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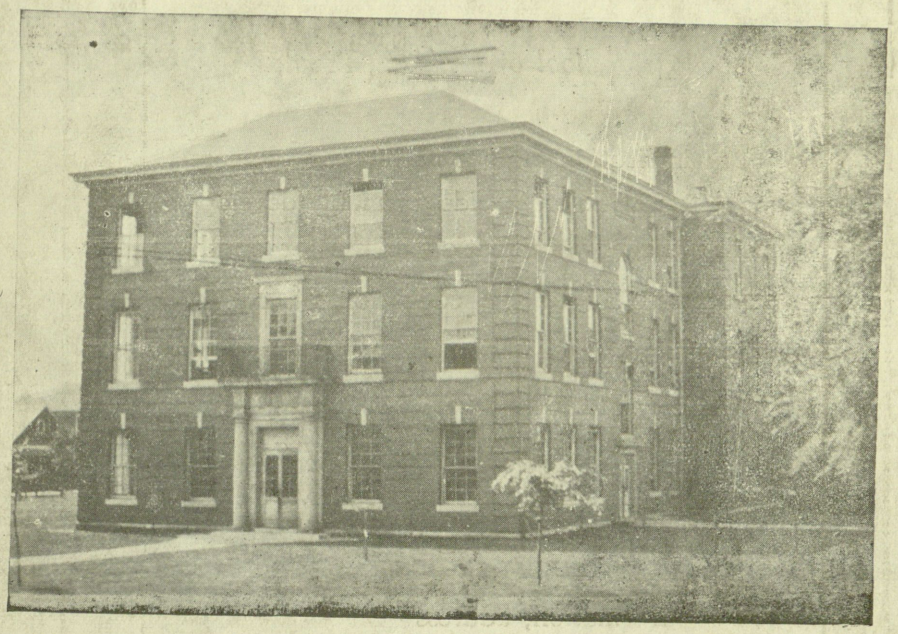
The Morehouse *Journal of Science*

BURWELL T. HARVEY, JR., *Editor*



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FEATURES

OUR VIEWPOINT

SUMMER SCHOOLS

From all over the Southland come encouraging reports of large attendance at the various summer schools. Why have they come? Is it from an inner urge or from an external mandate? Is it because they hunger and thirst after knowledge and desire self-improvement or do increase in salary because of attendance furnish the impetus?

I am sure every school has its quota of the following groups:

(1) Teachers, who love their work, and are ever alert, at any sacrifice to equip themselves more efficiently for their task, and to keep abreast of the time as to the art of teaching their particular grades or subjects.

(2) Men and women in other walks of life, who feel the lack of cultural background and knowledge of the humanities and sciences because of either poor training, or shortened scholastic careers.

(3) Teachers? No, job-holders and clock watchers who have no interest except to carry out the letter of the law by attending summer school. Those vagrant summer tramps, who attend a different summer school each year, taking the same courses over and over, hoping thereby to be able thus to pass each summer with the least possible amount of mental exertion.

(4) Undergraduate students; flunkers either from slovenliness or lack of ability, whose fond parents, much against the desires of the student, send them to summer school under less rigid rules as to conduct et cetera, and expect that to be accomplished in six weeks, which was impossible in three or four months.

(6) Undergraduate students, who have received a passing grade according to the latest fad in marking but not such that it carried honor points. Hence they find themselves deficient in honor points. For this reason they are repeating the course in a six weeks course, where they hope—because of their "little learning" to bluff the teacher as to their superior knowledge and get a higher passing grade to present to their Alma Mater in the fall, with a sigh of relief, for honor points.

The first three groups it is pleasing to note are in the majority, and show each year indications of a steady increase, and are the pride and joy of summer school administrators and professors.

The fourth group will diminish and disappear as school authorities give more attention to the courses pursued by teachers, during the summer and require that a passing grade be attained in order to secure credit for attendance.

The fifth and sixth groups if they are to be retained, will require study and adjustment as to their relation to the aim and purposes of the majority of the Negro Summer Schools, which are not primarily an integral part of the regular school term, or run for the benefit of regular school undergraduates.

DR. EDGAR FAHS SMITH

"When Dr. Edgar Fahs Smith passed on to join the immortals whose lives and works had always held for him such an absorbing interest, American Chemistry suffered the loss of one of its best-loved and most charming devotees. He will take his place in the history he loved so well as an eminent chemist whose long and active lifetime was filled with notable achievements. Yet those who knew him will remember him primarily as a *remarkable* and a *delightful personality*."

We agree heartily with the writer of the above as to the final estimate of the character of Dr. Smith. We have underscored the words "remarkable" and "delightful personality." For thus, he impressed us, when after we had delivered a paper before the Section of Chemical Education at the annual meeting of the American Chemical Society in 1922 at Carnegie Institute, Pittsburg, Pa., on "The Teacher of Chemistry in Negro Private Schools," Dr. Smith, then President of the Society as well as Chairman of the Section, sought us out after the morning session, and after asking some further questions concerning certain data quoted, shook hands heartily, and expressed the wish that we would follow up this beginning and not be content until some of the conditions were corrected. His final parting words with a kindly twinkle in his eyes, still urges us on. "Go to it, you are on the right track."

A DECADE OF NEGRO SELF-EXPRESSION

We are indeed grateful to Dr. Dillard for this occasional paper, number 26, of the John F. Slater Fund, as well as the accompanying letter expressing the opinion that the *Journal of Science* was worthy of listing among the magazines.

We recommend this paper to our readers as a guide for future reading and a source book for locating information concerning the following topics: Social analysis and discussion, The Negro's Cultural Background, Historical Studies, Collections of Negro Poetry, Negro Poets, Fiction and Belles Lettres, Negro Music, Negro Magazines and other Occasional Papers published by the Trustees of the John F. Slater Fund.

GENERAL EDUCATION AND NEGRO PRIVATE COLLEGES

The General Education through its recent conditional gifts to Talladega, Wiley, Virginia Union and Morehouse has put its stamp of approval in a very definite way on the type of personality and leadership as well as scholarship which is nurtured and will continue to be produced by our best private schools. There is a certain type of personal attention to conduct, ideals and well being which the private school alone can development. It is the recognition of these facts that prompts the General Education Board to lend a helping hand to the permanency of some of the best of these institutions, as the general public becomes more and more disposed to turn over the education of

the Negro youth of the land to the Land grant and state supported institutions. We are hoping in the near future to set forth the need of at least one Private Academy of a type for the training of key men, to enter the Freshman classes of these Colleges, and mold sentiment and character, on a basis of deep and broad scholarship and cultural training, which will help to guarantee the achievement of the highest aims and purposes of the Negro Private College.

IN THE EDITOR'S MAIL

In re The Morehouse Journal of Science, Volume 11, No. 2. The magazine is relatively young yet quite old in terms of many scientific magazines which have come up in a flash and died in the same time. The Journal has a place among worthwhile educational publications. It is scientific and readable. I congratulate the Editor and his Associate workers on the publication. The April issue of 1928 commends itself to persons interested in advancing science.—President John W. Davis, W. Va. Collegiate Institute, Institute, W. Va .

Please permit me to congratulate you and the other editors of "The Morehouse Journal of Science" for the most excellent magazine you are issuing. The April number is especially interesting.

I desire that you know of my appreciation, as I have enjoyed reading the different issues.—Dr. E. A. Pound, State High School Supervisor, Atlanta, Ga.

I am very sorry that the Journal of Science was not included in the list of magazines in the recent publication, copy of which I am sending you. It certainly ought to have been included and if a new edition is published, I shall see that it is included. I congratulate you heartily on the publication.—Dr. J. H. Dillard, President, The John H. Slater Fund, Charlottesville, Va.

NATIONAL ASSOCIATION OF TEACHERS IN COLORED SCHOOLS

The National Association of Teachers in Colored Schools holds its 25th annual session in Charleston, West Virginia, July 24-27. The conference theme is: "A Strong Association and Efficient Teacher Serve the Child." More than 3,000 teachers are expetcd to attend the association. Many will come in special cars and by automobile.

Among the principal speakers are: Miss Cornelia S. Adair, President, National Education Association; Dr. Mordecai Johnson, President, Howard University; Dr. Carter G. Woodson, The Association for the Study of Negro Life and History; Dr. Hardy, Official Representative, Canadian Federation of Teachers; Dr. Thomas, Official Representative, World Federation of Teachers; Miss Mable Carney, Graduate School of Columbia University.

The organization issues a bulletin monthly during the school year which contains research and studies along educational lines made by its officers and members. The yearly membership of the organization is $1.50, and includes a year's subscription to the bulletin.

DATUM, DATA

Down in sunny Buenos Aires,
  They call a vamp patata,
They speak la lengua espanol,
  And insist upon *la data.*

But up in bleak New England,
  Not quite so cold as Etah,
They follow Webster's unabridged,
  And intonate it *dayta.*

Barbarians out in Arkansaw
  Care not to whom they cater,
Any old parlance goes with them,
  They call it simply dayter.

Some reckless folks in other climes,
  Disgracing Alma Mater,
When questioned on their own research
  Reply, "I'm accumulating dater."

Then, there's the chap, who should be shot,
  (His re-search doesn't matter)
Who every time he opes his mouth,
  Talks about his datta.

And last we treat the hopeless guy,
  If he doesn't know better he oughta,
Who in spite of profs and courses and books
  Still pronounces it daughta.

So with dayter, dayta, datta,
  And with data, daughta, dater,
No matter where the mean may lie,
  Statistically, there's too much scatter.

I don't know what in h—l to do
  In this seeming simple matter;
But so long as God will grant me breath
  I'll never call it datta.

—F. E.

BIOLOGY AND PUBLIC HEALTH*

E. J. Sunkes, Georgia State Board of Health

Biology has been defined as "the science of life," including in its broadest aspects the investigation of all that pertains to the structure and functions of living things. Public Health might be defined as that phase of Biology which has to do with the ways and means of conserving and promoting human life.

It is advisable in considering this subject to obtain at the outset certain definite ideas regarding such words as "life"; "health" and "disease." Life has been defined as a period of activity of the vital living mechanism and death the final stoppage of the mechanism. In the normal course of events for all living beings, that mechanism which we call the body, is created, matures, degenerates and finally surrenders to death. Such is the normal course of events but, as Montaigne has so aptly put it: "To die of age, is a rare, singular and extraordinarie death." More often defects in the constitution or construction of the body or entrance into and unchecked proliferation of parasites produces an abnormality. We then have a condition known as "disease" resulting in temporary or permanent impairment of the body or even resulting in its death. That living organism which is enjoying the normal course of events which I have listed is therefore enjoying the condition known as health, while the body which is suffering from the abnormal conditions is suffering from disease. There are numerous methods of classifying diseases. From the standpoint of the biologist we might accept the classification proposed by Thompson in his book, "Everyday Biology." He states that from the biological point of view diseases may be classified as:

1. Constitutional
2. Modificational
3. Parasitic or Microbic.

Under this classification those abnormalities due to defects in the constitution or construction of the body would be listed as Constitutional while the abnormalities resulting from the entrance into the body and the proliferation therein of parasites would appear under Parasitic Diseases.

Now in our consideration of the subject of Biology and Public Health we are concerned primarily with the parasitic diseases. The parasites of human beings include both members of the animal and vegetable kingdoms. The animal parasites belong to the divisions Protozoa, Helminths and Arthropods. The vegetable parasites include the Schizomycetes (Bacteria) and the Fungi. Some use the term microparasite to denote those parasites microscopic in size while the term parasite includes not only the microparasites but also the animal parasites of macroscopic size. Likewise such terms as infection and infestation are used,—the former denoting presence of microparasites and the latter macroparasites. For

*Read before the Atlanta Association for the Advancement of Science, April, 1928.

example, the intestine may be infected with the typhoid bacillus and infested with hookworms.

For the sake of brevity let us select as an illustration of the biological forms producing disease in man the following:

1. A Bacterium representative of the vegetable parasite.
2. A Protozoan representative of the animal microparasite.
3. A Helminth representative of the animal macroparasite.

These three types of parasites are biological entities and it has been said that the vast majority of diseases of man are due primarily or secondarily to them. Their control and eradication has constituted one of the major problems of public health work. As illustration of diseases caused by these various types we might select typhoid fever, hookworm and malaria,—three diseases which are of great public health importance here in the South.

The causative agent of typhoid fever is a bacillus known as Bacillus typhosus. It is a one-celled plant which reaches the human body by being swallowed. When these typhoid organisms are swallowed by a susceptible person they pass to the intestines where they multiply rapidly. From the intestines they invade the blood stream and are carried throughout the body. In the blood and tissues they elaborate the poison, the effects of which on the different tissues and organs of the body give rise to the symptoms of the disease. From the bodies of persons sick with typhoid fever myriads of living typhoid bacteria are distributed in the stools and urine. Every typhoid fever patient should, therefore, be regarded as a source of infection, for if the excreta from this patient is distributed in such a manner that it can reach the mouth of susceptible persons, additional cases develop. Every person who has typhoid fever has recently swallowed some typhoid germs which have in some way come from the excreta of an infected person. However, there are some persons in apparently good health who harbor in their bodies and distribute in their excreta typhoid germs just as do persons who suffer from typhoid fever. These persons are known as "typhoid carriers." While they may show no evidence of the disease, yet they are capable of disseminating it.

We thus say that typhoid infection is a filth disease and that if human filth is prevented from reaching human mouths, typhoid fever will be prevented. If human filth is not properly disposed of, it can be carried in various ways with whatever typhoid or other disease-producing organisms it may contain to human mouths. It can be carried by washing rains or by surface drainage into water supplies, vegetable and fruit orchards. It can be scattered about by flies or animals From time to time it will get on the hands of persons and thence can be carried to water and foods. In this disease then we have a cycle in which the typhoid bacteria travels from the excreta of patients or carriers by means of hands, flies, and water to foods such as milk, vegetables and oysters and thence to the mouth of susceptible persons. What are some of the preventive measures used in the control and eradication of this disease?

1. Individual resistance is increased through inoculation of persons with typhoid vaccine. Here in Georgia the State Board of Health Laboratory manufactures and distributes free of charge annually thousands and thousands of doses of this vaccine.
2. Human excreta is properly disposed of and the typhoid organism is thus prevented from reaching susceptible persons.
3. Food and drink are guarded against contamination. Probably one of the most important functions of the State Board of Health here in Georgia is the guarding of public water supplies.

It can be safely stated that the proper and effective utilization of these measures would in the course of time eradicate typhoid fever.

Hookworm disease, caused by an animal parasite, has been and still is one of the foremost public health problems here in the South. It is caused by a helminth—the nematode technically known here in America as Necator americanus and commonly known as the hookworm. Here is another filth disease, for a study of the conditions under which the disease is disseminated shows that soil pollution with human excreta is necessary. We find that when hookworm eggs are passed from persons harboring hookworms these eggs under suitable conditions develop into embryos which hatch into larvae. These larvae undergo two moultings and are then infective for man. Usually the larvae gain entrance through the skin, although infestation by mouth may be possible. The larvae travel through the veins or lymphatics to the heart, then to the lungs, trachea, esophagus, stomach and finally reach the small intestines. Here further moultings occur and the sexes are differentiated, the worms growing to maturity. The mature worms feed on the mucosa and blood, moving from place to place in the intestines. They produce injury not only through feeding on the mucosa, but through the production of an anti-coagulant. The female worm passes enormous numbers of eggs, approximately 9,000 to 10,000 every twenty-four hours.

In this disease as in typhoid fever we find a vicious cycle which includes human infestation, soil pollution through the improper disposal of human excreta, soil infestation through the development of hookworm eggs and larvae, and human contact resulting in human infestation. Briefly, the means used to control this disease and eradicate the hookworm consists of—

1. Treatment of the patient to remove the worms.
2. Prevention of soil pollution through the construction of sanitary privies.
3. Prevention of human contact with polluted soil through the education of persons.

There are numerous other diseases here in Georgia that are caused by animal parasites. Among these I might mention the diseases caused by dwarf tape worm, the beef tape worm, the round worm, the pin worm and the whip worm. The State Board of Health Laboratory furnishes to doctors the specific treatment for hookworm disease and makes examination of feces for the presence of eggs of the intestinal parasites.

I have still to illustrate a disease caused by the third type of biological form which I have listed—the animal parasite of microscopic size. Such a disease is Malaria. It is caused by a protozoan of the class Sporozoa, genus Plasmodium. These organisms are blood inhabitors which reproduce by a process known as sporulation. In brief, the malaria parasite undergoes a period of development in two hosts, a vertebrate host—man, and an invertebrate host—a mosquito. Infection of man occurs through the bite of a mosquito carrying malaria parasites. Mosquitoes become infested through sucking in the blood of humans carrying malaria parasites. There is no more interesting study than that of the life cycle of the malaria parasite as it is found in man and the mosquito. What measures can be utilized to eradicate this disease? For one thing the human carrying malaria parasites must be treated until he is entirely rid of the parasites. This is one of the measures which frequently is not carried out effectually. Only too often the patient takes quinine just sufficient to ease himself, but insufficient to rid himself of all of the parasites. He then becomes a carrier and acts as a reservoir of the disease. Again the malaria carrying mosquito must be eliminated. One of the effectual ways to do this is to eliminate the breeding places and destroy the larvae. Here in Georgia there is one type of mosquito which carries the malaria parasite. This is the anopheline type and it is interesting to know that one of the functions of the Georgia State Board of Health Laboratory is the identification of this type of mosquito larvae. The Georgia laboratory is one of the few laboratories in the United States which does this work.

Another disease found here in Georgia which is caused by a protozoan is amebic dysentery, of which the causative agent is an amoeba.

In my discussion of these lower biological forms and their relation to public health I have probably over-emphasized the part they play in the causation of disease in man. It must be admitted that from a practical point of view this part is of surpassing importance. However, it must not be forgotten that many of them exert a marked influence upon the welfare of mankind in many other directions. For example, the bacteria not only disintegrate and destroy dead bodies and attack and kill living organisms, but some forms are also constructive to a high degree, and translate important chemical elements, like nitrogen and carbon, from unavailable combinations into substances that can be utilized by higher forms of plant life.

It has been discovered, for example, that certain kinds of bacteria profoundly modify the composition of the soil and the characters of crops and hence are of importance to the agriculturies; that other kinds of bacteria impart the characteristic flavors or aromas to butter, cheese and other dairy products; and that still others determine the success or failure of various industrial processes, such as the retting of flax, the tanning of hides and perhaps the curing of tobacco.

MINIMUM EQUIPMENT FOR HIGH SCHOOL CHEMISTRY*

This committee was appointed about April 23, 1926, and originally consisted of the following members:

L. W. Mattern, Chairman; McKinley Training High School, Washington, D. C.

R. H. Price, Phillips High School, Birmingham, Ala.

J. H. Norton, Junior College, Sacramento, Calif.

J. P. McDermott, West High School, Weston, Va.

J. H. Jensen, Northern Normal, Aberdeen, S. Dak.

Professors Price and McDermott requested that they be excused from work on this committee as they are no longer engaged in school work.

At the Philadelphia meeting Professor Mattern asked to be excused on account of other work. Hence, the present committee consists of Professor Norton and the chairman. It has been rather difficult to carry on this work, but with the reorganization of the committee we hope to make more rapid progress.

A preliminary report of the committee was made at Philadelphia based on a study of some 30 available lists of minimum equipment for high school chemistry as issued by the 30 state departments of education.

The cost of individual equipment, general apparatus, and chemicals for a class of 8 pupils varied from 138 dollars to as high as 487 dollars (the average cost per pupil being about 3.35 dollars).

At that time the committee was instructed to make up a list of equipment, stating the cost of renewal and length of life of each item. The committee attempted to secure this data by means of a questionnaire sent to the members of the Senate of Chemical Education. Out of a total of 100 sent out 28 considered the work worthwhile and spent some time in giving some very valuable suggestions.

A tentative list was presented at the Richmond meeting but no action was taken on the same. Also, a report was presented at the Detroit meeting indicating progress in the work. It is hoped that some definite action will be taken on this much of the report in order that the committee may know the wishes of the Division of Chemical Education.

In this tentative list the committee is presenting only the equipment for the individual pupil and such apparatus that may be used in common by two pupils. Each item is carefully specified as to size, type, and grade; as 250 cc. Beaker, Pyrex, low form. Such specifications are necessary for the inexperienced teachers in the high schools with an enrollment of 150 or less. This group of high schools makes up 74% of the total number of high schools in the United States. Also if the lists are submitted for bids each supply company will of necessity have to bid on exactly the same item.

The third project undertaken by this committee was to write to the

*Committee report, submitted to the Senate of Chemical Education of the A. C. S. at St. Louis, April 16, 1928.

state high school inspector of the various states in order to find out if such a list of minimum equipment would be desirable. Thirty-three of these inspectors stated that such a list would be desirable and the reasons stated are as follows:

1. To prevent foolish buying of equipment by inexperienced teachers.
2. Aid schools to secure necessary equipment.
3. Would show a definite requirement.
4. If state department allowed credit for chemistry without equipment specified some school boards would never buy any equipment.
5. School authorities do not know what is necessary.
6. Set up definite standards.
7. Result in economy in buying of equipment.
8. Because our principals and science teachers are dependent largely upon lists furnished by supply companies whose interest is not the needs of the pupil, but in the sales made.
9. Even trained teachers need guidance badly. Representatives of apparatus supply houses do not show sound judgment in their recommendation.
10. Boards of education do not realize the necessity of providing equipment and often furnish inferior equipment.
11. Without minimum equipment lists, equipment would be inadequate in 75% of the schools.
12. To secure uniform standards as a basis for accrediting.

Further, an examination of the state lists now available shows the need of a more standardized list. For instance, taking the items of beakers as a sample we find the following:

For a class of 8 pupils the state lists require the following:

1 state requires	4 beakers,	100 cc. for 8 pupils
26 states require	8 beakers,	100 cc. for 8 pupils
1 state requires	16 beakers,	100 cc. for 8 pupils
3 states require	4 beakers,	250 cc. for 8 pupils
19 states require	8 beakers,	250 cc. for 8 pupils
3 states require	16 beakers,	250 cc. for 8 pupils
1 state requires	4 beakers,	150 cc. for 8 pupils
6 states require	8 beakers,	150 cc. for 8 pupils
2 states require	4 beakers,	400 cc. for 8 pupils
12 states require	8 beakers,	400 cc. for 8 pupils

In some cases nests of beakers from 60 cc. to 400 cc. are specified. From the standpoint of the committee it would seem that it ought to be possible to standardize on not over two sizes of beakers for student use. A similar variety of sizes and types exist for other items such as flasks, bottles, etc.

Next, the committee secured the list of equipment supplied to the students in our large city high schools for purposes of comparison with the tentative list. The more experienced teacher would be located in these schools and in most cases would have a fairly stable list of equipment worked out for his particular use.

The items listed in this report are articles that would be usually required in any type of course. The only contribution made will be that of a definite specification for each item and an attempt to standardize on sizes, types, and grades.

This list meets the requirements of the following:

1. The equipment necessary for the minimum list of experiments as prepared by the Senate of Chemical Education.
2. The equipment necessary for the individual pupil as given in the commonly used textbooks such as Brownlee and others, Black and Conant, McPherson and Henderson.
3. Only such items are included as are used sufficiently often by the pupil to warrant being placed in the pupil's desk.

In the tentative list attached, please note that this list is the apparatus for the individual pupil only and the list of items that may be used by two pupils in common. Please keep in mind that we are attempting to prepare a list for the inexperienced teachers in the small high school. Therefore, we have attempted to set down very definite specifications for each item as far as that is possible. This is necessary in order to secure a suitable grade of equipment and to insure the supply houses quoting on the same grade of material if the list is submitted for bids.

All items in the list have been checked so that the items are properly co-related, for instance:

3 inch ring to serve as funnel support;
Rubber corks to fit test tubes, bottles,
Evaporating dish to fit 400 cc. beaker which serves as water-bath;
Watch glass to fit 400 cc. beaker and evaporating dish.

If this tentative list meets the approval of the Division of Chemical Education, then the committee's next projects will be as follows:

1. To prepare a list of general apparatus needed for use of pupils and instructor.
2. To list the chemicals necessary for the minimum list of experiments as prepared by the Division of Chemical Education, specifying in each case the grade of chemical needed such as Commercial, Technical, U. S. P., or c.p. To determine the grade most economical to buy and to determine the number of students it may reasonably be expected to serve.
3. To make up an additional list of material so it will be possible to work a greater variety of experiments.
4. To make up a list of desirable demonstration equipment for the use of the instructor.

Minimum Equipment for H. S. Chemistry

Individual Apparatus

For a class of 8 pupils or for 16 working in groups of twos

	Unit Price	Total
8 Beakers, Griffin low form, with lip, Pyrex (resistance grade at 0.17) 250 cc.	$ .25	$2.00
8 Beakers, Griffin, low form, with lip Pyrex (resistance		

	grade at 0.20) 400 cc.	.36	2.40
32	Bottles, wide mouth, white glass, uniform neck, 4 oz.	.09	2.88
32	Rubber stoppers to fit 4-oz. wide mouth bottles No. 6, 2-hole sp. gr. 1.2 to 1.4	.07	2.24
2	Bundles of Splints (500 in bundle)	.10	.20
8	Calcium Chloride Tubes, U-shape, plain 6-inch	.20	1.60
16	Rubber stoppers No. 1, to fit tubes, one hole, sp. gr. 1.2-1.4	.03	.48
8	Crucibles with covers, Coors, low form, No. 00	.18	1.44
8	Dishes, evaporating, Coors, 75 mm. dia., No. 00-A	.25	2.00
8	Pkgs. Filter Paper, 12½ cm. dia.	.16	1.28
8	Flasks, flat bottom, Erlenmeyer form, Pyrex, 250 cc.	.20	1.60
8	Rubber stoppers to fit 250 cc. flask, two-hole, No. 6, sp. gr. 1.2-1.4	.07	.56
8	Funnels, short stem, 65 mm. dia.	.25	2.00
8	Funnel Tubes like Central Scientific No. 6192A	.1g	1.20
32	Glass Plates, 10x10 cm. (secure locally) use wet filter paper instead of glass plates as covers.		
8	Graduates, cylindrical, graduated 1 cc., 50 cc. size, Exax grade	.65	5.20
16	Vials Litmus Paper, 100 strips per vial (8 vials of red and 8 vials of blue)	.10	1.60
8	Pinch clamps, Hoffman, screw compression, small	.25	2.00
8	Pipestem Triangles, 2 inch inside	.10	.80
8	Doz. Test Tubes, Machine made, well annealed, 6x¾ inch, doz.	.35	2.80
8	Test Tubes, Pyrex, 25x200 mm. (May be used as gas generators instead of 250 cc. Erlenmeyer flasks)	.25	2.00
8	Rubber stoppers to fit Pyrex test tube, 2-hole, No. 5	.06	.48
8	Test-Tube Brushes, tinned iron, tufted end	.07	.56
8	Test-Tube Clamps, Stoddard form, brass	.12	.96
8	Thermometers, 10 to 100 degrees, engraved scale, solid stem, graduated in one degree div.	1.10	8.80
8	Watch Glasses, to fit evap. dish and 400 cc. breaker, 3½ in diam.	.10	.80
	Total		$47.88

Desk Apparatus

(Equipment that may be used in common by two pupils or two classes)

		Unit Price	Total
8	Alcohol Lamps, 8 oz. (where gas is not available)	$ .40	$3.20
8	Bottles, Reagent, name in glass, Hydrochloric Acid, 4 oz., glass stoppered, narrow mouth	.20	1.60
8	Bottles, Reagent, name in glass, Sulphuric Acid, 4 oz., glass stoppered, narrow mouth	.20	1.60
8	Bottles, Reagent, name in glass, Nitric Acid, 4 oz., glass stoppered, narrow mouth	.20	1.60

8	Bottles, Reagent, name in glass, Sodium Hydroxide, 4 oz., rubber stoppered, narrow mouth	.20	1.60
8	Bottles, Reagent, name in glass, Ammonium Hydroxide, 4 oz., rubber stoppered, narrow mouth	.20	1.60
8	Burrette Clamps, with clamp attached	.55	4.40
8	Deflagrating Spoons, ¾-inch cup, brass	.13	1.04
8	Files, Triangular, 5 inch	.10	.80
8	Mortar and Pestles, porcelain, Coors, 100 mm. dia.	.70	5.60
8	Pneumatic Troughs (may use stew pans or make locally)	.65	5.20
8	Ringstands, iron, base 5x8 inches, rod 20x⅜ in.	.60	4.80
8	Rings, iron with clamp attached, 3-inch dia. to serve as funnel support	.18	1.44
8	Rings, iron, 4-in. dia., to serve as supports for beakers and evaporating dish	.20	1.60
8	Sponges (16 to lb.), lb.	1.50	.75
8	Test Tube Racks, 10 tube wood with drying pins	.75	6.00
8	Wire Gauze, asbestos center, 20 mesh, iron, 5x5 inches	.12	.96
	Total		$43.79
	Total cost of Individual		$47.88
	Total cost of Desk Apparatus for 8 Pupils		43.79
	Grand Total		$91.67
	Cost per Pupil		11.46
	If gas is available omit the alcohol lamps and add:		
8	Wing Tops for Bursen Burners	$ .10	$ .80
8	Bunsen Burners for Plaugas, Gasoline, etc.	.65	5.20
16	Ft. Rubber Tubing for burners, white cloth impression, ¼ in. dia. for burners, ft.	.14	2.24
			$8.28
	Deduct for 8 Alcohol Lamps		3.20
			$5.04
	Grand Total	$91.67	
	Add Bunsen Burners	5.04	
		$96.71	
	Cost per Pupil	12.09	

Allow about 25% for breakage of glassware.
Life of glassware about two years.
Renewal cost perpupil per year is about $0.50.

(Prof. Carpenter of Rochester, N. Y., states the breakage fees paid by 235 pupils from January, 1925, to January, 1927 is $0.30 per pupil).

Regular corks to fit w. m. bottles, No. 15, at $1.00 per 100 $1.00

Regular corks to fit $CaCl_2$ tubes, No. 6, at .37 per 100---	.37	
Regular corks to fit 250 cc. flask, No. 14, at .80 per 100--	.80	
Regular corks to fit test tube, No. 7, at .40 per 100------	.40—	$2.57
Cork borer, set of 3----------	$ .60	
Cork borer sharpener ----------	1.50—	2.10
Cost of 400 corks plus borer and sharpener----------		$4.67

Average cost of cork about one cent each.

64 rubber stoppers total as stated in list, $3.76.

Average cost of rubber stoppers about six cents each (rubber stopper more convenient, no boring of holes).

Respectfully submitted to the Senate of Chemical Education of the American Chemical Society, April 16, 1928.

J. H. NORTON,
J. H. JENSEN, *Chairman,*
Committee on Minimum Equipment for High School Chemistry

GO TO COLLEGE ADDRESS*

W. A. Robinson, N. C. State Supervisor of Negro High Scsools

On this whole matter of educating the Negro American there have been many arguments pro and con and the controversy goes well back beyond the Civil War. Indeed, Emancipation merely changed the aspects of the problem somewhat and added some new controversial elements.

Thomas Day, a free Negro in North Carolina, wrote thus in 1851 to his daughter Mary who was attending school at Wilbraham Academy in Massachusetts:

> "You sometime ago mentioned your regret at having to learn music. I want you to persevere in the practice of music and in all other accomplishments that may be useful or gratifying to you and to your friends in your intercourse through life.
>
> The mind is very much like any piece of building or workmanship. It requires many members suitably arranged to give proper gracefulness and symmetry to a building. In like manner the mind requires certain accomplishments to give that suitable ease necessary to its refinement. Music hath a happy tendency to soothe the unregular and bad passions of our nature. I want you to learn music well, to learn all other branches well that you have taken. Learn to walk well, to stand erect, learn to feel free and to feel well and easy; learn to wear a free and easy expression and never forget the modesty and gentle caution so necessary in a lady to give her an independent and unquestionable character."

That is not very different from an argument for a good education

*Delivered in First Congregational Church, Atlanta, May 13, 1928, under the auspices of the Alpha Phi Alpha Fraternity.

which would be made today. With the exception that in this utilitarian period must be added the argument that shows where one may cash in on one's investment in education. In fact most of the post slavery and present day arguments against an extensive education for the Negro hinges largely on this issue of utilitarianism.

Enoch Spencer Simmons, a prominent white lawyer of North Carolina, writing on the matter in 1898, says:

> "We would call a man foolish who would invest his fortune and time in anything which could be after completed of no value to him. We would call a man a fool who would work the best years of his life in acquiring a knowledge of a thing which could be of no pleasure and certainly of no value for want of an opportunity to utilize the same. This reasoning will apply to the folly of this race, spending their best days and money acquiring an education which can be absolutely of no practical value to them. We do not mean to say there are no exceptions; certainly a few of them are needed as preachers and teachers. We here speak of the whole race. What need is there of education for the Negro under the present conditions, futher than a limited knowledge of reading, writing, and knowing how to make figures?"

Although written thirty years ago and probably expressing an extreme view, the argument has a familiar sound to many of us.

After all there are merely two sides to this familiar argument. It is either, the Negro should seek every possible opportunity for unlimited education; or, the Negro should seek a limited type of education and beyond that he is wasting his time. Eta Lambda and other Chapters of the Alpha Phi Alpha Fraternity in Atlanta have asked me to come to you on this occasion to defend the affirmative side of this question, and, whatever many of us may feel about it, the affirmative side of this question really needs to be defended and the need for it was probably never more apparent than it is today.

Among the white people, especially the southern white people, this controversy is raging and the proper settlement of it by them is a matter of serious consequence to us all. An editorial in the Raleigh Evening Times of yesterday, which I bought in the station as I was leaving, emboldens me to cite to you some figures from my own State. I suppose you have here in Atlanta heard something of what we are trying to do in North Carolina in improving the facilities for the public education of Negroes. There are in North Carolina some 150 high schools for Negroes, 56 of which have already met the standards set by the State for accredited rating, with a probable increase of ten or more to this number by June of this year. From these 56 standard high schools last year were graduated 1575 boys and girls, 827 or 52½ percent of whom went on to college in September. I might add here that in 1925, 46% of the 1006 graduates went on to college and in 1926, 51% of the 1220 graduates continued their studies. Of last year's 827 who went to college this September, 664 or 80% went on to college right in North Carolina, while 335 or 54% of these went to our five ex-

cellent State supported institutions of higher learning. In other words, we are not only graduating young people from good public high schools but we are educating the majority of these high school graduates in colleges supported by the State. In five years our Negro college enrollment in North Carolina has increased from less than 200 to 1300. Undoubtedly there is some connection between these figures and the situation described in yesterday's Times editorial.

"WHITE YOUTH EVEN STEALING NEGRO'S PRIMACY IN CRIME." Fifty years ago the North Carolina press was quoting Judge W. A. Moore, a Republican who relied for his office largely upon the votes of Negroes, as delivering a moral lecture to his constituents to the effect that "it was no use for them to try stealing any longer, for the whites would never submit to it; for, said he, if you keep up stealing, the next thing will be the whipping-post, and then the next thing will be the extermination of the race. And the prisoner, accused of stealing a goose, went to the penitentiary."

"Showing, we may remark, that whatever his judicial ability, Judge Moore was a flivver as a prophet. In his day the greater part of the time of the criminal courts was taken up with the trial of emancipated slaves who had been accustomed to having all their necessities provided for them, who worked as they were ordered and supervised and idled when they got the chance, and who in a state of freedom naturally enough pilfered to cure an empty stomach, to warm a cold fire-place, or to replace their rags with clothes. Where the Judge erred was in assuming that the Negro was not learning and never would learn the lessons of responsibility and thrift. He was speaking with the despair which the man of that day, and for many days afterwards, felt regarding the Negro's future.

But not only has the Negro very largely recovered from his vice of petty larceny, but the astounding thing is that white youth has come to take the place he formerly occupied in the courts. Most of the chain gangs in the State now report that the number of white prisoners largely exceeds that of Negroes; whereas until a relatively few years ago the contrary was the rule and a white face among convict laborers the exception. The State Prison records tell the same story. Like it or not, we must face the fact that the Negro race is in respect of crime continually improving; while the white youth seem to be undergoing a process of progressive moral disintegration."

Compare this with the fact that there are still in all the States of the Old South only 246 State accredited four year high schools for Negroes and only 162 of these maintained out of public funds. With none, public or private, in Alabama and South Carolina, 2 in Florida, 5 in Louisiana, etc., up to 31 in Texas and 56 in North Carolina. In only 15 of these same States there are 5,891 such schools for white children or about 24 times as many as for Negroes. There can be no large college enrollments without high school graduates and surely we must not only urge boys and girls in the South to go to high school and to college but we must in some way convince the South that building schools for Negroes is cheaper than building and maintaining jails and penal institutions.

May I be pardoned for citing the situation in Georgia where the Negro population is 71% as large as the white population and where there are only six accredited high schools in the whole State maintained at public expense compared with 288 maintained for white children. In other words, 42% of the population get 2.2% of the public high schools. Of Georgia's 20 State accredited four year high schools for Negroes, 14 are maintained largely by Northern charitable funds with some considerable help from the Negroes themselves by voluntary taxation. From these twenty high schools last year were graduated 739 or only about 7.4% of Georgia's 9,521 high school graduates. Such a record as this must mean that Georgia is not fully convinced that an investment in Negro Education is profitable. Just suppose we should set out to do so and could actually prove the affirmative of this proposition to the white people of Georgia. Would the effort not be well worth while?

In spite of the figures from Georgia, I feel that I am right in saying that there are now few white people who take the extreme view in the matter and these are largely confined to the large land holders and industrial barons who see no argument concerning their laborers, white or black, that means a curtailment of a cheap labor supply. Even Senator Coleman Blease, of South Carolina, poses as a friend of Negro education, provided Negro education does not in any way upset the racial status quo.

But it is not what the white people think of this matter that concerns us so much on this particular occasion as what we Negroes feel, and especially what the young Negro whose future is before him thinks about it all.

Undoubtedly you, like myself, have heard that there is grave danger that the supply of educated Negroes is already greatly in excess of the demand and that one evidence of this fact is that the Pullman service is today filled with educated Negroes who cannot find work along the lines of their preparation. Almost without exception the cases of this kind that have come under my personal observation are cases of lack of character, not morals only, but that and much more—the stamina and perseverance and outlook upon life—all of which combine to make the individual's character.

But, suppose you say my observations are not extensive enough, then I would call your attention to a very careful study recently made by Dean Elder, of North Carolina College, at Durham, in which, after careful and intimate review of the situation in North Carolina, he finds that this one State needs today 650 Negro medical doctors in addition to its present quota of about 150 and that it will be quite 20 years before the State can supply its Negro population from the probable sources with anything like a safe proportion of physicians to the population. There is an immediate need also of 150 dentists in addition to the 50 now practicing in the State, and not for 30 years can North

Carolina hope to receive from the probable sources enough dentists to make North Carolina safe for Negroes' teeth. The same is probably true of other States and other professions not included in Dean Elder's study.

When one considers that in the ten States of Alabama, Arkansas, Georgia, Louisiana, Maryland, North Carolina, South Carolina, Tennessee, Texas, Virginia, and West Virginia there were only 5,000 Negro boys and girls graduated last year from accredited high schools with over half this number in the two States of North Carolina and Texas, there appears to be but slight chance that the commercial market for educated Negroes is in danger of becoming glutted.

But even a careful estimate like that made by Dean Elder should not govern our efforts at getting educated. Suppose the black boys in school 30 years ago had educated themselves for the opportunities then apparent on the horizon. Who would have filled the many openings that have come to Negroes in the last few years and which 30 years ago were unbelievable? That so many changes have come in Southern and National sentiment regarding the Negro is undoubtedly due to the fact that the boys of 30 years ago were willing to "launch out into the deep and into the dark" in this matter of getting an education. Is there not abundant evidence about us today that sentiment is changing and that the changes of the last 30 years will not compare with the changes that are eminent in the next 30 years?

A few years ago in my own city the Governor of the State sent a most splendid message to a Go to College meeting of 200 high school seniors conveying his greetings and warm sentiments and urging them to avail themselves of further educational opportunities. Imagine a Governor of a Southern State even ten years ago risking his political chances so far as to consider seriously a meeting held to urge Negro young people to go to college. The State of Tennessee has just made a pronouncement on a square deal in education a part of which reads as follows: WE BELIEVE: That every child is a future citizen of the State, asset or liability. WE BELIEVE: That it is the obligation of the State to see that every child has equal educational opportunities. Surely this is evolution even in Tennessee. For my own part I prefer with Tennyson to "Cleave to the sunnier side of doubt, and to a faith which hears the lark within the songless egg, and finds the fountain where they wailed 'Mirage'."

The story is told that a group of frightened financiers in Boston held a distress meeting in Boston some months ago at which the late Dr. Elliott was one of the guests. The cause of the distress was the fact that Massachusetts was rapidly losing its hold on the great textile industry and factory after factory was moving South to be nearer the raw material and to secure a cheap and abundant supply of labor. Man after man rose to deplore the crisis in Massachusetts' industrial affairs and to prophesy that unless something were done and done quickly Massachusetts would lose its leadership in American finance and its distinctive place in American cultural life. Finally, Dr. Elliott was called

on for his opinion. Calmly and with assuring presence Dr. Elliott rose and recalled how the founders of the State had made it one of their first acts to establish a system of universal education and how succeeding generations had made this one of the best educational systems in the world. The men wondered how a discussion of education had a place in the business under consideration. But Dr. Elliott continued with his story to relate how once the great State of Massachusetts had been the center of the ship building industry and the merchant ships of Boston had sailed to the four corners of the earth and the industry and the shipping had made Massachusetts rich and powerful among her sisters. But the time came when ship building waned and Boston was no longer the great port of America. Men had feared then for Massachusetts but in time the State had become again the center of a great industry, this time the great shoe industry and its wealth had continued to increase. Finally, that industry also gradually passed westward amid a song of distress. Then came the textile industry which had flourished and enriched the State for awhile and now that too was moving southward. "But," said Dr. Elliott, "as long as the State of Massachusetts continues to make large investments in the intelligence of its citizenry, that same citizenry will by the sheer strength of its combined intelligence create new and profitable means for maintaining the industrial and financial and cultural leadership of the State."

That story, it seems to me, holds a deep meaning for the Negroes of America today. Many of the doors once barred to us have been opened by the force of our intelligent effort. The walls that have stood between us and more than one sector of the American promised land of opportunity would still be standing had not Negroes with vision and determination dared to prepare themselves for intelligent assaults upon America's conscience and for intelligent occupation of territory so opened up to them.

A boiler full of lukewarm water will never turn a wheel in a thousand years but build a fire sufficiently hot and change that same water into steam and the wheels begin to turn and to do the work of the world. There is no doubt in my own mind that much of our useful work in America is still waiting until the present intellectual lukewarmness so apparent among us today has been transformed into energy by the fires of real and effective and constructive education.

There is, of course, the other side of the question that we cannot ignore and that the recent distressful happening in Atlanta has so forcibly brought to our attention. The brutal and unpunished murder of a young college boy here among you has had a deadening effect upon Negroes throughout the entire South. As I go about over North Carolina I find that I must counteract a sort of indifference born of despair over unfortunate instances of race relations. We must not blind ourselves to the fact that race relations are undoubtedly improving. Recently, your Atlanta Constitution declared editorially that the Negro problem is a myth, that there really is no Negro problem in the South. There is much real truth in that statement. We cannot deny that there

is a problem here, a very trying problem, but it is not a race problem. It is a problem of justice to the weak and helpless—educational justice which openly includes every child born as a part of the State's future citizenry and gives to every child the opportunity to "burgeon out" all that is within it; it is a problem of industrial justice which gives every worker an opportunity to sell his labor wherever he will and under the most favorable conditions possible; it is a problem of justice in public taxation which gives to all classes and groups in the commonwealth an honest share in the civic advantages purchased by the public funds received from taxing all the people according to their ability to pay; it is a problem of legal justice which guarantees the protection of the constitutional rights of every citizen without resort to legal subterfuge. And, yes, it is a problem of political justice which means an opportunity for all classes and groups to be represented in the affairs of government and to share in governmental patronage. The fact that the weak and oppressed in this case happens to be Negroes is only incidental. It might be Jews or Japanese, or Filipinos or Indians. Always there is a tendency for the strong to oppress the weak and to rob the defenseless. The problem in every case is one which the stronger group must voluntarily solve for itself and any help given them in arriving at a Christian solution of this problem is help toward the salvation of the group soul. More and more the stronger group here in the South is applying the golden rule and the principles of Jesus to the solution of their problem of power. There is still much oppression and injustice but there is in America generally a much nearer approach to justice than ever before. Already in the providence of God the first Negro woman has been given a place in the legislature of a Southern State and it is eminent that again the Negro will be represented by a member of his own race in the halls of the American Congress.

Some aspects of the problem are more difficult of solution than others and the difficulty varies from State to State. Here in Georgia, I understand that Negroes are now being given credit for extension work by the University of Georgia. In Virginia, the other day, I discovered quite by accident that the Virginia Academy of Science knows no color line whatever in its membership. Neither of these is true in North Carolina but my State has distinguished itself among its sisters in having Negroes as real bona fide members of its State Department of Education and by attempting in other ways to arrive at some sort of educational justice in its distribution of the public funds for educational purposes. Gradually in all of these States and in all of the disputed areas injustice is being besieged by the power of God in human hearts.

In "Black Majesty," Vandercook's recent book, which I am sure many of you have already read, you will remember that when the soldiers of France went to battle against the black soldiers of Dessaline and Christophe, these French soldiers were entirely disconcerted and their morale weakened because the black soldiers of Haiti went into battle singing the Marseillaise. How could soldiers of France fight against men, white or black, who faced them singing that Hymn of France? And so must

we black men in America, battling against injustice, break the morale of the opposing sentiment by singing back to America its best and most beautiful sentiments. Hatred and injustice, and oppression are not parts of America's great chorus. They are the discords that sometimes destroy the harmony. The hymn of America is a song of brotherhood, of justice for the oppressed, of democracy, and these we must constantly sing back to the great American conscience. At the same time we must prepare ourselves in the most effective way to accept the new opportunities that are now apparent or will undoubtedly be opened to us.

Finally, may I say to such young people as may be here today that we would do well to return to Thomas Day's philosophy of education mentioned earlier in this paper. Let us forget entirely the utilitarian argument for education. Many of the people, white and black, of real education that you see from day to day are not rich in worldly goods and probably never will be but they would not place a money value upon the fullness of life which they have achieved. If you are graduating from high school this spring and want to decide whether it is worth while to go to college in spite of the cost in effort, time and money which going to college may involve, then you must decide whether or not it will be worth your while to put yourself in line with the greatest and finest traditions of the human race, traditions which black people from time immemorial have had a proud share in helping to make and which black people somewhere will always have a share in; again you must decide whether it is a worthwhile achievement to learn to live with and think in terms of the great men and women of yesterday and today, many of whom are black; whether it is worthwhile to be rulers in a world where thought rules and thought has no color, You must decide again whether you love and value such truth as you have already been able somewhat dimly to recognize as you have experienced the great adventure of following truth thus far in your high school life.

You must decide whether it is worthwhile to achieve the ability which college helps you to achieve of concentrated and persistent effort in attacking great problems and handling great tasks, and of testing and strengthening under most favorable conditions the character you have been making for yourself from your earliest childhood days.

And finally you must decide whether you care to share in the rarest privilege in the world, the privilege of making friends and brothers of other splendid young people of the kind that today are making up our college communities, and who in the years to come will be making you proud by their worthy efforts to push back the frontiers of prejudice and oppression. The Alpha Phi Alpha Fraternity all over America is making a concentrated effort to assist young people in making these momentous decisions and the Eta Lambda Chapter is holding this meeting on this occasion because it believes that there is a divinity that shapes our ends and that a liberal education is one expression of that divinity.

The men and women who faced life as Negro boys and girls in America 30 years ago have made a more favorable America for you to labor in and it is your task to receive the torch from their hands and to "carry on" effectively for the next 30 years. I congratulate you upon the glorious adventure that lies ahead of you and to it may I dedicate you with these lines whose authorship I am sorry I do not know:

I RESOLVE:
"To keep my health!
To do my work!
To live!
To see to it I grow and gain and give!
Never to look behind me for an hour!
To wait in weakness and to walk in power,
But always fronting onward toward the light,
Always and always facing toward the right.
Robbed, starved, defeated, fallen, wide astray—
On with what strength I have back to the way!"

THE PERISCOPE

GEORGE WASHINGTON CARVER

Born of slave parents he was carried away with his mother by a band of raiders in the last year of the Civil War. His master sent a rescuing party to buy their release, but when the searchers located them, Mary Carver, the mother, had disappeared and was never again heard from. George Washington was found ill with whooping cough and was brought back to Mr. Carver, his mother's master, who raised him

His early education was obtained from a spelling book, until he was ten years of age. He then was able to attend a rural school for one year, working on neighboring farms meantime.

He made his way to Fort Scott, Kansas, and for nine years worked as a domestic servant, studying when he could and saving what money he was able to put aside after sustaining himself. He entered High School in Minneapolis, Kansas, and completed the courses. For three years he managed a laundry and accumulated sufficient money to pay his expenses in Simpson College, Indianola, Iowa, where he took literary work, art and music. Later entered Iowa State College, working his way by doing all sorts of work, whatever he could get to do.

Taking his Bachelor's and Master's degrees, he was graduated and placed in charge of a greenhouse, the bacteriological laboratory and the department of systematic botany.

While a member of the Faculty at the Iowa State College, he came to the attention of Booker T. Washington, who asked him to join his work at Tuskegee.

He took charge of the Chemical department in Agriculture and built it up to national renown.

He appeared before the Ways and Means Committee of the House of Representatives in Washington, which was considering the imposition of a tariff on peanuts and spoke for forty-five minutes, although the time limit for all speakers was five minutes, on the possibilities and use of this nut. He told the Committee of Congress of the one hundred and sixty-five products which had been created from it by him.

His research has discovered over a hundred products from the sweet potato, sixty articles of value from the pecan, in addition to the products from the peanut. He has extracted dyes from the Southern clays

He was made a Fellow of the Royal Society of Great Britain for his contribution to Science and in 1922 was presented with the Spingarn Medal for the most distinguished service by an American Negro of that year.

FREE TREATMENT FOR NEGROES

The Tuberculosis Sanatorium at Alta is now open for the care of the tuberculous Negroes of our State. For the first time in the history of Georgia this can be said. This institution is well equipped and is in the hands of the same physicians as are in charge of the white unit

Application blanks can be had by writing Dr. E. W. Glidden, Superintendent, Alto, Georgia.—*Georgia's Health.*

BALLAD OF THE LIBERALLY EDUCATED SENIOR

I learned quite a bit from here and from there,
I've muddled through books by the score.
Of Sophocles' dramas I'm faintly aware,
And of many an old Roman bore.
Bill Shakespeare I simply adore.
Of deadly dull novels I've read quite a few
And I've pinned French verbs to the floor—
Now I'm wondering: "What'll I do?"

I've learned about Who, about Which, about Where,
About When, about even What For.
I've traced the obstinate "x" to it's lair,
I'm up on political lore.
And history I know to the core.
Now it won't be long 'til I'm through
And the four year loaf will be O'er—
So I'm wondering: "What'll I do,"

For European drama I have quite a flare,
And Dante I couldn't ignore.
Blind Homer's thunder I caught in the air,
When I harked to the Odyssey's roar.

Philosophy rated a snore—
Not one of 'em found I who knew
What all the shooting is for.
I'm wondering: "What'll I do,"

L'Envoi

Prince, I entreat, beseech, and implore:
The future unfold to my view,
The years just ahead I'd like to explore,
I'm wondering: "What'll I do?"

—1928.

NEWS FROM HERE AND THERE

THE PLACE OF SCIENCE IN EDUCATION

There has just been published a report of the committee of American Association for the Advancement of Science on "The Place of Science in Education."

This report is organized under seven headings as follows and the summarizing sentence is given for some of them:

I. The Committee's Understanding of Its Functions.

II. The search for Enduring Facts and the Growth of Confidence in the Guidance of Scientific Truth. Science instruction both in schoo and out needs better organization, more effective cooperation to make even the health knowledge now available function more completely in the lives of people generally.

III. Obligations of Science Knowledge. Science, not to be discredited, must devise effective ways and means of developing, in its devotees first and in the whole people ultimately, a sense of moral obligation that will prevent the newly acquired knowledge and method of science serving base ends.

IV. The Science Subjects in Educational Programs. The hopeful elements is that the stereotype science courses of the college are being replaced in the earlier years at least by new types, tentative at present but frankly experimental, looking toward a more satisfactory college science sequence. The whole problem needs careful study.

V. Summaries of Types of Specific Studies Relating to the Educational Uses of Science. The above represent but a beginning in the application of the objective scientific method to the problem of science teaching. Such investigations must be multiplied and verified by those truly interested in the scientific solution of such questions.

VI. Those Who Teach Science. A more thorough-going preparation in the fundamentals of science is needed by all who aspire to teach it.

VII. Those Who Have Developed Science. Science as method is quite as important as science subject-matter and should receive much attention in science instruction.

The committee offers the following recommendations:

(a) That some organization of national scope, such as the United States Bureau of Education, or the Research Division of the National Education Association be asked by this committee to undertake a comprehensive and intensive study of the situations, tendencies and needs of science instruction in educational systems.

(b) That the services of a field secretary be secured to work with existing agencies, to distribute information on research in science education, to stimulate further research, to operate as a sort of clearing-house agent and to continue the organizing of new groups of science teachers, writers for popularization of science, etc. This field secretary should work under guidance of the Committee on the Place of Science in Education, or under the guidance of a national council of science teachers as soon as such a council is formed.

(c) That a national council of science teachers be organized to advance science teaching, to increase public appreciation of science and to secure for science teachers increased facilities and a wider usefulness. The services of a field secretary would be very useful in the oganization of such a council.

A copy of the full report will be mailed on request sent to Elliott R. Downing, School of Education, University of Chicago, Chicago, Illinois.

INTELLECTUAL IMMORALITIES

(1) Carelessness in observations.
(2) Inaccuracy in determining units to be counted in statistical research.
(3) Slovenliness in logic, fantastic explanations.
(4) Generalizing beyond one's data.
(5) Confusing opinions with knowledge.
(6) Contentment with "discussion."
(7) Egoism allowed to crowd one to the invention of "new" theories for personal distinction.
(8) Inventing interesting theories for the sake of selling them in books, articles, lectures and conversation.
(9) Formulating an hypothesis on weak bases of facts and then becoming blind to facts in opposition.
(10) Emotionalism during research, "I believe" instead of "I have proved."
(11) Opposition to a theory merely because of ignorance and stupidity, "I can not see how."
(12) Rushing into print with a report of research work that justifies no conclusions.
(13) Cowardice in supporting a verified generalization because it is unpopular and conflicts with selfish interests.

(14) Impatience, unwillingness to proceed step by step through a research.

(15) Indulgence in dense verbiage for the sake of appearing superlearned.

(16) Popularizing tentative generalization for the sake of personal publicity.

(17) Resort to the authorities, or to sarcasm and ridicule, against data, arguments and verifications.

—Fairchild (pamphlet issued by the Character Education Institution of Washington).

PUBLIC HEALTH AND THE PHYSICIAN

Care of the public health is the particular province and special responsibility of the physician, said Dr. William Sidney Thayer, of Baltimore, new president of the American Medical Association, in his inaugural address of June 13 at the annual meeting of the association in Minneapolis.

"In the first place we should use every means in our power to maintain the character of our public health officials," said Dr. Thayer. "Conditions have changed for the better but we are still treated too often to the humiliating spectacle of a mayor who appoints his family physician or some friend who has tired of practice to the position of commissioner of health."

Speaking to the 6,000 physicians who have assembled here, representing the organized medical profession of the country, Dr. Thayer reminded them of the object of their association as stated in its constitution: ". . . to promote the science and art of medicine and the betterment of public health." It is this altruistic attitude that marks the difference between medicine or any other profession and trade which has financial gain as its primary object. The true physician will not forget this difference and while he must earn a living, "if his main interest be not in his profession or if financial gain be his sole object, he will accomplish little and his name will be soon forgotten."

Of a physician's functions, the first, and most obvious, according to Dr. Thayer, is the individual care of his patients, after which comes prevention of epidemics, which requires attention to every detail involved in the spread of disease including cooperation with local boards of health by reporting communicable diseases, enforcing quarantine regulations, etc.

"Too early specialization is one of the great faults of modern American education," declared Dr. Thayer, speaking of the future of medical education. "The medical school is not the place for the training of specialists . . . the specialist who has not had a good basic medical training is a danger to society." Dr. Thayer also voiced the feeling current in many medical schools to-day that too much is being crowded into the four years' course. In this connection Dr. Thayer expressed the hope that "such elementary methods as a prescribed four years' course" will disappear from our medical education, schools of medicine

in the future will be organized so that the student will be treated as a man and not as a schoolboy.—*Science Service, Washington, D. C.*

WHO ARE THE 12 GREATEST LIVING PERSONS?

How List of Twelve Immortals Was Chosen

Dr. Archibald Henderson, in presenting the list of twelve contemporary immortals to be the subject of his series of articles, sums up the method of their choice and explains several points in connection therewith, as follows:

"Below is the choice of the ten distinguished Americans for the twelve greatest men and women now living, in the order indicated by the number of votes received, counting my own, which follows the name:

EDISON (9)	KIPLING (5)
MUSSOLINI (7)	MME. CURIE (4)
EINSTEIN (6)	CLEMENCEAU (4)
SHAW (5)	JANE ADAMS (4)
FORD (5)	ORVILLE WRIGHT (4)
PADEREWSKE (5)	MARCONI (3)

"One name has been arbitrarily eliminated from the lists submitted, since he is a prominent contender for the Presidency. Surely one of the greatest men in the world today is this man: Herbert Hoover.

"Nine names receiving as many as four votes each were chosen. The next eight received three votes, the next six, two votes each. Since there was so little difference between three and two votes, I selected two names from the first group, Jane Addams and Orville Wright, and one name from the second group, Marconi.

"In making the final choice I have cast my own vote—which resulted in giving the decision to the twelve whose achievements will be appraised in the forthcoming series of articles.

"Three of the committee of ten have preferred to remain anonymous: one the president of a great university, another distinguished U. S. Senator and the third a literary critic of note.

The Committee

"The committee consists, respectively, of a psychologist, a philosopher, a critic, a journalist, a belles-lettres, an historian, a churchman, a statesman, a scientist and a college president. The names are, respectively:

1. Prof. Lewis M. Terman—Eminent authority and writer on psychology and pedagogy.
2. Prof. John Dewey—Distinguished educator, noted author and essayist. Professor of Philosophy at Columbia University.
3. A Critic—(Anonymous).
4. Don C. Seitz—Associate Editor of the Outlook, and former Busines Manager of a New York newspaper.
5. Robert Underwood Johnson—Leading editor and author. Former ambassador to Italy.

6. Prof. Harry Elmer Barnes—Internationally known sociologist Professor at Smith College. Contributor to magazines and newspapers on subjects affecting international peace.

7. Bishop Thomas F. Gailor—High ranking cleric and Bishop of the Episcopal Church of the South. Noted author and speaker.

8. A United States Senator—(Anonymous).

9. Prof. Robert A. Millikan—Winner of the Nobel Prize in 1923 as a physicist. Authority and professor in this branch of science. Writer of note.

10. A College President—(Anonymous).

—*Sunday American.*

A PROOF OF THE ROTATION OF THE EARTH

Edgar H. Webster, Atlanta University

The boy is teaching a district school on the east slope of the Blue Ridge. He states that his pupils have little difficulty in accepting the fact of a round earth, but the fact of its rotation, they are not so willing to accept. For myself I well recall the enthusiasm with which I first learned of the shape of the earth; and dancing into the home of my aunt and exclaiming, "Aunt Ellen, the earth is round." Nor do I forget how my little bubble was burst by the cool rejoinder, "I knew that years ago." I suspect that as a lad my confidence in my teacher led me to accept the fundamental facts about the earth without demanding proofs. I do recall that, when told that "the earth is round like a globe or an orange" some of us asked what part the mountains played in the form. We were told that if one had a hand that could hold the earth as one can now hold an orange, that the roughness of the earth due to the mountains would be no more than that of a thin-skinned orange. And with regard to the rotation, the alternation of day and night was sufficient proof.

Stating my friend's dilemma to a family of mountain children, they smiled and one said, "Why, there are people around here who think the earth is flat." And so I am led to ask if it may not be that these mountain children are finding a heresy at home that counteracts the teaching of the school. I am also asking, if there may not be a demonstration of the rotation of the earth which will make its appeal to children at the age when the fundamental facts concerning the earth are brought before them. The fact of the deflection of the winds to the right or to the left according to the hemisphere one is in; of the eastward deflection of falling bodies; of the spheroidal shape of the earth as a result of the rotation; of the Foucault pendulum, these even if stated would have little meaning. Likewise, the lifting effect of the centrifugal force due to the earth's rotation similarly would be out of place. There is, however, a proof of an astronomical nature which perhaps lends itself to the age of the pupils and which would both illustrate the fact, and also lead to an appreciation of a scientific problem

First, the children must be shown that the psychological effect of motion is much the same whether it is one's self that moves or something else. I doubt not many a lad has had an experience much like this of mine as a lad. Accustomed to the lights of a city, I found myself at one time making my way along the street of a village on a moonless night, the darkness the more dark as I worked my way among the trees that lined the street. Suddenly I heard behind me the firm step of a man approaching and walking faster than I. Sure that in the darkness he had a gun and pursuing me with the purpose of robbery I quickened my pace. But steadily he got nearer and the nearer he came the more slowly I seemed to move; and when he was opposite me I seemed despite walking movements to be making no headway at all. As he passed me and was lost in the darkness I seemed for a moment to be moving backward rather than forward. This was perhaps my first personal illustration of the relativity of motion, and emphasizes that the child who is to reach an idea of the earth's rotation must first appreciate the difference between real and apparent motion. Most children of the age when this problem is presented have met the problem in the apparent backward motion of objects seen out of a car window as the car in which one sits moves forward. And doubtless some have asked themselves in the smoothness of motion of the train, "Is it I that am moving, or the trees and the houses?" A less simple illustration of the problem arises as another train passes the one in which one is seated, passing, let us say, in the direction in which our own train moves. Five possible explanations may present themselves: (1) your train is at rest and the other is moving; (2) both trains are moving in the same direction, but the other train moves the faster; (3) your train is moving backward while the other is stationary; (4) both trains are moving backward, but your train moves the faster; and (5) that both trains move, your train moving backward, the other moving forward. Under these circumstances one almost instinctively looks out the opposite window to compare himself with the neighboring objects to assist in the decision.

Illustrations of apparent motion due to real motion will occur to most students. A simple one that appeals to me comes from watching the lights as in the past I have at night taken a steamer to go down Boston harbor. So quiet is the movement of the boat that I should not be aware of the motion save as I watch the lights as we move down the harbor, the nearer lights seeming to change their position with regard to the more distant ones. To my eye these nearer lights are absolutely in motion; but their motion is apparent, being due to the real motion of the steamer.

If this idea of the relativity of motion is thus made clear, we can pass at once to the Sun-Moon-Earth system, with perhaps the stars as illustrative.

Pat and Mike were debating the relative value of the Sun and the Moon in our human economy. The argument was clinched by Pat, who said, "You must recognize, Mike, that the Moon shines at night

when we need it; while the Sun shines in the day when we don't need it." Perhaps like Mike, most children take the sun as they take the air without recognizing it. It may be that more children have seen the Moon than have seen the Sun. If so here is an opportunity to develop the daily journey of the sun from some point where it rises in the east to some point where it sets in the west. The fact that the rising and setting points are not the same nor at the same time, from day to day need not be emphasized at this point.

It need not be difficult to pass from sun-rise and sun-set to star-rise and star-set. But this is not necessary though interesting; and there is no good reason why the attention of children should not be called to stars and star-motions and what these mean in our Geography. But the changing position of the sun from the East into the West is motion. Something is moving; either the sun and the stars are moving toward the west, or the earth is rotating toward the east. If these were all the data the problem is well-nigh insoluble. Still the fact is, that as the solar and stellar distances began to be appreciated, the first proof of the rotation that appealed to the popular mind lay in these facts. The conception of motion around the earth on the part of the sun and the stars involved, first such tremendous velocities and, second, on the part of the stars such differing velocities that the stars always kept their relative positions with regard to each other, made too large a demand upon the mind and the rotation of the earth upon an axle was recognized as so much the more simple and reasonable that the westerly motion of the sun and the stars was recognized as an apparent motion due to the real motion of the earth toward the east.

If we rule this proof out as beyond the grasp of the children, then we are helpless as was Newton in the problem of gravitation, except that we have the help that he had, namely, the moon. Newton would never have raised his question, and if he had, the solution would have been impossible, had the moon been missing. With Newton, we may use the moon to solve our problem of the rotation.

Walking one afternoon, in the years that were over the fields and hills of a New Hampshire farming township, with two small nephews, the moon approaching the full was seen in the Southeast. And the younger boy said to the elder, "O, see the moon!" The elder replied more sagely, "That is not the moon. That is the place where the moon will be tonight."

Children who have noticed sun-rise and sun-set, star-rise and star-set, must have noticed moon-rise and moon-set; or if not, attention should be drawn to these facts. Also, the phases of the moon should be known and followed; at least the new moon, the first quarter, the full moon, and the third quarter, and even the old moon.

The study of the moon for our purpose will naturally begin with the new moon, or an approach to the new moon, when first seen in the West at sunset, or shortly after sunset. The moon will be observed to move toward the West and like the sun and the stars to set. Observations upon the moon from night to night at sunset, and this fixed

time is important, will show that the moon is further East from night to night than on preceding nights, until at sunset it will be found in the South as first quarter; and a week later at sunset will be found rising as full moon. Still later in the month the moon will rise from night to night after sunset, the time increasing, until all at once the moon rises with the sun—but not seen, and sets with the sun as again new moon.

We have thus established the fact, that the moon has two motions, one toward the West, a daily motion with the sun and the stars; the other a motion covering a month, toward the East, independent of the other heavenly bodies. The moon cannot have two actual motions in opposite directions. One must be apparent and the other real. The question now arises, *which* is the real motion?

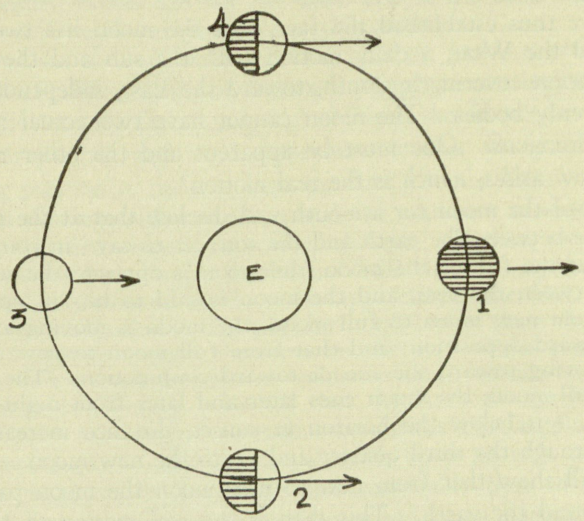
A study of the moon for a month will disclose that at the new moon the moon is between the earth and the sun; let us say "in conjunction." And that at the full of the moon, the moon is opposite the sun, or the earth is between the two, and the moon is said to be "in opposition." Further, from new moon to full moon, the moon is moving away from the sun toward opposition; and that from full moon to new moon, the moon is moving toward the sun or toward conjunction. The fact that after the full moon, the moon rises later and later from night to night, shows that it is below the horizon at sunset, distance increasing until it passes through the third quarter and on to the new moon. A simple diagram will show that from new to new moon the moon passes, (revolves) around the earth. This then is the real motion of the moon, a motion around the earth from West toward the East. The motion toward the West with the sun and the stars is, then, an apparent motion due to the rotation of the earth toward the east.

Here is a result rather contrary to the evidence of the senses and based upon observation and arrived at by reasoning. The fundamental data are but three: an appreciation of apparent and of actual motion; the daily motion toward the West of the sun, the moon, and the stars; and the monthly revolution of the moon around the earth.

Two students out of a class in Astronomy were passing through the city on a moonless night. Chancing to look up into the sky they began to point out the significant constellations and stars. Unconsciously to themselves, the passers-by stopped, listened and looked up. Similarly our young students might find in the monthly journey of the moon more and more evidence of the topic herein discussed. It was reported of an Italian astronomer, that having studied as a special topic the motions of the moon for twenty-five years, he was about to publish his study and its results to the scientific world. No grammar school student could in one lesson-study take in all that the moon can teach about the earth's rotation. But here is an object lesson, that repeats itself thirteen times a year, a lesson that would in time make its teaching a sure possession.

Positions of the Moon at sunset:

E ----------The Earth
1.----------The New Moon
2.----------The First Quarter
3.----------The Full Moon
4.----------The Third Quarter.



to the Sun

Note: Interesting diagrams can be made for the positions of the moon at sunset; at noon; at sun-rise; at midnight.

BIOLOGY AND SOME OF ITS MAKERS

H. EUGENE FINLEY, MOREHOUSE COLLEGE, CLASS 1928

Biology is of commanding importance in the world of science, and notwithstanding its numerous details, its progress has been relatively simple and orderly. We know that the Greeks studied nature by observation and experiment, but this method underwent an eclipse.

Aristotle was the founder of natural history, and it is known that he had an extensive knowledge of animals. "He made a direct appeal to nature for his facts." Probably next in line come Pliny, the elder. He was at least, a compiler. Vesalius is considered one of the founders of Biology and his greatest gift to it was his substitution of observation and reason for adherence to authority.

About 300 B. C., the dissection of the human body was legalized and in the Alexandrian school, the bodies of condemned criminals were devoted to that purpose. This didn't become general, however, and practicioners continued to use brute animals for study. Salan was probably the outstanding anatomist of his time, (having lived 130-200

A. D.) He is said to have had much talent and clear grasp on those experimental methods of anatomy.

Harvey took the next step and his work was complimentary to Vesalius: He did much work on movements of the heart, and for this work we give a place in the world of biologists to William Harvey.

This brings us up to the middle of the 17th century, and at this time the microscope came into use. We are well acquainted with this contribution made by Robert Hooke of London. Along with Hooke, Grew (1627-1711) Malphigi, Swammerdam and Leeuwenhock made notable contributions to the microscope.

As a resulting development, minute anatomy was made possible and this stimulated investigations and researches in the field of minute animals for the next century.

We have touched upon the field of descriptive natural history, but it is necessary to mention the work of Linnaeus, the great Swedish naturalist, born at Rashult in 1707. He became a popular professor at the University of Upsala where he made his contribution to Natural History.

Comparative anatomy had its beginning after Linnaeus had developed the external knowledge of animals. It came as a result of the study of internal organs due to the knowledge of the externals. The materials of which comparative anatomy was constructed had been accumulating long before the coming of Cuvier, but the mass of details was organized into the beginning of a compact science by him. He was born in 1769 in a French town named Montbeliard.

Marie F. Bicat was born in 1711 at Thoirette, department of Ain, and to him we give the credit of carrying out Cuvier's analysis of animal organization to a deeper level. He made a profound study of the tissues that unite to make up the organs, and may be called the father of Histology.

We next consider the rise of Embryology. Its story may be divided into five periods, each marked by an advance in general knowledge. These are: (1) The period of Harvey and Malphigi, (2) The period of Wolff; (3) The period of Von Baer; (4) The period from Von Baer to Balfour; (5) The period of Balfour. Among all the leaders it is believed that Von Baer stood out as a monumental figure at the parting of the ways between the new and the old,—the great observer.

The knowledge of bacteria has exerted a profound influence upon the development of general biology. Many questions relating to bacteria are strictly medical, but other phases of their life activities are broadly biological. They were first described by Leeuwenhock in 1687, twelve years after his discovery of the animacula now called protozoa.

There had been much discussion among scientists concerning the spontaneous origin of life. The question resolved itself into biogenesis: (life from previous life) or abiogenesis (life without prexisting life) or from inorganic matter alone. The historical development had its beginning during the period of Aristotle, 325 B. C. and extends to the present day.

We have now come to the time of Pastuer, and to speak to his contribution to the question of spontaneous germination, we say: His brilliant researches answered the question in the negative. And so it is regarded today by the scientific world. However, Louis Pastuer's supreme service was his contribution to humanity.

He applied his discoveries to the cure and prevention of diseases. Crowning his series of discoveries came the use of innoculation (1885) to prevent the development of hydrophobia in one if bitten by a mad dog.

AN INTERESTING EXPERIMENT

B. T. Harvey, Morehouse College.

Facing the usual situation of meeting in the summer session a class in introductory Physics who almost without exception had already flunked a year of Physics for various reasons, one Sunday afternoon I sat on the front porch and wondered how in the dickens through the hot days to follow I could arouse interest in this rehashed poorly chewed morsel, Physics. The wife was asked to write down the name of seven things she would purchase, that money could buy, that she most desired. I strolled across the campus and meeting the bookkeeper asked him to do the same.

The next morning to the class was put the same question after slips of paper had been passed around. At first there seemed some hesitancy. Then I noticed those on the first row had placed their names on the paper. So I immediately informed them this was not a new kind of intelligence test. That I did not want any names on the slips of paper. Just to cut loose and put down their hearts' desires, excluding sweethearts, happiness et cetera which money could not secure for the ugly and sick. This broke the tension and the lists were soon completed.

The lists were tabulated on the board. There were some amusing desires. However two things received a unanimous vote, Car and House. It was interesting to note that only two used the name automobile. Further, with one exception each, the boys desired a fine house and the girls well-furnished homes. Other topics which received high rating were, clothes, food, books, travel, amusement and education.

Then I informed the class that we would spend the next six weeks finding out about our favorite make of automobile, how it was made, how it worked, and what was likely to go wrong, and we would draw plans for our future house, build and furnish it with due care as to beauty, cost, convenience, use and repair.

The members of the class were instructed to select their favorite car, to go to the particular car dealer in town, tell him of the pupose of their visit, ask for a demonstration and one of the usual instruction books furnished with cars. They were to report name of cars and have instruction books when the class next met.

Then I asked one boy what was the first thing he wanted to know about a car. His answer was "How fast can she go?" Alright, let's

find that out also before the next class period. And take these questions also: How much does it weigh? Is it top heavy? How does the gas indicator work? What is the difference in the way the gas is fed to the carburetor in a Ford and a Buick? Why is it said a Ford will sometimes run backwards up hill after the gas is so low it stops? How does the elevator work at the Alemite station for lifting the car? How can I find out whether water has been added to the gas? These questions were used later to illustrate some practical applications of all the theory of the first two chapters of Practical Physics by Millikan and Gale and the stereotyped lecture table experiments which were performed as introductory and confirmatory evidence.

Two weeks have passed, and we have completed the following five chapters; Measurements, Pressure in Liquids, Pressure in Air, Molecular Motions, Force and Motion, with the aid of the following additional questions, always given in advance of the discussion of theory in class. Explain the apparent lightness of a car on a mountain road. Why does the automobile stop increasing in speed? When the car gives out of gas, why do we have trouble starting it again? How can you get gas out of your car? Why do we add alcohol to the water in the radiator in winter? What happens to water and alcohol in the radiator? Does it require more work on the part of the engine to pull the car up a steep grade than along level ground? Where is the best place to connect a tow line for pulling in a diabled car? What determines the stability of my car? What are the safeguards against turning over? Why do we have to put on breaks when going down a steep drive even though we cut off the engine? Other questions were stimulated by answers to these, from the students.

The laboratory experiments were selected by the students after consultation and discussion with the instructor from the following manuals, "Wauchope Laboratory Manual, Millikan, Gale and Bishops, Laboratory Manual and Goode, Physics of the Automobile. Further the students were encouraged to inspect and run the demounted 1918 Paige installed in the Laboratory, as well as the instructor's car, and other cars available during laboratory hours about the campus.

The first bi-weekly quizz was very gratifying. Only one failed to make a fair showing. By a peculiar coincidence this boy was three days picking his car and getting his instruction book. The latter part of his paper covering latter topics showed signs of improvement.

This is a sample of problem question: "I received a letter through the mail from Europe advertising the Erskine Six: It stated the Six could cover 60 kilometers per hour. The Chrysler "52" is guaranteed to make 52 miles per hour. Prove by comparative figures which is the faster. Compare this with the following problem question from Milikan." Find the number of millimeters in 6 Km. Find the number of inches in 4 mi. Which is the easier?"

Teacher and pupil alike have gotten a new thrill out of physics. I am looking forward with pleasure to the next four weeks and to the accomplishment of a rare specimen in science a 100% passing class.

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