

should be toward the blue end, and the opposite effect would show itself in examining stars in the direction *from* which we are moving. Campbell has examined many stars in the northern sky, and soon will go to Chile to continue his observations. The final result will give us both the point among the stars toward which the solar system is going and the velocity. These facts being known, the astronomer may be able in the future to calculate when the sun and his family will come into dangerous proximity to other great systems in space. Such thoughts need not worry us as the time is to be reckoned in thousands of years!

The spectroscope applied to sun, planets, stars, nebulae, comets and meteors, has given us a splendid record, and the present century is full of promises of greater results.

To-day in all great observatories photography is used to obtain permanent records of sun, planets and stars, etc. When we study the photographs taken, we are impressed with the fact that our sensitive plates, when exposed to an object, will show on development more and more, depending on the time of exposure. The startling information is obtained that after from ten to twenty-five hours or more exposure we can obtain a photograph which will show us what we never can hope (as far as we now know) to see in our telescope! Let us give our imaginations free rein, and we may dream of getting only general information with our eyes, but by the use of sensitive plates in photography we may make amazing discoveries all around us of things the eye cannot see.

In conclusion let me quote the words of one of our ablest workers in celestial photography: |

"If we were asked to sum up in one word what photography has accomplished, we should say that observational astronomy has been revolutionized.

"There is to-day scarcely an instrument

of precision in which the sensitive plate has not been substituted for the human eye; scarcely an inquiry possible to the older method which cannot now be undertaken upon a grander scale. Novel investigations formerly not even possible are now entirely practicable by photography, and the end is not yet.

"Valuable as are the achievements already consummated, photography is richest in its promise for the future. Astronomy has been called the 'perfect science'; it is safe to predict that the next generation will wonder that the knowledge we have to-day should ever have received so proud a title."

COLUMBIA UNIVERSITY.

J. K. REES.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. SECTION I, ECONOMIC AND SOCIAL SCIENCE.

IN the absence of Hon. Carroll D. Wright, Commissioner of Labor, Mr. John Hyde, Statistician of the Department of Agriculture and Vice-president of the section for the Denver meeting, presided over the Section. On the afternoon of June 30 the vice-presidential address of Mr. Hyde, on 'Some Economic and Statistical Aspects of Preventable Diseases,' was delivered. The address will be published in full in SCIENCE. Meetings for the reading of papers were held on the morning and afternoon of July 1, the morning and evening of July 2 and the morning of July 3. The meeting on the afternoon of July 1, at which the papers of Messrs. Alvord, Powers, Beal and Lazenby were read, was held jointly with the Society for the Promotion of Agricultural Science.

Titles and abstracts of the papers read in full are as follows:

Economic Situation of Pittsburgh: GEORGE H. ANDERSON, Secretary of Pittsburgh Chamber of Commerce.

Greater Pittsburgh, comprising Allegheny County, ranks fourth in population

and first in manufacturing industry among the cities of the United States. It leads the world in the production of steel and iron, steel cars, steel and wrought-iron pipe, and tin plate; of plate glass, tumblers and window glass; of air-brakes and electrical machinery; of coal and coke; of petroleum, etc. The freight movement during the year 1901 reached over 75,000,000 tons. The conditions to which the economic pre-eminence of Pittsburgh is due are as follows: (1) Cheap and abundant fuel; (2) exceptional facilities for railway and water transportation; (3) improved machinery and scientific methods of production. The union of these conditions, in unequalled degree, explains Pittsburgh's industrial supremacy.

The Electrical Industries of Pittsburgh and their Economic Influence: GEORGE H. GIBSON, Pittsburgh.

The most important electrical industry of Pittsburgh is the work carried on by the Westinghouse Electric & Mfg. Co., whose present plant occupies a site of 40 acres, and employs 5,300 men and 1,200 women. This immense plant is shortly to be duplicated.

The modern industrial age began with the advent of the steam-engine, but, in order to utilize the power of the latter, some means of transmission was necessary. The agent par excellence for power distribution is electricity. Electricity has furnished, also, the most useful means of lighting, and electro-chemistry has opened up a new but rapidly developing branch of industries.

Electric traction is an important factor in developing cities, redistributing populations, building up suburban districts and affording convenient transportation for farming communities. Some of the interurban roads are operating cars at fifty miles per hour and many carry mail, freight and express and even run sleeping cars.

On account of the convenience, frequency and cheapness of their service, electric roads are making a new field for themselves which was not open to and does not compete with steam roads.

In the modern factory the use of electricity conduces to profitable operation and permits the erection of cheaper buildings, their easy and convenient extension with the growth of business and an arrangement of tools advantageous to increased output. The use of electric cranes, hoists, etc., liberates the workman from the severe and more common sorts of labor and tends to raise him to a higher grade of intelligence and efficiency.

In mining, electricity as a means of power, transmission is unique in possessing all the advantages and possibilities of other methods and escaping their disadvantages. It is adapted to all classes of work and is used for hoisting, hauling, drilling and excavating in general, ventilating and pumping, as well as the additional use of lighting, which is possible with no other method. Electric wires may be run anywhere, they are easily laid, occupy small space and may be tapped at any moment at any point. The use of coal-cutting machines has not only released the miner from much severe labor but has resulted in a saving of \$5,300,000 per year in the United States. The extent to which electricity is adopted corresponds very closely to the extent to which mine owners and managers become familiar with this new means at their disposal.

The possibility of transmitting electric power over distances as great as 200 miles has added resources to such localities as Niagara and Messena, N. Y.; Sault Ste. Marie, Mich., and Snoqualmie Falls in the State of Washington. The largest transformers used for long distance transmission have recently been constructed in Pittsburgh, with a capacity of 2,700 kilowatts. In Pittsburgh too have been built the large-

est dynamos ever made, viz., those for the Manhattan Elevated Railway of New York City.

Electro-chemistry has not only made aluminum a rival of copper as an electric conductor, but nearly all the copper is now electrolytically refined. Calcium carbide, from which acetylene is generated, is formed under the electric arc; ordinary bleaching powder is manufactured from common salt by an electrolytic process; carborundum, a new abrasive more effective than emery, is made in the electric furnace, which aspires to the manufacture of graphite and even diamonds. Electrically generated ozone is used for the purification of water, and a company has even been formed to perfect a process for burning the nitrogen in the air for the commercial production of nitrates, which may go far to postpone the impending wheat famine predicted by Sir Wm. Crookes.

Electric lighting represents an investment of \$669,000,000 in the United States. Great improvements have lately been made in electric lamps. These include the Nernst lamp, which is a new form of incandescent lamp; the Bremer lamp, a new arc lamp; and the Cooper-Hewitt mercury vapor lamp, in which use is made of the incandescence of a vapor or gas. The development of new inventions, often very costly, is carried on here in Pittsburgh as an adjunct to regular manufacturing.

Mechanical and engineering development is a measure of a country's civilization, and the United States possesses 69 per cent. of all the electricity available in the world, 76 per cent. of all that portion available for traction, 76½ per cent. of all the electric railway mileage and 83½ per cent. of all the trolley cars.

The Genesis of Pittsburgh as a Seat of Iron Manufacture: J. B. JOHNSTON, of the *Pittsburgh Post*.

Some Consequences of the Trust Movement: H. T. NEWCOMB, Editor of *The Railway World*, Philadelphia. (Published in *The Railway World* of July 5, 1902.)

The Statistics of the Dairy: HENRY E. ALVORD, Chief of Dairy Division, U. S. Department of Agriculture, Washington. (This paper will be printed in full in the *Proceedings of the Society for the Promotion of Agricultural Science*.)

The relative importance of this branch of agricultural industry in the United States is pointed out and the value of accurate statistics thereof. The United States Census is regarded as the principal source of statistical information on this subject, but is by no means the only one. The enumeration of cows is the basis of reliable dairy data, and this count by the twelfth census is believed to be more complete and accurate than any preceding. It included for the first time the cows not on farms and ranges—found to be 973,033 in number, or 5½ per cent. of the entire milking stock of the country. The whole number of dairy cows, according to the census of 1900, was 18,112,707, and this is accepted as correct. Reasons are given for believing the enumeration of cows by the census of 1890 to be entirely unreliable and hence all the dairy statistics connected therewith. Consequently, comparisons between the dairy data of the eleventh census and the twelfth are considered as entirely misleading and useless.

Certain items in the dairy statistics of the last U. S. census are pointed out to be much more reliable than others. The following arrangement is presented as the probable order of accuracy: (1) The number of dairy cows, (2) the materials and products of the condensed milk factories, (3) the products of the cheese factories, (4) the products of creameries, (5) the cheese made on farms and sold therefrom, (6) the milk

received at cheese factories, (7) the butter made on farms and sold therefrom, (8) the milk and cream received at creameries, (9) the butter and cheese made on farms and there consumed, (10) the total milk produced on farms, (11) the milk and cream sold from farms. The first three or four of these items are considered approximately accurate; the last three or four are easily shown to be very inaccurate.

A number of tables, statements and computations are given and the deduction therefrom explained, showing that items numbered above 8, 10 and 11 must be much greater than given by the census, and that most erroneous conclusions would be reached as to the consumption of milk in its natural state, unless arbitrary but rational modifications were made of the published statistics. Two important factors have to be supplied by estimates: (1) The milk product of the 'town cows,' placed at 4,000 lbs. per year each, and (2) milk consumed by dairy calves, the estimate being 15,000,000 calves at 350 lbs. each, making an immense total, one twelfth of the entire milk product of the country.

Accepting those census statistics which bear tests of reliability, and modifying others according to the most reasonable probabilities, a table is presented as being likely to approximate the truth as to the dairy industry for the last census year. With further modifications, another table is offered as giving the probable facts, in round numbers, for the present year, as follows:

ESTIMATES OF DAIRY STATISTICS OF THE UNITED STATES FOR 1902.

Millions.	Millions of Pounds of Milk.
80 persons, at 65 lbs. per day, consume per annum.....	18,980
200 lbs. condensed milk require.....	800
300 lbs. cheese require.....	3,000
1550 lbs. butter require.....	36,422
12 gals. cream require.....	540
15 dairy calves consume.....	5,050
Total milk used as above.....	64,792

This is the product of 18,200,000 cows, at 3,560 lbs. each per year.

The annual consumption of dairy products per capita in the United States, based upon the census statistics of production, as modified and with proper allowances for exports and imports, is believed to be very nearly as follows: 19 lbs. 3 oz. of butter; 3 lbs. 7 oz. of cheese; 1 lb. 4 oz. of cream; 2 lbs. 4 oz. of condensed milk, and 237 lbs. 4 oz. of fresh milk.

The Passing of the Hired Man on Farms:

L. G. POWERS, Chief Statistician, United States Census, Washington.

1. The greater increase of farms than of farm population and its significance.

- (a) All farms and population.
- (b) Farms containing over fifty acres and population.
- (c) Farms operated by owners and population.
- (d) Farms operated by tenants and population.
- (e) Farms and agriculturalists other than farm owners and tenants.

2. Farm ownership, tenancy and wage service at different ages of life.

- (a) Farm owners of specified ages.
- (b) Farm tenants of specified ages.
- (c) Farm laborers of specified ages.

3. The economic changes of the farm and the city contrasted.

4. Increasing economic independence on the farm.

Observations by a Country Roadside: W.

J. BEAL, Michigan Agricultural College.

The paper was illustrated by about thirty lantern slides and was intended to show the objects of interest and of general significance on the road from Okemos to Lansing, passing by the Agricultural College—a distance of five or six miles. It was intended as a suitable exercise for a bulletin on elementary science, or nature study. The objects illustrated were an old grist mill; a country repair shop; a curve in

the river washing out the bank, where all the woody growth had been cut away; a country cemetery; a dangerous railway crossing concealed by high banks; a flat sandy road always bad in dry weather; a neat farmhouse with mail-box for free rural mail delivery; some old apple trees going to decay; fields extending near the highway with no fences; an old log house going into decay; a farm wood-lot where the trees are dying because it had been pastured; a perfectly graded highway; an old hawthorn; a view of the college campus; a deer park; the arboretum, twenty-seven years old; a large fine American elm; trees disfigured by telephone wires; fine views with nature's planting and the same after the woody growth had nearly all been removed; a neat modern cottage; a new brick school-house; a big split stone, with a cherry tree growing between the pieces; advertisements on board fences; a watering trough: two trees that survived after they had broken over; the State Industrial School.

The Timber Trees of Ohio and their Economic Uses: WILLIAM R. LAZENBY, Ohio State University, Columbus.

A scientifically classified list of all the timber trees of Ohio with notes on their distribution and abundance. The principal demands or present economic uses of wood are classified under fifteen different heads. Among these are building material, fencing, railroad cross-ties, poles for electric wires, transportation vehicles, cabinet ware, agricultural implements, household utensils, packages, paper, walks and roads, chemical industries, mining purposes, fuel and charcoal, miscellaneous uses.

The amount and kind of timber for each of the above uses are briefly discussed and a list of woods used for minor but specific purposes is appended.

The Importance of Cooperation between the Federal Census Office and the State Statistical Offices: CARROLL D. WRIGHT, Commissioner of Labor, Washington. (Published in 'Report on Manufactures,' U. S. Twelfth Census, Pt. I., pp. xl.-xlv.).

The law creating the permanent Census Office provides that in 1905 and every tenth year thereafter there shall be a collection of the statistics of manufactures; this is in addition to the regular decennial census as usually taken. The various State offices are constantly engaged in collecting data relative to manufactures; hence it becomes very necessary that duplication should be avoided wherever possible, and that the expense involved in the work of State and Federal governments should be either shared by them or, so far as possible, avoided entirely on the part of one or the other. Probably there is not a State in the Union that does not collect statistics relative to some of the subjects enumerated in the law establishing the permanent Census Office, and, specifically, there is a great chain of State statistical offices, known as such, having duties similar to those prescribed for the permanent Census Office. Thus a mass of information is published each year, and especially every ten years, so great that students and statesmen find it difficult to study the details sufficiently to enable them correctly to interpret results.

The fact that the results are open to criticism is perhaps the smallest matter, but certainly all data should be published in as correct a form as possible and properly interpreted and systematically and conveniently presented for public use. This desirable result can be assured only by avoiding the duplication of work, by systematizing the methods under which statistics are gathered, and by a uniform codification of the results, to accomplish which desired end it is absolutely essential that there

should be some system of cooperation between the State and the Federal offices.

Another strong argument in favor of such cooperation is derived from the fact that at present the State and the Federal governments are constantly canvassing manufacturing establishments and the people generally for statistical data. This duplication, or rather repetition, of attempts to secure information is becoming very annoying to the public generally, and causes the fear that there will be a revolt on the part of some interests, and makes it essential that these canvasses should take place as rarely as possible. Constant calls for information where no remuneration is provided for furnishing it result oftentimes not in careless answers but in positive refusals to comply with official requests. Again, while governments are constantly requesting manufacturers and others for information, the secretaries of trade associations, the editors of almanacs and year-books, and the compilers of encyclopedias and other works, are also besieging them for specific information for their various publications. These calls complicate the work of government offices.

The Change of Position, during the Nineteenth Century, of the Business Corporation: JUDGE SIMEON E. BALDWIN, Supreme Court of Connecticut, New Haven.

The close of the nineteenth century found the business of the world in the hands of private business corporations. It was not so in 1800 nor at any previous time in the history of the world. How came it?

The existence of such artificial persons was first freely permitted by Rome under the republic; but they grew so powerful that this could not be tolerated under the empire. The only form of Roman corporation (*universitas*) which survived to reappear in the beginnings of modern society was the university of scholars. Private in-

corporation at will under general laws, for business purposes, remained unknown for nearly 1,800 years. The few corporations of this kind that did exist existed under a special franchise. They were monopolies. They often grew inconceivably great. They fostered speculation, and were generally distrusted by the people. Great commercial partnerships were resorted to for large undertakings. Prior to 1800 there were only 225 business corporations in the United States, and of these two thirds were to promote quasi-public objects like canals, etc. The first American general incorporation law was for canals, in 1795. New York followed in 1811 with one for certain kinds of manufacturing enterprises, and in the course of the next seventy years freedom of incorporation on equal terms to all became the rule in almost all civilized countries. The freer and the richer a country is, the freer will be its general incorporation laws, and the more numerous the corporations formed under them. This and the enormous increase of the world's wealth since 1800 are the two factors which have put into the hands of the modern corporation the business of the world.

Sentimental considerations largely influenced this course of events. Popular distrust and jealousy kept men from investing in corporations or from wishing them well, so long as their character was monopolistic. The modern corporation is individualistic. It asks nothing from the State but to be let alone. The 'trust' at first was an abandonment of the corporate idea for that of partnership. Now it is reverting to the corporate type. The mobility of most business corporations is as great as is that of a natural person. It is greater, for they can choose their birthplace, and incorporate where they find incorporation offered on the easiest terms. They can also reincorporate subsequently in some other State, and so, Phoenix-like, die and revive again.

Mill said that industry was limited by capital. The modern corporation in a world with surplus wealth on every side eager for investment has removed this limitation.

Problems and Possibilities of a Department of Commerce: JOHN FRANKLIN CROWELL, Bureau of Statistics, Treasury Department, Washington.

Unexpected difficulties in administrative organization, more than anything else, prevented the enactment of the law creating a Department of Commerce at the latest session of Congress. Debate and hearings, however, developed the seemingly general conclusion that an efficient department could not be created out of more or less incoherent and semi-commercial bureaus as constituent elements, but that such a department would probably have to be started *de novo* and develop its own administrative machinery. The field for such a department in domestic commerce is full of unsolved problems, such as the railway problem, the trust problem, the shipping problem, the navigation problem and the problem of the development of trolley traffic and highway improvement. All of these are vital commercial problems which have almost no representation in federal administration and no direct representation in the cabinet. Add to these all those questions which are involved in the proposals to extend our foreign markets through the agency of the federal administration, and we have a sufficient scope for a most energetic executive department. These considerations should put to rest the doubt whether there is any place for such a division of administrative activity. If our commerce is to be reduced to a scientific business rather than to remain as a speculative hazard, then governmental leadership is necessary to focalize the policy which, taking into account both domestic

and foreign trade, would contribute most to our permanent prosperity.

The Development of American Commerce—Past, Present and Prospective (accompanied by diagrams): O. P. AUSTIN, Chief of Bureau of Statistics, Treasury Department, Washington. (Published in *The World's Work*, August, 1902.)

The foreign commerce of the United States divides itself into three distinct periods: (1) That prior to 1870 when the growth was comparatively slow and the imports usually exceeded the exports, (2) that following 1870, in which the growth was more rapid and the exports usually exceeded the imports, and (3) that of the last decade, in which manufactures form an increasing share of the exports and manufacturers' materials an increasing share of the imports. Following the construction of the transcontinental railway, completed in 1869, came the extension of other lines through the great Mississippi valley and the South, and this resulted in the opening of the great agricultural, forest and mineral areas whose natural supplies have made this the greatest producing country of the world and facilitated the assembling of these natural products for use in manufacturing. As a result, agricultural production has more than doubled and manufactures more than trebled. The value of farm products increased from less than $2\frac{1}{2}$ billions of dollars in 1870 to about $4\frac{3}{4}$ billions in 1900, and the value of manufactures has grown from $4\frac{1}{4}$ billions in 1870 to 13 billions in 1900; though in each case the figures of value fail to show the full growth in production, owing to the fall in prices of nearly all articles meantime. The production of coal, a prime necessity in manufacturing, grew from 33 million tons in 1870 to 290 millions in 1901; pig iron, from less than 2 million tons to over 13 million tons. Meantime the rail-

ways have grown from 52,000 miles in 1870 to practically 200,000 miles at the present time, and rates for rail transportation have fallen to about one third the rates of 1870. The result of all this is that the United States has become the greatest exporting nation in the world, having risen from fourth place in 1870 to first place in 1901. The value of our exports was, in 1870, 393 millions; in 1901, 1,487 millions; imports, in 1870, 436 millions; in 1901, 823 millions.

The causes of this development in exports are to be found in the fact that the United States is the world's largest producer of the great articles required by man for his daily life. The chief requirements of man are food, clothing, heat, light and manufactures; and of all these the United States is the world's largest producer: for food, wheat, corn and meats; for clothing, cotton; for heat and light, coal and petroleum; for manufacturing, iron, copper and lead; while in manufactures actually produced the United States exceeds any other nation.

This commanding position in the world's commerce seems likely to be retained by the United States. The natural production shows little if any signs of abatement, while we may reasonably expect that the development of science and invention and the application of American energy will still further reduce the cost of manufacture and transportation. This high standing of the United States as an exporting nation should be welcomed by the commercial world rather than antagonized. The commercial world buys our products because it requires them for daily use and because it can obtain them more readily and cheaply from the United States than from any other part of the world. The effect of the refusal of Europe to purchase from the United States any of the great articles of which we furnish so large a proportion of the world's supply would be to cause an advance in the

price of those articles in other parts of the world, while the fact that the United States in 1901 sold to Europe alone more manufactures than she ever sold to the entire world in any year prior to 1895 shows the progress that American manufacturers are making.

It must also be expected that our imports will continue to grow. The reasons are coincident with our growth in manufactures. While the United States is the world's greatest producer in the chief elements required in manufacturing, it does not produce certain articles of tropical and subtropical growth of which the manufacturers are requiring constantly increasing quantities, such as raw silk, fibers, Egyptian cotton, india-rubber and many other articles of this character. Add to this the tropical requirements for food, such as coffee, cocoa, tea and such portions of the sugar and tropical fruits as are not produced at home, and it is apparent that the importations must increase, and especially those from the tropics. This fact of our growing dependence upon the tropics suggests that the events of the past four years have been of advantage in the fact that they have brought under the American flag an area capable of producing a large share of these tropical requirements, and taking an equal quantity of our products in exchange therefor.

New Light on the Per Capita Wheat Consumption Problem: HENRY FARQUHAR, U. S. Census Office, Washington.

The census results recently published from the flouring mills of the country in the year ending with May, 1900, include amounts of flour produced and of wheat used in its production, which, taken in connection with amounts exported during the same period, furnish an index to the country's consumption of flour, and hence of wheat. The consumption so ascertained

from the Twelfth Census agrees closely with that from the Eleventh, from flour mills; and they differ very little from those deduced from the last census for agriculture, making allowance in the latter for all wheat not consumed for food in this country. But the per capita figure from these concurrent sources is some twenty per cent. in excess of the amount which appeared to result from previous inquiries, by the reported consumption of representative families, converted into an average for the country by use of population tables for different localities and classes.

The quantity found by the latter method might be deficient in several ways: the amount consumed might be underestimated; or wastes and losses and consumption other than as human food might be neglected; or the number of consumers might be overstated, owing to absences from home, etc.; or the families considered might be not fairly representative. The census determination might be excessive through faulty methods of supplying imperfect data—for example, overestimate of the amount of wheat required for a barrel of flour. The least improbable source of error in the agricultural census would be an introduction of supposititious farms by the enumerators. It is possible also that the per capita rate might actually have increased.

Municipal Insurance against Unemployment: HENRY J. HARRIS, Department of Labor, Washington.

The four causes which force the working-man involuntarily to become a burden to society are accident, sickness, general invalidity and lack of employment. The first three of these have been more or less successfully removed from the field of charitable effort and relief for them placed on the basis of insurance; attempts are now being made in various European coun-

tries to place relief for unemployment on a like basis.

The first attempt to accomplish this was made in the city of Bern, Switzerland, in 1893, by establishing a municipal office for voluntary insurance against unemployment. The plan finally adopted was to charge the members of the Fund the sum of fifty centimes per month as dues, and in case of a member becoming unemployed—through no fault of his own—during the months of December, January and February, he was paid one and one-half francs (or two francs if others were financially dependent on him) per day for a period not exceeding sixty days. With modifications to suit local conditions, similar Funds have been established in Basel, Cologne and Bologna; the four Funds have memberships ranging from 160 to 1,200 persons each; the insured persons pay between thirteen per cent. and thirty per cent. of the total cost of the insurance, the deficit being met by contributions of private persons and municipal subsidies.

In August, 1901, the city of Ghent, Belgium, adopted the plan of increasing, under certain conditions, by fifty per cent. the out-of-work benefits paid by the trades unions of the city to their members. The plan has met with favor in other localities and is used by the city of Dijon, France, and the province of Liege, Belgium. About 13,000 persons are now insured under this system.

Municipal Government in the Philippines: CLARENCE R. EDWARDS, Chief of Bureau of Insular Affairs, War Department, Washington.

The institution of local self-government in the Philippines has given the most practical evidence of the beneficent intentions of the United States. Under General Henry W. Lawton, the important town of Baliuag, immediately on its capture in May,

1899, was permitted to hold a public meeting and elect a captain municipal, or mayor. The plan of electing local administrative officials at town meetings was extended during the next few months to Santa Ana, Pandican, San Pedro, Macato, Pasig, Patero, Malabay, Paranque, Los Pinar, Bacoar, Imus, San Felipe Neri and a few others. The success of this experiment led to the installation of similar municipal governments in towns that subsequently passed under American control.

Owing to the conditions existing, some control over the local governments by army officers was necessary, especially in financial matters, but that control was gradually lessened until it became little more than advisory. While in some cases the municipal officers elected were in active, though secret, sympathy with the insurgents, many were assassinated because of their loyalty to the United States.

In 1900 a general order (No. 40) was adopted, applicable to any town in the archipelago, substituting for supervision by local commanding officers the right of appeal to the military district commander. It also provided for election by ballot and for limitation of the franchise. That order was subsequently modified by the municipal code, promulgated by the Taft Commission and is now the municipal organic law of the islands. The code extended the franchise, required expenditure for public schools, restricted the forms of local taxation, and provided for a centralized system of collecting the revenues. The early success of liberal and progressive local self-government prepared the way for the civil government now auspiciously instituted.

The following papers were read by title:

The Progress of Irrigation as disclosed by the Returns of the Twelfth Census: F. H. NEWELL, Hydrographer, U. S. Geological Survey, Washington.

Progress in Insurance Engineering: EDWARD ATKINSON, Boston.

The Practical Handling of Woodlands: GIFFORD PINCHOT, Forester, U. S. Department of Agriculture, Washington.

Public Protection of Private Savings: JAMES H. BLODGETT, U. S. Department of Agriculture, Washington.

Local Life by Local Time, Expressed in Standard Time: EDWARD S. WARREN, Newton, Mass.

Voluntary Associations Among Cuban Working People: VICTOR S. CLARK, Washington.

Social Bacteria and Economic Microbes, Wholesome and Noxious: A Study in Smalls: EDWARD ATKINSON, Boston.

The Formative Period of a Great City: A Study of Greater New York: WILLIAM H. HALE, Brooklyn.

FRANK R. RUTTER.

Secretary.

SCIENTIFIC BOOKS.

Die deutschen Universitäten und das Universitätsstudium. Von FRIEDRICH PAULSEN. Berlin, Verlag von A. Asher & Co. 1902. Pp. xii+575.

Professor Paulsen aims in his new book to give a systematic account of the nature, function, organization and historical development of the German university. Owing to the exalted position which the German university occupies in the world of education, and the universal nature of the problems discussed by Professor Paulsen, his work will be of value not only to his own countrymen, but to persons interested in the subject everywhere. It ought to be studied by every man who takes any part in university legislation, whether as president, professor or member of a controlling board, and by every student who desires to get the most out of his university course. It is so rich in valuable information, so full of practical suggestions, that it cannot fail to prove