mind of the Western church, working out the relation between God and man that is still accepted by many Christian churches, thought "that the preservation of the world is a continuous creation."

For many years people were influenced by the Biblical chronology of Bishop James Usher, Archbishop of Armagh, who lived in Ireland and England

1. "Babylonian Epic of Creation," Encyclopedia Britannica, Vol. 6, p. 651

2. James Hastings, Encyclopaedia of Religion and Ethics, Vol. III, IV, p. 229

3. Ibid., Vol. V, VI, p. 615

from 1581-1659. In 1650-1654 he published Annals Verteris et Nove Testimenti in which he stated that the earth was created on October 23, 4004 B. C. at nine o'clock in the morning. This chronological scheme has been disproved and it is known that Usher used the dates inserted in the margin of an authorized version of the Bible by an unknown authority. Many of the objections to the teaching of the age of the earth appear to stem from this chronology.[1]

Philip Henry Gosse (1810-1888), an English naturalist who published popular books on zoology, tried to meet the conflict between Biblical fundamentalism and geology. The situation is described thus:

> The geologists could prove that life had existed upon the earth for millions of years and that every existing plant and animal species had undergone far-reaching change in the course of evolution. But to Gosse, as to millions of other intelligent people, Genesis was literally true, and the instantaneous creation of the world in 4004 B. C. was an unassailable fact. The evidence of geology had to be ignored or explained away. Gosse chose the latter course. The earth, he still maintained had been created in a single instant, but it had been created in its present form with all the appearances of having slowly evolved. In other words, "God hid the fossils in the rocks in order to tempt geologists into infidelity."[2]

Perhaps this is the only answer many people will accept although it is not scientific.

Luther commented on Genesis 1 saying, "Moses is writing history and reporting things that actually happened." To him it was profane to speculate about it.

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1. "Usher, James," Encyclopedia Britannica, Vol. 22, p. 907

2. Aldous Huxley, "A Case for ESP, PK and Psi," Life, XXXVI (January 11, 1954) p. 102

Calvin felt that God approved the fact that a history of creation existed. In order to show his feeling on the subject he told a story of a man who was asked derisively what God did before the world was created. The old man answered, "He made a hell for the inquisitive."

These will give an idea of the attitude of many of the church leaders of the past when "the Fathers, the Scholastics, and the Protestant theologians believed that the world was miraculously created out of nothing, in six days some six thousand years ago."[1]

Modern theologians take into account the words of 2 Peter 3:8 which says, "But, beloved, be not ignorant of this one thing, that one day is with the Lord as a thousand years, and a thousand years is as a day." Even here on the earth if an evening and a morning are taken into account, one would have a day of 365 twenty four hours at either the South or the North Pole. Much of the previously quoted material is also used by scholars who accept the record of science.

The material thus far has been of a religious nature and now the scientific material will be presented.

Scientifically, the advances in the atomic age have greatly facilitated man's effort to classify the age of the earth and of fossil remains. For a long period of time estimates of geologic time were based on the activities that had produced known effects in known intervals of time. For example the retreat of Niagara Falls has averaged five feet a year in the last few years and estimates far back into the past could be made from this fact.

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1. Hames Hastings, op. cit., p. 229

In other places wind erosion, changes made by glaciers, recessions made in rocks along the sea shore, formation of land from fresh volcano lava, and land formed under marshes were measured. This was done in the places where geologists were interested in the age of rocks or fossils.

From this data an estimate was made of the age of fossils from the layers of rocks in which they were found. This was considered the most accurate estimate possible but geologists differed greatly in their estimates and as new evidence came to light, the estimates were changed. Hence, many scholars gave different estimates and it was difficult to keep abreast of the times with the latest estimates constantly changing.

With the coming of the atomic age, new methods have come into use which are more accurate and accepted by more scientists.

Uranium, thorium, and other radioactive elements disintegrate at a known atomic rate. The conditions such as heat, pressure, etc. which usually affect change in elements have no effect on these elements. In fact no condition has been found that changes their rate of atomic disintegration. Since this is true, the age of any of these elements found may be estimated very accurately. Using this method uranium deposits have been examined everywhere. The oldest deposit was found in Carelia, Russia. The estimate is given for the rock in which this uranium was found as 1,800,000,000 years. From this fact scientists estimate that the oldest rocks may be at least two billion years old. This would make the age of the earth from its gaseous stage about three billion years.[1]

1. Henry Dewey Thompson, Fundamentals of Earth Science, pp. 28-31

During World War II a young British scientist found a way to estimate the age of bones found in the same deposits by the use of flourine. By measuring the amount of flourine that the bones have absorbed from the ground and its water one may determine the relative age of bones from the same deposits.

Still later a radio-chemist at the University of Chicago found a way to measure the age of organic matter up to 25,000 years. The Carbon-14 or radiocarbon can give an accurate date. This again has upset the time tables and in this instance the age has been scaled downward indicating that the evolution of animals and man may have taken less time than previously indicated.[1]

Scientists have made a chart of the different ages of the earth and given an estimate of time for each of the developments on the earth. In reading this outline of the ages observe that (as has been previously mentioned) the sequence is the same as in the Genesis account of creation.

Cosmic Time - gaseous stage - 400 million years

Asoic Time - The formative stage - 600 million years

Archeozoic Era - earliest life - 800 million years
(No fossil remains are found in this era but it is believed that the life during this time did not have hard shells and therefore would leave no fossil remains)

Proterozoic Era - primitive classes of life - 650 million years
(some development in plant and animal life such as colonies, fossil algae)

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1. Ruth Moore, Man, Time, and Fossils, pp. 7-9

Paleozoic Era - ancient life - 650 million years
(During this era life advanced from algae and marine invertebrates to true fishes and woody plants, petroleum, coal and salt deposits were accumulated and coral reefs, deserts, and later glaciers were upon the earth.)

Mesozoic Era - age of reptiles - 200 million years
(The Dinosaurs and other reptiles, conifers and flowering plants and insects are widespread, volcanic action, mountains building, and milder climate.)

Cenozoic Era - Mammals appear - 60 million years
(Modern flora, grazing animals and primitive man, mountains shift and high mountains appear, climate mild but cooler with glaciers more frequent.)[1]

The story of the finding of fossil remains of primitive man is an interesting one and takes one almost around the world. The first fossils that came to the attention of scientists was one found in Dusseldorf, Germany in 1856. This was a skull unlike modern man but not like an ape either.

In 1890 Dubois, a doctor in the Dutch Royal Army, was stationed in Java. He became interested in the fossil remains he had heard about there and he dug in a cutting made by the Solo River and found the fragments of a skull and the femur which he believed to be the connecting link between the ape and man. He called it Pithecanthropus erectus which means erect ape man. The church men were outraged at such a suggestion and Dr. John Lightfoot, chancellor of Cambridge, called the claim that this outlandish Java creature could have anything to do with man rank heresy. Dubois was discouraged and hurt by this attack and locked the fossils away for some thirty years and would not let them

1. Hans Cloos, Conversation With the Earth, p. 1

be examined by anyone. When he did again let them be examined, he had with them two other skulls which he had found so long ago but had never announced because of the way his other fossils had been received.

In 1941 an enormous human jaw was found in Java and a similar one in Peking, China in 1929. These fossils seemed to belong to a giant race and one may recall Genesis 6:4 "There were giants in the earth in those days." But the giants were not to end there for more fossils of the ape man, even larger than those previously mentioned, were discovered in South Africa.[1]

Many other fossils of the supposed link between the ape and man have been found. The Piltdown man that was discovered in England has recently been proved a hoax. This made many doubt the findings of other scientists and has made the science teacher's explanation of these findings more difficult especially where there is any religious opposition to such teaching.

No material on evolution would be complete without much emphasis being given to the scientist Charles Darwin who may be considered the father of modern evolution.

In 1831 Darwin went on a five-year voyage on the "Beagle" which took him to South America, some of the South Sea Islands, around the Cape of Good Hope and back to England. On this voyage he studied the animals, plants, and people. He discovered a marked similarity of

1. Ruth Moore, op. cit., p. 234-255

species in different and apparently unconnected land. For example the tortoise from the Galapagos Islands resembled in some manner the South American tortoise. An idea came to Darwin that if each species had not been created separately but had evolved from an earlier form of life, these similarities could be explained. For twenty years Darwin collected the evidence and stated his theory and assembled the evidence to support it in a book which he called The Origin of the Species.

His main points were: All organisms have a tendency to increase in geometrical ratio, but in spite of this fact the number of a given species remain more or less constant. From these facts he made this deduction, that there is a struggle for existence. From this came his next deduction, that of the survival of the fittest.[1]

Later Darwin wrote The Descent of Man and Selection in Relation to Sex. In this book he expounds the theory that man is evolved from a lower type of animal, possibly the ape. He includes a picture of the embryo of a dog and of a human in the same stage and shows similarities. He also shows that man often has a pointed spot on his ear which may be a carry over from the ape or other animals. He mentions the fact that human embryos at six months have hair all over the body which is another indication that they are going through the stages of the animals. He gives much more such evidence.[2]

1. Ruth Moore, op. cit., pp. 12-170

2. Charles Darwin, The Descent of Man and Selection in Relation to Sex, pp. 1-65

In The Origin of the Species he advances the theory that all life may have evolved from a common source but it is his Descent of Man which really caused the objections from churchmen. Darwin advanced the theory but he could not prove it by fossil remains and "the missing link" became a great joke among scientists and church people also.

Lamark, a French scientist worked out a new system of classifying animals by their fundamental organs of respiration, circulation, and forms of the nervous system. This led him to see that there was a gradual descent from man to the polyp, the simpliest organism in his scale. Then he concluded that the simple forms at the bottom of the scale were the material from which nature had formed all the others.

The way this development had come about and the reason for so many species was that the "habits and manner of life and conditions in which its ancestors lived that have in the course of time fashioned its bodily form, its organs and qualities."

Lamark published his theory but few thought it worth while and it was lost to the world until Giard found his work and gave lectures on it at the Sorbonne in Paris, Then Lamark took his rightful place among the evolutionists.[1]

Next came De Vries with the theory that mutations are the explanation of the many species. Mendel contributed to the scientific store of knowledge with his theories and laws of heredity.

1. Ruth Moore, op. cit., pp. 71-94

It would be impossible to give the views of all of the scientists who have contributed to the theory of evolution but some new and interesting facts come to light frequently in this modern age.

From recent newspapers have come the announcement that scientists have a new chemical, Acrasin, which when added to a culture makes amoebae come together in colonies. It is thought that this chemical was produced in the slime some billions of years ago and is the first step in many celled plants and animals. It also may be the cause of specilization of cells and tissues and possibly of sexual reproduction.[1]

Another report was of a new kind of creature near Singapore[2] and in the Himalayas which are described as an "ape-like man" or "hairy, fanged creature." These are suggested as the missing link not in fossils but in the flesh.[3]

New reports may prove or disprove many of the theories, but this is some of the material a science teacher may need to answer the questions of pupils who have religious objections to the teaching of certain or all phases of evolution.

1. Roanoke Times, March 27, 1954, p. 8
2. Roanoke Times, January 2, 1954, p. 6
3. Roanoke Times, January 3, 1954, p. 14

CHAPTER IV

EXAMINATION OF SCIENCE TEXTBOOKS

Three science textbooks for each grade at the junior high school level were examined. These books are on the approved list for public schools of the Commonwealth of Virginia. An effort has been made to find any sections or smaller portions to which minority religious groups might object. The portions will be listed under grades and under the objections as numbered in Chapter II.

SEVENTH GRADE

The Wonderworld of Science - Book Seven
Morris Meister
Ralph E. Keirstead
Lois M. Shoemaker
Charles Scribner's Sons, New York
1944 pp. 352

Objection 1

p. 47 Picture showing the earth as circular

p. 75 "The earth is a great ball. . ."

p. 76 polar projection of earth

p. 173 picture of earth as sphere

p. 223-235 seasons - based on earth as sphere

Objection 2

p. 90 Pictures of bacteria that causes certain diseases

p. 91 Bacteria as cause of disease

p. 93-96 Bacteria as harmful in water supply

p. 114 Tuberculosis caused by germs

p. 150 Cause of beriberi

p. 151 Cause of scurvy, rickets, etc.

p. 152-153 Diet for health

p. 165 Sunshine kills harmful bacteria

p. 175 Doctor and nurse for patient

p. 179-180 Temperature high when persons are ill

p. 267-268 Bacteria cause disease - penicillin kills them

p. 277 Animals used to learn about disease

pp. 281-292 Plants and animals that are harmful to man

pp. 323 -340 Prevention of disease

Objection 3

p. 164 Man on earth a billion years ago

p. 189 Coal formed million of years ago

p. 192 Gas formed in earth millions of years ago

Going Forward with Science
Gerald S. Craig
June E. Lewis
Ginn & Company, New York
1947 pp. 413

Objection 1

p. 199 Picture of earth as sphere

pp. 260-289 "One Hundred Billion Suns" - Based on earth as sphere

Objection 2

p. 136 Saccharine used by diabetics; aspirin for headache; carbolic acid as disinfectant

p. 148 Vaseline for burns

pp. 183-185 Chemicals for good health

p. 204 Eyestrain

p. 223 Right food to prevent illness

p. 229 Beriberi and its cause

p. 230-231 Cause of scurvy

p. 233 Prevention of pellagra and excessive nose bleeding

p. 256 Underweight - need physician

p. 257 Overweight - need physician

p. 292 Hayfever and its cause

pp. 300-304 Poison ivy

p. 314 Fleas from house rats cause bubonic plague

Objection 3

p. 119 Earth and man here millions of years

Understanding Our Environment
Franklin B. Carroll
The John C. Winston Co., Philadelphia
1952 pp. 330

Objection 1

No objectionable references found

Objection 2

pp. 4-6 Conquering disease

p. 16 Superstitions about causes of malaria

p. 17 Illness treated by doctor

p. 120 Pollen cause of hayfever

pp. 130-133 Dust carries disease

p. 157 Treating flesh burns

p. 167 Radioactivity causes sickness and death

p. 172 Radioisotopes locate disease

p. 185 Faulty elimination causes disease

p. 188 Anemia, needs a doctor

p. 189 Diseases of the heart

p. 191 Kidney diseases

pp. 197-200 Disease germs in unclean food

p. 201 Eye defects

p. 202 Hearing defects

p. 208 Fatigue causes disease germs to grow

p. 209 "How not to get sick"

pp. 209-210 Fight disease germs

p. 211 Patent medicine

pp. 211-212 Periodic health examinations

pp. 213-224 "Some Diseases You Should Know"

pp. 225-230 "Do Not Poison your Body"

pp. 231-236 "Taking Poison for Fun or Cure"

pp. 237-248 Safety and taking care of accident victims

Objection 3

pp. 96-97 Glaciers thousands of years old

EIGHTH GRADE TEXTS

The Wonderworld of Science - Book Eight

Morris Meister
Ralph E. Keirstead
Lois M. Shoemaker
Charles Scribner's, New York
1950 pp. 360

Objection 1

pp. 5-50 The Solar System - based on the earth as a sphere

p. 141 Picture - earth circular

p. 182 Picture - earth sphere

pp. 266-268 "How does a navigator tell his Position?"

p. 267 Picture - earth sphere

Objection 2

p. 321 Eyeglasses to correct defects

pp. 345-352 Atomic energy to track down and to treat disease

Objection 3

p. 19 Glaciers many thousands of years ago

pp. 83-96 Earth millions of years old and also that complex animals come from simpler forms

Our Environment-How We Adapt Ourselves to It

Carpenter and Wood (revised by Paul E. Smith)
Allyn and Bacon, Inc., New York
1952 pp. 585

Objection 1

p. 39 Picture of earth as sphere

pp. 123-124 Based on the fact that the earth is a sphere

Objection 2

p. 112 Climate and health

pp. 315-357 "Community Health and Sanitation"

pp. 359-405 "Personal Health and Safety"

p. 441 Plants cause skin disorder and hayfever

p. 489 Pasteurizing kills germs that cause typhoid and tuberculosis

p. 491 Pork may cause trichinosis

pp. 501-504 Food protects against disease

Objection 3

p. 523 Coal took millions of years to form in the earth

ENJOYING MODERN SCIENCE
Victor C. Smith
W. W. Jones
J. B. Lippincott Co., New York
1951 pp. 466

Objection 1

pp. 177-208 "Our Planet The Earth"

p. 323 Picture of the earth as a sphere

p. 328 Global projection

pp. 330-361 Change of seasons based on earth as a sphere

Objection 2

p. 11 Germs cause disease

pp. 99-172 Community health, disease prevention and control, and sanitation

p. 265 In buying - Does the article protect health and safety?

pp. 289-293 Clothing and health

pp. 294-297 Shoes and health

Objection 3

pp. 11-12 Charles Darwin's contribution to science

p. 212 Earth millions of years old

NINTH GRADE TEXTS

Science for a Better World
Morris Meister
Ralph Keirstead
Lois M. Shoemaker
Charles Scribner's Sons, New York
1946-1952 pp. 778

Objection 1

p. 5 Earth is a slightly flattened ball

p. 305 Picture of earth as a sphere

p. 308 Picture of earth as a sphere

p. 313 Picture of earth as a sphere

pp. 692-748 "The Solar System" - based on the earth as a sphere

Objection 2

p. 87 Bacteria and fungi cause disease

pp. 246-258 Pure water, food and air as protection against disease

pp. 262-278 "Causes of Ill Health"

pp. 279-291 "The Fight for Better Health"

pp. 292-304 "Better Health for Everyone"

Objection 3

pp. 158-159 Argument for and against spontaneous generation

pp. 210-226 "The Pageant of Man" - Darwin's theory and new facts about evolution

Our Environment - How We Use and Control It
George C. Wood
Harry A. Carpenter
Allyn and Bacon, New York
1950 pp. 870

Objection 1

p. 239 Earth as a sphere

pp. 543-569 "The Sun as the Center of Our Universe" - based on earth as a sphere

Objection 2

pp. XX-XXIII Mosquitoes as the cause of yellow fever

p. 138 Catarrhal condition requires a physician; stale air lowers resistance to disease

p. 142 People ill

p. 143 Moist air favorable for disease germs

p. 165 Ways ice is used for the sick

pp. 168-171 Home sanitation

pp. 175-195 Community water supply purified for health

pp. 258-259 Eye defects

pp. 271 Ultra violet rays to kill germs

p. 278 Care of eyes

pp. 663-691 The Proper food for health

pp. 697-715 Microorganisms that are foes of man

pp. 723-749 How to keep our bodies healthy

pp. 751-791 "Human Health and Safety"

Objection 3

pp. 517-540 The formation of the earth as based on the tidal theory

pp. 793-795 Creation from the Bible and spontaneous generation

pp. 803-806 Darwin and his theory

Using Modern Science
Victor C. Smith
W. E. Jones
J. B. Lippincott Company, New York
1951 pp. 654

Objection 1

pp. 57-65 Earth's energy from the sun - based on the earth as sphere

p. 456 A picture of the earth as a sphere

Objection 2

p. 13 Disease carried by insects

p. 14-15 Disease caused by bacteria

p. 168 Eye strain

p. 178 Effects of eye strain on health

pp. 191-192 Eyeglasses to correct eye defects

pp. 250-254 Vitamins as protection against disease

pp. 255-258 Minerals as disease preventative

pp. 262-263 Special diet as protection against disease

pp. 267-313 Disease, bacteria, and medicine

p. 410 Better plumbing reduces disease

Objection 3

p. 55 Glaciers 25,000 to 100,000 years ago

pp. 67-68 The age of the earth is estimated

p. 545 Tree picture showing animals developed from simpler forms
pp. 557-562 Explanation of the "survival of the fittest"

Upon examination of the science textbooks approved for the seventh, eighth, and ninth grades of the Virginia public schools, the following appeared to be best for each grade and for each group of objectors.

For the seventh grade Understanding Our Environment did not appear to have any section thatwould teach that the earth was a sphere. For the eighth grade Our Environment - How We adapt Ourselves to It had one picture of the earth as a sphere and one section of approximately one hundred pages in which the earth is considered a sphere. The other textbooks do not have any more material mentioning the spherical earth but the pictures and written material are scattered throughout the books.

The ninth grade text, Using Modern Science and Our Environment - How We Use and Control It, each have two rather short allusions to the earth as a sphere.

Since many of the general science texts have sections on astronomy, the causes of seasons, the sun's energy on earth, weather conditions, and the like, it is not surprising that only one of the nine texts should, so far as could be determined, have no reference to the earth as a sphere.

There were many sentences, paragraphs, and sections dealing with health, sanitation, and disease in all of the textbooks examined. Some were from the standpoint of prevention, some the causes of disease, and some the treatment for disease or injury.

Going Forward with Science for the seventh grade seemed to have the least amount of objectionable material although it had some mention

of disease. However, there appeared to be only one actual mention of insects or bacteria causing the disease.

For the eighth grade The Wonderworld of Science would meet with the fewest objections since it has one section where eyeglasses are mentioned as a means of correcting eye defects and another on atomic energy used to track down and treat disease.

All of the ninth grade texts appear to have many pages in which health and disease are discussed. Science for a Better World has the objectional passage in units and not under miscellaneous topics as they appear in other texts.

The objection to the teaching of evolution has many phases. Unless one of the minority religious groups specifically objects to the date beyond 4004 B. C. for the age of the earth, none of the seventh grade texts examined would be objectionable. However each text speaks of the earth having been in existance for many, many years beyond 4004 B. C.

Our Environment - How We Adapt Ourselves to it, so far as could be determined, has only one mention to the earth as millions of years old. The other two texts not only have this phase of evolution but have either a mention of Darwin and his theory or present the hypothesis that complex animals evolved from simpler forms. Hence, a larger group of church people would object to these texts.

All three of the ninth grade texts not only allude to the age of the earth in millions of years but have sections explaining Darwin's theory. Our Environment - How We Use and Control It also discusses

the tidal theory of the formation of the earth. There would appear to be more numerous objections to this combination of objectionable passages than to either one separately.

Using the word objection does not mean that science teachers, public school pupils or patrons in general have any complaint about these texts. The word is used to designate facts or theories which members of some minority religious groups appear to find objectional. All of the texts are approved for use in the public schools of Virginia and would only conflict with the viewpoints of a few individuals or groups of persons which have been called minority religious groups throughout this study.

CHAPTER V

CONCLUSION

After searching periodicals and getting the views of science teachers, it was found that the minority religious groups and individuals in larger religious groups had these three main objections to the teaching of science in the public schools.

1. The schools should not teach that the earth is round since the Bible states that it has four corners.

2. No scientific facts that relate to resistance to disease, health and sanitation problems, spread of disease or transmission of disease by bacteria or insects should be taught in the public schools.

3. No phase of evolution should be taught in the schools, how the earth plants, animals, or man evolved.

In order to meet these objections, material has been compiled for the use of science teachers. No effort has been made to suggest methods of teaching such material since the teaching situations of science teachers appear to be varied and each individual can best select his own method.

For Objection 1, proof was found that the Bible states that an angel may sit on the circle of the earth showing it could be round, and science proves that the earth is an oblate spheroid. Therefore, science teachers should be able to deal adequately with this problem if it should arise.

Since Objection 2 stems from the belief of some religious groups that any disease or injury is evil and hence unreality, and others that

sickness or injury is a judgment of God and to be endured instead of cured; the teacher has a very difficult problem. In some instances the only solution seems to be to excuse the child from the class during objectional discussions. In other cases the fact that the Bible teaches sanitation and prevention of the spread of disease may help to eliminate conflict.

In dealing with Objection 3, the fact that much of the material compiled is fact but used to substantiate some theory cannot be over emphasized. The meaning of the word theory is really the key to the presentation of the scientific data that may appear to conflict with religious beliefs. The datum is a fact but the conclusions drawn from it are often theories and not facts. Hence, one may be a Gosse or a Darwin and be reasoning from the same known facts but both conclusions are theories.

An effort was made to include facts and theories in both religion and science that are not commonly known by science teachers. The science textbooks usually present the essential facts, consequently, few of them are included in this study.

It appears from the examination of science textbooks for the junior high schools of Virginia that all of the texts have some passage that would be contrary to the religious views stated in the objections above. The science teacher may either dismiss the pupil from the classroom during such discussions or use material similar to that presented in Chapter III to help eliminate conflict. This material is not exhaustive

but portions of it seem relevant to the problem involved in teaching science to pupils with such religious viewpoints or whose parents object to such teaching.

A dogmatic approach to the problems involved in meeting such religious objections may increase the conflict. Patience and a realization that a scientist should meet every problem with an open mind may aid such teaching.

Who knows but what Loren C. Eiseley may be right when he presents the theory of the origin of life on earth in this manner:

> The idea of the eternal universe allowed the possibility of the spores of life drifting from the wreckage of one burned out system to systems beginning anew, and an infinity of time in which man might arise again and again.[1]

If this proved true, both the religious beliefs or interpretations of the Bible presented in this study and the theories of science now accepted as most valid would be invalidated. Hence, an open mind ready to discard theories proved false or accept those proved true seems an essential for science teachers who hope to eliminate conflict with such religious attitudes as appear in this study.

These lines from a poem by Cabel Winchester seem an appropriate motto for science classrooms where teachers encounter the objections of certain minority religious groups and a fitting conclusion to this study.

> And let those learn who here shall meet
> True wisdom is with reverence crowned,
> And science walks with humble feet
> To seek the God that faith has found.[2]

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1. Loren C. Eiseley, "Is Man Alone in Space," Scientific American, CLXXXIX, (July, 1953) p. 80

2. John E. Merrill, "Religion in The Teaching of Astronomy," Christian Education, XXV, (September, 1952) p. 191

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