

39. The nature of spoken vowels, with reference to the theories of Helmholtz and Hermann. E. W. Scripture, New Haven, Conn. Read by title.

40. Pressure and wave-length. J. F. Mohler, Carlisle, Pa. Read by title. *Astrophysical Journal*.

41. The attenuation of sound and the constant of radiation of air. A. Wilmer Duff, Ithaca, N. Y. Read by title. *Physical Review*.

42. Optical calibration of the slit of a spectrometer. E. V. Capps, Lincoln, Nebr.

WILLIAM HALLOCK,
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SECTION I.—SOCIAL AND ECONOMIC SCIENCE.

SEVENTEEN papers were announced, fourteen of which were given in full and three were read by title. The address of the Vice-President, Dr. Marcus Benjamin, will be published in a subsequent number of SCIENCE.

There were four morning sessions and two afternoon sessions, and the interest was sustained till 3:30 on the last day.

The first paper was by Mr. John Hyde, of the U. S. Department of Agriculture, on 'The Relation of Indian Corn to the Wheat Problem.' Mr. Hyde traced the development of corn raising and wheat raising from their beginnings, showing that wheat had passed a maximum while corn was apparently approaching one. Though quite independent in production, the sympathetic agreement in price is remarkable. Mr. Hyde predicted a permanent foothold and an increasing demand for American corn. While the United States is admirably fitted for corn the same is true of relatively few other lands. Wheat may be sown either in the spring or fall, and in many lands. We cannot expect to control the wheat market, but we can the corn.

Miss Cora A. Benneson, a lawyer of high standing on Federal matters, gave a paper on 'Federal Guarantees for Maintaining Republican Government in the States,' in which she pointed out that the constitution guaranteed to every State in the Union a

republican government without defining what this is. This power has been used in regard to disputed possession of territory, to suppress riots, etc., and the reconstruction following the Civil War, federal intervention was constantly needed, even beyond those warranted by the constitution. It is a question how far the provision of the constitution guarantees a republican form of government to territories, it depending on what is included under 'United States.'

Mr. Henry Farquhar, of the U. S. Department of Agriculture, gave a short paper on 'Calculations of population in June, 1900.' The formula employed by Mr. Farquhar was

$$\Delta p = \frac{p}{e + fp + gp^2}$$

in which p is the population shown by a United States Census. Δp is the 'natural increase' in a decade, excluding immigration; e, f, g are constants determined from former United States Censuses, after deducting immigration figures. In all his calculations Mr. Farquhar rejected the Census of 1870 as defective. The immigration for the decade ending next June he put at 3,750,000. Expressing p in millions, and calculating the constants from different sets of data, the writer produced four separate calculations of the population, as thus shown:

| | e | f | g | p in 1900 |
|----------|-------|-------|---------|-------------|
| <i>A</i> | 2.862 | 0.035 | 0.00091 | 73,648,000 |
| <i>B</i> | 2.279 | 0.086 | 0. | 74,693,000 |
| <i>C</i> | 2.570 | 0.073 | 0. | 75,679,000 |
| <i>D</i> | 3.350 | 0.000 | 0.0012 | 74,466,000 |

The writer preferred *C* over the others, and concluded that the next Census would show more than 75,000,000 and less than 76,000,000.

Mrs. Florence Kelley, the Corresponding Secretary of the National Consumers' League, read a thirty minute paper on

'The Power of the Consumer, Economically Considered.' The paper was well written and admirably presented. Its general conclusions were:—The consumer, at present, has the power to decide that a given article shall not be produced, by refraining unanimately from buying it; to promote the production of a given article by demanding it; to decide within certain limits the conditions under which the production of desired articles shall be carried on. The consumer has, however, hitherto done none of these things in an orderly way, except so far as cooperative buying has been practiced, and the intervention of adulteration laws and factory laws has been invoked by consumers. The power of the consumer, while potentially very great, is really slight at the present time, and increases only in proportion as consumers organize, get into direct communication with manufacturers, and inform themselves minutely with regard to the conditions of production.

Professor Mansfield Merriman presented a study of the 'Median Age of the Population of the U. S.,' showing a marked and steady increase. His results were derived from curves obtained from the Census reports. The *abscissas* of the platted points were the ages from 0 to 100 or above. The *ordinates* represented the summation of all the population below the ages represented by the corresponding *abscissas*. For example: on the curve representing the census of 1890, the ordinate at the *abscissa* 20, represented the number of persons enumerated in the census of 1890 whose age was 20 or less. The curves become tangent to the lines of total population at about 104 years.

The *abscissa* of the point where the curve crosses the line of *half the population* marks the 'median age' since one-half of the whole people are less than that age and one-half are more than that age. In addition to the median age of all classes, the median

ages of particular classes were given, as shown in the following table:

| Census year. | Whites. | Native Whites. | Colored. | All Classes. |
|--------------|---------|----------------|----------|--------------|
| 1850 | 18.6 | — | 16.5 | 18.3 |
| 1860 | 19.3 | — | 16.5 | 18.9 |
| 1870 | 19.9 | 16.2 | 17.7 | 19.6 |
| 1880 | 20.9 | 17.8 | 17.5 | 20.4 |
| 1890 | 21.9 | 18.9 | 17.6 | 21.4 |
| 1900 | (22.9) | (20.0) | (17.6) | (22.4) |

This indicates a steady increase in the length of life, though it does not tell what that length is.

Mr. H. T. Newcomb's paper on 'Trusts, a Study in Industrial Evolution,' was exceptionally fine in both form and substance. No brief abstract can do it justice. There was no sentiment in it, no partisan bias, but a careful and impartial statement of the growth of the various forms of combination and cooperation by both employer and employed, from partnerships through trusts to corporations; from trades unions, to the American Federation of Labor. Mr. Newcomb's paper will undoubtedly be published in some form at an early date.

Dr. Washington Gladden's paper on the 'Moral Tendencies of Existing Social Conditions' was an able discussion of the moral effects of the prevailing industrial and commercial system. Dr. Gladden is a close student of men and affairs, and his observations should have great weight. The competitive system is responsible for the tendencies whether good or ill. He enumerated the *gains* we seem to be making: 1. In common honesty. There is less of cheating and fraud in ordinary business than there were fifty years ago, though buyers are more reckless in running into debt. 2. In the development of the fiduciary virtues. Men learn to trust each other more and to deserve more confidence, notwithstanding an occasional embezzler. 3. The system enforces a valuable lesson in cooperation. Dr. Gladden believed that the big corporations

which almost control the markets, furnish better goods, edible compounds with less adulteration than formerly; and that retail buyers are less honest than retail sellers. On the other hand there were *losses* incident to the growth of the present system. 1. Men lack self-reliance and initiative. There are lessening opportunities for independent enterprise. While we learn to coöperate we lose the power to set ourselves to work. 2. The lowering of moral standards through an exaggerated popular estimate of the importance of material wealth. Against these evil tendencies there is strong resistance. The moral ideals were never more clearly held or more bravely maintained than now by teachers, preachers, writers, artists.

Probably changes in the industrial and social organization will be found needful. Doubtless the world will never be reformed by changes in the machinery of society; but doubtless the world will never be reformed without such changes. It is needful that the spirit of fellowship and coöperation be cultivated and the spirit of strife and competition be repressed.

Before Sections D and I, Mr. G. B. Morrison gave the results of experiments in heating and ventilating a model house. The paper was full of technical matters, but the grand conclusions appeared to be two in number:

1. Air, warmed to a proper temperature, should be introduced to a school room through numerous small openings in the floor throughout the room, so that the great mass of air may rise slowly and uniformly to the ceiling, and there be allowed to pass out, growing cooler as it rises.

2. Given the proper amount of air to be furnished to a crowded room, it is far cheaper to move it by fans than by an aspirating flue which requires heating for the purpose.

Mr. John S. Clark, of Boston, well known for his labors in the dissemination of works

on drawing and art, read a very interesting paper on: 'Science and Art in their Relation to Social Development.' He said that scientific research to-day aims through knowledge at the solution of practical problems. Art is the product of creative activity. It is impossible to draw a sharp dividing line between industrial and fine art. Attention was then called to the relation between art on the one hand, and civilization on the other hand. He pointed out that the last century of scientific research also witnessed the development of landscape painting and of the poetry of nature. Fine art is the ultimate result of any given race or period. In art, man finds the fullest room for the exercise of his broadest powers.

A paper, by Dr. Thomas L. Balliet, 'On Some New Aspects of Educational Thought,' was one of the best of the meeting, and it commanded the closest attention and aroused the greatest enthusiasm. The discussion which followed lasted for over an hour and was participated in by Dr. Gladden, ex-President Scott, Professor C. M. Woodward and many others. It is expected that a detailed abstract of the paper will be published in SCIENCE.

In his discussion of 'The Manual Element in Education,' Professor C. M. Woodward, of the St. Louis Manual Training School, sketched the growth of the manual element from its introduction in the kindergarten, the chemical laboratory and the engineering and trade shops forty years ago, to the modern manual training school and the light tool work now introduced into the higher grades of the grammar schools. Kindergarten teachers had thus far shown their inability to extend their work into the primary school. A great wall of prejudice prevents any proper union of the first reader with the 'gifts.' But from the upper side all the grades are coming into a participation in the benefits of educational tool work and exact drawing. Every child

is entitled to a modicum of systematic manual training as a part of a rounded education.

Mr. Newcomb's paper on 'The Spoils System in Theory and Practice' was a surprisingly frank and straightforward exposition of the manner and extent to which members of Congress plunder the national treasury by creating unnecessary offices and filling them with friends who make themselves agreeable, but perform no needful public service. The paper will soon appear in print.

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THE AMERICAN MATHEMATICAL SOCIETY.

THE sixth summer meeting of the American Mathematical Society was held at the Ohio State University, Columbus, Ohio, on Friday and Saturday, August 25th and 26th, simultaneously with the meeting of the American Association for the Advancement of Science at that place. In attendance and range of subjects covered in the papers presented, the meeting was thoroughly representative of mathematical activity throughout the country. The President, Professor R. S. Woodward occupied the chair, and in opening the first session contrasted the present lively interest in mathematical investigation as indicated by the list of papers to be read, each of which was in some way a contribution to the sum of mathematical knowledge, with the conditions of thirty or forty years ago when the workers in mathematical science were very few and were confined within narrow limits.

The American Mathematical Society which represents the organized forces for research and the diffusion of mathematical knowledge in the United States has had a remarkable growth. It was organized upon its present basis in 1894 and now numbers over three hundred members. Ten new members were elected at this meeting and eight applications for membership were received.

The following is a list of the papers presented, many of which will be published in the *Trans-*

actions of the Society, others in the *American Journal* or the *Annals of Mathematics*:

'Note on relative motion,' Dr. A. S. Chessin, New York, N. Y.

'On surfaces of zero relative velocity and a certain class of special solutions in the problem of four bodies,' Mr. F. R. Moulton, University of Chicago.

'On the use of generalized differentiation in the solution of physical problems,' Professor John E. Davies, University of Wisconsin.

'A new class of link works,' Professor Arnold Emch, Kansas Agricultural College.

'A relation between point and vector analysis,' Mr. Joseph V. Collins, Stevens Point, Wisconsin.

'John Speidell's 'New Logarithmes,' Professor Florian Cajori, University of Colorado.

'On analogues of the property of the orthocenter,' Herbert Richmond, M.A., King's College, Cambridge.

'A theorem on skew surfaces,' Professor C. A. Waldo, Purdue University.

'Irrational covariant conics of a plane cubic,' Professor H. S. White, Northwestern University.

'On the generalization of Desargues' theorem,' Professor Frank Morley, Haverford College.

'On certain crinkly curves,' Professor E. H. Moore, University of Chicago.

'Note on non-quaternion number systems,' Dr. Wendell M. Strong, Yale University.

'On mixed groups,' Professor H. B. Newson, University of Kansas.

'The invariant theory of the inversion group,' Dr. Edward Kasner, Columbia University.

'Note on the imprimitive substitution groups of degree fifteen and on the primitive substitution groups of degree eighteen,' Miss Emilie N. Martin, Bryn Mawr College.

'A new definition of the general abelian group,' Professor L. E. Dickson, University of Texas.

'Definition of various linear groups as groups of isomorphisms,' Professor L. E. Dickson, University of Texas.

'On the groups of cogredient isomorphisms that are abelian,' Mr. W. B. Fite, Cornell University.

'On the groups that are the direct products of