

THIRTEENTH ANNUAL MEETING OF THE CENTRAL ASSOCIATION OF SCIENCE AND MATHEMATICS TEACHERS.

The thirteenth meeting of the Central Association of Science and Mathematics Teachers was held in East High School, Des Moines, Iowa, Nov. 28 and 29, 1913. Although held farther west than the meetings of the Association have ever been located before, the attendance and interest were gratifying. The facilities offered by the building in which all meetings were held and the completeness of the local arrangements contributed very much to a successful meeting.

The General Sessions were held in the auditorium of the high school and were presided over by President Millis. At the Friday morning session the address of welcome was delivered by Superintendent Thornburg of Des Moines. The response on behalf of the Association was by Dr. E. R. Hedrick of the University of Missouri. The two principal addresses of the session were by Dr. Florian Cajori and Dr. O. W. Caldwell. Dr. Cajori's subject was "Science and Mathematics in Vocational Schools; a Retrospect," and Dr. Caldwell spoke upon "Science and the Changing Ideals of Education." At the conclusion of these addresses a preliminary report was presented by the Committee on a Four-Year High School Science Course. This report is printed elsewhere in the Proceedings. The report was received and the committee continued. Members of the committee are O. W. Caldwell, chairman, James H. Smith, C. E. Spicer, W. M. Butler, A. W. Evans, and Geo. D. Works.

Friday afternoon was devoted to the section meetings and to a reception held in the corridors of the building. At the annual dinner in the evening there were short speeches by Messrs. Wade, Peet, Newhall, Eikenberry, and C. H. Smith, representing the several sections, Mr. James H. Smith acting as toastmaster. The unity of interests of the sections was emphasized. After dinner the Association adjourned to the auditorium and were addressed by Dr. Rollin D. Salsbury of the University of Chicago, on the subject "In and About Patagonia."

The General Session of Saturday morning was devoted to business. The Secretary reported the results of the postal card vote on change of date of meeting as follows:

In favor of change of date.....	29
Opposed to change of date.....	209

There was therefore a large majority in favor of retaining the present time of meeting. It was moved and carried that there be no change in date.

The Auditing Committee reported that they had found the Treasurer's accounts to be correct, whereupon the report of the Treasurer was read and adopted. The Treasurer also read a membership report showing a net gain of 60 members. These reports will be found separately printed in the Proceedings.

The Nominating Committee reported the following:

President, Willis E. Tower, Chicago.
 Vice President, E. Marie Gule, Toledo, Ohio.
 Assistant Secretary, Jessie F. Chaplin, Minneapolis, Minn.
 Treasurer, H. R. Smith, Chicago.
 Assistant Treasurer, Lewis B. Mull, Ottumwa, Iowa.

The Secretary was ordered to cast the ballot of the meeting for the persons nominated and they were duly declared elected.

The President reported from the Executive Committee a suggestion

that sections be organized in Agriculture, Domestic Science, and Manual Training. It was decided that action be taken to establish sections for Agriculture and Domestic Science. No action was taken regarding Manual Training. The President-elect was empowered to appoint a committee of three for each of the new sections, these committees to proceed with the organization of the sections and provide programs for next year.

It was also decided that hereafter the Committee on Resolutions should be appointed a year in advance in order that time might be available to prepare a more adequate statement of the principles of the Association.

The Secretary read the following report from Professor C. R. Mann, delegate of the Association to the Council of the American Federation: *To the Central Association of Science and Mathematics Teachers.*

Gentlemen: Your delegate to the Council of the American Federation attended the meeting of the Council in Cleveland last December. Reports there presented showed that the Federation's geometry syllabus had been reprinted in the *Mathematics Teacher*, and another 5000 reprints ordered for distribution. The sum of \$70 was appropriated to pay for this. The work of the Committee on Practical Apparatus in Physics has been progressing, and \$50 was appropriated to continue this. The Treasurer reported a balance of about \$110 in the treasury after paying these appropriations.

The future work of the Federation was discussed at length, and it was decided that it is not just to ask men to undertake the kind of work the Federation is organized for on the small income that accrues from the 10 cents per capita dues (about \$200 per year). It was therefore voted to appoint a committee to see whether other means of financing the work might not be discovered, and in the meantime to undertake no new work and to ask for no dues from the local organizations for the year 1913. Another meeting of the Council will probably be held next month, and if no more adequate means of financing the work have been discovered, the organization may be discontinued. Under these conditions, your delegate suggests that this Association take no action now with regard to the Federation, but leave matters as they are until the Federation Council makes further report. Report accepted.

Dr. Florian Cajori and Dr. Rollin D. Salisbury were elected to honorary membership in the Association.

Mr. James H. Smith reported for the Committee on Four-Year Course in Science that of the \$75.00 allowed for the expenses of the committee but \$2.50 had been used, and requested that an allowance of \$50.00 be made for next year's expenses. Request granted.

Urgent invitations were extended to the Association to hold its next meeting at Toledo, Ohio, and at Gary, Ind. It was the sense of the meeting that the next meeting should be held at Chicago and with this understanding power to fix upon location was delegated to the President, Secretary and Treasurer.

Upon motion of Mr. C. H. Smith the following resolution was adopted: "Resolved, That the Central Association of Science and Mathematics Teachers, in annual meeting assembled, at Des Moines, Iowa, do unhesitatingly, in the strongest terms, condemn the use of soapstone or other mineral material as a substitute for wood on physics or biology laboratory and lecture room table tops. The soapstone is too soft, easily becomes scratched, thus rendering it unfit to be used as a writing desk; it is more expensive than wood; uprights and framework cannot be easily fastened to it; it is easily broken and being a good conductor of heat always feels cold, especially in winter, to the touch.

"It is recommended that a top of hard wood be used, made up of nar-

row strips, glued together, and wide and long enough to project at least three inches over the rail on all sides."

The Committee on Resolutions reported the following resolutions which were adopted:

REPORT OF THE COMMITTEE ON RESOLUTIONS.

The Committee on Resolutions unanimously recommends the adoption of the following:

Whereas, The meeting just closing at Des Moines, Iowa, has been one of the most inspiring meetings ever held; therefore,

Resolved, That the Central Association of Science and Mathematics Teachers hereby expresses its cordial thanks to the Board of Education of Des Moines, Iowa, to the Local Committee on Arrangements, to the Committee on Publicity, and to the Committee on Membership, for their untiring efforts to provide every facility and comfort for the Association, and for their cordial hospitality, which has made the success of the meeting so great; that it expresses its appreciation of the action of the Iowa State Science Teachers Association and the Iowa State Mathematics Teachers Association in waiving their annual meetings the current year and in urging their members to attend the meeting of the Central Association; that it expresses its thanks to the Iowa teachers for their generous hospitality in providing the complimentary luncheon to visiting teachers.

Resolved, That this Association hereby accords a hearty vote of thanks to Professor Florian Cajori, to Professor Otis W. Caldwell, and to Professor Rollin D. Salisbury for their vital and invigorating addresses.

Resolved, That we express our appreciation of the work of the Des Moines newspapers in furthering the work of this Association by preliminary announcements of the meetings and by their excellent service in reporting the proceedings of the convention.

Resolved, That this Association hereby expresses its sincere appreciation of the faithfulness and untiring efforts of the President, Mr. James F. Millis; and of the former Secretary and present Treasurer, Mr. C. E. Spicer, through whose combined efforts this Association has increased greatly in membership and power.

Resolved, That this Association approves the organization of four-year courses in high school science, based fundamentally on a study of what young people need and can use, and believes that it is one of the chief problems before us to find out by experiment how such courses can be effectively created.

Resolved, That this Association recognizes the importance of the vocational trend that the teaching of science and mathematics is now taking, and urges the necessity of finding a method of organizing courses in science and in mathematics, which shall make these subjects of greater social and economic value to pupils without diminishing their high value as instruments of a truly democratic education.

Resolved, That this Association approves of the movement to economize time in education by reducing the time of the elementary school from eight to six years and increasing the period of secondary schooling from four to six years, believing that this administrative change will help this Association and other similar bodies in carrying on their work of strengthening the teaching of science and of mathematics.

Respectfully submitted,

C. R. MANN.
MARIE GUGLE.

Minutes of the meetings of the sections, as well as many of the papers presented, appear elsewhere in the Proceedings.

W. L. EIKENBERRY, *Secretary*.

MEMBERSHIP REPORT FOR THE YEAR ENDING NOV. 28, 1913.

Paid up membership, Nov. 27, 1912.....	559
Honorary membership, Nov. 27, 1912.....	7

Total membership, Nov. 27, 1912.....	566
Delinquent but left on list as per constitution.....	67

Total names on list, Nov. 27, 1912.....	633
New names added during year.....	146

	779
Resigned during the year.....	52
Deceased, or dropped for delinquency.....	39
	91

Total names on list, Nov. 28, 1913.....	688
Delinquent but left on list as per constitution.....	62
Honorary membership, Nov. 28, 1913.....	7
	69

Paid up membership, Nov. 28, 1913.....	619
Net increase of membership for the year.....	60

C. E. SPICER, *Treasurer*.

TREASURER'S REPORT FOR THE YEAR ENDING NOV. 28, 1913.

RECEIPTS.

Balance shown by last report.....	\$ 233.90
Advertisements in 1912 program.....	269.00
Advertisements in 1913 program.....	132.00
Tickets for annual dinner at Evanston.....	50.00
Three copies of Correlation Report at 25¢.....	.75
Eight copies of Proceedings at 50¢.....	4.00
Dues of 448 members at \$2.50.....	1,120.00
Dues of 67 members at \$2.00.....	134.00
Dues of 23 members at \$1.00.....	23.00
Dues of 46 members at 50¢.....	23.00
Total receipts.....	\$1,989.65

EXPENDITURES.

Subscriptions to SCHOOL SCIENCE AND MATHEMATICS.....	\$ 767.50
Annual dinner at Evanston.....	50.00
Printing and distributing 3,000 programs for 1912 meeting.....	291.94
Postage in office of Treasurer.....	41.00
Printing and distributing Historical Pamphlet.....	96.50
Badges for 1912 meeting.....	8.75
Expenses of Section Meetings, 1912.....	2.00
Reprints of Constitution and of Resolutions.....	3.25
Badges for 1913 meeting.....	10.00
Rebates to local centers for dues of members.....	4.50
Expenses of speaker for 1912 meeting.....	6.02
Expenses for janitor service at 1912 meeting.....	1.50
Premium on Treasurer's bond for \$1000.....	2.50
Expenses of Membership Committee of 1912, postage and exp.....	26.94
Expenses of Membership Committee of 1913, postage and exp.....	20.51
Printing letter heads, circular letters, receipts, etc.....	47.00
Mailing programs of 1913 meeting.....	5.01
Printing and distributing Proceedings for 1912.....	201.09

Postage and supplies for office of Secretary.....	8.47
Total expenditures.....	\$1,594.48
Balance cash on hand.....	395.17
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	\$1,989.65

C. E. SPICER, *Treasurer.*

Minutes of the Biology Section.

The Biology Section was called to order by the chairman, Mr. J. G. Coulter, at 1:30 Friday afternoon, November 28th.

The general subject for discussion was "The Place of Plant and Animal Studies in a Science Program for Secondary Schools." The discussion followed the general lines indicated by the chairman in a brief summary of the specific points of the general topic upon which it seemed desirable to have an expression of opinion by the members of the section. These were as follows:

I. That a course in science should be required of all in the first two years of the high school course.

II. That, to be science in the educational sense, a course must be scientific both as to teaching method and as to the organization of subject matter. No course should be classed as science simply by virtue of the nature of the information imparted. (Certain courses call for special caution in this connection.)

III. A. That, preferably, the course indicated in I should have continuity through grades IX and X.

B. That, if the course can be given in one year only, grade X is preferable to grade IX.

C. That double periods are not essential for this course.

D. That human relation to environment should be the primary theme of this course.

E. That the study of organisms and of chemical and physical phenomena directly related to life should have at least three-fifths weight in such a course.

F. That in this course plant studies should precede animal studies, and that the teaching of alternating plant and animal types, and the organization of the biological subject matter primarily on the basis of general principles are not recommended for this course.

G. That the technical use of the term *food* should be restricted to organic substances.

IV. A. That in grades XI and XII various full year electives should be offered, and that such electives should presuppose the course indicated above.

B. That, when possible, differentiation should be made in these upper courses between those taken by students expecting to go to college and those taken by students not expecting to go to college.

C. That the "college" courses should be administratively equivalent to the similar courses given at colleges, and that college credit should be obtained therefore.

D. That the "non-college" courses of this group should have vocational character, agriculture and domestic science being characteristic thereof.

Mr. E. L. Mahaffey of the High School of Commerce, Columbus, Ohio, opened the discussion. He expressed himself as thoroughly in accord with the idea of making two years of science the minimum in all courses. In most courses science should find a place in all four years. As to the

place and content of such courses neither has been worked out satisfactorily as yet, probably owing to the fact that the schools have attempted to deal with too many subjects. The number should be reduced. Biology, chemistry, physics, geography and agriculture would perhaps cover everything that should be attempted. Geography should be an intensive fourth year rather than a mediocre first year introduction to science. Physics should find a place in the third year, while chemistry may be adapted to second year work, or agriculture may be placed in the second year to splendid advantage. Biology should come in the first year for two reasons. First, because it is a subject which beyond question has the greatest influence upon the later lives of boys and girls. For this reason it should be placed first in the course in order to reach the greatest possible number. Second, because biology is concrete rather than abstract. It deals with material things, which can be seen, touched, and felt. It is this capability of being demonstrated which makes biology the logical beginning science. As to the content of the course, general biological factors should be presented first. The double laboratory period is to be preferred.

The second speaker, Mr. H. B. Shinn of Carl Schurz High School, Chicago, thought that one serious defect in the organization of courses in science is that such courses are not adapted to the pupils. The growing belief that the break in school work is not between the eighth and the ninth grades, but between the seventh and eighth grades seems to indicate the advisability of a readjustment of work in those grades, placing a part of the work of the eighth grade in the seventh and adapting the work of the ninth grade to the eighth. This with departmental teaching would make possible a more unified course of study. In science this would consist of two years of general science in the eighth and ninth grades, followed by three years of further work which should be elective and which should have more work of a practical nature. This general course would be elementary in character laying the foundation for later work which might be collegiate, industrial, or agricultural according to local conditions. The teacher should incorporate into this course related material, both to counteract the tendency to specialization, and to give pupils an idea of the interrelation of the sciences.

As to the content of the course the natural sciences tend strongly to lead the mind away from itself into broader fields, while the physical sciences tend to make the mind egoistic and self centered.

Whether the high school should offer collegiate and college preparatory must depend upon strong local demand. If such courses are offered they should be directed by the state university. This is a secondary matter. The main business of the high school is to educate that 90 per cent that never go to college. Its business is to serve the needs of its community, not to be a feeder for the college.

Dr. Bailey of Cedar Rapids believed that one serious obstacle to be overcome is the prejudice still existing in secondary schools in favor of classic subjects, especially in the smaller high schools—a feeling that stands in the way of giving the full four years to science that the importance of the subject warrants and which is accorded without question to other subjects. The educational value of science teaching must depend upon the personality of the teacher. Considerable discussion was evoked over the desirability of standardizing courses in science as a means of avoiding needless repetition on the part of the students in later college work.

Mr. Douglass of North Des Moines High School maintained that the content of the course was not significant—the important point was that it should be vital. The test of the value of the course was whether it gave

the pupil knowledge of himself, whether it stimulated interest in his surroundings, putting him in harmony with his environment. The speaker advocated nature study in the grades as a means of keeping alive that spirit of inquiry inherent in the young child, and which is too often lost in later school life.

Mr. Garber of Yeatman High School, St. Louis, spoke on the desirability of plant studies preceding animal studies in high school science, urging as a reason that plants come more prominently into the pupil's environment, and are easily obtained. Furthermore, plants are more suitable for experimental work, the study of the growth of cells, repair of cells, reproduction, and the response to environment. The basis for instruction in sex hygiene may well be laid in the study of plants. The pupil arrives at a better understanding of the life processes of his own body through the study of the processes which are fundamental to the life activity of all organisms, as shown in nutrition, digestion, absorption, and the transfer of liquids in plants, growth and repair of living tissue.

As to the place of the study in the course, in the opinion of the speaker, the tendency toward placing the biological studies in the later years of the high school course, is due to the spirit of specialization which is finding its way down to the high school from the college and university through teachers untrained in methods of reducing the subject matter to the level of comprehension of the average high school pupil. The colleges are not giving us teachers who are alive to the needs of the high school in this work. There is nothing in any high school science which should demand the mature development of the senior. Proper presentation of material is the significant thing.

Mr. Ewers of the McKinley High School, St. Louis, raised the question as to whether there was an actual decrease in the number of pupils taking science in the past seven years as statistics given seemed to indicate. If so, to what could this be ascribed? It was brought out in the discussion that the statistics upon which such conclusions were based were misleading, inasmuch as they included pupils of a single year or at most two years of science, as compared with the total number taking English or mathematics in the three or four year course. Mr. Ewers suggested some valuable lines of work in botany that could be carried on to advantage in city schools. Tree study and garden work should be in any such course. Experimental work in the plant laboratory and school greenhouse should be especially emphasized as it serves to vitalize the work. A two years' science course is desirable in the early years of the course.

Miss Charlotte H. Stetson of Princeton Township High School believed that two years of science should be required of all pupils in the first two years of the high school, both on account of its practical value and because of the training it afforded in logical thinking. A single year of any science is not enough.

The Saturday morning session was devoted to the further discussion of the specific points brought out by the speakers of the previous session. The following resolutions were adopted by the section after considerable discussion of the points involved:

First, That a course in science should be required of all in the first and second years of the high school as at present organized.

Second, That this course should be synthetic of material drawn from the various branches of science—and should have unity in its organization as a whole.

Regarding the content of such a course, considerable discussion was evoked. Mr. Eikenberry believed that the order of presentation of material in the course should be left to the judgment of the teacher, who should not be limited to a certain line of work.

Third, That we recognize the desirability of teaching elementary science or nature study in the grammar grades, and urge that such work be made a part of the course in those grades.

Miss Peterson of Sioux City High School thought that it might be inadvisable to urge the question at this time owing to the already crowded condition of the average school program, and to the fact that few teachers were prepared to handle the subject.

Miss Merrit of Ottumwa thought this last difficulty might not be a serious hindrance as the work could be placed under the supervision of the high school science teacher.

Fourth, That the size of science classes be limited to twenty-four pupils.

Fifth, We urge at institutions concerned the establishment of a course designed specifically for the preparation of high school teachers of general science, believing that equality of attention to various branches of science, is requisite in this connection, and that overspecialization is undesirable for this purpose.

The report of the Committee on Nominations was made and the following officers were elected for the ensuing year:

Chairman, H. B. Shinn, Carl Schurz High School, Chicago.

Vice Chairman, A. F. Ewers, McKinley High School, St. Louis, Mo.

Secretary, Miss Charlotte Stetson, Princeton High School.

ETTA M. BARDWELL, *Secretary*.

Minutes of Chemistry Section.

The Chemistry Section held two meetings in East High School, Des Moines, November 28th and 29th.

FRIDAY AFTERNOON MEETING: The meeting was called to order by Chairman W. F. Roecker, Madison, Wis. In the absence of Secretary E. F. Downey, C. W. Botkin, Ottumwa, Iowa, was chosen temporary Secretary. Mr. V. C. Lohr of Joliet, Ill., was unable to be present to give his paper on "Relation of Theoretical to Applied Chemistry."

"Practical and Correlated Chemistry for Grades and High Schools" was presented in a paper by S. G. Engle, Gary, Ind.

"The Limitations in Making a Course in Chemistry Practical" were given in a paper by F. B. Wade, Indianapolis, Ind.

A discussion of the above subjects was led by Miss Sara Nollen, Des Moines, Iowa, and participated in by most of the members present. Some of the points emphasized in the discussion are as follows: Vocational chemistry is for the few who become chemists, and its teaching is largely the work of the college. High school chemistry must be taught for its application in the usual vocations. It should be based on the necessary principles and theories of chemistry, but with a large application to sanitation, domestic science and community affairs. Some experiments along these lines were described and results discussed. Segregated classes were advised, especially in the latter part of the course, where the work of the girls would be of a household nature.

The chairman appointed the following committees:

Nominations—F. B. Wade, Miss Jessie F. Caplin, Minneapolis, Minn., and Mr. H. A. Senter.

Resolutions—H. R. Smith, Highland Park, Ill., S. G. Engle, and Miss Frances Church, Des Moines.

The section held a joint session with the Physics Section. Papers were read by Prof. G. W. Stewart of the University of Iowa, on the "Teacher's Conception of Physics," and by Prof. C. R. Mann, of the University of Chicago, on "What Is Vocational Physics?"

SATURDAY FORENOON MEETING: Vice Chairman Sara Nollen presided. Prof. R. E. Smith, Ames, Iowa, read a paper on "Some Experiments Dealing with Practical Affairs of Daily Life."

The report of the Committee on Practical Experiments in Chemistry was read by Mr. H. R. Smith.

Chairman Roecker led in a discussion of the above papers. Some new experiments were suggested and ways of making chemistry interesting and more useful were discussed.

The report of the Committee on Experiments was accepted and the work of the committee continued under the direction of Mr. H. R. Smith.

The report of the Committee on Nominations was read and received the entire ballot of the section. The officers chosen for the next meeting were:

Chairman, H. M. Ibison, Marion, Ind.

Vice Chairman, Isabel Henkel, Milwaukee.

Secretary, H. D. Abells, Morgan Park, Ill.

Total attendance, 24.

C. W. BOTKIN, *Secretary pro tem.*

Minutes of Earth Science Section.

The meeting was called to order by Miss Zania Baber, the chairman of the section. In the absence of the regularly elected Secretary, Mr. Peet was appointed. The program had to do with the vocational aspect of the earth sciences. Professor R. D. Salisbury spoke of the "Vocational Aspect of Geology." Professor A. C. Trowbridge of the University of Iowa and Miss Bertha Henderson of the University of Chicago High School spoke of the "Vocational Aspect of Physiography." A paper on the "Vocational Aspect of Commercial Geography" was read by Miss Alison E. Aitchison, Iowa State Teachers' College, and a paper prepared by President W. J. Sutherland of the State Normal School, Platteville, Wisconsin, on the "Vocational Aspect of Regional Geography" was read by Professor Sanford of the same institution. The two papers last mentioned will be published in full in *SCHOOL SCIENCE*. A synopsis of the paper by Professor Salisbury prepared by himself appears elsewhere in this number.

In the discussion of the "Vocational Aspect of Physiography," which was divided between Miss Bertha Henderson and Professor A. C. Trowbridge, Miss Henderson said that the aim of physiography is no longer solely to train the mind of the student into a scientific attitude but to show the relation between earth science and the things in the student's environment both immediate and also more remote, to give a glimpse of some of the great enterprises and great problems of the present day upon which physiography has a bearing. She called attention to the fact that physiography touches upon the fields of work of the civil engineer, the forester, the agriculturist, the mining engineer, the navigator and of many others. It brings the student into contact with problems of conservation, transportation, water supply, protection against destructive action of the elements and control of their constructive action. It calls his attention to many vocations, the existence of which would otherwise be wholly unknown to him and unconsidered in his choice of a life work. In closing she said: "The great problem in education today is vocational training. It is wiser to retain our already organized subjects and to adapt them to the needs of the boys and girls than it is to throw away all the old material and start in untried lines with chaotic untried material."

Professor Trowbridge called attention to the importance of physiography for the professional geologist in his great task of interpreting the history of the earth, making it possible to supply chapters in this history which

are wholly lacking in the accessible parts of the rock record. As examples of its importance to the economic geologist placer deposits and the recovery of gold from them through physiographic processes were mentioned. The removal of the Maquoketa shales of Wisconsin and Iowa made possible the lead and zinc deposits of the underlying dolomites. The close relation of physiography to geography and to history and economics was mentioned. Without physiography, there can be no intelligent teaching of geography. The conditions which control agriculture are most fundamental in economics. Soil, rainfall and climate are physiographic subjects and are controlling factors in agriculture. The influence on the philosophy of the high school student when he comes to realize the great results produced by the slow processes of nature acting through a long time is worth while. Although human nature changes slowly, in time great changes may come. That physiography knowledge has a bearing on medicine was shown. Diseases are conveyed by water and by air. Temperature conditions, air pressure, the purity of the air and of the water supply, all have their influence on the production of or the cure of disease. Even in law physiographic questions may be involved. Boundaries are changed by streams, the ground water level is changed by draining mines, thus causing wells to run dry, a farmer's land is washed away while his neighbor's land is increased. In numerous other legal situations, physiographic questions are involved.

In the discussion which followed these papers, Professor Tilton of Simpson College, Professor Pammel of the Ames Agricultural College, Professor Kay of Iowa State University, Professor Sanford of Platteville, Wisconsin, Professor Salisbury of the University of Chicago, Professor James H. Smith of Austin High School, Chicago, Professor Spicer of the Joliet Township High School and others, took part. Mention was made of the report of the Committee on a unified science course for the High School and of its probable effect on the work in physiography now generally in the first year of the high school. Professor Sanford spoke unfavorably of the work that is being done in Wisconsin in the so-called "General Science" courses. Professor Spicer called them "chop-feed" courses and said that he believed the revolt against physiography was due to the introduction of the college course in the subject into the first year of the high school instead of a course adapted to students of high school age. Professor Smith suggested that the agitation some years ago for more emphasis on the human element was the beginning of the revolt. He said that the leaders in high school physiography were making progress and that if there had been less haste and less impatience, the physiography courses would have developed satisfactorily. Professor Salisbury said that to get teachers prepared in physiography is difficult. To get them prepared in several subjects would be more difficult.

In the continuation of the discussion Saturday morning, Mr. Peet said that his experience had led him to feel sure that if physiography were broadened out to reach down into the underlying physical sciences and up into the study of life it might very well be made the central subject in the proposed two year introductory science course. For the sake of improving the work in the physiography itself he had found this a desirable thing to do, because, for one reason, it made it possible to introduce the experimental method to a larger extent than could be done within the strict limits of the orthodox course in physiography. To produce better results in our high school science we do not need *uniform* courses, but *unified* courses. It is not necessary and it is not desirable that the work should be everywhere alike. He ended with making a plea for an open-minded attitude toward the work of the committee and the use of the

boasted scientific methods in the solution of this important problem. We owe allegiance to no subject. Our responsibility is only to the young people in our charge.

Professor Kay announced that the University of Iowa has engaged a man whose duty it is to give instruction in how to teach physical geography. He also announced that Professor Trowbridge has prepared eight sets of lantern slides with accompanying descriptions which are available for use by the physiography teachers in the high schools of the state.

On Saturday morning owing to the inclement weather, the field excursion was abandoned. Professor Kay gave an interesting and instructive lecture on the "Glacial Epoch in Iowa," illustrated by lantern slides.

A committee was appointed to investigate the present status of the high school physiography as follows: C. E. Peet, chairman, Miss Aitchison, Miss Smedley, Professor Sanford.

A committee on illustrative material was appointed: Miss Baber, chairman, Mr. Harry Clem and Mr. James H. Smith.

The following officers were elected:

Chairman, Professor Kay.

Vice Chairman, Miss Aitchison, Iowa State Teachers College.

Secretary, Miss Grace Baird, Bowen High School, Chicago.

CHARLES EMERSON PEET, *Secretary pro tem.*

Minutes of Physics Section.

FRIDAY AFTERNOON SESSION: Chairman C. F. Adams called the meeting to order promptly at 1:30 P. M., attendance about 40. In the absence of the Secretary, the chairman appointed C. H. Slater Secretary *pro tem.* The following Nominating Committee was then named: Mr. W. E. Tower, Chicago; Miss Emma J. Fordyce, Cedar Rapids, Iowa, and Mr. C. H. Slater, St. Louis, Mo. After a short discussion as to the general interests of the section, a motion was carried that the Chairman, Vice Chairman and Secretary be constituted an Executive Committee to direct the activities of the section.

The first paper of the section, "What Girls Can Do, and Should Do in Physics," by Miss Emma J. Fordyce, Cedar Rapids, Iowa, was a most interesting and practical presentation of the subject. The girls and boys in the Cedar Rapids High School have been taught in separate classes for some time, hence the points in the paper were given by one with whom this work is no longer an experiment, but successful experience. In that school the girls have shown greater interest and freedom of discussion in separate classes. The topics covered are almost entirely those of special significance to girls, e. g. the following: Machines—sewing, washing, cleaning; water, gas and electric meters; water pressure and systems; heating, ventilation and lighting; refrigeration; plumbing; sounds, musical instruments; electric bells, irons, lamp, motor, etc., etc. More and more has the work of the home been lightened by application of mechanical and physical principles, and never before has it been so important that a girl should have an adequate knowledge of elementary physics. It must be practical, significant and not theoretical. The paper was freely discussed and its ideas approved. Several teachers were present from schools where segregated classes are being tried out. They stated, in brief, as follows:

Mr. Tower, Englewood: Physics problems are *real* problems for girls.

Mr. Adams, Detroit Central: Segregated classes prevail throughout the school.

Mr. Glynn, Gary: Boys and girls prefer separation and do better work under different methods.

Mr. McClellan, Gary: Discussion in segregated classes leads in different directions.

Mr. Burrows, Des Moines: Girls' classes progress faster, and have more interest.

Mr. Barber, Bloomington: Omit much of the theory and give home applications; go from environment to principle.

Miss Cora G. Hathorn, Mason City: It is easier to adapt the work to the needs of the pupils.

The second paper was by Prof. L. P. Seig, University of Iowa, on "The Energy-Quanta Theory of Light." It was a very clear exposition of this newer theory of light. Prof. Seig said that it should not be taught, but that the wave theory be given as *a* theory, not as *the* theory.

At this point in the program the Chemistry and Physics Sections met in joint session to hear an address of interest to both by Prof. G. A. Stewart of the University of Iowa, subject: "The Teacher's Conception of Physics." The following excerpts show us as teachers that the child, and his needs, not the subject, is the important thing ever to keep in mind:

1. Physical research is never more *accurate* than is necessary. *Accuracy* should not cloud the *appreciation* of the subject.

2. Classification should be reduced to a minimum; it has its value but should not lessen the *appreciation*.

3. The attitude of mind is important; progress can only be made with an open, receptive mind.

4. Fundamental truths and principles, as *ends*, are not interesting; they give perspective vision when found in the many activities of life.

5. The attitude toward applied physics and chemistry should be to satisfy the *needs* of the pupil.

6. Mathematical formulae, etc.; physics exists aside from mathematics; do not use it if it does not help in something. Physics is a "Human document."

"What is Industrial Physics," by Prof. C. R. Mann, University of Chicago, concluded the program of the afternoon. If anyone expected another physics syllabus, he was disappointed. Instead Prof. Mann presented the thing that syllabi cannot give, the most valued product of all, the real "Scientific Spirit." Sciences have aided industry and elsewhere in many ways, theoretically and practically. Great industrial progress has come about through this spirit. It has been revealed to the world in the lives of such men as Maxwell, Faraday, Watt, the Wrights and others. It is the instinctive inner faith to strive, to will to do, and to appreciate the thing done. It is a faith in the harmony of things, in achievement, in men. This is the spirit that the public believes in and demands today. Syllabi of facts are no longer the great thing. Part time school and shop seems to give the spirit. Any subject matter that secures the absorbing interest of pupils gives it. Achievement give it. The physics that develops this spirit is industrial physics. This spirit is what industry wants.

SATURDAY MORNING SESSION: The report of the Nominating Committee was first called for, and was given as follows: Chairman, F. E. Goodell, Des Moines, Iowa, Vice Chairman, Mr. C. M. Brunson, Toledo, Ohio, and Secretary, Mr. Earl R. Glenn, Gary, Ind. Upon motion, the Secretary cast the ballot of the section for these officers for the ensuing year. The following resolution as to stone top tables was then offered and unanimously passed:

Resolved, That the Physics Section of the Association of Science and Mathematics Teachers in annual meeting assembled at Des Moines, Iowa, do unhesitatingly, in the strongest terms, condemn the use of soapstone or other mineral material as a substitute for wood as physics or biology laboratory and lecture room table tops. The soapstone is too soft, easily becomes scratched, thus preventing pupils using it as a writing desk, it is

more expensive than wood, uprights and frame work cannot be as easily fastened to it, it is easily broken, it being a good conductor of heat always feels cold, especially in winter, to the touch.

We do recommend a wood top made up of narrow strips glued together, wide enough to project over the rail at least three inches on all sides.

The chief paper of the morning was then given by Mr. Walter R. Ahrens, entitled, "Two Year Vocational Course in Electricity, at Englewood High School." The first year's work is preparatory for the second and covers Mechanics, Heat and Electricity as given in Mann and Twiss Physics, together with some practical constructional work in wiring and blue print reading. About 45 experiments are performed in the laboratory. Three single and two double periods per week are given to the work throughout the year. The second year combines theory and much more practice, construction, and electrical testing. Two periods per day are given throughout the year. Jackson and Jackson is the text used. The course is evidently successful as the enrollment is growing and very few drop out. The paper with accompanying drawings will appear soon in *SCHOOL SCIENCE AND MATHEMATICS*. Further information can be obtained by addressing Secretary Board of Education, Chicago, relative to the "Two Year Vocational Course in Electricity."

The concluding paper of the section was given by Prof. C. D. Poore, Northern Normal and Industrial School, Aberdeen, N. Dak., entitled: "Mental Economy in Physical Science" (Illustrated). Prof. Poore explained the development of a chart from which, by a series of grouped symbols representing all the various related scientific and mathematical quantities in common use, it was possible to make any required computations without formulae and much quicker by means of logarithms and the slide rule. The chart is certainly an ingenious device worthy of a more thorough study especially by those having much computing to do. The section then adjourned.

CHAS H. SLATER, *Secretary pro tem.*

REGARDING BIOLOGY AS THE PUPIL SEES IT.

Mr. Wood in his article on "Biology from the Pupil's Standpoint" (December, 1913, Issue) expresses great surprise at the fact that the pupils did not answer topic C in his questionnaire in accordance with their views as shown in the charts. He considers the two results as contradictory and gives two reasons for the contradiction. Might it not rather be that he has not interpreted the results of topic C correctly?

In his results there is really no contradiction to be explained away. It is very possible, indeed probable, that pupils should prefer function subjects to structure ones and yet in *order of study* prefer to study structure subjects *first*. Pupils know from experience that they are able to understand the function of an organ better after knowing its structure, and their greater interest in function is more fully satisfied when the necessary structural details have first been studied. I think Mr. Wood would generally find that pupils who have a great interest in function, tolerate structure only as it leads to function, and hence realize that it is better to study structure first although they may not like it so well. Pupils also like to have the hard dry part of a subject over with as soon as possible, which is an additional reason why they like to study structure first in order of time. Had they voted to study function first, then would have been the real contradiction.

ORAN L. RABER, Rushville, Ind.