

Of the 88 separate residuals three quarters are less than $0^s.01$ each, a quantity that I had supposed less than the uncertainty with which a clock comparison was read from the chronograph sheet.

At the end of October, 1906, the 6-inch transit circle was equipped with a self-registering right ascension micrometer of the Repsold type made by Warner and Swasey.

Previous to beginning the following series of observations, one of the observers had practised with the new micrometer on two nights and the other two on one night each. Two men worked on each of the eight nights, each observing ten time stars. Each man on half of the nights that he worked observed the first list of ten stars, and on the remaining nights the second list. The same twenty stars were used throughout the entire series.

A least-square solution gives for relative personal equation

$$E - F = +0^s.001 \pm 0^s.012$$

and

$$E - L = -0^s.001 \pm 0^s.015.$$

The relative personal equation $E - L$ by the key method of observing was $+0^s.20$.

The clock rates during these six weeks were also computed by least squares, first giving a weight unity to each rate and, second, a weight equal to the interval between the observations from which it was determined.

The resulting rates are

$$-0^s.0436 + 0.000924(T - \text{Nov. 25.0})$$

and

$$-0^s.0445 + 0.000997(T - \text{Nov. 25.0}),$$

giving as residuals:

A similar discussion of rates obtained by the key method of observing transits gave for thirteen weeks in the spring of 1904 a mean residual of $0^s.015$.

$O-C$	Wt.	$O-C$	Wt.
$\begin{smallmatrix} s \\ -0.011 \\ +0.015 \\ +0.010 \\ -0.023 \\ +0.011 \\ -0.001 \\ -0.003 \end{smallmatrix}$	$\begin{smallmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{smallmatrix}$	$\begin{smallmatrix} s \\ -0.009 \\ +0.017 \\ +0.012 \\ -0.022 \\ +0.012 \\ 0.000 \\ -0.003 \end{smallmatrix}$	$\begin{smallmatrix} 8 \\ 5 \\ 1 \\ 2 \\ 4 \\ 13 \\ 7 \end{smallmatrix}$
± 0.011		± 0.007	

We thus see that by the use of the self-registering right ascension micrometer in this series of observations the mean residual of the daily clock corrections is decreased from 25 to 50 per cent. and relative personal equation has disappeared.

HAROLD JACOBY,

For the Council

(To be concluded)

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SECTION I—SOCIAL AND ECONOMIC SCIENCE

FIFTEEN different papers and addresses were presented at the New York session. The attendance varied from thirty-five to over a hundred persons. One joint session with Section H was held. In the absence of Professor Irving Fisher, whose address has already appeared in SCIENCE, at the opening session, the incoming vice-president for the section, Charles A. Conant, presided, beginning the proceedings with an introductory discussion on banking reform, the substance of which was as follows:

Unless some sound legislation is in due time enacted, our prosperity will be arrested, our rapidly absorbed currency will prove entirely inadequate for business needs, and we must be put at a great disadvantage at home and in our competition with foreign nations in the open markets of the world.

The proposed banknote reform, it should be understood, is not a measure intended

to aid the banks, but to remove restrictions upon the use of credit in this form where it is found to be useful. If the government will remove the outgrown restrictions and require proper security, there can be no danger to any economic interest involved.

Commerce determines the amount of bullion currency, not the government. And this is just what we ask in regard to note issues. The idea that a government can or ought to determine the amount of money in circulation is not held in any civilized country. The government ought only to determine the rules that insure that a currency shall be what it purports to be, and that it shall have stability and flexibility.

The regular papers were presented in the following order:

The Evolution of Property: LOGAN G. MCPHERSON, New York City.

The problems of to-day in the United States are largely problems concerning property. The corporate régime has extended; and attacks upon corporations have extended.

The change from the artisan and the tradesman doing business in a small way to the great organization operating in an extending field, unquestionably marks one of the great transitions in the mechanism whereby property is held and transferred, one of those cataclysms, it being understood that every cataclysm is the slowly accumulated result of forces long at work, one of those cataclysms that has marked the passage from one property régime to another. Three such régimes are clearly discernible in the history of the human race. These are the tribal or gentile régime, the feudal régime and the joint stock or corporate régime of property, representing in a general way the ancient, mediæval and modern forms of property evolution.

Under the system of the gens it was every family for itself. Under the system of Cleisthenes it became, subject of course to the modifications of the political government, every man for himself. The régime of the joint stock company has come with that progress of invention through which the efforts of all men are coordinated for the benefit of all men. This régime tends more and more to reach that status where—under any person who through frugality, thrift, foresight obtains a measure of resource above his living need may participate in the ownership of one or more of the great corporations that produce and distribute the things of material need.

That it is possible for a great organization to produce more cheaply and sell more cheaply, that the ability of administrative officers can be directed into channels for which it is best fitted, that it presents—if properly steered—a formidable resistance to the dangers of both the waves of prosperity and the slough of adversity have time and again been demonstrated in theory.

That in practise all of these advantages have not been attained at all times by all corporations, that in practise all of these advantages may not have been attained at any one time by all corporations, is known to all men. It may even be that there are corporations which have not in practise attained any of these advantages at any time. But it is incontestable that every one of these advantages has been attained at one time or another by one corporation or another; and the ultimate salvation of any corporation lies in its attaining and maintaining in its practise every one of these advantages all the time.

The Concentration of Wealth: HENRY LAURENS CALL, Washington, D. C.

Fifty years ago there were not to exceed fifty millionaires in the whole of the United

States; and their combined fortunes—including the half-millionaires as well—did not exceed a probable \$100,000,000, or one per cent. of the then aggregate wealth of the nation. Sixteen years ago the combined fortunes of this class were estimated at \$36,500,000,000, or fifty-six per cent. of our national wealth. To-day a bare one per cent. of our population owns practically ninety per cent. of the entire wealth of the nation.

As a result of this wealth concentration, industrial society is practically divided into the two classes, of the enormously rich, and the miserably poor; our 18,000,000 wage earners receive an average of but \$400 per year; nine tenths of our business men are, notoriously, failures; our clergy receive an average annual salary of about \$500; the average for the educators of the land is even lower; and the income of other professional men in proportion; while of our 6,000,000 farmers, one third are tenants, and the homes of one third of the remaining two thirds are mortgaged, and a debt burden is almost universal.

These conditions are not normal nor the result of national law or causation, but are instead the result of a monopoly of land and mineral resources, of money, of transportation, and other public utilities, as also of industry. This monopoly has, moreover, been brought about by means of the corporation, industrial, financial and public service. It is thus the work of human law alone; the product of vicious institutions. The corporation, as constituted, is in fact a monstrosity in our industrial system.

But if the conditions outlined are the result alone of unjust and vicious institutions, then to law must we look for their correction. The corporation should yet be made cooperative, social, instead of as now the instrument of private greed.

Methods of ascertaining the Cost of Transportation: JOHN B. DAISH, Washington, D. C.

From the adjudicated court cases it seems reasonably certain that the method used by the Supreme Court in *Smyth v. Ames* is inaccurate, for the relation which operating expenses bear to gross receipts does not and can never show the cost of transporting the commodities. The method used by the Circuit Court of the United States for the District of South Dakota could not stand the tests applied by the Supreme Court of the United States, which tests, it will be recalled, were different from the method formerly used by that tribunal. The method used by the Kentucky Railroad Commission is clearly more elaborate if not more correct, than the Supreme Court cases.

To determine with mathematical accuracy the cost of traffic, a definite method has not as yet been devised. The difficulty is twofold. First, on the one line of road, with a single equipment, two kinds of traffic are carried. How is the capital to be separated for the purpose of producing revenue upon these two kinds of traffic? Again, the method used by the Kentucky Commission considers the whole schedule of rates, rates in gross, and secures its results in figures per ton per mile. In short, in the same focus it takes a broad survey of all kinds of commodities in the two kinds of traffic and microscopically looks at the smallest possible unit of measurement. The shipment of a box of books is augmented to per ton per mile, a shipment of a car-load or train-load of vegetables is reduced to the same unit. While this unit may be used in mathematics, it can be confidently asserted that it rarely, if ever, enters the head of a traffic manager making rates; ordinarily he does not consider the cost of traffic, for he does not know it.

The difficulties in this matter seem to be the unwarranted assumptions, the legal fictions, as it were, within which there might be such a variation as to cause rates (single or as a schedule) to be unreasonably low on the one hand or extortionate on the other.

The assumptions heretofore made may or may not be true. Until proved correct, we can not hope to ascertain to a mathematical certainty the cost of transportation to the carrier by any of the methods considered or one hereafter to be devised.

Competition versus Combination of Railroads as affecting the Basis of Rate-making: H. G. BROWN, Yale University.

The fact that railroads are operated under the law of increasing returns lies at the basis of the systems of rate making. Increased traffic is carried at proportionately less cost and yields proportionately greater profit. It therefore becomes worth while for a railroad company to get this increased traffic even if somewhat lower rates must be conceded. But lower rates will not be conceded unless there is a compensating increase of business. Reductions will be made where traffic is responsive and only where it is responsive.

Discrimination between different cities is largely due to railroad competition. When two railroads connect a couple of cities by different routes, each has a monopoly of the traffic between intermediate points on its own line. Hence there is discrimination in favor of the through traffic, which is most responsive. The reductions take place on the through traffic not because it is absolutely responsive, not, that is, because by such reductions traffic as a whole can be increased, but only because it is relatively responsive, because traffic is so gained by one road at the expense of another. If in the absence of competition reductions are made in favor of traffic be-

tween any two places, it will only be when such traffic is absolutely responsive, when the total traffic of the district served is thus increased.

The discriminations among different shippers, which have been so common with competing railroad companies, are similarly explainable. The concessions to large corporations forced by the threat to transfer patronage to another railroad are concessions made where considerable traffic is in question, where, therefore, traffic is responsive and where it is relatively responsive. It is not so much that these discriminating reductions increase traffic as a whole as that they increase the traffic of one company at the expense of another.

The tendencies of competition and of combination to affect diversely the basis of rate charges, whether among different cities, among different corporations, or among different commodities, have been reduced to the generalization that rate reductions will take place *where* traffic is sufficiently responsive to such reductions and *only* where it is sufficiently responsive. With competing roads it is chiefly relative responsiveness and with non-competing roads it is absolute responsiveness only that determines a lowering of rate.

Psychic Factors in the Fluctuation of Prices: RICHARD T. COLBURN, New York City.

The first decade of the twentieth century has many surprises for America and for Europe, political, social and financial; and in none more remarkable than the expansion of commerce and credits. These are not accurately reflected by the visible balance of trade figures, but by an invisible ledger balance of credit. This is born of confidence—a state of mind—our credit is good, perhaps too good. We are the good customer of tradition, suggestive of the spendthrift.

The 'economic man' of the text-books is unlike the actual man (and woman) of society, because he is often swayed by a group of impulses, emotions and psychic phases which have little reference to his gain or loss and range into the irrational or pathological. Many illustrations might be given from history or from current events. The inflation of stock-exchange dealings, real-estate booms; speculative 'buying for a rise' in commodities, holiday gifts, bargain-counter rushes; wedding, funeral and religious expenditures. The imitation of the crowd seems a large factor, and in spite of the spread of knowledge and useful inventions, the range of rise and fall in prices is more extreme and the psychic factors equally important.

Economic and Social Conditions of Porto Rico: JOHN L. HOGAN, New York.

The main need of this people is now initiative and leadership in lines of productive enterprises with which the Porto Ricans are themselves more or less acquainted and which are based on utilizing their natural resources and their climatic advantages, as in the growing of tropical fruits, canning vegetable products, etc. Their talent as lace-makers is a fine art that is being developed by at least one company which is introducing the needlework of Porto Rican women and children to the markets of the United States. The government has succeeded only moderately in promoting prosperity; the main reliance is now and always on far-sighted private enterprise.

The Charter and Work of the Board of Education of St. Louis: CALVIN M. WOODWARD, St. Louis.

The discussion of the subject included details of the charter, the reasons for its adoption, the organization and work of the board, its non-partisan character and how it is maintained. Some obvious fruits of

the general policy adopted by the board were described. The reports of the board give much information on these topics.

Ethical Training for Efficient Citizenship: FELIX ADLER, New York.

An outline of the qualities which have been regarded as essential for good citizenship, from the days of Plato (see his 'Republic') and Aristotle (see his 'Politics') to the present time.

Training for Physical Efficiency as an Aim of Education: G. O. BREWSTER, New York.

Present methods of physical training aim to improve the body in both normal and abnormal conditions. Exercises known as hygienic and corrective are employed to this end. The highest aim of education is the development of reason, and reason must have facts as a basis. In present methods of physical education I have been unable to discover reason, inasmuch as there are no facts or definite knowledge of the chief subject under consideration employed. The chief consideration is the individual, and a definite knowledge of himself is necessary to a reasonable understanding of his work in physical education. The smattering of physiology and hygiene, which the pupil receives during the formative period of life, aims to conceal rather than reveal the facts of life, from fecundation to birth and from birth to death.

Our aim is supposedly to leave better men and women in our places than we are, and to accomplish this result we must give them the benefit of our mistakes through our lack of knowledge or whatever cause regardless of pride and personal feeling.

In my experience in school teaching and the practise of medicine in this city, I came to feel that ignorance of the structure and functions of the body was accountable for the majority of humanity's ills.

Therefore I believe it necessary to the physical training of our youth, *not* that they should receive more exercise or mentally exhaustive and complicated drills for the exercise of muscles and functions of which they know nothing, but that instead they should receive simple, recreative exercises graded according to their physiological knowledge of themselves, and so applied that they can know what occurs in their physiological economy when they exercise either body or mind—to the end that physical efficiency be increased as abuses decrease and the standard of life proportionately raised.

Standards of Social Efficiency in School Policy: JOHN FRANKLIN CROWELL, New York.

There are three requisites by which school work has to be judged to determine its level in the scale of social worth. They are the economic, the political and the spiritual standards.

The economic standard of efficiency requires that the school training shall first of all bend its efforts to guarantee to the individual the capacity to make a decent living and maintain a respectable livelihood for himself and those rightfully dependent upon him.

The political standard requires that the individual have that degree of intelligence and self-expression to participate in constructive discussion on questions involving the common welfare.

The spiritual standard requires that there be developed in each pupil the love of things moral, intellectual and spiritual so that he may appropriate for himself the best that our civilization affords.

Some Results of Research in Child-employing Industries: OWEN R. LOVEJOY, Assistant Secretary National Child Labor Committee.

The census for 1900 shows 1,750,178 children between ten and fifteen years engaged in gainful occupations. The majority are in agricultural labor, but the numbers increase most rapidly in the industrial trades. While the chief evils are in the great industrial centers, we have found poverty, ignorance and neglect of a large number of children in country communities. There is evidence that, in some branches of agriculture the hours of labor and housing conditions are sufficiently alarming to warrant the careful regulation of child labor in agriculture.

Research in manufacturing and mechanical pursuits, mercantile establishments and street trades, indicates that as soon as childhood shows its capacity for any specific form of labor, industry at once seizes it, and posits an economic necessity for so doing; that the physical effects of child labor are a menace to society; that the effect upon family income is detrimental; and that child labor tends to industrial deterioration.

While many phases of our research must be carried on for several years before positive results are announced, we believe we are justified in urging the following demands in opposition to child labor: (1) The regulation of all industries in which children are employed, (2) the entire elimination of the child under fourteen as an industrial factor, (3) the restriction of employment for children between fourteen and sixteen, prohibiting the defective and the illiterate and carefully regulating the hours and employment of others, (4) the agreement of age standards in child labor laws and compulsory education laws and the fitting of our educational curriculum to the needs of our population, by providing such training of the hand as will appeal to the parents as promotive of the future industrial efficiency of their children.

News Service and Political Science:

FRANKLIN FORD, General News Office,
New York City.

The gathering and sale of news for a profit is a modern development. It was hardly sold at all before the time of Charles II. in England. Of one thing you may rest assured, that when some man in London first conceived the possibility of getting his living by the gathering and sale of news, that day unjust privilege had, clearly and definitely, started on the road to its last ditch. And if you wish to dramatize this assertion you have only to think of a pack of reporters at the heels of derelict life-insurance officials.

The fast press and the talking wire have come in, but the manner of classifying and handling news—the mode of interpretation—has not changed essentially. True organization in the field of news has been waiting on the introduction of a new point of view, of a new way of ideas. Scientific method has entered nearly all the great branches of manufacturing, but a new co-ordination has yet to obtain in news handling.

To organize news we must classify it, which implies a science of news. But, as already indicated, since the news movement relates to all organs or functions in the social body, the desired science must in the nature of things be the science of Politics. Call it sociology, if you will; there is no difference.

The pending advance in news organization to the level of the highest integrity introduces the oncoming new legislature, or the fact-finding and law-declaring organ. News is the universal element of social control.

From the business standpoint, when a new fact is disclosed in the news movement it carries three possible sales or profits: (1) Its general application to be distributed through the daily paper, (2)

its class application to be sold through the trade paper, and (3) its special application to individuals which they can buy through the bureau of information.

The Rate of Sickness as determined by the Companies doing Health Insurance in the United States, particularly, the Experience of the Travelers Insurance Company of Hartford: HIRAM J. MESSENGER, Hartford, Conn.

The first attempts to write health insurance in the United States were made about sixty years ago and all efforts following these attempts up to about 1897 were practically failures on account of the lack of knowledge of the business and lack of solid financial backing. About 1897 a stock accident company commenced doing health insurance, first by issuing a special health policy limited to fifteen diseases which was later increased to twenty-one and then to over thirty. The general tendency was towards a more comprehensive contract and after a few years most of the companies were issuing a health policy which covered practically all diseases. The experience of the Travelers Insurance Company on their special health policy shows .29 of a week of sickness for each year of exposure for ages 18–25, and gradually decreases to .18 for ages 40–49, and then increases to .30 for ages 55–60. On the general health policy the number of weeks sickness per year of exposure is about .65 for ages 18–50 and then rapidly increases to .95 for ages 55–60. Several of the accident companies have combined their experience on their health policy, covering practically all diseases, with the result giving a rate of sickness about 60 per cent. of the Travelers' experience.

The Manchester Unity's experience of England shows .81 of a week of sickness for ages 16–19 and from there on gradually increases to 1.44 for ages 40–44 and 3.76

for ages 55-59, representing risks that have been under observation for a longer period.

Special investigations in connection with this experience show in general that there is considerably more sickness among the outdoor industrial classes than among the indoor industrial classes and slightly more sickness among the indoor industrial classes than among the clerical and professional classes. The amount of sickness in the north and west is about the same and in each case is less than in the south—while the amount of sickness in large cities is less than in the small towns.

The following subjects were read by title:

Two Neglected Subjects of Social Economy, including interment and cremation considered from sanitary and sentimental standpoints: by MRS. L. OSBORNE TALBOTT, Washington, D. C.

Relation of Death Rates and Birth Rates, applying well known natural laws to the explanation of sociologic phenomena, and concluding that the far-reaching sociologic effects of the reduction of the birth rate are reduction of death rate, survival of the most intelligent, loss of physical robustness, and growth of higher civilization and democracy: CHARLES E. WOODRUFF, U. S. A., Plattsburg, N. Y.

The Brain and Education: THOMAS M. BALLIET, New York University. The main thesis being that while our knowledge of the brain is too scanty to build a theory of education on it, neurology can throw many side-lights on educational problems.

J. FRANKLIN CROWELL,
Secretary

SCIENTIFIC BOOKS

Chemical Abstracts. Published by the American Chemical Society. Edited by WILLIAM A. NOYES and C. A. WATERS, with the co-

operation of a large staff of assistant editors and abstractors. Published semi-monthly. Easton, Pa., Chemical Publishing Co. Vol. I., No. 1, January 1, 1907. Price, \$6.00 per annum.

Brief abstracts are given of all chemical investigations of any importance published in any part of the world. These abstracts are classified under the following sectional headings, each section being in charge of an expert in that particular branch of chemistry: Apparatus (Walker); General and Physical Chemistry (Lewis); Radioactivity (McCoy); Electrochemistry (Whitney); Photography (Friedburg); Inorganic Chemistry (Smith); Analytical Chemistry (Dennis); Mineralogical and Geological Chemistry (Hillebrand); Metallurgy (Richards); Organic Chemistry (Bogert); Biological Chemistry (Mendel); Foods (Bigelow); Nutrition (Langworthy); Water, Sewage and Sanitation (Kinnicutt); Soils and Fertilizers (Veitch); Fermented and Distilled Liquors (Wahl); Pharmaceutical Chemistry (Stevens); Acids, Alkalies and Salts (Briggs); Glass and Pottery (Barton and Bleininger); Cements and Mortars (Drew); Fuel, Gas and Coke (Pennock); Petroleum, Asphalt and Wood Products (Sadler); Cellulose and Paper (Little); Explosives (Munroe); Dyes, Bleaching and Textile Fabrics (Olney); Pigments, Resins, Varnishes and India Rubber (Sabin); Fats, Fatty Oils and Soap (Richardson); Sugar, Starch and Gums (Browne); Leather; Patents (U. S., British, German and French) (Seaman).

The appearance of this journal marks an epoch in the progress of chemistry in America, and is an achievement of which the American Chemical Society may well feel proud. The establishment of such a publication has been made possible by the untiring efforts of the editor, Dr. Noyes, and the loyal support of more than 130 of the leading chemists of the country who are acting as assistant editors and abstractors either gratuitously or at a merely nominal remuneration. The society is to be congratulated also on the fact that it has had the courage to undertake this publication single-handed and without entering into 'entangling alliances' with any other organiza-