servations are not peculiar to the faculties to which they are applied. The time has already come when the professional faculties, and preeminently so those of the technical schools, must be active, living parts of their professions. There is no other way by which they can either properly discharge their own functions or become members of a university organization strengthened and equipped to meet its wide educational responsibilities which make it one of the greatest conserving and elevating forces of the community.

The technical schools constituting the great modern professional schools of the university are integral parts of it and necessary consequences of its natural evolution. They belong to it historically and naturally. They are professional schools, and professional schools not only belong to the university, they are the university.

WILLIAM H. BURR.

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

THE address of the retiring vice-president, Professor Fisher, on 'Economic Science,'[1] was followed by an address of welcome by Professor Frank A. Fetter, ex-secretary of the American Economic Association, in which the work of the section was commended for its services in emphasizing the scientific method in economics in contrast with the conception which gave most attention to theoretical descipline.

The discussions of Professor Norton's paper (see below) by Dr. W. H. Welch, of Johns Hopkins, and Dr. A. C. Abbott, of the Philadelphia Board of Health, added materially to the value of this session. Dr. George W. Kober, of Washington, and Fred. L. Hoffman, of Newark, sent communications on this paper, the latter especially criticizing the proposals relating to federal control of medical institutions.

[1] See SCIENCE, August 31, 1906.

Economic Advisability of a National Department of Health: PROFESSOR J. PEASE NORTON, Yale University.

The salvation of the civilization and the race lies in the hands of exceptional men. The hope of the race inheres in their efficient organization for action. Organization consists in compelling voluntarily or involuntarily each individual to do that thing within his capability which has greatest value for society. To do otherwise is a great waste. To permit great wastes to go unchecked is more than a suicidal policy; for an evil more heinous than race suicide is race homicide.

There are four great wastes to-day, the more lamentable because they are unnecessary. They are preventable death, preventable sickness, preventable conditions of low physical and mental efficiency and preventable ignorance. The magnitude of these wastes are testified to by experts competent to judge. They play their part in a cruel devastating destruction that is almost incredible to the human mind.

The economic reasons for establishing a national department of health are five: (1) To enable society to progress more rapidly under the law of increasing returns through increasing the per cent. of exceptional men of each degree (many of whom are now lost through preventable accidents), in addition to increasing the total population. (2) To lessen the burden of the unproductive years on the productive years by increasing the average age at death. (3) To decrease the burden of death on the productive years by increasing the age at death. If the expenses of illness and death are $300 and the average age at death is forty years, the average death expenses average $15 on the twenty

productive years. Could the average age be increased to 50 years, the burden falls to $10 or a decrease of fifty per cent. For 80,000,000 of people, the saving of $1.50 per year of life would be equivalent to $120,000,000 per annum. (4) To lessen the economic burden of sickness. Assuming Newholme's figure of nine days average illness per annum, approximately 2,000,000 years of life are lost per annum. Estimating wages at $1 per day, and all other expenses $1 per day, $1,444,000,000 loss per annum is registered by this item. Could the days of illness be cut down one third nearly $500,000,000 would be saved. (5) Higgins has estimated that six hundred millions are now spent on criminality in the United States. If the criminality is largely the product of social environment, such as over-crowding, alcoholism, etc., measures which would decrease this only fractionally are worthy of consideration. A decrease of $16\frac{2}{3}$ per cent. would result in savings of $100,000,000 per annum.

For the last four estimates, the total savings range between $1,800,000,000 and $4,000,000,000 per annum. In addition to the positive gain, in addition to the savings above, there exists a vast amount of misery and sorrow which would be lessened, but may not be measured by statistics.

How Shall the Destructive Tendencies of Modern Life be met by the Individual? Dr. Richard Cole Newton, Montclair, N. J.

First of all a physical education is needed to develop, strengthen and preserve the body. In spite of mechanical and scientific advance, we are far behind in respect to the rules of simple and healthful living. A systematic study of diet, use of narcotics, employment of exercises as they apply to 10,000 people for ten years would settle many fundamental questions which nothing short of government could successfully undertake to solve. A national bureau of health should be formed to undertake such studies and experiments as are necessary to make these inquiries. This bureau should pass on every new remedy and every proposed system of treatment, so that the humblest citizen might know that he will not injure himself in using such remedies or systems of treatment. By positive direction and training the Japanese have made their armies invincible. We must profit by their example if we would maintain our national life and our racial preeminence.

Limitation of Great Fortunes: Professor James Walter Crook, Amherst College, Mass.

The problems connected with the amassing of enormous fortunes have been given a special importance by President Roosevelt's Washington address, on April 14. The remedy by him proposed was a progressive tax so framed as to prevent giving or beqeathing fortunes, over a given amount, the tax to be imposed by the federal government.

Unlimited opportunity to accumulate fortunes has a selective value by attracting a large share of the best talent into business. A change would affect commercial activity as a pursuit. It would create a new source of federal income and greatly modify the distribution of wealth in the community.

We must remember that the wealthy in large measure manage their wealth for society. Before radical action we should consider whether the growth of large fortunes is due to temporary or permanent causes.

The causes of great fortunes are, as a rule: (1) underground resources (mining, oil, etc.), (2) development of transporta-

tion facilities, (3) combination of corporate enterprises, (4) increase in land values, (5) speculation in corporate securities, (6) monopoly. All except the second and the sixth are still open fields for the fortune maker.

Possibly something, not much, may be expected as a remedy from seeking an honorable family name, from public service, but the remedy is too remote.

Of the three methods proposed: (1) An arbitrary limit to accumulation, (2) progressive income tax, and (3) progressive inheritance tax, the first is arbitrary, the second no less acceptable, and the third is good for raising revenue but doubtful as a means of repressing accumulations.

A tax heavy enough to accomplish the purpose would raise problems of fiscal administration of a perplexing character, both in the collection and use of the funds. Economically, such a tax would repress industrial activity, financially it might cause extravagance in governmental expenditure and disturbance of the money market by its collection.

On the subject of agriculture the introductory talk of Professor L. H. Bailey, of Cornell, on the 'Problems of Agriculture,' and the paper by Professor G. N. Lauman, on 'Rural Conditions and Problems in Europe,' were timely and full of suggestion in the service of American experience.

Professor Bailey said: The farm is going to be laid out by the rural architect with regard to good taste. We shall begin with the highways and take down the advertising signs among the first. Sanitation will play a larger part. Even now many of our best dairy stables are more truly sanitary than the majority of homes in city or country. The rural home must solve its servant problem (1) by simplifying its food preparation, and (2) by reduction of labor with mechanical appliances.

Causes and Consequences of the Past Ten Years of Agricultural Prosperity in the United States: GEORGE K. HOLMES, U. S. Department of Agriculture.

The prosperity of farmers, which has been preeminently in evidence during the last half dozen years, must be and is logically reflected in the higher capitalization of their lands, and in better and additional buildings and other improvements. It has been ascertained by the U. S. Department of Agriculture that the farm real estate of the United States increased 33.5 per cent. in value during the five years following the census of 1900, or an amount that averaged $100,000,000 a month and equaled $6,000,000,000.

There has been a cessation in recent years of the longtime tendency to overproduction; there is no more cheap cultivable land of nation, state and railroad to be robbed of its fertility for cheap production. The agricultural population is becoming a smaller fraction of total inhabitants, and there is a nearer approach to equilibrium between agricultural production and consumption, helped by enormous exports of cotton, grain and meat. In the meantime, immigration, which had long poured its hordes upon the farms, has changed in character and been diverted to the cities, to consume instead of multiply the products of the farm. Besides, the consumption per capita of some things seems to have increased—of wheat, meat and its products, vegetables, fruit, poultry and eggs.

These are among the chief causes that are making agricultural consumption tend to push agricultural production, with the result that prices have risen and farming operations have become more profitable.

The greatest economic gain that the

farmer has made, apart from higher prices, is the freedom to shift from one crop to another, the most conspicuous illustration being cotton. Now that the planter is not generally working against a crop lien bearing 40 per cent. interest and profit to secure advances for living and production and has no creditor who will lend on no security but cotton, he is in a position to raise cotton or some other product, as he pleases, and there will never be an excessive crop of cotton again, unless by chance for one year, as in 1903.

Among other results of prosperity, are the ability of the farmer to borrow at a low rate of interest, his enormous accumulations, deposits in banks, and investments, the cancellation of old farm mortgages, and his ability to hold his crop after harvest until the price is satisfactory to him, in place of dumping it upon the market as he formerly did to pay debts and expenses. The farmer now has an impregnable economic position.

Economic Geography: Dr. J. Russell Smith, Wharton School, University of Pennsylvania.

Economic geography is a study of the world in which we live as a place in which to make a living. Another way of putting it is that it is the description of lands in terms of human usefulness. This phase of geography does not permit itself to be carried off into speculation of purely scientific interest unless there is also an economic aspect. It is held down by that qualification of human interest—usefulness to man.

Almost every industry and every form of human activity is controlled by the physical conditions of the land in which the people live. The understanding of these relations is economic geography, and it is one of the shortcomings of our educational system that this study has not received greater attention.

Economic geography needs to go into higher education in as thorough a way as has been the case with history. It is useful not only to other sciences but to the direct preparation of the individual for citizenship and business.

The concept and treatment of history have been rapidly changing because of the growing recognition of the part that economic conditions have had in shaping human affairs. The understanding of the past and the present are alike in their requirements. The science of economics, like history, requires for its understanding the fundamental facts of economic geography. Economic geography gives the economic facts that are requisite to an understanding of economic theory. Many of the problems of political science also grow out of geographical conditions.

Private industry and investment also depend closely upon the information given by economic geography. Twenty years ago there was a great rush of emigrants into western Kansas. They were unfamiliar with the economic geography of the region and a quarter of a million of them attempted to make farm homes where it was impossible to do so. They were driven out bankrupt after years of labor, and eastern mortgage holders also lost millions. Economic geography is quite as important to the financier as to the representative of industry or government.

On the general theme of municipal ownership four papers were presented. That by Charles W. Tooke (Syracuse, N. Y.) dealt with legal and financial phases of the problem. The discussion was opened by Charles Whitney Baker of the *Engineering News,* New York City, who said:

The 'public utilities' in cities at the present day are absolute necessities; hence

their control or operation by the public authorities is a far more vital question than it was twenty years or even ten years ago.

There have been three important changes in the public point of view of the municipal ownership question: First, the enemies as well as the friends of municipal ownership are now agreed that public utilities, if not owned by the city, must be operated under strict franchises, providing for good service and regulation of rates and limited in duration.

Second, all are agreed that 'public utilities' are natural monopolies and that attempts to create competition in the gas, water or electric supply are in the long run injurious, both to the stockholders and to the public, and hence should not be permitted.

Third, the recent disclosures of inefficiency, corruption and wholesale graft in some of the private corporations which the public has been accustomed to regard as models of good business management, has enabled people to make a fairer comparison between municipal work and private work. Public utilities in most cities are and must be operated by large corporations, unless the cities themselves take charge. In these corporations, there is and will inevitably be more or less red tape, inefficiency, graft and corruption. It probably still remains true that this corporate management will generally be more efficient than city management, but the difference is far from being as great as has usually been supposed.

Public Ownership and the Wage-Earners: H. T. NEWCOMB, Washington, D. C.

In its efforts to convert municipal, state and national governments to particular portions of its socialistic program the persistent propaganda of public ownership, whose tireless activities so visibly pervade current American politics, usually demands the support of wage-earners upon the ground that the employees of public enterprises will be more favorably treated than those of private enterprises in the same field. It is claimed that public ownership means higher wages; shorter hours of labor, and, generally, better conditions of employment.

Experience proves not only that the government is not the best employer, but that it is not even a fair employer. Nor is this all. When government engages in industry on a large scale the condition of its employees naturally and inevitably degenerates to that of slavery.

Government does not advance wages with the increased cost of living.

Democracy is an arbitrary employer. Public employees must not seek to better their condition, on penalty of discharge, according to President Roosevelt's order of January 31, 1902.

Compulsory labor in New Zealand (Parsons, 'Story of New Zealand,' p. 179 seq.) gives no hope to labor for freedom under government employment.

The public employer has neither the knowledge of labor conditions, nor the incentive to efficiency which springs from the demand for pecuniary success. As truly as republics are ungrateful, the majority is sure to prove harsh as a task-master, and grudging in yielding compensation to its servants. Its enthusiasms are usually, not always, toward generosity, but they are changing, remittent and unreliable, while its sterner morality produces an ideal of justice that inspires the niggardly legislator while he crushes, in the ostensible interest of the taxpayer, every proposal to deal fairly and, therefore, wisely with the problems arising out of the public employment of labor. More than this; democracy, or the majority, through which it operates, is intolerant of disagreement with its principles, relentless in beating down opposition to its policies, merciless to the minority

which persists in impeding the execution of its will. What could such an employer be, in dealing with labor on a large scale, save a harsh task-master? What could it naturally become save a driver of shackled slaves? Where is the clear-headed and independent wage-earner who will consciously invoke such tyranny?

Fallacies of Municipal Ownership: Allen Ripley Foote, Secretary State Chamber of Commerce, Columbus, Ohio.

The most beneficent service a government can render the people is to correctly regulate, not to own and operate, public service utilities. Every gain made in reducing prices for services charged to the people by eliminating the political elements of the costs of ownership and operation paid by corporations, can be eliminated by placing corporations under a correct system of regulation, and granting them, without charge, every privilege enjoyed, without payment, by the municipal corporation.

Politicians now take advantage of corporate mistakes to make promises of better service. They make a show of keeping their promises to the people, by the simple process of not charging into the account numerous items all of which are paid by corporations and must be covered by prices they charge for services rendered. The apparent gains sometimes shown by municipal ownership advocates in the department of economic costs, on close analysis and inspection are invariably found to be the products of political book-keeping, and an unsound financial policy. These include the payment of the interest account on bonds out of the tax-payers' money and charged to general expense, instead of to the operating expenses of the utility; no insurance, with losses by fire to be paid out similarly; no account taken of depreciation.

Economic gains are thus shown, but not made. Such gains must be earned, they can not be created by a fiat resolution. Instead of making savings for the people, municipal ownership has resulted in hampering, restricting and deadening all enterprise and improvement in the industries it has absorbed, and in placing heavy burdens upon the tax-payers.

Correct regulation would require all corporation accounts to be kept in the form prescribed by the state for the information of the people. There would be an end of watered stock; wars between competing corporations would cease; operating costs would not be inflated by charges for franchises and property taxes; prices charged for services would be true economic prices.

The Corporate and the Individual Conscience: Cora Agnes Benneson, LL.B., Cambridge, Mass.

Within the last decade great changes have taken place in business management. From individuals it has passed to corporations, composed of individuals, to be sure, but they must now consider corporate instead of personal interests; they have, or should have, a corporate conscience.

Granted, that although a corporation proverbially has no soul, it has a corporate conscience. Who is responsible for that conscience, the stockholders, the directors or the state?

On measures involving public welfare, the state conscience should be on the alert. If a corporation corners a necessary commodity, like wheat or coal, or unduly cheapens labor, it is dangerous to the republic and the state should take away its charter. State laws should be passed protecting minority stockholders.

The directors are responsible for the corporate conscience, when they resort to double-dealing, as for instance privately giving lower railroad rates to certain corporations than to individuals, or exploiting the corporation for private ends. The

remedy lies with the stockholders to put such out of office. Stockholders are responsible for the corporate conscience when they permit corporate measures they would not personally sanction.

Few stockholders attend annual meetings. If they absent themselves, what right have they to complain that the directors are self-elected and a small number or even one gains control? Attendance gives opportunity to ask questions; the more searching these are, the more welcome are they to directors who have nothing to conceal and who have kept the corporate conscience clean.

The Public Bath System of Brooklyn: WILLIAM H. HALE, Brooklyn, N. Y.

A system of free public baths is a most important and beneficent exercise of municipal ownership, conducing as it does to public health and ultimately to improvement of public morals.

The floating baths have long been in use along the river front during the summer season; three of these dating back nearly or quite thirty years are still in commission; two more were built in 1897, and the five are now open to the public. It is estimated that 1,500,000 people used these baths last summer.

The system of interior baths open the year around is very recent. Six have been opened thus far.

These baths provide shower baths, with hot and cold water, free to all. Soap is provided at a cent a cake and use of towels for a cent. Tubs in private rooms with soap and use of towel, cost five cents.

Great care is taken to keep the bath houses well cleaned, and this is so well done that many of our good citizens use the public baths, and many persons regularly come from New York to use them.

Receipts for soap, use of towels and use of tubs in 1905 were $4,446.75. The estimated attendance during 1905 was 6,000 a day.

The cost per capita of each bath for the Montrose Avenue bath for April, 1906, was 3.42 cents. The number of bathers for this month was reported as 47,956, and the cost of operation of that bath above receipts for that month was estimated at $1,594.01. This does not include the cost of the water used nor any estimate to cover rent for the building, but merely operating expenses.

And it is indeed doubtful whether public funds can in any way be better expended than in the cleansing of the people by these baths, in promoting health and comfort, and in its generally ameliorating effect. It is the testimony of the attendant in charge of the bath which we have just been discussing that it has a distinctly perceptible effect not only in improving the health, but also in elevating the moral tone of the community in that immediate neighborhood.

Regulation of Freight Rates: N. T. BACON, Peace Dale, R. I.

The railroads legitimately object to freight charges based on mileage only, that in many cases, and especially for short distances, haulage only represents a minor part of the cost to them, being of less importance than switching, and the use of terminals and rolling stock. To meet these objections rates are proposed based on three subdivisions of the charge:

1. Terminal charges for switching and use of terminal facilities. For this all stations should be graded, according to annual freight receipts, into say six classes, terminal charges to be uniform for each grade of stations for the different services rendered at each end.

2. Use of rolling stock.

3. Haulage.

All these should differ for the different classes of freight, but all rates and gradings should be published, and no modification

allowed without publication a month in advance. Charges should be only for services rendered, so that in case of concerns owning their own sidings and doing their own switching, terminal charges would be eliminated for that terminal, but not at the other unless the freight received such treatment at both ends. Similarly no charges should be made for rolling stock against firms providing their own cars, except that where they are returned empty a suitable published rate should be made for this. These are the legitimate advantages of wealth, but no illegitimate advantages such as exclusive contracts should be tolerated. Those already existing are probably ultra vires for common carriers and therefore void.

Freight classification should be left to periodical conventions of general freight agents. It is too complicated for any other treatment.

Finally, the railroads should be liable for demurrage for unreasonable delays, on a basis similar to that on which they charge demurrage for delay in unloading. Some allowance should be made for extraordinary demands; but favoritism should be drastically punishable, and the president or directors of a railroad should be personally responsible for the shortcomings of subordinates, without exonerating these. Moreover, those finally responsible should be under heavy bonds and not at liberty to avoid suit by taking refuge abroad. Our laws should be altered, to allow an action *in rem* instead of *in personam* in the case of any fugitive from justice who does not return on publication of a summons. There are few greater scandals than those of wealthy men abroad defying our laws while they depend on them for the enjoyment of the income of their property.

The Problem of Railroad Taxation: Herbert N. Edwards, Yale University.

The modern industrial corporation has found its chief field of operation in transportation which is the life of industrial development. In the United States methods of assessment and collection of taxes on these properties are so varied as to be confusing. But in principle there is more uniformity. Forty-seven out of fifty states and territories tax their railroads on the basis of physical valuation. The general property tax still obtains nearly everywhere, but by methods differing from that used in taxing individual property. The method in most common use is the state board of assessment and collection. The average value per mile is the valuation basis to which any given rate is applied. But valuation is in some cases not that of use and personal property but of the stocks and bonds (Delaware, Pennsylvania, Massachusetts, New York) supplemented by gross receipts tax.

Railway taxes are now the chief source of state revenue in many cases, leaving the general property tax to local divisions. In Michigan the basis is the sum of values of the tangible and intangible property. Plehn advocates the value of their securities as the best basis and Seligman the taxation of net receipts. The states now derive $60,000,000 revenue from this source. Their methods are, however, inadequate and some form of federal control is needed for the sake of more harmonious methods.

What may Accounting teach Economics: Frederick A. Cleveland, New York.

To the economic dogmatist and abstract reasoner who conceives economics as composed of a set of specific doctrines as expounded by the physiocrats, the Malthusians or the Marxians, or as embraced in a congeries of concepts known as the abstinence theory of capital, the marginal theory of rent, the residual theory of labor, the quantity theory of money and the utility

theory of value—to these accounting can teach nothing.

On this conception of economics, after a century of research and discussion, Professor Hollander holds that we have not as yet developed any scientific conception of industrial society. Many others agree with him. Economics as a branch of science is rather concerned with *the group activities of man toward individual and social gain.* The point of view is that (1) of economic factors, (2) of economic relations (*a*) to the material world and (*b*) to institutions both social and economic, and (3) the forms of economic income, including private and public incomes.

Already considerable progress has been made in this direction by others than economists, especially by the student of history and public law. Scientific economics considers data as related to (1) organization, (2) problems of administration, and (3) methods and technique. We must lay aside dogma and classify data to get an intelligent grasp of affairs.

Accountancy is to scientific economics what the clinic is to medicine. The examination made by the professional accountant is for purposes of prescription. A record of the diagnosis, of the prescription, of the remedial result, and of the history of the performance of normal physiological functions recorded in the accounts, may be taken as the data upon which broad scientific generalization may be based; this broad generalization should be made by the economist.

Structure of Cities: RICHARD M. HURD, President, Lawyers' Mortgage Company, New York.

Cities grow and conform to economic law. The point of origin is that of contact with the outer world. In its organization from 40 to 70 per cent. of the area is used for streets, the balance is devoted to three uses: Business, residences and public buildings. The distribution of business utilities is purely economic, land going to the highest bidder. Residence areas are based on social considerations. Growth is axial or central—around centers or around the circumference.

Central growth has two main aspects; first general growth in all directions from the point of origin and second local growth around subcenters within the city, such as transportation termini, public buildings, exchanges, factories and hotels. As a city grows the centralizing influence of public buildings steadily diminishes while its exchanges assume increasing importance, these varying in character according to the leading business transacted in the city. Normal growth consists of the gradual aggregation of buildings of the same character due to the gregariousness of mankind and the saving in time from the close juxtaposition of buildings. Continuity is a vital feature of all growth, whether central or axial, every break causing a weakness in the structure similar to the loss of a link in a chain. An internal movement which constantly goes on is the gathering together of similar forms of business into special districts.

There are three main causes of changes in a city's structure; increase of population, increase of wealth and new transportation facilities. Increase of population without increase of wealth would normally tend only to a gradual extension of buildings of the existing character over a larger area. Increase of wealth, however, causes continual rebuilding within the city, old-fashioned shops, dingy offices and plain residences being supplanted by buildings of a new standard of magnificence. New and improved methods of transportation draw residences beyond the city's limits, concentrate business in higher buildings at the center and establish new axes of travel as

additional vertebræ for the city. More and more in the life of great cities is improved transit of importance, the tendency being for traffic to mass at intersecting points with inferior utilities in the quiet side streets.

Insurance Problems relating especially to the Management of Assets and Legal Regulation of Investments: Dr. Lester W. Zartman, Yale University. (To be published elsewhere.)

The New York insurance investigation revealed the dangers and abuses in the management of insurance assets. As a result stricter legal regulation has become necessary. The evils of insurance fund management are of three classes: (1) Officers and trustees made personal profit out of the company's funds; or (2) they took no interest in the disposition of the funds, and (3) the policy-holders to whom the funds belong exercised no control over their property.

Stricter limitation of the investing powers of officers and trustees has not proved an adequate reform. It has rather produced abuses, such as collateral loans and trust company deposits, both of which should be given up.

The vulnerable point in insurance is the making of personal profits by officers and trustees. Making this a penal offence would tend to divorce insurance management from other lines of business. Stock insurance companies should be forbidden, because of the danger of stock control, and real mutuality secured. Abolish the proxy system and provide voting of policy-holders by mail for boards of managers are in the right direction. More reliance should be placed on the election of responsible directors than in strict legal regulation.

Mathematics and Formal Discipline: Joseph V. Collins, State Normal School, Stevens Point, Wis.

In the training of the reasoning powers the service of that faculty in social and economic science is to be considered. Professor Lewis (Dartmouth) in his study of formal discipline by tests in geometry and practical reasoning (*School Review*, April, 1905) shows that a relationship exists but does not prove the faculty theory true. Tables prepared by the author of the present paper show that what a student does in any subject depends more on his mental equipment and native environment than on the particular matter considered.

Mathematics gives a training *sui generis*. In arithmetic the problems correlate at many points with the actual affairs of life. Speaking broadly, though the most important effects of the mathematical training are abilities of quite general application: as, holding a number of particulars in the mind at one time, training in sustained reasoning, habit of overcoming difficulties, recognizing the universality of the application of correctly stated laws, perceiving the need of care to secure the accuracy of results required, and so on. These powers have identity of qualities with multitudes of activities the individual finds himself engaged in in after life. They thus furnish hooks on which to hang new experiences and conquer new problems. In these ways perhaps more than in any others mathematics justifies its place in the course.

The following papers were read by title or in abstract:

Conditions and Needs of Southern Agriculture: Professor Andrew M. Soule, Blacksburg, Va.

Labor Conditions in Southern Farming: Professor F. W. Massey, Raleigh, N. C.

Value of an Organized Working Force in Industry: President E. L. Blackshear, Prairie View, Texas.

Restriction of Telegraph Development Under Monopoly Control: ROMYN HITCHCOCK, New York.

J. FRANKLIN CROWELL,
Secretary.

SCIENTIFIC BOOKS.

The Vegetation of the Lamao Forest Reserve. By H. N. WHITFORD. *The Philippine Journal of Science,* Vol. I., No. 4, pp. 373–432, pls. 1–27, with map; May, 1906; and Vol. I., No. 6, pp. 637–682, pls. 28–45; July, 1906.

This paper embodies a careful descriptive account of a large body of virgin forest near Manila, in the study of which the author has carried into the tropics the precise methods of temperate forestry and the viewpoint of physiographic ecology as developed by Cowles. The Lamao Reserve occupies an area of 4,426 hectares on the eastern slopes of Mount Mariveles, which is located in the center of the peninsula which forms the northern mouth of Manila Bay. The reserve runs from sea-level up to 1,406 meters altitude and presents throughout an erosion topography. The climate of the region is shown to possess a marked dry season from December to April, with copious rains in the remaining months; the annual curve of humidity follows that of rainfall and the temperature is rather constant with an annual mean of 36° C. and an annual mean range of 3.4° C.

The forest is midway in character between the evergreen hygrophilous forest and the monsoon forest, differing from each in having an intermingling of evergreen and deciduous trees. The author distinguishes six types of forest formation in his area with distinctions due to differences of altitude and the attendant change in climatic conditions: (1) The Strand, which is found to agree closely with that described by Schimper for the Indo-Malay Peninsula. (2) The Bambusa-Parkia formation, characterized by an open stand of trees many of which are leafless throughout the dry season, and by pure and mixed growths of several species of bamboo, which are in effect partly deciduous. (3) The Anisoptera-Strombosia formation inclines less to the monsoon type, as it contains no trees which are leafless throughout the dry season; bamboos are here replaced by small dicotyledonous trees; the specific make-up of the forest is very complex. (4) The Dipterocarpus-Shorea formation exhibits an almost complete absence of deciduous trees and a simpler floristic make-up than the formations at lower altitude. Here the variations due to differing physiographic situation begin to be manifest. (5) The Shorea-Plectronia formation lies between 400 and 900 meters altitude and has a more hygrophilous climate than the last formation with a more abundant representation of pteridophytes and bryophytes. The instability of the substratum in this formation and the next prevents as rich a development of the forest as the climate would lead one to expect. (6) The Eugenia-Vaccinium formation lies above 900 meters altitude and is characterized by a very humid and cloudy climate together with high winds. The forest is here xerophilous and stunted on the ridges, although more hygrophilous in the ravines and depressions. Epiphytic vegetation abounds and liverworts and filmy ferns are common. Many genera are represented in this formation which are common to tropical mountains throughout the world or even to the temperate regions.

In the Bambusia-Parkia formation a study has been made of the clearings, known as 'parangs,' and the return of these areas to the climax forest. Some six types of parangs are characterized, in each of which the flora is poorer than in the original forest, and may consist largely of comparatively pure stands of certain small trees or may be occupied by the climbing bamboo *Dinochloa.* In each of the formations a detailed enumeration of the forest trees has been made in several plots on different soils or in different physiographic situations. The summation of results for six plots in the Anisoptera-Strombosia formation, aggregating 5,850 square meters in area, shows a total flora of 99 species. Of these the five most abundant form but 35 per cent. of the total and 64 are represented by three individuals or less. In another series of seven