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# Ninth-grade optional related readings in general science from selected articles in periodical

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BOSTON UNIVERSITY  
SCHOOL OF EDUCATION

Major Project

NINTH-GRADE OPTIONAL RELATED READINGS IN GENERAL SCIENCE  
FROM SELECTED ARTICLES IN PERIODICALS

Submitted by

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(B. S., Boston University, 1939)

In partial fulfillment of requirements for  
the degree of Master of Education  
(1950)

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First Reader: John G. Reed, Associate Professor  
of Science Education

Second ?

#### ACKNOWLEDGMENT

I wish hereby to express to Dr. John G. Read, Associate Professor of Science Education, Boston University, School of Education, very deep and sincere appreciation for invaluable counsel and advice far beyond the call of duty.

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CHAPTER I  
INTRODUCTION TO STUDY

The purpose of this study.--The purpose of this study is to provide suitable references that will stimulate thinking as well as furnish background and enrichment in scientific facts and concepts with which ninth-grade students should be familiar. More specifically, the purpose is to locate, collect, and list many up-to-date, informative, interesting and readable articles that aid science education. The aim is to select articles from periodicals and to arrange them as an annotated bibliography.

Need of a bibliography of related readings in general science from articles in periodicals.--A survey of published lists of references in general science reveals that no similar list exists. The published lists in the science area include references to textbooks, scientific publications and popular books such as Velikovsky's "Worlds In Collision". Educators advocate optional related reading, extensive reading and wide reading. Thus there exists a need for an annotated bibliography of articles selective in content from recognized periodicals. A list of readings are necessary that will stimulate lively discussions while offering

background and enrichment in the latest developments in general science topics covered in the curriculum. This study is an attempt to select and organize such scientific material. It endeavors to provide a means to make scientific facts and concepts more comprehensible to ninth-grade students. This bibliography strives to assemble from available periodicals selected articles in science that will prove valuable to students and teachers.

Treatment of problem.--The problem of discovering and assembling such a list may be divided into four main parts:

1. The topical areas in science to be covered that provide background or enrichment on the ninth-grade level.
2. The periodicals to be used as a source for articles.
3. The selection of the articles.
4. The organizing of the articles in relation to one of the selected topical areas.

Scope of the problem.--The scope of the problem is narrow. Selective readings in scientific publications are not considered. The selections presented are in a language of remarkable clarity and simplicity, rather than those which are too technically complete and exhaustive. The aim is to present scientific facts and concepts in such a way as to give both value and enjoyment by selecting articles that

are very readable and interesting. Each article accepted is placed under one of the seventeen topical science areas listed in a recent survey of the relative subject weights in fifteen largely used science books. Only articles included in periodicals from April 1, 1947, to April 1, 1950, are examined. Many advances in science have been made during this period that induce an abundance of worth-while, up-to-date, scientific information relating directly to topics in a science curriculum and keeping within the reading ability of the average ninth-grade pupil.

Method of procedure.--The methods of procedure used in the different parts of this bibliography follow closely the established methods of procedure used in similar studies with some modifications.

Selection of topics and organization.--The title of each selected article has been classified under one of the topical areas set up in a recent unpublished manuscript on science. Each article which was closely related to more than one of these topics has been duplicated under all of its related topics. The chosen article has been placed in order of date of publication. Articles in monthly publications of the same date of issue have been arranged in the alphabetical order of the periodical. Two or more articles in the same magazine have been classified according to the ascending order of the pages.

The selection of the periodicals.--The selection of the five periodicals used as sources for the scientific articles have been determined by their rating and circulation in published surveys. These cover interest, value, and availability to secondary-school students, of which the ninth-grade is considered a part. Periodicals primarily fictional in content have been eliminated.

The selection of articles.--The articles were selected from periodicals by examining the table of contents of each issue from April 1, 1947, to April 1, 1950, for articles of scientific value. Each possible article has been read and judged in regard to its relation to one of the listed topical areas in science. The selected articles from the table of contents of the periodical must be very readable and contain little or no technical matter. These articles have been arranged under appropriate related science topics with a brief description of their contents.

Restatement of problem.--The purpose of the plan is to provide a means of enriching a science course, of giving a science background, through optional related reading that stimulates the thinking of ninth-grade students. The main purpose is to provide a wealth of material to benefit all scientifically-minded students and teachers.

CHAPTER II  
SUMMARY OF RESEARCH

Research of Optional Related Reading

Optional related reading defined.--The words optional and related are self-explanatory; that is, optional and related readings are those in which the pupils engage of their own free will. They are related if their content brings added understandings to the area covered in the curriculum.

Optional related reading bearing on a limited set of general science topics stimulates thinking in pupils as they acquire quite incidentally broader backgrounds and enrichment in science education.

An optional related activity defined by Billett<sup>1</sup> follows:

The words optional and related tell the whole story. The activity certainly would not be optional if pupils were constrained in any way to engage in it. The activity would not be related if participation in it were not likely to produce an increment of educative growth which is a definite horizontal or vertical extension of the main learning product.

Contribution of reading.--Reading has a unique contribution to make to the life and personality of the student.

1. Roy O. Billett, Fundamentals of Secondary School Teaching. Houghton Mifflin Co. Boston, 1940, p. 507.

An effective way of improving the understanding of concepts is to read extensively. Collateral reading of scientific material clarifies definite concepts of importance in general science. Through reading experiences the student increases his understanding of the real world around him, his environment, which is the main objective of every general science program.<sup>1</sup>

Bond and Bond<sup>2</sup> express their views on the contribution of wide reading to richer backgrounds.

Just as the life experiences of the individual add to his background so do his reading experiences. Wide reading is recognized to be among the foremost avenues through which the background of the individual can be enhanced or enlarged. Wide reading may be extensive reading either in many or in few fields of human endeavor. Preferably, it should be a wide exploration into many fields, enriched by more intensive coverage in a limited number of fields.

The science teacher can aid materially in the growth of meaning backgrounds by having his students read broadly in the many topical areas found in the general science courses. By extensive reading new interests are stimulated and new realms of reading experiences opened, that are no longer dependent upon the extensive study of a single text.

Extensive versus intensive reading.--A noted educator,<sup>3</sup> gives his viewpoint on extensive and intensive reading:

1. Guy L. Bond and Eva Bond, Developmental Reading in High Schools. The Macmillan Co. New York, 1941, p. 115.

2. Bond and Bond, op. cit., p. 117.

3. Billett, op. cit., p. 198.

First, a choice between the terms free reading and extensive reading should be registered. The latter term does not imply in any way, the absence of guidance and direction of the pupil's reading experiences, and it is a perfect antonym of intensive reading, the time honored practice which must decrease as extensive reading increases.

The same noted methods educator further states:<sup>1</sup>

A program that is limited to intensive reading not only exerts an undesirable influence on the educative growth of the pupils--it also acts as a soporific on the teacher. Under a program of extensive reading, the abundance of materials, suited to the aptitudes, abilities, interests, aims, and needs of his pupils, he becomes constantly better informed.

Voluntary reading provides enriching experiences. It broadens the understandings, heightens interest and clarifies meaning, and corrects misconceptions.<sup>2</sup> The writer's experience has been that reading experience limited to one book, one page, even one paragraph creates serious difficulty in getting meaning for some of the science concepts, and leads the conscientious student to memorizing or learning these concepts by rote in order that he may receive the necessary rewards. Wide reading of selected rather than extensive material can aid materially in eliminating this difficulty, and in making purposeful reading a thoroughly enjoyable and enriching activity.<sup>3</sup>

1. Billett, op. cit., p. 203.

2. National Society for the Study of Education. Committee on the Teaching of Reading, Reorganization and Improvement of Instruction in Reading, Thirty-sixth Yearbook, Part I, University of Chicago Press. Chicago, 1937, p. 141-142.

3. Ibid., p. 141-142.

These beliefs are conveyed by Snedaker and Horn<sup>1</sup> showing the relation of wide reading to the enrichment of the content fields by stating:

Experiments have consistently shown the superiority of extensive reading over what is ineptly called 'intensive reading'. The need of wide reading as a means of achieving clear and accurate meanings, of giving a vivid sense of reality and of developing interests in the problem at hand is generally accepted. Without wide reading and other sources of experience, instruction tends to become formal and verbalistic. Few of the practices that characterize the best modern instruction are not possible on the basis of the textbook alone.

Collateral reading is particularly important as a means of building the rich background of meaningful concepts that make possible the re-creation of experience.

Assumption of the discussion.--The underlying assumption of this discussion is that children learn from experience and that the process of learning involves the association of related experiences into increasingly enlarged understandings.

The desirable procedure, is not to "get rid of the textbook" but to avoid restricting the study to the contents of a single textbook and, instead, to supplement it as abundantly as may be desirable.

Periodicals offer supplementary related readings.--Magazines are fruitful sources of materials in which the scientifically minded will find a reservoir of new experiences. Many illustrations found in the periodicals add to the

1. Thirty-sixth Yearbook, Part I, Op. cit., p. 47

extensive backgrounds that students develop. Pictures bring<sup>9</sup> vicarious learning experiences that aid retention.

The students' newly acquired backgrounds are easily clarified by illustrated material which results in the co-operative building of more and broader backgrounds. The student through this means obtains new and related firsthand experiences.

Finch,<sup>1</sup> in referring to picture magazines such as Life, offers the following:

Often a series of pictures conveys an idea more quickly than five pages of solid type.

Justification for the adoption of the extensive reading method of instruction.--The extensive reading method, which produces interest, significance and usefulness to the learner, is advised for adoption by the committee<sup>2</sup> on science education.

A methodology including a much greater use of extensive reading of books and magazines in the science fields should be adopted by science teachers everywhere. There is a considerable body of experimental guidance to support the learning values of a wide range of reading in science.

At present a wealth of non-textbook material

1. Hardy R. Finch, "How To Teach Students To Read Mass Magazines Critically". The English Journal (September, 1949) Vol. 38, No. 7, p. 390.

2. National Society for the Study of Education. Committee on the Teaching of Science, Science Education in American Schools, Forty-sixth Yearbook, Part I, University of Chicago Press. Chicago, 1947, p. 162.

is available for reading. Much has been given to the needs of children and adult lay readers.

Rice<sup>1</sup> concludes his study by declaring that extensive reading is not employed to the extent justified by its value in the American secondary schools.

Factual value of extensive reading in science.--Rice,<sup>2</sup> in summarizing a most comprehensive study of experiments by Curtis,<sup>3</sup> indicates the value of extensive reading in science as a means of acquiring a knowledge of scientific facts and principles. Three hundred eighty-six matched pairs of pupils were tested on items which appeared in magazines but not in the texts in use at the time of the tests. The experimental or extensive reading group in general science was superior in all except 7 tests (50 were given) and also exceeded the control group from 3.00 to 4.37 per cent in the total items known. In addition to the superiority of the experimental group in the tests involving "standard" items of the course of study, experimental pupils possessed a knowledge of 197 items more than the control pupils.

1. M. S. Rice, "Extensive Reading Versus Intensive Textbook Study". Journal of Experimental Education (June, 1936) Vol. 4, No. 4, p. 376-402.

2. Rice, Ibid., p. 376-402.

3. Francis Day Curtis, Some Values Derived from Extensive Reading of General Science. Contributions to Education, Teachers College, Columbia University, 1924, p. 9.

Extensive reading here has proven to be an effective means of acquiring a knowledge of scientific facts and recall of test items.

Other values of extensive reading in science.--Curtis<sup>1</sup> sent out 206 questionnaires to selected high schools to ascertain if "outside" readings function in stimulating a greater interest in science. The total number of replies received were 105 or 51.0 per cent. Eighty-four or 80 per cent of these replies were tabulated. One and two tenths (only one teacher) stated positively that this reading does not function; 78.6 per cent stated positively that this reading "functions noticeably and certainly in adding to the pupils' fund of accurate and serviceable knowledge of general science".

These opinions are potent arguments for the inclusion of extensive reading in every course in general science.

Curtis<sup>2</sup> believed it justifiable to conclude that extensive reading of scientific literature functions for the subject, and for inspiring and stimulating the student's desire to pursue further the study of science.

1. Curtis, op. cit., p. 88.

2. Loc. cit.

Extensive readings may also function for the improvement of reading tastes by the reading of scientific articles in some magazines of the highest type. They may establish the habit of reading a very great amount of scientific literature for recreation along with regular school work.<sup>1</sup>

Again the conclusion seems justified in the light of the results of these studies that extensive reading functions. Therefore as much stress as possible should be placed upon voluntary extensive reading of scientific literature in connection with all courses in general science.<sup>2</sup>

#### Sources of Material

The evolution of general science.--General science came into existence in this country partly as a protest against the now functional courses in pure science, partly as an interesting introduction to other sciences which would follow and partly as a means of interesting young people in the interpretation of their science environment. Then with the coming of the junior high school, general science spread out and moved downward into the grades as well as keeping its place in the ninth grade.<sup>3</sup>

1. Curtis, op. cit., p. 111.

2. Ibid., p. 112.

3. George W. Hunter and Alice L. Parker, "The Subject Matter of General Science", School Science and Mathematics (December 1942) Vol. 42, No. 371, p. 869.

The subject matter of general science.-- Considerable work has been done on the content of texts; such as, the studies of Weckel,<sup>1</sup> Rodean,<sup>2</sup> Hunter and Parker,<sup>3</sup> Pettit,<sup>4</sup> Davis,<sup>5</sup> Simmons,<sup>6</sup> Clish,<sup>7</sup> Leonelli,<sup>8</sup> and others. These studies in general science show the changing content of general science as evidenced in the textbooks. While there was an indefinite pattern at first made up of segments of the various sciences taught in high school and college, later there began

1. Ada L. Weckel, "Are Any Principles of Organization of General Science Evidenced by the Present Textbooks on the Subject?". School Science and Mathematics (January 1922) Vol. 22, p. 44.
2. William A. Rodean, "Overlapping in Content in Textbooks in General Science and Biology." School Review (March 1932) Vol. 40, p. 213-220.
3. Hunter and Parker, loc. cit., p. 869.
4. Donald D. Pettit, "The Content of Junior High School Science," School Science and Mathematics (October 1940) Vol. 40, No. 351, p. 643.
5. Ira C. Davis, "Analysis of the Subject Matter in the Eight Most Widely Used Textbooks in General Science", School Science and Mathematics (June 1931) Vol. 31, No. 269, p. 707-711.
6. Maitland P. Simmons, "Changing Conceptions of Major Topics in General Science Textbooks". Journal of Educational Research (Nov. 1937) Vol. 31, No. 3, p. 199-204.
7. A. R. Clish, Study of Content of General Science Textbooks, Boston University, School of Education, Unpublished Master's Thesis, 1940.
8. Renato E. Leonelli, Principles of Physical and Biological Science Found in Eight Textbooks of General Science for Grade Eight, Boston University, School of Education, Unpublished Master's Thesis, 1947.

to emerge a pattern that showed more social and more health application in this field.<sup>1</sup>

Several of the studies of the content of general science courses based on the study of texts will be discussed.

Weckel<sup>2</sup> examined 14 textbooks and infers:

Many administrators and some science teachers, too, are not aware of the uniformity which occurs in the content of the courses given in the textbooks of general science.

Simmons<sup>3</sup> investigated 18 textbooks in general science to determine the relative values of various subject matter between the years 1911 and 1934. He made a survey of the table of contents of 16 general science textbooks and found in every case 16 major topics and traced the changes that were found in the page allotment of certain texts. There were 4 texts used for 1911-16 period, 4 for the 1917-23 period, 4 for the 1924-38 period, and 6 for the 1929-34 period. In the latter period 3 of the texts were in a general science series for the junior high school (7, 8 and 9th) years. The 16 major topics and their rank or place of importance in 1911 and later in 1934 follows:

1. Hunter, op. cit., p. 869.
2. Weckel, op. cit., p. 44.
3. Simmons, op. cit., p. 199-204.

Air changes from 5th place to 9th.

Animal Life changes from 11th place to 12th.

Electricity remains in 7th place.

Energy changes from 16th place to 13th.

Forces of Nature change from 14th place to 16th.

Health changes from 3rd. place to 1st.

Heat remains in the 4th place.

Light changes from 6th place to 11th.

Machines change from 10th place to 3rd.

Matter remains in the 15th place.

Planets change from 12th place to 5th.

Plant Life remains in 8th place.

Soils change from 1st place to 10th.

Sound changes from 13th place to 14th.

Water remains in the 2nd place.

Weather changes from the 9th place to the 6th.

Davis<sup>1</sup> conducted an investigation to determine what subject matter was included in 8 of the most widely used general science texts and with what frequency this subject matter was used. The units in which the subject matter was to be organized was determined by analyzing the contents of the textbooks and by selecting the units that were selected by

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1. Davis, op. cit., p. 707-711.

other investigators. A topic was retained from any textbook when it contained sufficient material to make that topic teachable and occurred in 6 or more of the 8 examined books. This procedure gave a total of 137 topics of which 73 occur in all text, 37 in 7 and 22 in 6. He lists the following topics as those being taught in our schools: air, water, heat, weather and climate, light, sound, magnetism and electricity, energy and machines, the solar system rocks and soils, plants, animals, the human body, and foods and clothing.

Davis<sup>1</sup> concludes:

Results of the investigation demonstrate clearly that our leading textbooks in general science do agree on subject matter. They are no longer a hodge-podge or piece meal mixture of science.

Clish<sup>2</sup> in his study of the content of 17 general science books quotes the following:

Recent books emphasize the practical need of pupils, with a sacrifice of scientific principles.

An investigation of present day subject matter shows that the science courses of the junior high school have become relatively stabilized. The content is in effect a

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1. Davis, Op. cit., p. 710.

2. Clish, op. cit., p. 10.

spreading and an enlargement of general science to cover the science needs of pupils of this maturity level.<sup>1</sup>

Source of topical areas chosen.--The topics taught in our schools are best obtained by determining what textbooks the teachers use, since most of them teach from a textbook.<sup>2</sup>

The optional related readings used in this bibliography follow the pattern of Read's<sup>3</sup> investigation. He conducted a study to determine what subject matter was included in 15 of the latest textbooks in ninth-grade general science and with what frequency this subject matter was used.

These are topics the teachers are teaching and the continued use of texts containing these topics seem to indicate that they are satisfactory.

Read's<sup>4</sup> 17 topical areas produce a very good picture of the present content in the curricula.

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1. Forty-sixth Yearbook, Part I, op. cit., p. 149.

2. Davis, op. cit., p. 707.

3. John G. Read, Unpublished Manuscript, Boston University, School of Education, Charge of Science Education.

4. Read, loc. cit.

Pettit<sup>1</sup> infers that changes do not occur in a year or even ten, therefore, it is believed that Read's<sup>2</sup> findings which follow give a view of the present course and its possible future trends.

Relative Subject Weights

Topical Areas

11%	Human Body Structure and Food
10%	Conservation
10%	Work and Mechanics
8%	Magnetism and Electricity
7%	Air
7%	Astronomy
7%	Bacteria
7%	Geology
7%	Heat
7%	Water
7%	Weather
4%	Chemistry and Fire
2%	Light
2%	Scientific Method
2%	Sound
1%	Communication
1%	Transportation

1. Pettit, op. cit., p. 643.

2. Read, op. cit.

Choice of Periodicals.--The selected periodicals for these optional related readings in general science have been given careful consideration. It is a well recognized fact that students read what they want to read.

Severance<sup>1</sup> says:

High school pupils do not read what educators think they read.

Under wide reading Mirrielees<sup>2</sup> states:

Each pupil begins reading where he can with enjoyment.

Eells's<sup>3</sup> study of periodicals read "fairly regularly and most enjoyed and valued by over 17,000 pupils in 198 secondary schools located in every state in the United States was used as criterion for this selection. The 5 chosen magazines are among the list of the first 15 of 108 magazines read as "fairly regularly." The same 5 magazines are among the first ten of a list of 51 reported as "enjoyed and valued most frequently." The order of the results of the above mentioned lists and the chosen periodicals are: Reader's Digest, Life, Popular Mechanics, Popular Science Monthly and National Geographic Magazine.

1. Henry Severance, "Magazines Which High School Pupils Read", School Review (October 1926) Vol. 34, p. 587.

2. Lucia B. Mirrielees, Teaching Composition and Literature. Harcourt, Brace and Co., New York 1948, p. 23.

3. Walter Crosby Eells, "What Periodicals Do High School Pupils Prefer?", Wilson Bulletin For Librarians (December 1937) Vol. 12, p. 248-252.

The periodicals Ladies' Home Journal and McCall's Magazine appear on every list of periodicals in this research. Their science material is excellent but they are not the preferred in this study as those magazines appeal primarily to girls.

The following quote from Punke<sup>1</sup> substantiates this.

Different interests in life from those served by women's magazines, as well as a fear of being considered "sissies" deter boys from reading magazines appealing to women and maturing girls.

The articles chosen.--These articles supply informative, interesting material that relates to one or more of Read's<sup>2</sup> 17 topical areas in general science. The articles that have been given preference present their information in attractive form, some accompanied by fascinating, photographic illustrations and thus have appeal to the prospective reader on subjects of interest and value in general science.

The selective readings contain easy non-fiction that is brief enough to be read in a few minutes.

The wide circulation of these publications<sup>3</sup> gives ample reason to assume that their articles must be interesting and their periodicals easily available. Thus they comply with the necessary requirements to be listed in this annotated bibliography.

1. Harold H. Punke, "The Home and Adolescent Reading Interest", School Review (October 1937) Vol. 45, p. 619.

2. Read, op. cit.

3. "U. S. Magazines of Large Circulation", The World Almanac, Sixty-Fifth Year of Issue. The New York World-Telegram, N. Y., 1950, p. 536.

The experience of the writer in teaching general science furnishes background enough to select articles that meet the stated specifications.

Access to such scientific articles cultivates thinking, broadens background and enriches the knowledge of science in a way that is simple enough for the youthful mind of the ninth-grade student.

### CHAPTER III

#### BIBLIOGRAPHY OF ARTICLES

##### Related to Air

1. \_\_\_\_\_, "Torrid Belt 30 Miles from Earth", Popular Mechanics (May, 1949) Vol. 87, No. 5, p. 84.  
Thermometers carried by V-2 rockets and reported temperature readings.
2. \_\_\_\_\_, "How Fast Is 3,000 m. p. h.?" Popular Science (May, 1947) Vol. 150, No. 5, p. 119.  
Speeds of the stratospheric rockets; illustrated.
3. \_\_\_\_\_, "Humidity Controls Comfort", Popular Science, (June, 1947) Vol. 150, No. 6, p. 220-221.  
Humidity and its effects accompanied by experiments.
4. \_\_\_\_\_, "1948 Rocket Will Double V-2's Record", Popular Science (July, 1947) Vol. 151, No. 1, p. 75-77.  
Rocket designed for scientific survey trips into stratosphere.
5. \_\_\_\_\_, "Why a Spinning Ball Curves", Popular Science (October, 1947) Vol. 151, No. 4, p. 216-217.  
Experiments showing principles of air pressure.
6. \_\_\_\_\_, "Jet Wing Takes Off", Life (November 3, 1947) Vol. 23, No. 18, p. 38-39.  
Description, cost, and research of huge bat-shaped airplane.
7. \_\_\_\_\_, "Two Hundred Tons--And It Flies!", Popular Mechanics, (January, 1948) Vol. 89, No. 1, p. 124-128.  
Cost, weight, size and speed of largest plane ever flown.
8. Goodwin, Chalmers, "Twenty Minutes of Eternity", Reader's Digest (January, 1948) Vol. 52, No. 309, p. 43-46.  
Descriptions and sensations of pilot's ride as launched in the XS-1 rocket plane.
9. Colton, F. Barrows, "Our Air Age Speeds Ahead", National Geographic (February, 1948) Vol. 93, No. 2, p. 249-272.  
Advances and future predictions of flying.

10. \_\_\_\_\_, "Law of physics Is Demonstrated by 'Diving' Medicine Dropper", Popular Mechanics (February, 1948) Vol. 89, No. 2, p. 180.

Amusing demonstration of Archimedes' principle.

11. \_\_\_\_\_, "Air Force Displays Its New Jet Planes", Life (April 26, 1948) Vol. 24, No. 17, p. 34-35.

A glimpse of the air war present and future.

12. \_\_\_\_\_, Francis, Devon, "New Balloons Explore Roof of Airways", Popular Science (May, 1948) Vol. 152, No. 5, p. 98-104.

Unmanned balloons investigate conditions of sound, wind, temperature, and gravitation above the earth.

13. Boone, Andrew R., "Planes Race Past Sound", Popular Science (June, 1948) Vol. 152, No. 6, p. 102-104.

Reasons for successful airplane flights into and through the transonic region.

14. \_\_\_\_\_, "This is the Plane That Outflies Sound", Popular Science (August, 1948) Vol. 153, No. 2, p. 96-97.

Bell X-1 succeeds in smashing one of world's physical mysteries.

15. \_\_\_\_\_, "The Stratocruiser", Life (August 16, 1948) Vol. 25, No. 7, p. 38-39.

Views and schedules of world's fastest airliner.

16. \_\_\_\_\_, "Atomic-Powered Rocket For Carrying Man to Moon", Popular Mechanics, (September, 1948) Vol. 90, No. 3, p. 108.

Around-the-moon flights of man-carrying rockets as foreseen by the British Interplanetary Society.

17. Clark, Blake, "Dorothy Massie, Classroom Magician", Reader's Digest (September, 1948) Vol. 53, No. 317, p. 121-124.

Explanation of principle that water boils when its internal pressure exceeds the pressure from outside.

18. \_\_\_\_\_, "Tilting Wings Aid Flight", Popular Science (November, 1948) Vol. 153, No. 5, p. 155.

Description and use of pivoting device on British amphibian.

19. \_\_\_\_\_, "More Power To You", Reader's Digest (November, 1948) Vol. 53, No. 319, p. 107-109.  
Story of jet plane, its take off, amount of heat produced and speed.
20. \_\_\_\_\_, "Nineteen Die in Pennsylvania Smog", Life (November 15, 1948) Vol. 25, No. 20, p. 107-110.  
Cause and effect of impurities in air.
21. \_\_\_\_\_, "Air Scooter", Life, (December 20, 1948) Vol. 25, No. 25 p. 55.  
Details of nations smallest piloted airplane.
22. Johansen, Herbert, "Riding the Ramjet", Popular Science, (January, 1949) Vol. 154, No. 1, p. 130-131.  
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CHAPTER IV  
CONCLUSIONS

Results of Study

1. This study produced 487 different articles of which Popular Science furnished 141; Life, 129; Popular Mechanics, 116; Reader's Digest, 69; and National Geographic, 32. These timely, well-written and illustrated articles develop enriched backgrounds in the many topical areas covered in the ninth-grade science curriculum.

2. Twenty-five of the articles were related to more than one topic. Forty-seven of the articles were related to air, 27 to astronomy, 16 to bacteria, 94 to chemistry and fire, 5 to communication, 33 to conservation, 45 to geology, 21 to heat, 28 to human body structure and food, 51 to light, 25 to magnetism and electricity, 2 to scientific thinking, 12 to sound, 21 to transportation, 29 to water, 20 to work and mechanics and 36 to weather.

3. The periodicals covered all of the 17 topical science areas ranging from 2 articles concerning scientific thinking to 94 articles concerning chemistry and fire. A close examination showed that chemistry had more listed readings than any other single topic. Chemistry led with 73

related readings while its combined topic, fire, had 21.

4. The average number of articles per issue produced by the 300 examined periodicals are Popular Science, 3.91; Popular Mechanics, 3.22; Reader's Digest, 1.91; National Geographic, .88; and Life, .82.

5. The particular science area stressed by each of the periodicals is noteworthy. The Reader's Digest contained the greatest number of articles on human body structure and food. Popular Science, Popular Mechanics and Life devoted their largest number of articles to chemistry and fire. The National Geographic emphasized geology though Life contained more geological articles.

6. The number of science articles per year in these periodicals showed an increase of 43 articles in 1949 over 1948. The year 1949 yielded 178 readings of scientific value in the general science course.

7. The space devoted to these science articles, including charts, diagrams, illustrations and printed matter, covered part or all of 2132 different pages. The number of part or whole pages devoted to this science material by the different periodicals was National Geographic, 722; Life, 433; Popular Science, 367; Popular Mechanics, 357; and Reader's Digest, 253.

8. The average length of the articles including pictures, diagrams and charts was 4.16 pages per article and slightly

over 7.01 pages per issue.

9. The topical area most prominent in the various periodicals (as indicated by **space**) proved to be similar and dissimilar to the topics emphasized by their number of articles in these same periodicals. Geology received the largest amount of space accorded any topic by the magazines perused. National Geographic ranked first with respect to the number of pages devoted to this science with Life filling second place. Popular Science and Popular Mechanics gave their greatest amount of space to chemistry and fire. The Reader's Digest placed its emphasis by space on human body structure and food.

10. The picture space of these magazines showed wide variations. The photographic space in the National Geographic accounted for the fact that this periodical contained the largest number of pages and the fewest articles. An examination of the picture space of the National Geographic disclosed 451 full pages of photographs. This left 271 pages of printed matter for 32 articles. The National Geographic had an average of 14 full page pictures per article. Life averaged ten pictures of various size to each article. With the exception of the Reader's Digest, most articles allotted a liberal amount of space to illustrations, charts and diagrams.

11. This study did not exhaust the science material in these magazines. Many comprehensible and stimulating articles were not included as they would not fit under any of the categorical areas. Some articles contained excellent items pertaining to science but were eliminated if the emphasis of the article was not within the limited scope of subjects included in this study.

#### Suggestions for Use of the Bibliography

1. The realistic, practical material in this bibliography may be used to bring science closer to the student's life. Views of human living today through these articles may shape the mind of the student so he may enjoy a fuller and more effective life.

2. These articles may prove useful to those constructing a unit on science. These readings maybe of particular value in that they cover all the areas included in a modern science program. The unit system has placed emphasis on the individual differences of the pupil. Many of these articles have devoted their major space to photographs, therefore they can aid visually in providing for range in student ability in addition to being suited to the needs of the average boy or girl in a ninth-grade science class.

3. Articles concerning futurity, the predictions of the scientists, may be used to stimulate the student's thinking and to bring about lively discussions. Stimulation of

the mind through these readings may result in promoting interest that increases learning.

4. These optional related readings may aid in revising the teaching of science to the more desirable methods advocated by today's educators. The articles, fresh in content, may be used to shape the science curriculum and keep it in pace with recent world developments.

5. The bibliography produced by this research may prove to be of considerable value to the teacher as well as the student. This study supplied up-to-date, informative, scientific material capable of providing background enriched in the knowledge of science.

