

TREASURY DEPARTMENT  
UNITED STATES PUBLIC HEALTH SERVICE  
V. D. BULLETIN No. 50

A High School Course in Physiology  
in which  
The Facts of Sex are Taught



PREPARED BY DIRECTION OF THE SURGEON GENERAL

1919



## A High School Course in Physiology in which the Facts of Sex are Taught.

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SEX HYGIENE in the high school with which the writer has been connected has been included as an integral part of the course in general physiology. This is its natural setting; and nowhere else does it appear to make the same appeal.

The present methods of teaching physiology in this school began to be developed ten years ago. At that time the direction of athletics was given to a man who was also qualified to teach physiology. His participation gave the opportunity to separate the boys and girls, and to offer to each group the instruction best adapted to its needs. The work in sex hygiene was very carefully and gradually introduced. At first it was a brief extension of personal hygiene, adding for the boys a discussion of venereal disease, and warnings against the various cure-alls for sex weakness then being advertised in our city papers.

The subject has usually been given for one semester of the year. At first there were only two sections, one of girls' and one of boys, but at present there are six sections with a total enrollment of 150. In the past ten years more than a thousand pupils have received the instruction in physiology and sex hygiene substantially as outlined below. Practically all features of the work in sex hygiene have been the result of continuous experiment on the part of the three men and four women who have been connected with this work.

Physiology is now taught five sixty-minute periods a week for one semester of twenty weeks. For the most part two of these periods are given to laboratory work and three to class work. Although in the curriculum the subject is placed as a tenth grade elective, in actual practice the classes always contain students of all grades above the ninth. Ninth grade students are never taken unless they are much older and more mature than is the rule in that grade. Since the subject is elective many students who can not take it during the tenth year elect it later. In many subjects this would be objectionable, but in physiology the more mature views of the older students are often helpful to the younger ones. The ages of the students run from fourteen to eighteen years with occasionally one or two of twenty years. There are colored and white students in the classes and all the racial groups of a cosmopolitan city, including Dutch, German, Lithuanian, Polish, Syrian and the conglomerate race we call American.

Many of the girls come from homes in which some instruction in sex hygiene has been given them. Others state that it had never before been mentioned to them by their mothers. The latter is as often true in the homes of the educated and cultured as under other conditions. The less fortunate mother knows more about the possible temptations and gives more serious warnings. Boys rarely have had much more information than they pick up from their companions.

Students entering the physiology class are expected to have had a semester either of botany or zoölogy. Frequently, however, the requirements for entrance to a particular college are so rigid that this is difficult. The student, therefore, who does not wish other biological science is not compelled to take it. A desire to take either botany or zoölogy after the course in physiology is completed is often noted. No student is refused admission to physiology because of lack of previous preparation.

#### OUTLINE OF GENERAL PHYSIOLOGY.

For the regular work in physiology a small text prepared especially for the writer's classes is used. This is not because of a dearth of physiology texts on the market, but because a special introduction to the subject is desired and also because the time is limited and it is necessary to deal only with essentials. Anatomy is subordinated to physiology and hygiene, and there is a very close connection between the classroom work and the work done in the laboratory. A special laboratory manual is also used for these classes.

The teaching of physiology can be begun at almost any point desired. This particular course begins with the cell. The lesson in the text is illustrated with a microscope or a microscope lantern and as many kinds of cells as possible are shown, including living plant and animal cells, stained sections of muscles, etc. This is followed by a lesson in the laboratory on the use of the microscope for discovering the structure of the cell. The cell and its work form the basis of the course for the semester.

Textbook work on the elements found in the body and classes of compounds are illustrated as far as possible in the classroom. It is followed in the laboratory by the study of food and digestion. Simple experiments in testing for starch, protein and peptone are followed by experiments on digestion *in vitro*. These are accompanied in class by a discussion of the hygiene of the mouth, nose and alimentary canal in general, as well as a detailed study of foods and digestion.

Next comes the study of the entrance of food into the blood and the utilization of the food for energy. This brings about a discussion of the ductless glands and hormones. The hormones of the reproductive glands may or may not be mentioned here, but sufficient attention is given them

to make easy the discussion of the reproductive gland hormones when they are studied at the time devoted to sex hygiene.

Dissections of the heart and lungs of cattle or sheep are always given when the heart or blood vessels are under consideration. Here is made clear another point for later use in connection with sex hygiene—the fineness of the adaptations in the machinery, and the possibility of disturbance from other causes, such as adenoids, diseased tonsils and endocarditis. Osmosis is studied by various experiments and emphasis placed on it for future use. The study of the lungs, skin and kidneys furnishes much opportunity for the presentation of the hygiene of ventilation and cleanliness.

The pupils by this time are interested in the bones and muscles which are studied together. The skeleton is studied with special relation to defects of posture, effects of these, and the difference in the skeleton of man and woman.

A study of the nervous system is made under the topic "How the Body is Controlled." The responsibility of the individual to his own nervous system is emphasized for the purpose of a better understanding of the effects of fatigue, exercise and right living. The last three main divisions deal with bacteria, the conservation of health and first aid. Bacteria are studied to make plain various requirements of hygiene and sanitation. The information acquired may also be used to advantage in the study of venereal diseases. Probably no part of the course arouses and holds the interest more completely than the study of inoculation by various methods of the nutrient media in the petri dishes and the resulting growth of bacteria and molds. The teaching of bacteriology for nurses in the same laboratory gives the opportunity to use added equipment and to study many stained specimens.

The discussion of the "Conservation of Health" is modeled on Fisher and Fiske's "How to Live." The cost of illness and the possibility of the control of many diseases is made clear. This is an adequate background for the presentation later in the course of the cost of venereal diseases in the sacrifice of child life, domestic unhappiness and ruined careers.

The outline above does not present all the topics discussed; it emphasizes isolated points which relate themselves to the division of the course presenting sex hygiene. The course itself aims to be a sane and well-balanced treatment of physiology and hygiene for its own proper value in the lives of students. In addition it furnishes a setting for the study of sex hygiene which is included in the latter part of the course. The more inclusive aim of the general course may be better understood by quoting the introduction to the textbook used in the writer's classes.

"It is the purpose of this physiology to make some answer to the perennial question, 'What knowledge is of the most worth?' with the intent that

the students of the Central High School may be physically efficient to meet the inevitable difficulties and bear the burdens that come to all of us. The source of all the solid, durable satisfactions of life is the indispensable foundation of health. Domestic happiness and professional efficiency, personal usefulness and honorable careers in the community, productive citizenship in any capacity; are conditioned on clean bodily vitality. Neither as individuals or communities shall we reach our highest standard of usefulness and prosperity until we realize that the basis of the art of living lies in the intelligent care and use of the human body."

The subject matter presented in the general treatment of physiology, of use as a foundation for sex hygiene, may be briefly summarized as follows: The structure of the cell, cell secretions acting as "chemical messengers," the hormones, interdependence of organs and the necessity of the undisturbed functioning of all; nervous equilibrium with a controlled will to keep the individual to the determined plan of action; exercise and the value of games and contests in group-action, the common disease infections and their results in the body, and the need of personal hygiene and quarantine laws for their prevention and control.

#### METHODS OF TEACHING SEX HYGIENE.

The work outlined in the preceding pages forms an excellent introduction to sex hygiene. The material used, its arrangement, and many of the methods employed in the classroom for this specific branch of the subject need to be related. In the first place sex hygiene is never referred to as such in the classes. It is called special physiology for girls or boys, as the case may be, and is treated precisely like any other division of the subject—from the scientific-standpoint with such personal applications to life as the class see and can understand.

The general aim and method in teaching sex hygiene may be best set forth by quoting from the introduction of the text used with girls.

"It is a long time now since Huxley said of physiology texts, that if they were to be inspected by visitors from another planet, or by a later age, it would be concluded that man had been a sexless animal. We have finally learned that sex and its manifestations are not subjects to be avoided, but rather to be treated scientifically and openly, so that from them as well as from the lesser facts of life we may gather inspiration for better living and cleaner thinking. It is with this object in mind that this book has been prepared for my own students. . . ."

"If it may also serve to establish clearer ideals in the lives of other young women as well, it will fulfill all that the writer hopes for its use."

The book is put into the hands of the girls only for periods of supervised study. At or near the end of the course each girl is given a book and asked to show it to her mother.

The material employed in the girls' classes in sex hygiene will now be outlined. In every case where the material for the boys differs from that used for the girls, the difference will be stated.

For the day this work is to begin it is customary to assign a review lesson in the regular text. After the talk for the day is done and the questions are discussed, there is almost always time for a few questions on the assigned work. This plan is followed so that the pupils will go out of the room at the close of the period talking of something else. It lessens self-consciousness and provides a normal return to the topics of everyday life.

The first lesson usually takes up little more than the single-celled plants and animals and their methods of reproduction. "Immortality" among the protozoa, methods of asexual reproduction, the formation of spores in molds, conjugation and subsequent division in paramecium are always interesting and bring many questions. If protozoa are available they are shown under the microscope. For the next lesson one or more blooming plants are examined in class, the pollen is shown under the microscope and cross-fertilization is demonstrated. Plants with large flowers like the lilies are best for this use. The union of the nucleus of the pollen cell with the ovule cell is shown by diagram. This is explained as sexual reproduction—the only method of producing young among the higher animals. Egg and sperm cell are shown and the sizes of eggs of common animals such as the frog, fish and bird are discussed. Fertilization among animals is explained to be the same as in plants—that is, a union of two different elements. Attention is drawn to the fact that in land animals some method must be used which will assure the meeting of egg and sperm. Since bees are kept in the laboratory and many students are interested in their care, the wedding flight of the queen bee is described as an example of internal fertilization. The number of sperm cells received, the fact that the drone cells are unfertilized, and the death of the drone are all included in the description *so that internal fertilization becomes only one fact among many.*

This description makes it plain that in the higher animals much more than the simple system of caring for the eggs and sperms in the lower forms is necessary. Diagrams of the reproductive system of some animals are put on the board.

This work on a few occasions has been given by the writer to classes of boys, and there has never been any sign of self-consciousness, even when the boys knew that lessons on human reproduction and venereal diseases would follow. One of the older boys, when asked if this particular lecture given last year by a man was successful, replied: "Yes, but none of the boys would have minded if you had given it as you did the remainder of the lessons." This instance does not in any way go to show that a woman can give this work for boys as well as a man can do it. It does show,

however, that much of the embarrassment felt by some teachers is due to themselves and communicated by them to their pupils.

The study of the human reproductive system is next introduced. Models of the female reproductive organs are used. (When the course is given by a man to boys, models of the male reproductive organs are used). These are very simple and are supplemented by drawings, use of manikin and skeletons, with an explanation of their location and structure. The function of each part of the human reproductive system is discussed. In neither case is the effort to explain the structure of the other sex carried further than is needed to give satisfactory understanding. In the case of the boy more is needed than in that of the girl.

In connection with the reproductive organs the egg cell and its history, or the sperm cell and its pathway, as the case may be, are discussed. The development of the reproductive organs at maturity, especially the hormones secreted by them with their effects, are also taken up. Illustrations from animal life make clear the necessity of the secretions for development.

A very little of the historical phase of the subject, such as primitive beliefs, the effect of sex on the development of the race, the evolution of woman from a chattel to a companion are included in this portion of the work.

"The Beginnings of Life" is the title of the next section. No one who tells the story of the maturation and development of the egg cell—the chromosomes and their meaning—need fear any lack of interest. A series of models of ovary, egg, and embryo on an enlarged scale are used. More use, however, is made of a lump of plasticine. Maturation of egg and sperm cell is shown by chart, chromosomes are discussed, and the reason of the reduction division is seen. Then by colored drawings the union of the egg and sperm nuclei is traced to the time of the division of the cell into two parts. From this point the growth of the embryo is traced by modeling. The dependence of the embryo on the mother for food goes back to the question of osmosis; a clear understanding of the manner by which food is received and wastes are disposed of will do something towards removing the fear of prenatal influences which hangs over so many mothers.

For the girls some time is spent in the study of development, for the boys not so much. The boys need to know enough to enable them to reverence the mothers who bore them, and to understand the possibilities of heredity. The history of the growth of the child before birth and the suffering of birth should leave the boy in a new attitude of respect for women. One mother of a high school boy who had studied physiology in the months just preceding the birth of a baby brother, made a visit to the school to express to the teacher her appreciation of her son's changed attitude and care for her during her difficult months.

Hygiene is fully discussed with each group. It is desired to make the girl feel that her possibilities are too great and too valuable for her to be careless, and the boys are shown that hygiene is one safeguard to their ideals. Since the sex organs hold the key to the normal development of the individual in body, mind and spirit, manhood and womanhood are dependent upon them. Hygiene can not take the place of morality, but its habitual practices can furnish a background to morals, considerable in its effects. The teaching of the boy includes an appeal for real chivalry and the adoption of an attitude toward all girls which he wants other men to take toward his sisters. The girls' attention is called to the fact that *the common standards of boys and girls are set by the girl.*

It is earnestly desired and sought to make girls realize how they cheapen themselves and lower ideals of themselves when they allow familiarities. The result of such familiarities is often a criticism of the girl's mother, and many girls are sensitive to this. The feeling that they may lose friends if they refuse to permit such actions often disappears when they learn the remarks boys make about them. To hear that the boy said, "I put up a bluff, and she was easy," gives a different feeling about the boy's action.

The story of the unmarried mother is taken up but not dwelt upon at any length. The number of births in the city taken from the records and the number of those who are illegitimate children are presented. The story of the girl, her loss of friends and home, of the unwanted child, hated before its birth with no place provided for it in our scheme of things, makes a deep and lasting impression upon both the girl and the boy. The stories which come back to the teacher are a clear indication of this effect. The suggestion to the teacher that some one should look after such a girl in the school or the inquiry as to where such a girl in the neighborhood may be sent for rehabilitation is frequent.

#### THE STUDY OF VENEREAL DISEASES.

Many of the mistakes which are made in the teaching of sex hygiene are made at this point. No amount of teaching can scare a boy into the straight and narrow way. If such teaching is carried too far it may turn him in the other direction. Not alone what he may get, but what he may give, and to whom, is the thing that affects the average boy. The study of venereal diseases is made more emphatic for the boys than for the girls. It is not wise to make girls feel that every boy or man they meet is of questionable habits. Such teaching is destructive. Girls are taught the connection of venereal diseases with the prostitute—its many innocent victims, its effects upon women and children, and the need of physical fitness for marriage.

To the boys, the man in charge presents the case of the prostitute—somebody's sister—whom some man has put in her present position, the percentage of feeble-minded women among prostitutes, the futility of medical inspection, the uncertainty of prophylactics, and finally the results of the disease to the victim and to those he loves. The diseased boy may become a danger to his mother and sisters; a diseased father may cause his own children to be born blind and sickly, handicapped by an hereditary taint. This appeal has proved very strong among boys.

At this place also the teacher can make the strongest plea for a clean life of which he or she is capable. Here a boy needs instruction by a man—a young man who knows men's temptations and leads a clean life himself.

The coach, the athletic instructor or any man who deals with boys does his best work here. The teaching must be lived as well as taught. It must be associated with the best the boy knows. Back of it must be a foundation of physiology and hygiene. The boys are told that their very physical strength should hold them back from imposing on the weaker, that their knowledge should restrain them when the girl is ignorant. It is urged upon the boy that with other good men he should repudiate the double standard. Many of these points will be developed by the boys themselves in response to the suggestions of the teacher.

There are other points of emphasis; nobility of character can not go hand in hand with selfishness and sensuousness. Efficiency and the concentration of will power for mastery of studies or industry do not go with the inability to exercise self-restraint. Experience indicates that among the strongest motives to be urged is the square deal. Boys admire fair play. "It's a clean team," is very high praise from a boy. Girls are future mothers; on his treatment of them depends the future of the race. As a nation treats its women, so it determines its place in the scale of civilization. No boy wants to be thought "yellow" enough to rush out to safety and leave women to perish in case of accident. How much better is the boy or man who gets a girl into a trouble which ruins her life and leaves her to face it alone?

The results of this teaching of sex hygiene tend to the development of girls whose honesty is contagious and whose love of wholesome fun keeps everybody else in the open; of boys who are not "sissies" but who control their impulses for the sake of the mates they will have later. A clean mind, an interest in clean athletics—not a sideline rooster's interest but a performer's; deliberate avoidance of suggestive temptations; a hobby to occupy the leisure moments when the devil who tempts the young is at his best and, every day, enough of work and play to send a boy tired and sleepy to his bed—these after all are the great needs of the boy's life.

Finally the problem of heredity is discussed. To those who have not tried the teaching of this subject it may seem complicated and very difficult. Two books in which the problem is very simply presented are suggested here for the use of teachers of any form of biological science. These are "The Next Generation," by Frances Gulick Jewett, and "The Third and Fourth Generations," by Elliot Rowland Downing, of the School of Education, University of Chicago. The latter especially will provide teachers with a number of illustrations for their purposes.

The charts which show the Mendelian laws as worked out in animals and plants, and such unit characters as have been worked out for man are used in presenting this part of the subject. It is not necessary here to repeat these laws or their applications. The books mentioned and many others will give the information needed. Several interesting charts of inherited family peculiarities have been collected for class use by the pupils.

The essential point is the application of the knowledge. Boys are always much interested in the pedigrees of race horses or farm animals; girls display more interest in plants and family histories. The study of feeble-mindedness leads directly to the discussion of eugenics and what constitutes a good stock. The closing paragraphs of the book given to the girls will indicate as well as may be done in a brief discussion the direction of this study.

"In order to be sure of good stock one should know the history of three successive generations; among them should be none of the defective unit characters just mentioned (alcoholism, epilepsy, feeble-mindedness, criminality, syphilis, insanity). So long as your ancestors were sober, sane, and honest you have a good inheritance. One may well be proud of such a family record. The fact that you are preparing yourselves for more effective living argues that good qualities must predominate in your inheritance.

"If fifty years from now, a similar group of girls is studying this subject in this city, the chances are that some of you will figure as their ancestors. The past has indeed furnished the variegated web of your characters, but your responsibility is to the future; what kind of ancestor are you going to be? Wisdom and courage will both be needed, if this sacred flame of life you carry shall be passed on undimmed. . . ."

"What we need to realize is what is best in the interests of the race; to get into our minds a broader view of humanity, and see it as it has struggled upward through the past, under heavy handicaps. It is an infinitely pathetic spectacle, this long procession of human beings whose greatest and ever-increasing burdens are due to their ignorance. Once a person gets such a view, and sees not only the multitudes of the past but the numbers yet to be born, all pressing onward to the same invisible goal, and

all heavily burdened, he will never willingly add to these burdens. Each normal person born into the world owes society some form of service. If your service to society is to add to the world's children, see to it that the heredity you give them is a desirable legacy."

The book used for girls is valuable for reference more than for anything else, but for this use it has been found to be a great help. A book for boys, along a similar line, is to be prepared during the coming summer.

#### THE RESULTS OF TEACHING SEX HYGIENE.

Sex hygiene is not presented as a cure-all for the evils that afflict the world. No one knows better than those who have tried this teaching that it is not infallible, but it does help and often makes the difference between right and wrong living. In the writer's desk at this moment and in her memory also are the grateful letters of those whom it has helped. From the Mexican border, from the cantonments in this country and from the boys abroad have come, in these last four years, undoubted evidence of the value of these teachings. In one way or another has come back the message: "I have come through clean, because I had been taught."

#### ATTITUDE OF THE TEACHER.

Some things are taught by teachers who do not believe in them, see no use in them, or even consider them a waste of time. There can be no such half-hearted teaching of this subject. If the teacher is not convinced of the necessity, the desirability, the unavoidable duty of giving this knowledge to boys and girls, he has not the right to attempt the task. If he would aid in the perfection of body as a fit temple for the soul, this work will appeal to him as a high privilege for helping boys and girls to be true men and women who will keep the racial destiny consciously in their hearts.







