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EDITED BY
WILLIAM JAY YOUMANS

VOL. LV

MAY TO OCTOBER, 1899

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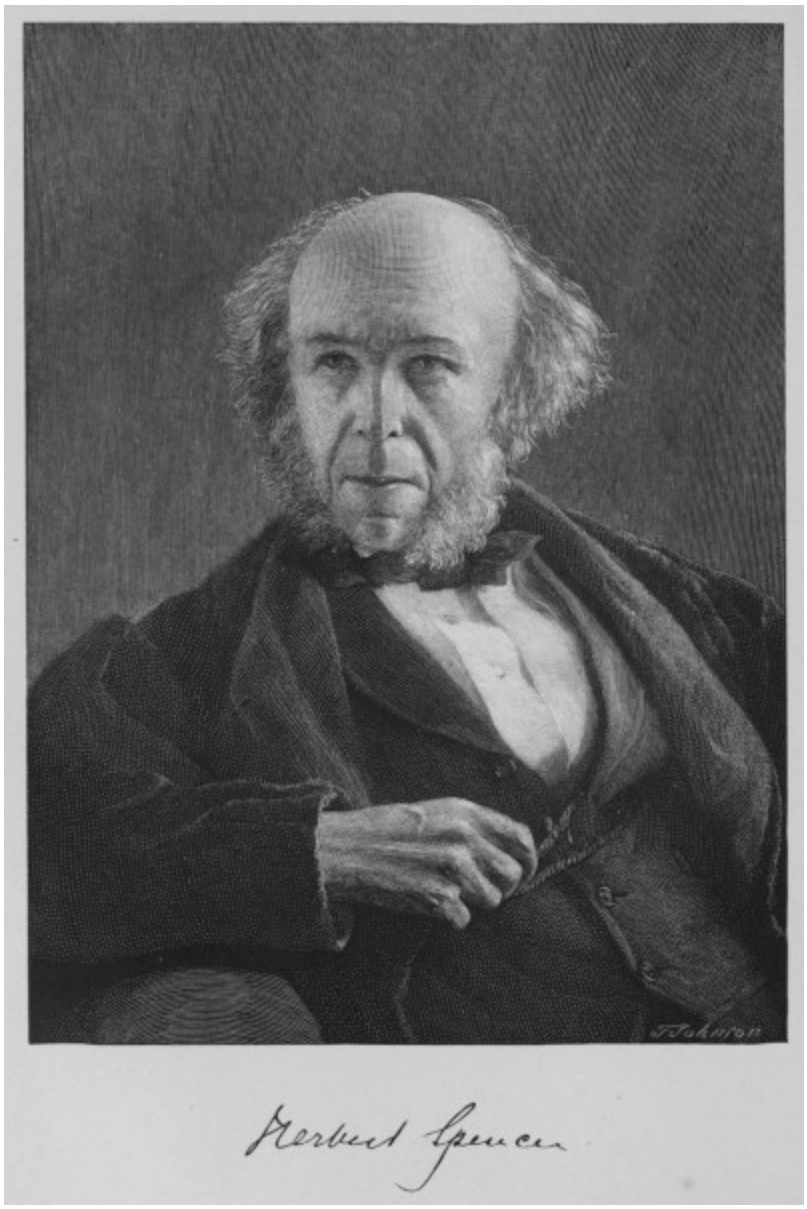


Herbert Spencer

APPLETONS' POPULAR SCIENCE MONTHLY.

AUGUST, 1899.

PUBLIC CHARITY AND PRIVATE VIGILANCE.

By FRANKLIN H. GIDDINGS, Ph. D.,

PROFESSOR OF SOCIOLOGY IN COLUMBIA UNIVERSITY.

The Comptroller of the City of New York deserves the thanks of all good citizens for his serious indictment of the abuses of public charity that have grown up in this city and State within the past ten years. Probably very few of the more intelligent men and women of the community were aware that three million dollars, raised by taxation, are annually appropriated to the assistance of private charitable institutions, over which the public has no real control and only the most shadowy authority through the inspection of the State Board of Charities. Of those who were informed of this fact, very few indeed were acquainted with the specific abuses which the comptroller's article exposes. To a few individuals, however, who have devoted time and money unselfishly to the defense of public interests and to the exposure of the evils of irresponsible relief, these facts have long been familiar. Such can not fail to take satisfaction in the clear presentation of the case by Mr. Coler. Especially to the men and women who have been connected with the work of the State Charities Aid Association and the Charity Organization Society will Mr. Coler's article be welcome, as a strong re-enforcement of arguments which they for years have been presenting to the people of New York, oftentimes, it has seemed, to but unwilling hearers.

It is therefore in no spirit of fundamental disagreement, but rather in the desire to further the reform which the comptroller demands, that I venture to criticise in two particulars the statement as he has left it.

It is an incomplete view of the enormously difficult problem of charity which fails to set forth some of the reasons that have led to the growth of an excessive faith in the excellence of private institutions and in the wisdom of

a co-operation between them and the public, which is taken for granted when they receive appropriations of public money.

Great as have been the abuses associated with private charity, they are small when compared with the abuses that have existed in the public administration of poor relief. As all familiar with the history of this subject know, the old English poor law was so administered in the rural parishes that paupers were in a more eligible position than industrious farm laborers; that women with bastard children were publicly rewarded for unchastity; and that, now and again, rent-paying farmers were willing to surrender their lands to the paupers to work them for what could be made, rather than to go on paying rates. The exposure of the evils of the system, which was made in the report of the famous Poor Law Commission appointed in 1832, and the attempt to abolish them by the provisions of the Poor Law Amendment Act of 1834, ought to be studied by every citizen who desires to perform his full duty as a guardian of public interests, and especially by every individual whose sympathies lead him to undertake any practical effort for the amelioration of pauperism. In the United States, on account of the extremely decentralized character of our poor-relief system generally, we have no such impressive body of critical literature as that which was brought out in England during the first half of the present century. None the less, whenever special investigations of the management of town and city relief administration and of the management of almshouses have been made, deplorable abuses have almost invariably been exposed, and individuals acquainted with the facts have argued that any possible misdirection of either private or public funds through private agencies could not equal the corruption and the inhumanity for which officialism has been responsible.

Let us look at one noteworthy example. In 1891 a special committee appointed to report on outdoor alms in the town of Hartford, Connecticut, discovered a state of affairs with which nothing revealed in Mr. Coler's statements can for a moment be compared. The general situation, the committee said, was found to be as follows:

"In 1885 Hartford was paying $2.07 for each man, woman, and child of its population in poor relief. New Haven was paying $1.30; Bridgeport, $1.03; Waterbury, 81 cents; Norwich, $1.54; New Britain, $1.39, etc.; for twelve

Connecticut cities an average of $1.22 per capita against our $2.07; and with Hartford far ahead of her nearest competitor. For outdoor relief the figures were similar. Hartford, 90 cents per capita; New Haven, 51 cents; Norwalk, 23 cents, etc.—an average for the twelve of 61 cents per capita, with only one higher, Hartford in the lead again by fifty per cent. Five Massachusetts cities, including Boston, Worcester, and Lowell, average $1.16 for all relief, against our $2.07; and 24 cents for outdoor relief against our 90 cents. Five other New England cities, including Providence and Bangor, average 33 cents for all relief, against our $2.07; and 12 cents for outdoor, against our 90 cents. Four New York cities—New York, Brooklyn, Buffalo, and Albany—average 63 cents, against our $2.07; and 43 cents, against our 90 cents. Five cities in Pennsylvania and Maryland, including Philadelphia, Pittsburg, and Baltimore, average 38 cents against our $2.07; and 4 cents, against our 90 cents. Seven Western and Southern cities, including Chicago, Cleveland, Detroit, Milwaukee, and Charleston, average 62 cents for all relief, against our $2.07; and 17 cents, against our 90 cents."

A similar comparison extended by the committee to the principal cities of Europe, including Berlin, Dresden, and Stuttgart, showed that here again Hartford led them all. In short, it appeared to be proved that Hartford was spending on the poor more money per capita of population than any other city in the United States, and more than any other in the world, with certain exceptions in Italy, and the noteworthy exceptions of London, $3.75 per capita, and Paris, $3.66 per capita. Hartford, however, outranked even London in its percentage of pauper population, which was 6.2 in Hartford, against 2.46 in London. While in Hartford every sixteenth person was a recipient of municipal bounty, in London the proportion was only one in forty. Paris led all, with one in eight.

Investigation of the causes of this deplorable state of affairs revealed an astonishing understanding between the paupers and the officials. Tramps were given residence and support for the sake of their votes on election day. Grocery stores were practically subsidized. Families whose individual members could be made useful politically were supported in outdoor relief.

That the showing was so much better for New York and other great American cities was not a proof of greater honesty or wisdom of administration on the part of municipal officials. The difference was almost

wholly due to the enormous extension of private as over against public charity outside of typical New England Commonwealths like Connecticut, where the town method of dealing with such matters still holds its own against other forms of philanthropic enterprise. Proof on this point would be overwhelming were we to take the necessary space to present it. One has only to go through the annual reports of the New York State Board of Charities and read the exposures that have repeatedly been made of the state of affairs on the islands of the East River and in the county almshouses of the State to satisfy himself that were the whole burden of supporting the pauper population of this Commonwealth, and especially of this city, thrown upon the public, private enterprise withdrawing from the competition, the appropriations mentioned by Mr. Coler would sink into ridiculous insignificance by comparison. The appropriation of public money to private institutions has become a scandalous abuse, but we shall never understand its strength until we frankly face the fact that the public has been experimenting with it, hoping thus to find a way of escape from the greater abuses that attend the administration of public relief by public agencies except when they are incessantly watched and held up to the broadest light of publicity by the disinterested efforts of private citizens.

The omission of this side of the matter from Mr. Coler's discussion may perhaps be regarded as a mere failure to deal with the whole of a very large and difficult problem. But it is more than a mere omission; it is, I think, a positive error, and a serious one, into which the comptroller falls when he lays as much stress as he does upon the expenditure, for salaries and wages, of a large proportion of the sums appropriated by the city for private institutions. The real question here, as all sound experience has repeatedly demonstrated, is not whether the expenditure is for salaries in general rather than for relief. This Mr. Coler practically admits when he says that a great deal of money spent for relief is worse than wasted, because it fosters pauperism instead of repressing it, and when, at the close of his article, he says that he found it necessary to create in his department a bureau to investigate the character of institutions asking aid. This is a frank confession that the expenditure of money for salaries or for wages may be wiser than its expenditure in relief, provided the salaries or wages are earned in actual investigation, which results in exposing fraud and preventing expenditures on improper applicants. This is the very kernel of

the whole matter, whether it is a private or a public administration of charity that we are considering. The use of money, public or private, for the payment of salaries that are mere sinecures is dishonesty pure and simple, and neither the comptroller nor any of those private organizations that make it their business to watch and criticise administration can have a more imperative duty than that of putting an end to such corruption. But, on the other hand, there could be no better index of positive progress in solving the practical problems of charity than a steady increase in the ratio of expenditures in salaries and wages on account of investigation and prevention to the amount spent in actual relief. That, in fact, would be an ideal administration of public and private charities in which the efficiency of investigators and the practical sagacity of relieving agents was so high that nearly the whole sum expended had to be charged to their salary account.

This is precisely the principle which private organizations like the State Charities Aid Association and the Charity Organization Society have labored in season and out of season to make the public and the officials comprehend. Innumerable exposures of the impostures practiced upon a credulous public by the great class of professional mendicants, tramps, and place seekers have furnished all the evidence that sensible men need to satisfy themselves that large sums expended by the public and by private individuals of charitable proclivities have no other result than that of encouraging pauperism and misery. It is largely due to the tireless efforts of the State Charities Aid Association for many years past that the institutions receiving public moneys in this State have been watched with such vigilance that there is now a strict system of accounting in all of them, and that it has become the duty of the State Board of Charities not only to insist upon such accounting and to carry out a thorough inspection, but also to frame and enforce rules for their government.

These criticisms I offer, however, only because, as I said at the outset, I desire to see the fundamental proposition of Mr. Coler's statement strengthened and made to bear practical fruit. It is indeed a very serious question whether the appropriation of public money to private institutions has not become so great an evil that it would be better to put a stop to it once for all. And yet I must confess to a doubt whether, upon a complete survey of all the facts, this would be the judgment of the most practical and

far-seeing men. The granting of appropriations gives to the city and the State a reason and an excuse for a strict inspection of organizations that otherwise might do incalculable mischief by preying upon the credulity of a generous public while concealing their actual operations. I therefore am inclined to think that the path of practical wisdom lies through an attempt to perfect the existing co-operation between public and private agencies, and to bring it to a sounder business basis by developing inspection, publicity, and accountability. If private organizations are encouraged to do all in their own power under a system wherein the State grants them aid under strict conditions, lays down necessary rules for their government and guidance, and remorselessly exposes all their transactions, the actual result may be better in the long run than if State and private associations proceeded independently of one another, often duplicating each other's work, or, if not that, working at cross-purposes.

RECENT LEGISLATION AGAINST THE DRINK EVIL.

By APPLETON MORGAN.

Five years ago it was sought in these pages[1] to discover the cause or causes of the total failure in the United States of prohibitive legislation.

Our conclusion, so far as a conclusion could be said to have been reached, was that the failure lay in the misapplication of ways to means, rather than of means to ends—namely, that an attempt to abolish the crime (or misdemeanor) of drunkenness by punishing, not the criminal, but the community in which he committed the crime, and to prevent law-breaking by legislating out of existence the neutral instrument which happened to form the particular temptation to the particular law-breaker (or with which he found it convenient to commit the crime), was quite too logical to be practicable; as, for instance, laws abolishing the use of spoons, as so many temptations to housebreakers; or of railways, because trespassers on railway tracks were often killed; or steamboats, because steamboat boilers sometimes burst, would be quite too logical for public convenience. Whence it followed that there was no demand for prohibitive liquor laws, and therefore only failure had resulted from attempting to enforce them.

In the five years since that paper was printed almost every one of the United States (in fact, all, with but one exception) have recognized such failure and striven to so recast each its statutes as to plant the responsibility for breach of public order upon the real offender without hardship to the law-abiding classes. The results of these attempts have evolved many novel and unusual contrivances and much curious operation of statutory and statistical wisdom, and some remarkable propositions—so much so that it is believed that an effort to digest them (not by States, but by the principles, or rather by the remedies, attempted) will be interesting consideration for readers of the Popular Science Monthly. If the following summary shall develop two apparent paradoxes—first, that the fewer the places where liquor is sold the larger the consumption of liquor; and, second, that the larger the

consumption of liquor the less drunkenness—the present writer can only submit that these paradoxes are not his own, but seem to arise from the official statistics submitted under the oaths of the authorities commissioned to collect them, as hereinafter will more fully appear:

Of the forty-nine States and Territories in the United States, the solitary exception above noted is the State of Maine. With a heroism that is actual martyrdom of self-interest and convenience, the State of Maine has clung with imperious tenacity to her policy of absolute prohibition, and to the logic of the report of her citizen, who, sixty-three years ago, carried her first prohibition law through her Legislature. Said that report: "The objection will doubtless be made that had we such a law it could not be enforced. Now, admit the validity of this objection, and it proves the utter hopelessness of the case; for no one, we presume, will venture the supposition that you can accomplish, against law, that which you could not effect with it."[2]

Admitting, as all the world does admit, that the abolition of drunkenness is desirable, against such pitiless, such iron, logic as this, there is no appeal, and from it there is no escape even to-day. But the trouble was, and is, that it is placing an entire Commonwealth in time of peace under martial law. It was in the fitness of things that General Appleton, a soldier, who had seen intoxication in a form most likely to impress him with dangers to the public —i. e., in soldiers to whom the safety of the State in time of war was intrusted—should have brought in the first prohibition law on record;[3] and that, in the teeth of more than two generations of failure, the sovereign State of Maine should have adhered to his martial logic, with the loss of her commerce and the reduction of her census, is a tribute to both the logic of a soldier or the self-insistence of the State which must compel admiration! In sixty-three years Maine has seen her commerce disappear and her population dwindle. She has seen not only her contemporary sister States, but those admitted yesterday and the day before, pass her in affluence and prosperity. But the only remedy for her failure she will listen to the suggestion of is an increased severity of prohibition statutes and an increased crucifixion of her law-abiding citizens, lest one of her own or a single stranger within her gates should obtain a glass of alcoholic compound within her borders.

But, cling as the State of Maine may to the fierce logic of prohibition, it appears that her forty-eight sisters have found its unappealable rigor too rigid, and have modulated it in the diverse ways now to be considered.

In these remaining forty-eight States and Territories of the Union the statistics regulating liquor seem to divide themselves, as to the remedies attempted, into ten heads, as follows:

I. Abolish all liquor laws except those for revenue.

II. Example.

III. Education.

IV. Government control of all warehousing and sales.

V. Regulation of hours for retailing liquors.

VI. Refusal of employment to drinkers. Change of pay-day.

VII. Personal damage law.

VIII. Encourage the use of light wines and beers; remove all duties or imposts on food products; quality inspection.

IX. High revenue—national, interstate, or State.

X. Local option.

For No. I, pure and simple, we have but a single report, perhaps (as of a frontier State) not exemplary, or safe to guide the more interior States, but given exactly for what it may be worth. The Governor of Montana (a State which boasts the bad eminence of having proportionately more liquor-sellers paying license fees than any other State in the Union—having, in fact, one licensed liquor-seller to every fifty-five inhabitants) reports as follows:

"Saloons are run wide open night and day; while there is a great deal of drinking there is very little drunkenness, and one in an intoxicated condition is promptly arrested and fined." One other State, however (Louisiana), has the continental idea that liquor laws are for "revenue only." Louisiana, therefore, has an elaborate excise, guiltless of any suggestion of reformative

objects. So far as her statistics go, she is the most temperate State in the Union.

II. EXAMPLE.—This may be called the apostolic cure—the one laid down by the apostle St. Paul (I Corinthians, viii, 13)—though we find a prominent English ecclesiastic, Dean Hole, on being asked if he was not aware that people ought to abstain for the sake of their example to others, replied: "I have never seen any one converted by example. I have often challenged teetotalers to produce Mr. Jones converted by the example of Mr. Brown, but I am waiting for him. I don't see why I should make a fool of myself because others do." I should not deal with the matter quite so summarily myself. Doubtless the example of a thrifty, wholesome, prosperous laborer, if left (without exhortation or impertinence of third parties) to work upon his dram-drinking, wretched neighbor, might have its laudable effect: such example not being deprived in advance of its value by the fetters of a written pledge which a man's personal pride might force him to ostentatiously observe—or if the exemplary person does not get his living by denouncing liquor—or by the coercion of a Ladies' Temperance Union! But as the person converted by the example would be certain not to parade the fact, no statistics could even then be attainable. The case or cases, if genuine, would be hidden in the consciences of the converts and beyond any marshaling in figures. All we can do is to hope and trust that our good examples may prevail, and that, like the apostle St. Paul (whom our British ecclesiastic begs to differ with), there may be some among us strong enough physically as well as spiritually to say, "If meat make my brother to offend, I will eat no meat while the world standeth."

These considerations have not, however, deterred certain States from ingrafting example upon the statute-book, as nearly as it could be made a subject of legislation, by enacting that there shall be held before the eye of the possible drinker the spectacle of his neighbors drinking rum: trusting, doubtless, to the rum itself to work a condition in the drinker to afford the example required, and so add to the unestimated but hoped-for good example to bad example at hand. Three States—i. e., Indiana, Michigan, and Utah—and the city of Atlanta, Georgia, by municipal ordinance, provide that the premises on which liquor is retailed by drinks shall have no screen or other obstruction before its windows, so that passers-by may see the drinking which goes on therein and its horrible accompanying

circumstances. The reports from these States, however, are not such as to commend this policy of example to universal acceptance.

III. EDUCATION.—Within the past four years several States—Wisconsin, Ohio, New Jersey, Nevada—have enacted statutes providing that pupils in the public schools should be particularly instructed in so much at least of the science of toxicology as relates to the uses and abuses of alcohol, and of its effect upon the human system. Such instruction, if honestly imparted by capable teachers and by honest text-books, can not fail to be of the highest value. Capable teachers and honest text-books could not possibly teach, for example, that alcoholic liquors were an unmixed evil, could not deny their medicinal value, or their stimulative aid in fortifying against disease or exposure, or in supplying the waste of age; could not teach (as I gave instances of of fanatical teachings) that it were better to die for the need of a glass of whisky than to have one's life saved by the use of it, or that the use of liquor "destroys both body and soul" (in the teeth of the facts that only the most flagrant and protracted abuse of liquor ever, and that after a long term of years, destroyed a human body, and that statistics as to the soul are not attainable). Much is to be hoped for under this benign instruction. It is not possible that our youth will not miss to acquire much important information, such as that "wine is a good servant if well used"; that total abstinence is a regimen only to be pursued by advice of a physician; that the vast majority of human beings can and do partake moderately of alcoholic liquors, not only without injurious consequences, but with positive benefit; and that, as it is a source of much enjoyment, and much discomfort often springs from its discontinuance, it is difficult to say why such use should be discontinued under ordinary circumstances. Our youth will learn, too, that there are many nations that thrive without alcoholic drinks—nations, for example, professing the Mohammedan faith, to whom alcohol is forbidden by their religion; but that among them the use of stronger narcotics, such as opium and Indian hemp, is extremely common, and the exchange from alcohol to these narcotics can hardly be looked upon as a gain. The result of this State instruction may be confidently looked for, and can not possibly do harm. It is too early as yet to procure data for discussion of the amount of good accomplished by this legislation. We must wait until the adolescent pupil has grown to man's estate, to middle age, until his mortal change, and search his record, and the record of the family he leaves behind him, for the

benefits of the paternal legislation. In short, it is exceedingly doubtful if data upon this subject, in the nineteenth century at least, will ever be collected at all. It is noticeable, however, that in the States' scheme of education the peripatetic temperance lecturer, with his lurid colored charts of the human stomach in the horrors of suffering from what he calls "the flowin' bowl," have no place, and no salary is provided for such "university extension" processes. A suggestion lately made in these pages that temperance lecturers as well as liquor dealers being obliged to take out licenses (at least as caterers to the public amusement) is conspicuous by its absence from the educational plan.

IV. Government Control of Traffic.—The idea of a government monopoly in liquor is from continental Europe, and, like most ideas from that source, is paternal and monarchical pure and simple. The idea reached perfection in what is known as the Gothenburg system, which, attracting considerable attention from students of the liquor problem, was introduced into the statutes of Georgia, where after a brief trial it was discarded. The State of South Carolina, however, adopted its principal features, calling it the "dispensary system," and is still maintaining it.

The story of the Gothenburg system is as follows: Since the days of Gustavus Adolphus III there had existed in Sweden and Norway a policy making the distillation of a liquor called *bränxin*, or brandy, a right running with the ownership of land first, afterward with a tenancy of land, and ultimately a right secured to tavern-keepers. This brandy being distilled from grain or potatoes, and containing about fifty per cent of alcohol, was cheap, and in consequence of the poor food supply grew into universal use, until not only men and women but very young children drank it. Drunkenness became the rule, and pauperism and crime prevailed in startling proportions, outrunning the range of either charity or police to control them. In this state of affairs a Dr. Wisselgren, Dean of Gothenburg, a Swedish city, arose, and from his exertions grew the famous Gothenburg system.

Stripped of detail, this system provides that stock companies called brandy companies shall receive from the crown a monopoly of liquor sales, on condition of maintaining eating houses, reading rooms, lodgings, and other conveniences for the community, and out of surplus profits contribute to the

police, the poor, and the educational, funds of the community. The companies shall be under inspection of the royal governor, with no appeal from his discretion, and also under inspection of officers of the three funds entitled to the surplus profits. The companies must close their places of sale on Sundays, can sell only to persons over eighteen years of age, and in the rooms devoted to drinking alone there must be no chairs or settees. After drinking, the purchaser must depart. Such rooms must not be in communication directly with the eating and lodging rooms. In these latter cleanliness and cheapness must prevail, but the company may raise the price and dilute the strength of the brandy sold.

With much amendment and revision, this system appears to be to-day substantially in effect, with what good results opinions differ. It was speedily rejected after brief trial in Georgia for a high-license system pure and simple. In South Carolina its introduction from Georgia provoked riot and even bloodshed on account of the right of search which it involved. The main feature is, of course, that the State becomes the real buyer, jobber, and retailer of all ardent spirits. Here it has been found difficult of complete administration, and, unless its success should be more distinguished than at present, it probably is but a short-lived expedient.

V. Regulation of Hours of Sale.—All the liquor-licensing States and Territories regulate the hours of opening and closing drinking places. They all agree in closing them during the small hours (that is, from midnight or one o'clock A. M. until about sunrise or an hour after). It is difficult to all what effect for good or ill these statutes can have upon either the decrease of drunkenness or the increase of revenue. Doubtless they are convenient for the public force of cities or the constabulary of the smaller towns, so that they may know when to be prepared for possible breaking of the public peace. But in no State, so far as we can discover, are they applied to Sunday, the day when, in large cities especially, and in the heated season, the inconvenience of hermetically closed ale and beer houses is most exasperating to the wayfarer, and intolerable and even (from a sanitary standpoint) dangerous to the wage-earning and poorer classes, packed in torrid and fetid tenements on the figment of a danger of "disturbing a public worship" (I say "figment" because no instance of a disturbance of public worship by the sale of liquor can be found in the history of this planet). Why in torrid weather the worthy poor man and his family who can not

afford ice-boxes can not quench a natural and normal thirst, and so avoid contracting disease by drinking stale and impure water in the superheated apartments of city tenement houses where an average of three families to a window pane has been said to be the rule, I for one have never been able to comprehend. A good Sunday law, as in London, not allowing but compelling the opening of beer houses on certain hours on Sundays, would be a most desirable thing, especially in our great cities. The fact, too, that at present the streets of our American cities are woefully lacking in other sanitary conveniences, which are only supplied meagerly by an occasional drinking place, would appear an additional reason why a Sunday-opening law would be quite as convenient and quite as welcome as a Sunday-closing law. Such a law would have the effect of at least meeting public convenience, and might well be substituted for the present ridiculous closing laws. Into what legislative intellect it ever first entered to conceive that the cause of temperance would be assisted by closing liquor saloons seven hours out of the twenty-four (and those seven the hours when all Nature, drunk or sober, is asleep) it passes imagination to conjecture. Most Legislatures have followed the first one, however, and enacted such provisions.

VI. Refusal of Employment to Persons known to be Habitual Users of Liquor.—In two States—viz., New York and Ohio—clauses have been introduced forbidding the employment by railways and other common carriers of passengers, of persons known to be addicted to the use of intoxicants. In the latter State the common carrier must be notified that such person has been known to be intoxicated while in said carrier's "active" employment, in order to bind the carrier with knowledge. Such a provision as this may be criticised as the Czar of Russia's proposition for a universal disarmament is likely to be criticised—as admirable and millennial, but of no value if gradually adopted, and impossible of instant adoption. No public industry, not even the liquor industry, could cease and disappear in a day without throwing tens of thousands of wage-earners out of employment, and it would be hardship indeed if the family of the drinking man, the toiling wife, scheming to save a morsel of the weekly wages from the dram shop, should be forced to accept the alternative of no wages at all. The suggestion presents, again, a maze of presumption from which, once entered into, no practical exit would present itself. Supposing that no skilled

laborer, no finisher, no engineer, no oiler, no fireman, etc., could be found who was a total abstainer for any one factory or railway service, let alone a hundred or a hundred thousand cases? Clearly this discussion could only be pursued as a curiosity (or, say, a fascinating speculation as to the effects of an industrial chaos). The first item in the recipe for making hare stew was to catch your hare. To run our commerce with totally abstaining employees we must find our totally abstaining employees. To pause to create them would bring commerce, and with it society, including the churches, the schools, and the Temperance Unions themselves, to a standstill like that of Joshua's moon in Ajalon! In connection with this employment question, however, a practical suggestion has been made. It is suggested that, as Saturday night is the workman's "night off" and the ensuing Sunday is his holiday, it might work well to make the weekly pay-day of a Monday instead of a Saturday. The experiment is worth a trial. The change could be made abruptly, and the bad half an hour to the workman would occur but once. Let him be handed his wages some Monday morning when the Saturday night's spree and the long Sunday's headache had been novel and conspicuous omissions. The necessity of good shape for Tuesday's stint would prevent a Monday night at the bar room, and the probability is that the wife and family might realize a substantial instead of a marginal proportion of the weekly wage. At any rate, compared with some of the suggestions made for remedying the drink evil, this is superbly sensible. Indeed, one who has not had occasion to examine these matters can have little idea of the absurdity to which otherwise perfectly sane persons will go in combating an evil with which they are very properly impressed, but to the consequences of an abrupt removal of which it has not occurred to them to pay any attention whatever; for example, the seriously proposed law against "treating"—that is, against inviting a friend to "take a drink" with him. Granted that the tippling habit is encouraged by the social instinct, and that the great peril of drunkenness comes (as an old New England farmer expressed it) "not from drinkin', but from drinkin' agin," a law to prevent treating, like a law forbidding a man from inviting his neighbor home to dinner, or his wife inviting the other man's wife over to luncheon, would be obliged to first find its lawgiver. But gentlemen who solve the liquor question are not apt to be particular to find a jurisdiction and a source for the laws they propose. It is interesting to note that in one State (Nevada) an anti-treating law was once actually passed, but

repealed, "having proved impracticable" (at least, that is the official record of the reason for its repeal, no particulars being given).

VII. The Personal Damage Law.—that is, the holding of a seller of liquor to a person known to be dangerous when in drink responsible for damage caused by his intoxication. This principle has now become ingrafted in the laws of seventeen of the United States, sometimes coupled with high license and local option and sometimes not. It is really only an application of the principle of the common law that a man must so use his own as not to injure his neighbor; that communities had the same right to hold a supplier of intoxicants to a violent drinker as a criminal as it had to punish the keeper of a dangerous beast (of a biting dog, for example, knowing it to be such—i. e., if the animal has once bitten a human being or killed a domestic animal kept for revenue, as a cow or a sheep). This civil damage law has been made statutory in many ways. In Ohio the seller is held indefinitely for the "expenses of any one who takes charge of the intoxicated person" after notice to the seller not to sell to that person. In Michigan the damages may be exemplary. In Vermont, if the drunkard is imprisoned the seller must pay two dollars per day to his wife or minor children in addition to suffering an imprisonment. In New Hampshire and Nebraska, and in several other States, a person arrested for drunkenness is given his liberty if he will disclose the name of the person who sold him the liquor on which he became intoxicated. In most of the other States (as in New York) the damages are not limited except by the facts of such case. In New York, too, the preliminary notice is insisted on. In other States (as Idaho) the seller's damage is the loss of his license, if notice not to sell has been properly served upon him. In Arkansas the liquor seller as a condition of his license must give a bond to pay all damages awarded. In Nebraska the seller must give a bond to support all widows and orphans, and pay all legal expenses of prosecution as well as all damage resulting from any intoxication induced by or traceable to his sales.

VIII. Encourage the Use of Light Wines and Beers.—The suggestion has often been made that this would undoubtedly solve at one swoop a respectable proportion of the problem. The practical difficulty would be to institute the reform in any but the cities and larger towns. Everybody has remarked that, to see the true and distinguished squalor of drunkenness, one must seek the villages, sparsely settled communities, the rural districts

whence come the "come-ons," the willing victims of the green-goods men, anxious to cheat their Government (and so, one might say, at least a shade less estimable than the sharper who only proposes to cheat a fellow-citizen). It seems to me that the reason for this difference lies distinctly in the fact that the countryman, who will gratify his appetite for drink, has no choice but the concoction of ardent spirits, high wines, or whatever it is which the local publican sets before him. To him the word "wine" suggests a luxury beyond his venture or his purse. And so for the price at which, in a large city, he could obtain half a bottle, or even a bottle, of wholesome red wine, the consumption of which at a settling would do no possible harm, he throws into his stomach a glass of biting poison, and, horrible to relate, another and another; whereas the whole bottle, or at least the half bottle, probably shared with a neighbor, would have satisfied his craving without ruining his digestion or stealing away his brains. This clause of our discussion runs largely into our IX. But meanwhile here are some figures which may startle prohibitionists as completely as did the figures given in these pages four years ago, which went to prove that habitual drunkards lived longer than total abstainers. (These figures have been strenuously denied in declamation and denouncement. I have yet to learn that any attempt has been made by industry in collection of counter-figures to demonstrate their fallacy.[4]) But here are certain other figures: It appears by the official report of Dr. Nagle to the Health Department of the city of New York for the first thirty-one weeks of the year 1893 (the city then prior to the consolidation or to the present "Raines" law) that in the community (as it then was of 1,765,645 inhabitants) out of 29,080 deaths only twenty-nine were directly traceable to the use of liquor. And this in a community where 10,749 liquor saloons were in operation from sunrise to midnight daily, not to mention the use of wines and liquors in hundreds of hotels and clubs and of wines and malt liquors on tens of thousands of private tables. These figures are startling, and read quite as extravagantly as those quite to the reverse conclusion with which the prohibitionists are wont to appall us. But they are from the official sources, and, unlike the awful figures which show a larger mortality from the use of liquor alone than the mortality from all known causes (liquor included), can be verified by taking the trouble to consult the files of the (New York) City Record. As for the part which drinking wine has to do with this official summary, I may mention the difficulty of approximating to the sales of what may be properly called

"light wines." But I have been able to ascertain (as some indication of it, perhaps) that in the fifty-two weeks of this same year (1893) there were consumed in the same city 265,414 cases of champagne! So it would appear that even champagne is a mitigant, rather than an aggravator, of at least the public horrors of drunkenness.

I am not unconscious of the fluent answer to these figures. It will be of course urged by the prohibitionist that they only show deaths the "direct" cause of dram-drinking. But such answer is correspondingly unsafe. For, since death, albeit normal to us all comes from some cause (notably from old age, for example), a better formula would be that, since many deaths are caused by old age, and as old age is caused by living too long, we should be careful not to live too long. Hence, as life is prolonged by eating, as well as shortened by drinking (granting that contention), to abstain from the use of food is the only course of wisdom!

This encouragement to the drinking of light wines has, so far, only positively found its way into the statute-books of the one essentially wine-growing State, California, though in other States it has made its limited appearance. Nor does there seem to be any reason why every State should not include in its laws such a provision, for example, as that of Oregon (certainly not known as *per se* a "wine-growing State" at present), which provides that "owners of vineyards may sell their products without license"; or of Utah, which, however, adds to a similar provision that the sale must be in quantities not less than five gallons. Even Kansas provides that wine or cider, grown by the maker for his own use or to be sold for communion purposes, is not within the prohibitions. However, as in most of the States, the price of a license to sell only wines, or wines and beers, is less than the price of a license to sell ardent spirits, it may fairly be said that an encouragement to drinking wines in preference to distilled liquors has become parcel of the public policy in most communities. In Georgia the sellers of wines who are also manufacturers thereof are exempted from paying any license. The State of Michigan is justly proud of its Dairy and Food Commission, which provides for the examination and secures the purity not only of fruits, butter, milk, cheese, but of buckwheat flour, jellies, canned goods, lard, vinegar, coffee, sirups and molasses, chocolate, cocoanuts, baking powder, flavoring extracts, mustard, and other spices. And this same law (elsewhere considered as to adulteration of liquors)

seems to encourage light wines by a distinct provision that "the blending of liquors will be permitted if spirits or other ingredients are not added." In Rhode Island, if manufactured from fruit or grain grown in the State, no license is required for the manufacture of cider, wine, or malt liquors; and (with a thrift not uncharacteristic) alcohol, while subject to a heavy license for home consumption, may be produced for exportation without any license at all.

IX. Remove all Duties, Taxes, Imposts, or Burdens of any Sort on Food Products, Serials, or Meats, in order that the food supply may be unfailing everywhere.

Ten years ago the Hon. Edwin Reed, of Boston, Massachusetts, published a pamphlet[5] in which he had the courage to say that, if a man were well fed, liquor could have no terrors for him. "Take care of the eating and the drinking will take care of itself." Repeal all laws that in any degree and on any pretext tend to enhance the market prices, was Mr. Reed's thesis, and he nailed it boldly to the Massachusetts State-House door! Mr. Reed proceeded with figures to remind us that the countries where drunkenness existed to the most alarming degrees were those countries where the masses of the people eat the least, see meat perhaps once or twice a year, and perhaps never; where the year's labor barely suffices to pay the year's taxes!—in Italy, Russia, or Sweden, and parts of Germany, for example, where life is a struggle for bread enough to keep life in the body. The figures Mr. Reed gives are too appalling for an Anglo-Saxon to read calmly. "If Russia," says Mr. Reed, "could reduce her infant mortality to that of Great Britain she would save annually a million of lives. Half the Russian mothers can not nurse their children. The whip and spur of poverty drives them to labor in the fields, where they follow the plow three days after confinement, and where the death rate is forty-eight per thousand.... In France many a factory hand lives on a slice of sour bread for a meal, over which he is fortunate if he can rub an onion to give it flavor.... In Italy, where taxes are imposed to twenty-five per cent of the laborer's income, the average length of life is twenty-seven years, and the whole kingdom is mortgaged to an average of seventeen per cent." In Würtemberg Mr. Reed assures us that "in this garden of Germany the peasant lives on black bread and potatoes with meat only once a year." And even in England Mr. Reed (quoting his authority) declares that the collier breakfasts on bread soaked in hot water and

flavored with onion, dines on bread and hard cheese, with sour, thin cider, and sups on potatoes or cabbage greased with a bit of bacon rind. And precisely the identical testimony, varying only the staples of starvation, comes from Switzerland, Poland, and other countries. Now, all this requires something, and that something usually takes the form of something alcoholic. Poor Edgar Allan Poe produced his fascinating prose and marvelous poetry on dinners of herbs, and the well-fed, fat, greasy Honey-thunders and Podsnaps recognize the crime, not in the fact that such a man was left to eat such dinners, but that he took a glass of whisky to keep the life in his poor unnourished body while he wrote. Therefore Mr. Reed would make food as plentiful as Nature has enabled man to make it. In other words, a condition of unfedness requires the human system to crave alcoholic stimulants, and what the human system craves it must find, since the craving becomes functional, and impossible to disregard, *malgre* laws, systems, or statutes whatsoever. Even the children in Switzerland, says Dr. Schuler (quoted by Mr. Reed), are fed whisky between meals in order to sustain their tiny lives, the low regimen of whose mothers has given them the frailest possible hold on life to live at all. Mr. Reed believes also that, on public grounds, other effort for amelioration should be made by the State, such as shorter hours of labor, two holidays a week, etc. But as to these we will not follow him here. He makes his point, however, and his pamphlet is worth the consideration of philanthropists. It can not be denied that, with the exception of the shorter hours for labor and the general tendency to increase the number of holidays ("Labor Day," Arbor Day, Memorial Day, Lincoln Day, etc.), much of Mr. Reed's theories have got into our statute-books. And the general tendency to ameliorate the condition of the laborer, which is everywhere apparent in the United States, may fairly be alluded to here as among statutory efforts to the universal betterment.

[*To be concluded.*]

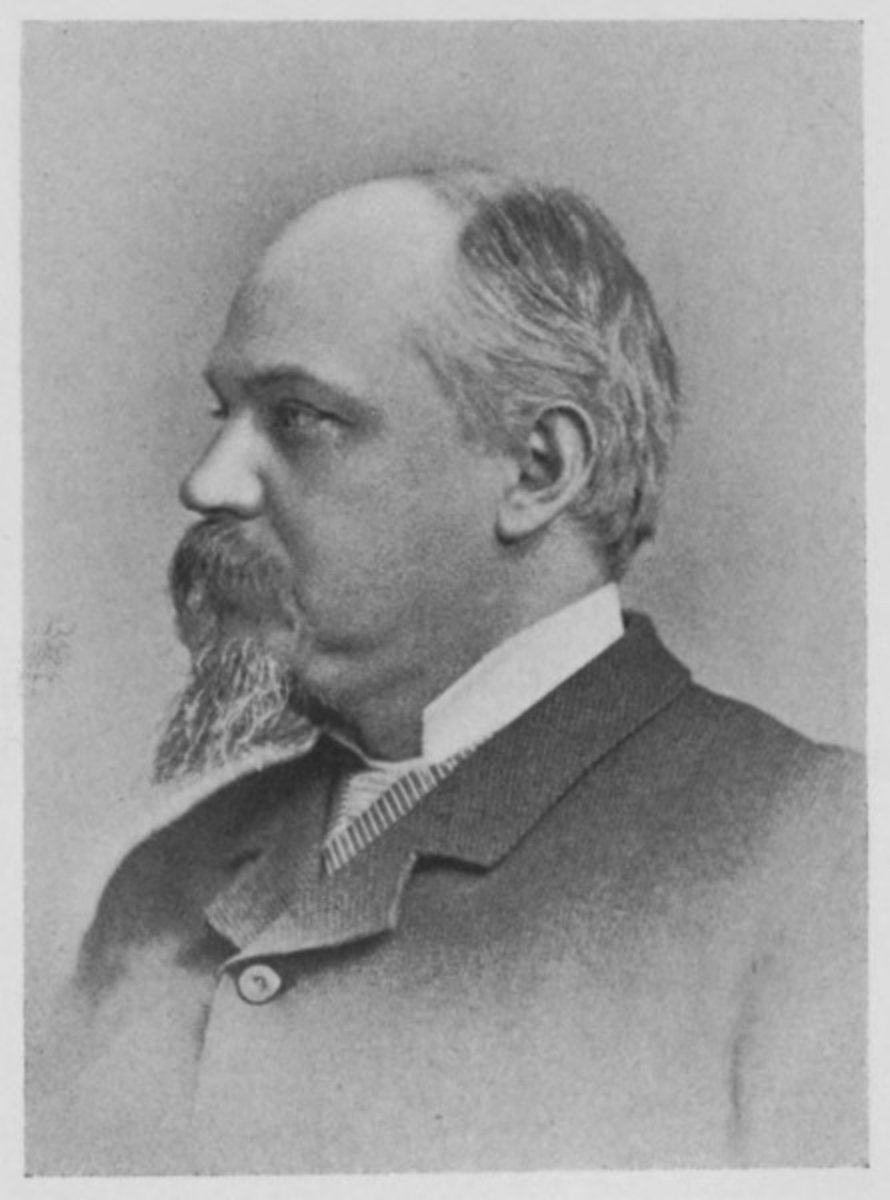
Regarding changes in the language of science, as illustrated in the English Historical Dictionary, C. L. Barnes pointed out, in the Literary and Philosophical Society of Manchester, England, that the words "astronomy" and "astrology" have interchanged meanings since they

were first introduced, as is shown by Evelyn's speaking, in his Memoirs, of having dined with "Mr. Flamsteed, the learned astrologer and mathematician." Gaule, in 1652, spoke of chemistry as "a kind of præstigious, cheating, covetous magick"; and even as late as 1812 Bentham spoke of the "unexpressive appellation chemistry" as the single-worded synonym for "idioscopic or crypto-dynamic anthropurgics." Atom originally meant a small interval of time—the 22,564th part of an hour. The word gas was suggested to Van Helmont by the Greek chaos. "I called that vapor gas," he said, "an ancient mystery not long from chaos." Algebra was a branch of mathematics and also the art of bone-setting, and both meanings are still used in Spain.

TEACHERS' SCHOOL OF SCIENCE.

By FRANCES ZIRNGIEBEL.

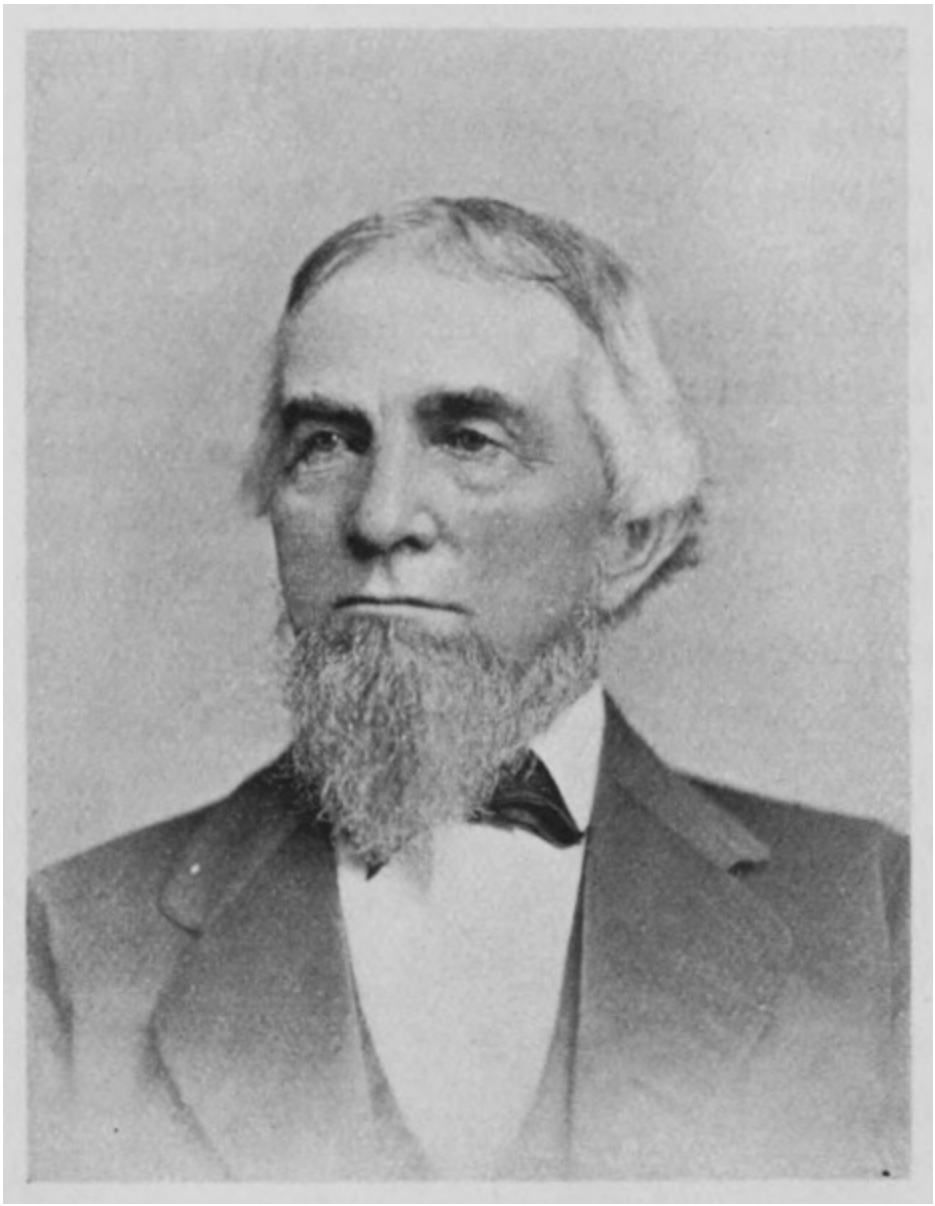
"He who would most effectually improve school tuition must find out the most effectual way of improving the teachers. Hence he is the greatest educational benefactor who does most to raise the character and qualifications of the teachers," said John D. Philbrick, late superintendent of the public schools of the city of Boston, in his twenty-third semiannual report. By providing teachers with the best instruction on subjects the teaching of which was at the time of making this report, and is still, unsatisfactory, The Teachers' School of Science of the Boston Society of Natural History has for nearly three decades been a great educational benefactor. It stands unique as an institution which, while doing a great work for many years, has presented nothing of startling nature such as would attract the attention of the general public, and is therefore not so widely known as it deserves to be.



ALPHEUS HYATT.

During a conversation held at the council room of the Boston Society of Natural History, in 1870, between Prof. Alpheus Hyatt and the late Mr. John C. Cummings, a Boston merchant interested in natural history and curator of the plant collection of the society for twenty odd years, the latter expressed regret that the Lowell lectures for teachers had been discontinued. Professor Hyatt then suggested to him a plan for lectures for teachers exclusively. That afternoon Mr. Cummings gave five hundred dollars for the commencement of such a course, and soon after the matter

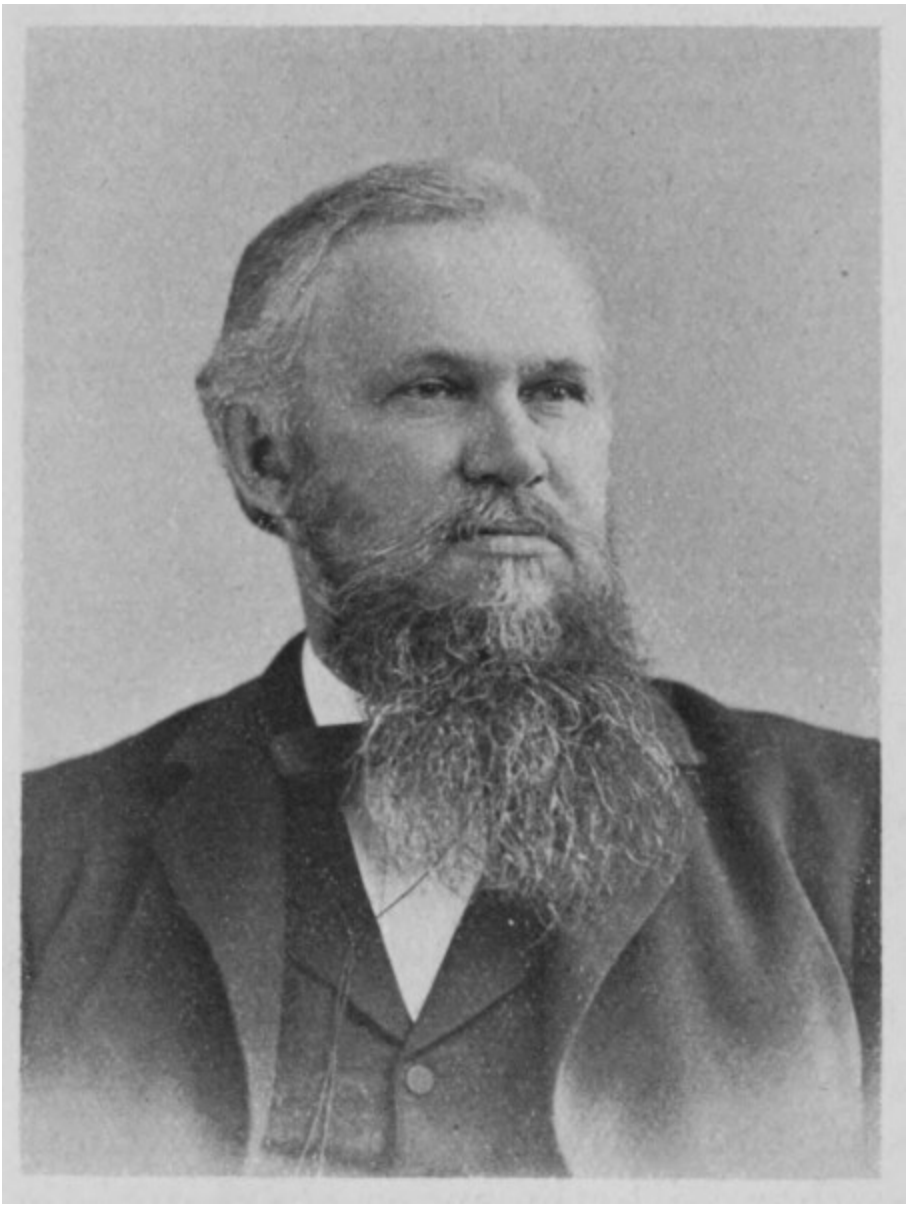
was brought before a committee consisting of Mr. Cummings, Professor Hyatt, and Professor Niles.



JOHN CUMMINGS.

Under the direction of the committee the courses of lessons were given as follows: physical geography, by Prof. William H. Niles, of the Massachusetts Institute of Technology; mineralogy, by Mr. W. C. Greenough, of the Providence Normal School; zoölogy, by Prof. Alpheus Hyatt, then custodian of the Boston Society of Natural History; botany, by Dr. W. G. Farlow, of Cambridge—in all thirty-three lessons. These courses

were wholly tentative and experimental, but attained success that was most encouraging.



WILLIAM H. NILES.

Through the kindness of Professor Runkle, President of the Massachusetts Institute of Technology, Huntington Hall, in which so many great scientists have spoken, was opened for the first lesson in geography. Professor Niles here delivered six lectures. "He undertook to give the more general features of the earth's surface, and then to apply these general principles to the explanation of the physical characteristics of Massachusetts." The success

of this course may be judged by the average attendance, which was about six hundred teachers of all grades, and by the fact that the teaching of geography in some of the public schools at once underwent a change in favor of the more natural method introduced by him.

ON THE RIGHT, BUILDING OF THE BOSTON SOCIETY OF NATURAL HISTORY; ON THE LEFT, ROGERS'S BUILDING OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

"On account of the necessity of actually handling and dissecting specimens, the tickets issued for the succeeding lessons were limited, and at the six lessons on mineralogy and eleven on zoölogy there was an average attendance of about fifty-five. The materials for the course in zoölogy were gathered in sufficient abundance through the extraordinary facilities for collecting marine animals afforded by Prof. S. F. Baird, United States Commissioner of Fisheries; those for the course in botany were furnished with equal readiness and generosity by Prof. Asa Gray from his botanical garden at Cambridge."

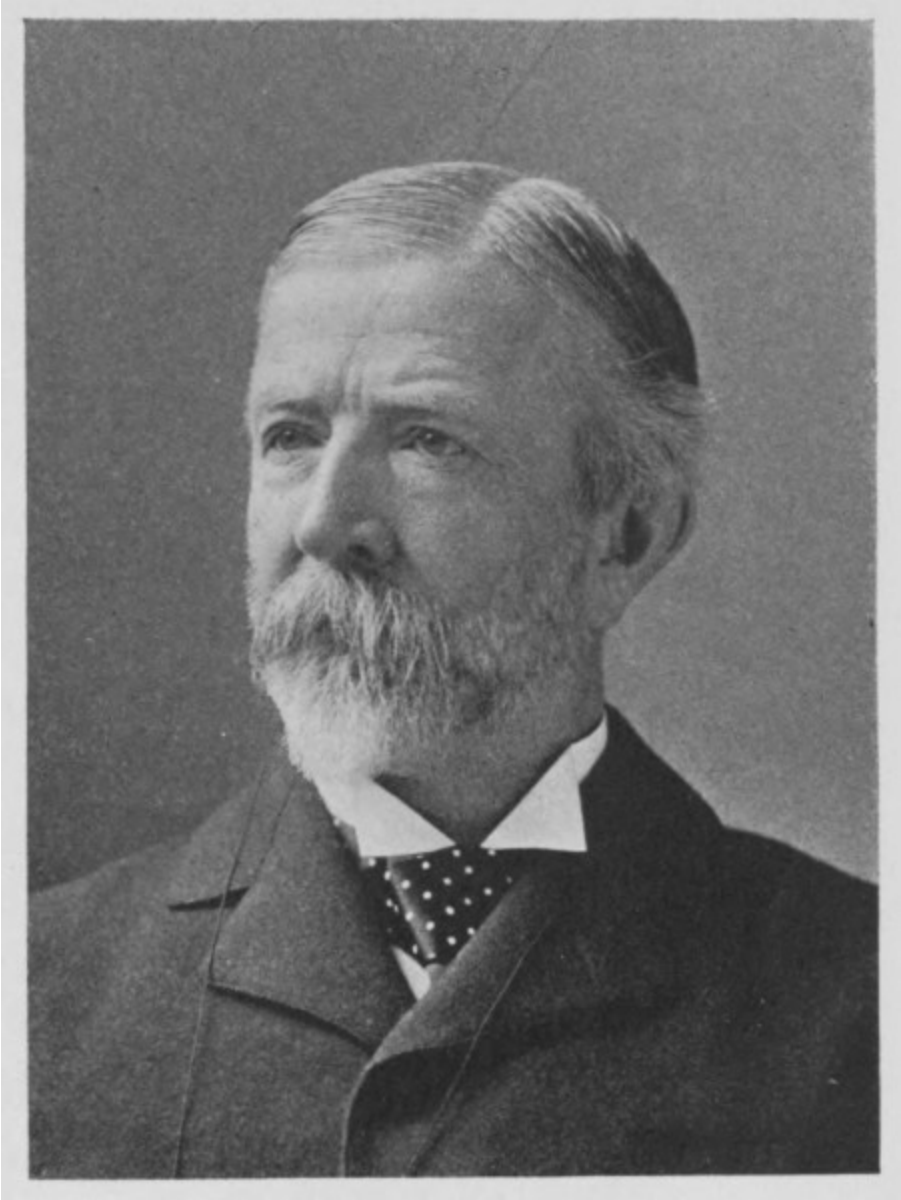
The society's attempt to introduce natural history into the public schools met with favor at the hands of the superintendent, Mr. Philbrick, and a committee of school principals was appointed, with Mr. James A. Page as

chairman, who canvassed the teachers regarding this matter. Accordingly, in October, 1871, a circular was sent to teachers which said that lessons were to be given by "professors familiar with the object methods of teaching and skillful in the use of chalk." Seven hundred teachers signed this circular, and so signified their pleasure at the prospect of receiving such instruction.

While Mr. Cummings was generously providing these courses of lectures exclusively for the benefit of teachers, Mr. John A. Lowell, trustee of the Lowell Institute Fund, made liberal provision for free courses on different branches of natural science, to which teachers were specially invited and which were well adapted to their wants, although not intended exclusively for them. During the winter of 1872-'73, on account of the large fire in Boston and the absence of Professor Hyatt in Europe, the lessons in The Teachers' School of Science were necessarily suspended. In the autumn of 1874 they were resumed and supported by renewed donations from Mr. Cummings. Mr. L. S. Burbank gave thirty lessons on minerals, and distributed the specimens used at the lectures among the teachers. These minerals were then used in the schools for instruction. This was virtually the introduction of the teaching of natural science in the public schools of Boston. The following winter Mr. Burbank continued his teaching by giving fourteen lessons in lithology to a class averaging ninety in attendance. One hundred sets of seventy-five specimens each were distributed, and many of these sets placed in collections of the city schools. "A supplementary course of field lessons about Boston was voluntarily conducted by Mr. Burbank, who had in his class this year seventy-five per cent of the members of the class in mineralogy of the previous year. This class included a large number of the busiest teachers of Boston and vicinity, and each member of the class was provided with tools, consisting of a small hammer, magnet, file, streak stone of Arkansas quartzite, a bottle of dilute acid, a glass rod, and the scale of hardness previously used in the mineralogical course."

In 1876 women were admitted to the Society of Natural History, and in that way further privileges were granted to teachers. As in previous years, through the liberality of Mr. Cummings, the lessons were continued, and a course of twenty-one lessons in morphological, physiological, and systematic botany was given by Prof. George L. Goodale, of Harvard University. Each lesson was illustrated by specimens which were distributed to the students. The analysis of the flowers and the

determination of the peculiarities of floral structure were considered by Professor Goodale an important part of the course. For this purpose blank forms were distributed to the teachers, which enabled each one to pursue his examination of the flower in hand independently, and made it possible for the instructor to cover more ground than would have been practical by any other method. There was an unusually large attendance at these lessons, averaging one hundred. The following year Professor Goodale continued to teach in the school, giving twenty lectures on the principles of systematic botany. Printed synopses of the lectures were placed in the hands of the teachers, and nearly all the large orders of plants were illustrated by specimens or diagrams. The teachers were also provided with dried and named specimens of native plants suitable for private herbaria. About one hundred and fifty sets of these plants were distributed during the course, at which the attendance was even greater than that of the previous year.



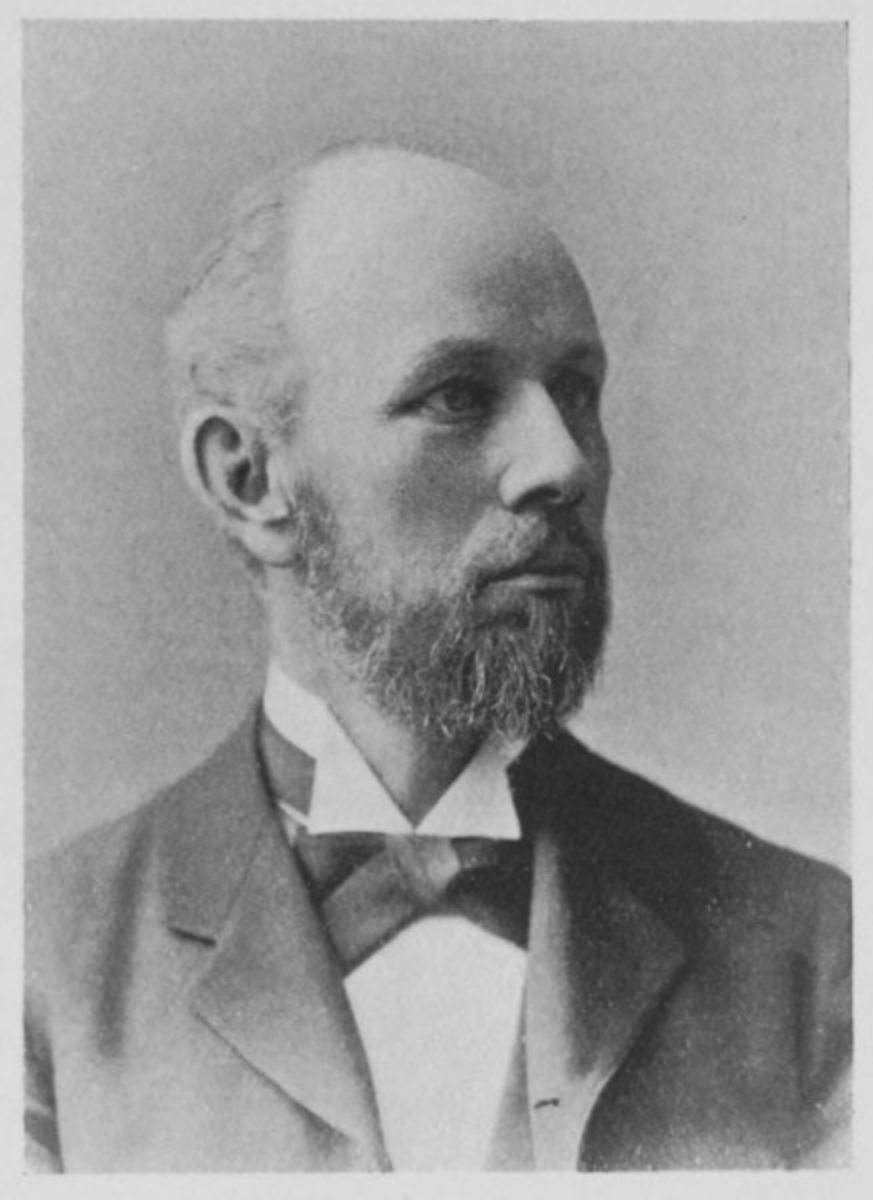
GEORGE L. GOODALE.

It was at this time that, through the efforts of Miss Lucretia Crocker, the study of zoölogy was introduced into the high schools of Boston, and the study of Nature in the public schools took a definite form. At this time The Teachers' School of Science attained an extraordinary size and importance, a development which was sudden and unexpected. The supervisor of Nature study, Miss Crocker, assured the directors of the school that their assistance would be of great benefit, and in fact essential, to the success of the introduction of this subject into the schools. It was therefore determined to institute appropriate courses upon elementary botany, zoölogy, and

mineralogy, if the means of paying the expenses could be raised. Mrs. S. T. Hooper and Miss Crocker undertook a considerable amount of the necessary work, and fortunately their scheme met with substantial appreciation from Mrs. Augustus Hemmenway, who subscribed most liberally, and they were assured of further support and interest. Obstacles arose on account of the number of applicants and the necessity of providing identical specimens for all. The association and sympathy of Mrs. Elizabeth Agassiz with the undertaking was particularly gratifying, since Prof. Louis Agassiz was the first naturalist who ever taught the popular audiences in this country with the specimens in hand. Large sums of money were contributed by women, many members of the Natural History Society, and the teachers themselves joined in making up the necessary fund. The Institute of Technology generously gave the use of Huntington Hall upon the payment of a nominal sum for cleaning and heating. Count Pourtalés, Dr. Hermann Hagan, and Mr. E. C. Hamlin, of the Museum of Comparative Zoölogy, which was under the direction of Mr. Alexander Agassiz, at various times assisted by donations from their respective departments. Further assistance in various ways, such as the drawing of zoölogical charts, preparations of models, and donations of specimens, was received from other persons. There were six hundred and sixteen applicants for this winter's course, and the number of specimens distributed did not fall short of one hundred thousand. After an introductory lecture, at which the Superintendent of Public Schools, the President of the Society of Natural History, and the custodian, delivered addresses appropriate to the occasion, Professor Goodale completed a course of six lessons on botany, in which he instructed the whole audience of five hundred. These lessons were followed the same year by twelve on zoölogy by Professor Hyatt, and five on mineralogy by Mr. Burbank, which ended with a geological excursion to Marblehead. These lessons were given to very large classes, and were supplemented by the issuing of pamphlets under the general title of Science Guides. Three numbers—About Pebbles, by Professor Hyatt; A Few Common Plants, by Dr. Goodale; and Commercial and Other Sponges, by Professor Hyatt and others—were published by Messrs. Ginn and Heath, who have since brought out many such helps.

After a winter of intense activity there came a period of repose, and no lectures were given the next season. After lying quiet for a year the school

once more came into active operation. Mrs. Quincy A. Shaw and Mrs. Augustus Hemmenway showed their sympathy with the efforts on behalf of education by most generously assuming the whole expense of the lessons given that year. Immediate measures were taken to carry out the plan which had been arranged several years before, which consisted in giving a series of lessons which would be a good preparation for a course in physiography. Accordingly, Professor Cross, of the Institute of Technology, was engaged to give eight lessons in physics, Professor Hyatt following with eight on the physical relations of animals to the earth; Professor Goodale gave four treating of plants in the same way, and Mr. W. O. Crosby concluded the course with four lectures on the relations of geological agencies to physiography. The applications for tickets to these lectures so far exceeded the expectations of the committee that they were forced to duplicate them, each speaker repeating his lesson on the same day before a different audience.



WILLIAM O. CROSBY.

After this the work of The Teachers' School of Science was taken under the protection of the Lowell Fund, Mr. Augustus Lowell sending word that he would make an annual donation of fifteen hundred dollars. Mr. Lowell allowed the Natural History Society to make engagements and announce lectures one year beforehand, and also gave the use of Huntington Hall. Eighteen lectures were given that winter, under the title of the Lowell Free Lectures in The Teachers' School of Science. Eight of these lectures were on physics, by Professor Cross; five on geology, by Mr. Crosby; five on physiology, by Dr. H. P. Bowditch, of the Harvard Medical School, and all

were very successful and well attended by the teachers. The Teachers' School of Science had another branch in active operation, which was courses of laboratory lessons paid for by the teachers themselves.

LABORATORY OF THE BOSTON SOCIETY OF NATURAL HISTORY USED BY CLASSES OF THE TEACHERS' SCHOOL OF SCIENCE.

Through the liberality and co-operation of the Woman's Education Association the Society of Natural History was able to announce that a seaside laboratory, under the direction of Professor Hyatt and capable of accommodating a limited number of students, would be open at Annisquam, Massachusetts, from June 5th to September 15th inclusive. The purpose of this laboratory was to afford opportunities for study and observation to the development, anatomy, and habits of common types of marine animals under suitable direction and advice. It was believed that such a laboratory would meet the wants of many teachers who had attended practical lessons in The Teachers' School of Science. Twenty-two persons—ten women and twelve men (nearly double the number expected)—availed themselves of

the privileges offered. The summer work, which was very successful, was due to the ability and energy of Mr. B. H. Van Vleck, who had the whole charge of the instruction and work done in the laboratory. The seaside laboratory continued to be used successfully in the same way during seven consecutive summers, and the work of the laboratory materially influenced the future science teaching in several colleges and in many public schools of this country. In 1886 Professor Hyatt called the attention of the Woman's Education Association and the society to the fact that the laboratory had reached a stage when it could claim the support of patrons of science and learning, and be placed on an independent and permanent foundation. The two associations accordingly called a meeting, made up largely of the representative teachers of biology, who decided to make an effort to establish a permanent biological laboratory and raise at least fifteen hundred dollars to carry it on for five years. The result was the foundation of the Marine Biological Laboratory, at Woods Holl, which now attracts to its general courses teachers and other students from all over the land, and also maintains a department for special research work.

In 1882 agents were obtained, by correspondence and through the kindness of the Secretary of the State Board of Education, Mr. Dickinson, in forty-four towns, who distributed tickets and filled out blanks so that the benefits of The Teachers' School of Science were extended beyond the limits of Boston. In this year there were two courses, one of ten lessons, by Professor Niles, on physical geography, and five on physiology, by Dr. H. P. Bowditch. These courses began in November and continued throughout the whole year, with a decrease in attendance after the Christmas and April holidays. These lessons were followed by five on elementary chemistry, by Prof. L. M. Norton, of the Massachusetts Institute of Technology. His subjects were as follows: First Principles of Chemistry; the next, Chemistry of Air, Chemistry of Water, Chemistry of Combustion, Chemistry of Metallic Elements. There were also five on Practical Examination, with Simple Apparatus of the Physics and Chemistry of Vegetable Physiology, by Professor Goodale, which were divided as follows: (1) Vegetable Assimilation, the mode in which plants prepare food for themselves and animals; (2) The Kinds of Food Stored in Vegetable Organs, illustrations of the starches, sugars, oils, and albuminoidal matters; (3) How Food is used by Plants and Animals in a Formation of New Parts, mechanics of growth;

(4) How Food is Used in Work of all Kinds by Different Organisms; (5) Adaptations of Organisms to Extremes of Heat and Light, chiefly with respect to geographical distribution. This session was concluded with a series of five lessons on Chemical Principles illustrated by Common Minerals, by Professor Crosby.

At the beginning of this season there was the usual large attendance, with teachers from thirty towns, but the number was slowly reduced. It was evident to the curator that the decline in attendance was not due to the subjects nor the mode in which they were treated, but from fatigue on the part of the teachers, and this state of affairs caused him to say in his annual report that "proper and wise forethought should long ago have given teachers a portion of every week besides the usual Saturday holiday for the pursuit of information needed for teaching new subjects." He believed that the efficiency of the individual teacher would be greatly increased by this expedient, and that the pupils would gain more than they lost by the shortening of the school hours.

At the request of the Superintendent of Schools the curator gave the following year ten lessons, which were directed mainly to the subjects put down in the course of study under the title of Elementary Science Lessons. In his course in Elementary Mineralogy, Professor Crosby followed the plan indicated by Mrs. E. H. Richards in one of the science guides—First Lessons in Minerals. The curator, for his course on Structure and Habits of Worms, Insects, and Vertebrates, used many specimens which had been tanned by a process which was then in use. Over twenty-eight thousand zoölogical specimens were given away in two years. Professor Crosby, with a class of sixty, continued the course of the previous year, giving lessons in the mineralogical laboratory of the Massachusetts Institute of Technology, and the specimens there studied were retained by the teachers.

In the winter of 1888-'89 Professor Crosby, using for his auditorium Huntington Hall, gave a course of ten lessons on the geology of Boston and vicinity. "The object of the lessons was to acquaint the teachers of Boston and vicinity with natural opportunities by which they are surrounded, and specially to show them how to use these opportunities for their own culture and the benefit of their pupils. The subject was treated in accordance with the following scheme: (1) A general study of the physical features of the

Boston basin and of the geological changes now in progress in this region; (2) a systematic study of the various minerals and rocks found in the Boston basin, together with the more characteristic kinds of structure which they exhibit; (3) a summary of the geological history of the district so far as that is plainly recorded in the rocks. The course was freely illustrated by maps and diagrams, also to a large extent by specimens, more than ten thousand of which were distributed. Special pains were taken at every step of the work to indicate the localities where phenomena such as were described in the lessons might be most advantageously studied. This comprehensive course formed suitable preparation for a second series of lessons, the principal object of which was to apply the principles taught by the first series to a thorough and detailed study of the physical history of the Boston basin. Each important locality in the section under consideration formed the subject of a separate lesson, in which its structural features and the more important events of its history were presented. Special attention was given to tracing the relations of the existing surface features of each district to its geological structure, thus connecting the physical geography and geology of the region. These lectures were based on a large amount of original investigation and results reached by Professor Crosby in his studies of the Boston basin."

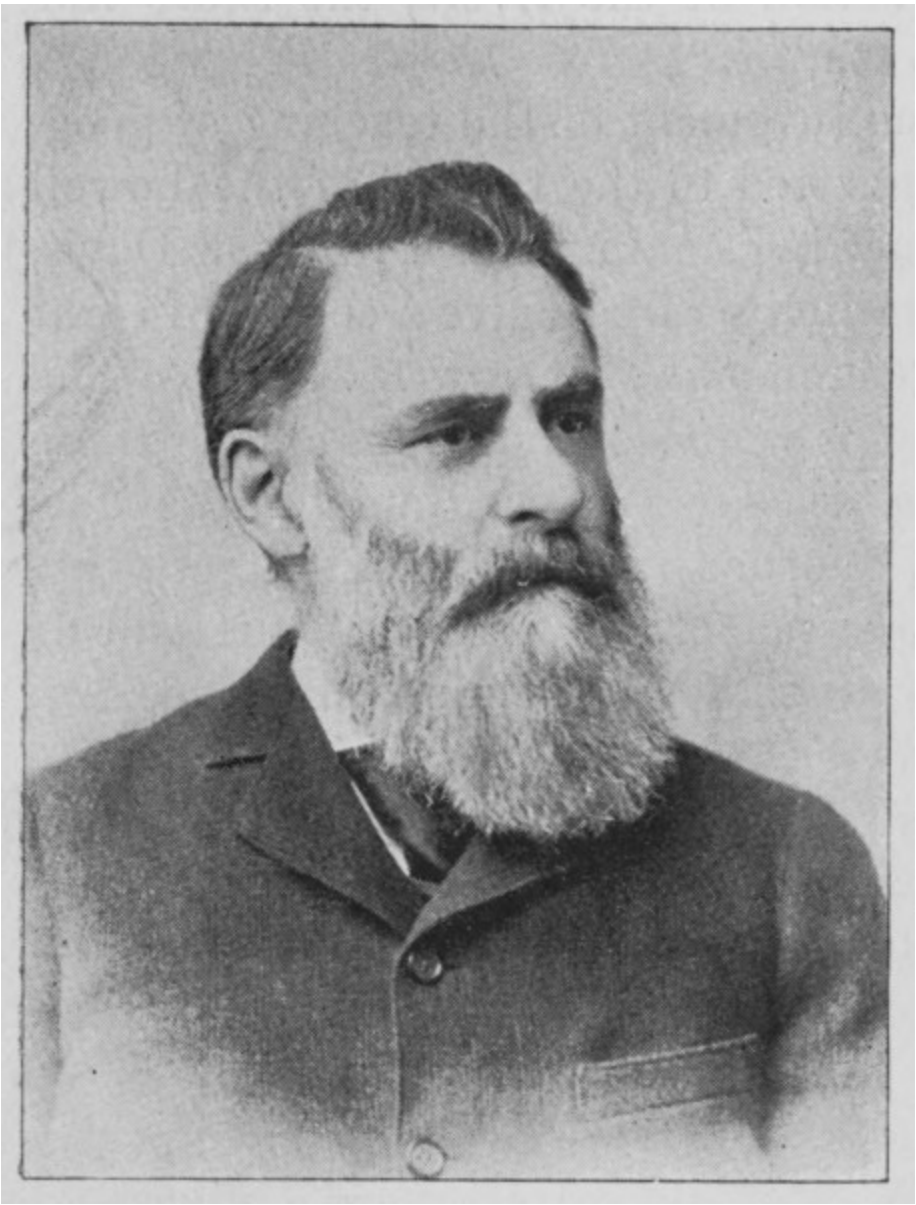
During the winter of 1886-'87 Prof. W. M. Davis delivered a course on Problems in Physical Geographic Classification, treated of in two lessons, and the Laws of the Evolution of the Principal Topographical Types occupied the remainder of the course. Professor Davis gave the class the benefit of the results of his investigations, which were original contributions of importance to the progress of physical geography. "The graphic manner of illustrating the lessons upon the Glacial period and the effects of the great glacier upon the area of the Great Lakes was very effective. This was shown by means of a relief model whose surface was composed of an ingenious arrangement of overlying and differently painted surfaces. By removing these in succession the lecturer traced the whole history of changes following upon the recession of a continental glacier and its effects upon the surface waters.... These lessons were so novel and useful to teachers that he was invited to give a course of ten lessons during the next winter upon the physical geography of the United States. New matter, new models, and more extended illustrations were used in this course. The

objects of the course were: To illustrate the value of systematic classification in the study of physical geography in order that forms of similar origin might be grouped together; to advocate the importance of studying the evolution of geographic forms in time, so that forms similar in origin but dissimilar in age (and consequently in degree of development) might be regarded as their natural relations; to apply these principles to the physical geography of our own land; and, finally, to promote the use of models in geographic teaching. The different parts of the country were considered in this order: The mountains as constituting the framework of the continent, the plains and plateaus flanking the mountains, the rivers carrying the waste of the land into the ocean, the lakes temporarily interrupting the transportation of waste to the ocean and retarding the action of the rivers, the shore line where the land dips under the sea."

Persons interested in the improvement of the teaching of geography in the public schools suggested to the trustee of the Lowell Institute the advisability of hearing again from Professor Davis, and the curator was requested to invite him to give a course of eight lectures on geography in the autumn and winter of 1897-'98. The subjects treated of in these lessons were selected from among those presented by Professor Davis in his course on geography in the Harvard Summer School, as they afforded material most directly applicable to the work of grammar-school teachers. At the end of each meeting opportunity was given for individual conference on questions suggested by the lectures. This course excited more interest among teachers than any which had been given since the beginning of the school, and it was consequently a serious disappointment to many teachers when it became known that Mr. Lowell did not feel able to re-engage Professor Davis and continue this kind of instruction.

The same winter that Professor Davis gave his first course on physical geography Prof. F. W. Putnam, of Harvard University, Curator of Peabody Museum of American Archæology and Anthropology at Cambridge, and now President of the American Association for the Advancement of Science, gave lessons on American archæology. The topics selected covered the whole range of the remains of prehistoric man and his life on this continent so far as these subjects could be presented in ten lessons. The original methods of research elaborated by Professor Putnam, which have placed his name among the first in his department of archæological work,

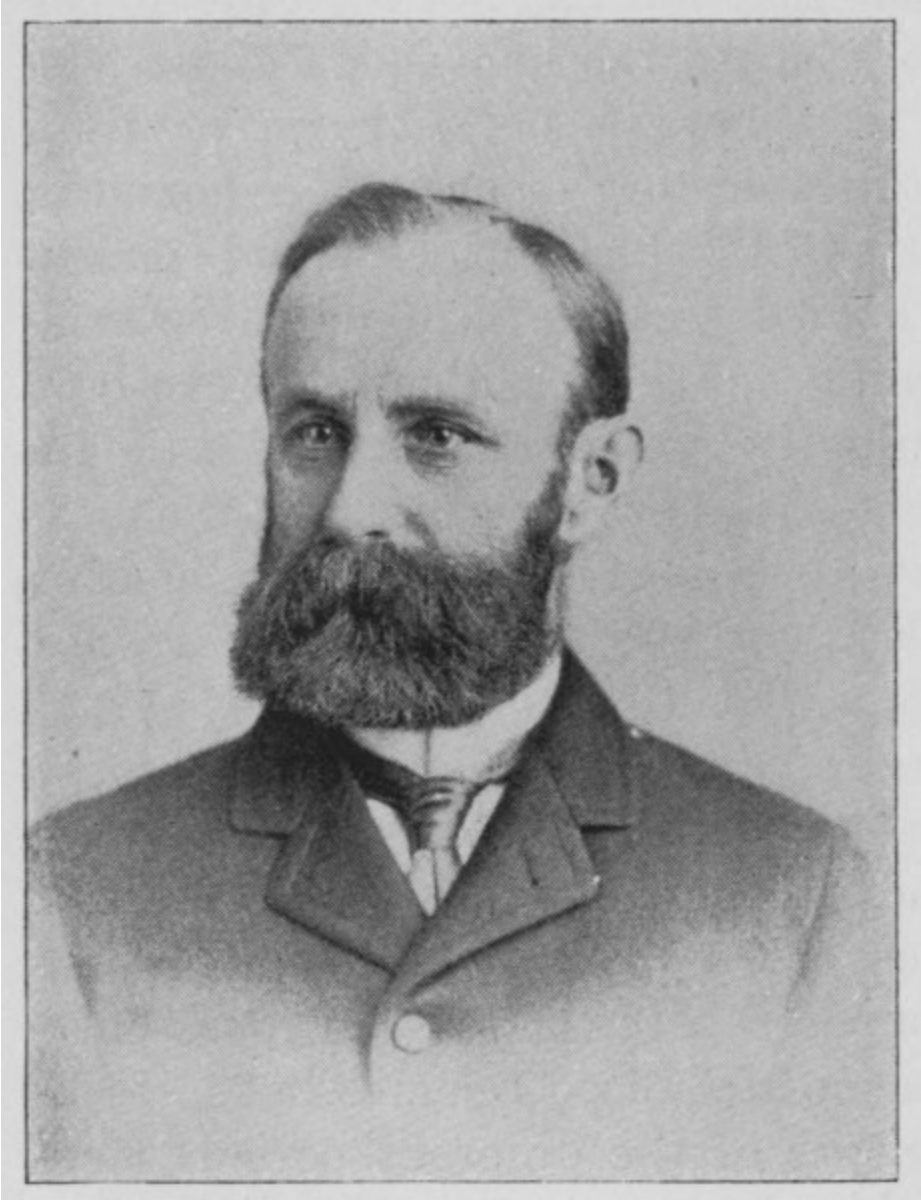
rendered this course remarkably interesting and instructive. Specimens were studied and given away in sufficient numbers to illustrate the modes of making stone implements and some of the different kinds of pottery. Professor Putnam invited the teachers to visit the Peabody Museum, and there gave them an opportunity to inspect the larger objects which it had not been possible to bring into the city. The audience became so interested in the famous serpent mound in Ohio, which was then threatened with destruction, that a subscription was started which finally made it possible to purchase and preserve this ancient monument.



F. W. PUTNAM.

The winter succeeding the lessons on archæology, Mr. B. H. Van Vleck, who had spent a considerable portion of the previous summer in preparing specimens for this work, gave fifteen lessons on zoölogy. The study of the general morphology of animals was made under advantages such as had never before been offered in this school, and enabled teachers to see and study structures not usually within their reach. The work was mainly directed to the observation and study of a limited number of types, but general points in physiology and anatomy were also taken up in a comparative way. The microscope was also used in this work. This special course was continued during the next two terms.

Dr. J. Walter Fewkes gave a series of ten lessons, during the winter of 1890-'91, on Common Marine Animals from Massachusetts Bay. Special attention was given to the mode of life, differences in external forms, local distribution, habitats, methods and proper times to collect the eggs, young, and adults. The anatomy, embryology, and morphology of the species considered were dealt with incidentally.



J. WALTER FEWKES.

"The relative abundance of species and individuals, local causes which influenced distribution, the rocky or sandy nature of the shores and their characteristic faunæ, and the influence of depth of water tides and temperature, were also considered."

The relations and boundaries of the marine fauna of New England were treated of under the following heads: Comparison of the Fauna of Massachusetts Bay with that of Narragansett Bay and the Bay of Fundy, and Causes of the Differences Observed; Pelagic Animals; Littoral and Shallow-

Water Genera; Introduced and Indigenous Marine Animals; and Marine Animals which inhabit both Brackish and Fresh Water.

It having been found that for several years the audiences at the general courses had been decreasing, it became evident that the giving of general information had accomplished a mission, but that there was a demand for more specialized courses of study and that a change of policy was warranted. It was therefore determined to abandon the general courses and continue the special prolonged laboratory courses.

Since 1891 all lessons have been given either in the form of laboratory lessons or field work, and the school was organized and conducted upon a new and more effective basis. The teachers have been required to keep notebooks and attend examinations in order to be candidates for the certificates which have been, and will continue to be, granted to those who have completed a series of lessons.

In the fall of 1890 was begun a course of lessons on paleontology which had been planned for some time but had not been previously undertaken because the teachers lacked the knowledge of the elements of zoölogy and geology which was a necessary preparation for those taking up the study of the history of animals as found in the earth's crust. The members of this class, which now began to make systematic observations upon fossils, were found to be sufficiently prepared to study certain groups which illustrated the laws of evolution. The class was limited in number and was under the instruction of Professor Hyatt, who for five years conducted the most advanced course of lessons ever given in The Teachers' School of Science, and such as have not elsewhere been offered to teachers nor to many classes of college students.

The lessons began with general instruction in the use of the microscope, the structure of cells and their union and differentiation into tissues, and then a study of simplest organisms—*Protozoa*. The work was continued through *Porifera*, *Hydrozoa*, and *Actinozoa*, and the types of fossils compared with their living representatives. The periods of occurrence of fossilized remains in the rocks were noted, and the characteristics of the different periods mentioned, but details of stratigraphic character were subordinated to the tracing out of the relations of the animals and the laws which governed the

evolution of their forms. Special attention was given to those classes whose history is most complete and which furnish the best specimens for examination.

Echinodermata, represented by a large number of both living and fossil forms, was made the subject of study the second winter. The common starfish was examined in detail, and with it were compared other members of its class—*Asteroidea*, living and fossil forms in *Ophiuridea* and *Echinoidea*, the modern *Holothuroidea*, the ancient *Blastoids* and *Cystoids*, and both extinct and modern *Crinoids*, the last of which were illustrated by alcohol specimens of *Comatula*. Professor Hyatt was assisted in giving these lessons by Miss J. M. Arms, who, in conjunction with him, had previously written the largest of the Science Guides—entitled Insecta—and by Dr. Robert T. Jackson, who has done much work on this group of fossils. One member of the class a few years ago, after receiving these lessons, looked over and prepared a large number of fossils, principally *Crinoids*, belonging to the Natural History Society, and discovered a form of paleozoic *Echinoderm*, which proved to be an interesting new species and was described by Dr. Jackson as *Lepidesthes Wortheni*.

The third year of this series consisted of lessons on *Brachiopoda* exclusively. Professor Hyatt was at that time in correspondence with Dr. C. E. Beecher, of Yale, the distinguished paleontologist, who has made remarkable discoveries and was then investigating *Brachiopoda*, and communications from him regarding this group were from time to time read to the class. "The sudden expansion or the quick evolution in the earlier periods of the earth's history and the slower evolution of the same types in their progressive history, after a period of sudden expansion had been passed through," were shown in several series.

The ancestral form of this group, the phylembryo, has been found in *Paterina*, whose adult represents the youngest stage, the beak of the shell, of other *Brachiopods*. There was, therefore, unusual opportunity to here illustrate theories of evolution, particularly the theory of constitutional tendency involving a conception of the youth, maturity, and senescence of species. In order to make the instruction clearer, terms used for the different stages of development by Professor Hyatt in his writings on bioplastology were explained to and used by the class.

The many specimens used in this study were carefully figured in the notebooks, and the teachers became so familiar with them that they were able to pass at the end of the term a severe examination. The final test of the season's work consisted of three parts: The passing in of lecture notebooks, the naming and classifying of a dozen fossils selected by the professor, and the answering of a set of difficult questions.

On account of the amount of time required for this course, and because the lessons were such as were not directly applicable to work in the public schools, the attendance decreased. The number who continued, however, were those who felt that a broad scientific education is necessary to the best teaching of even elementary science.

The fourth year was devoted to *Mollusca*, *Cephalopoda* in particular, and the class was fortunate in having for its teacher one whose investigations in this latter group have given him world-wide fame.

The evolution of the group from its straight radical form, now named and called *Diphragnoceros*, was traced through the bent, curved, and coiled forms of the *Nautiloids*, *Ammonoids*, and *Belamites*. The phylogeny of the *Ammonoids* presented a complete cycle, late forms entirely uncoiling and presenting the straight characters of their ancestors.

The study of *Cephalopods* amply illustrated the neo-Lamarckian theory of evolution, including the inheritance of acquired characters which is now believed by most paleontologists.

The fifth and last year of this course included the study of *Arthropoda* and *Vertebrata*. The insects presented many illustrations for the theory of natural selection, which the neo-Lamarckians consider an aid, but a subordinate factor, in the origin of species.

About this time Poulton gave a series of twelve lectures on animal coloration at the Lowell Institute, drawing his illustrations mainly from insects. Many of the students of The Teachers' School of Science in zoölogy and paleontology attended these lectures.

After working on fishes, batrachians, reptiles, birds, and mammals, in which the structural development of some animals—man, for example—was found to be retrogressive and the physiological development

progressive, the lessons closed with the study of man's structure as compared with the anthropoid apes and the few remains of prehistoric man, and finally with a discussion of the works of paleolithic man.

The teachers who had attended this course throughout the five years and had passed satisfactory examinations have been presented with diplomas testifying to their proficiency.

[*To be continued.*]

PROPER OBJECTS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

By EDWARD ORTON,

PROFESSOR OF GEOLOGY IN OHIO STATE UNIVERSITY; PRESIDENT-ELECT OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The objects of the American Association for the Advancement of Science are clearly expressed in the opening paragraph of its constitution, which was adopted at its first meeting, held September 20, 1848, in Philadelphia. From that day to this the paragraph referred to has not been modified except by the replacement of three words, viz., "the United States" by a single and more comprehensive word—"America."

As here defined, the objects of the association are "to promote intercourse between those who are cultivating science in different parts of America, to give a stronger and more general impulse and a more systematic direction to scientific research in our country, and to procure for the labors of scientific men increased facilities and a wider usefulness."

Three distinct elements are included in this general statement, viz.: (1) The cultivation of personal intercourse or acquaintance among the workers in science in this country; (2) the encouragement, extension, and proper direction of scientific research; (3) the gaining of popular recognition and good will for the results of scientific work. These objects may be conveniently summarized as (1) *social*, (2) *scientific*, (3) *practical*.

There is nothing in the original paragraph to indicate whether the elements of this threefold division were counted of equal value, or whether they were arranged in either an ascending or descending scale of importance, but from the fact that in the development and expansion of the association during the last fifty years nothing has been added to and nothing subtracted from this general statement, while in many other divisions of the constitution large

and sometimes radical changes have been adopted, it seems safe to conclude that the present members of the association see its work and office in very much the same light as its founders did.

But, while sailing under the old colors and apparently by the old charts, it is quite possible that the association is, insensibly to itself, undergoing modification more or less important. Such an experience is unavoidable in all human institutions, at least in those that retain their vitality in state, society, or church.

The fifty years that cover the life of the association are unquestionably the most important, so far as the growth of science is concerned, in the history of the race. Within this period every science has been recast and rewritten, and divisions and subdivisions of the old units have gone forward and are still in progress. Of every one of these sciences the boundaries have been so enormously extended that even the *dream* of universal knowledge on the part of any man has gone by, never to return. Leibnitz, it has been said, was the last of the intellectual giants of old who mastered all that was knowable in his day. Alexander von Humboldt could almost claim the same for the knowledge of Nature that was attainable in the first quarter of our century. But since the application of the compound microscope to the study of Nature and the subdivisions of the sciences that have resulted therefrom, and especially since the extension of the method of science to all the branches of anthropology, as language, history, institutions, the task of mastering all that is known is seen to be altogether too great for finite powers and span-long lives.

It might well be, therefore, in view of the amazing changes that have taken place in the entire field covered by the association, that it should have outgrown the aims and ambitions of its early days. The fact that it continues to use the identical statement of its objects with which it began its work, while it does not definitely settle the question, affords at least presumptive evidence that no such change has taken place.

How, then, do the objects originally recognized by the association as its *raison d'être* correspond to the needs of our own time?

1. Is the *social* feature of the association, to which the first place was assigned by the founders, whether by design or not, worthy of preservation

by us? In other words, is it as important "to promote intercourse between those who are cultivating science in America" at the close of the nineteenth century as it was at the middle of the century—the need that was responded to by the formation of the American Association for the Advancement of Science? While revolutionary changes have taken place in the country at large during this period in modes of travel, facilities for acquiring education, and the diffusion of intelligence, it would be hard to show why the need in this field should be in any respect less urgent. There is a far larger number of people who are cultivating science, and there are many more branches of science to be cultivated.

What particular service is to be expected from such intercourse as the association seeks to provide? The gathering of the workers in the diverse fields of science into a single organization has a tendency to *unify* them. They find that a common spirit animates them, that they all make use of essentially the same method of research or inquiry, and that the results which they reach all have a common note of certainty, being herewith differentiated from other and older views on the same subjects, as knowledge differs from opinion. They are thus led to see more clearly than they could otherwise see the unity of the universe, that knowledge is one, and that each science is but a facet cut on the crystal sphere of natural truth, touching other facets at many points, and by no means independent, but supported by the integrity of the sphere.

Such a gathering tends to an increase of mutual respect and confidence on the part of all engaged in scientific work. It tends to discourage the narrow conceit of the specialist, who, if left entirely to his own tastes, comes to think that his own facet is the only one that deserves to be regarded, and practically to ignore its relation to the sphere of which it constitutes an essential though a minor part.

Such an association tends toward making specialists intelligible to each other. In other words, it puts a premium on the art of popularizing science, for when the specialist makes himself intelligible to his brethren in their widely separated fields he makes himself intelligible to all educated men, whether especially trained in science or not.

The specialist is under a strong temptation to limit himself to a language of his own, which is an unknown tongue even to the rest of the scientific world. Technical terms, carried out to minute subdivisions, are indispensable in every branch of modern science, but the student of any science is in an evil state who can not present his results to the world without appealing to the technical jargon of the branch which he cultivates.

There even seems a reluctance on the part of some to use plain language in stating scientific conclusions, as if the cheapening of science were feared by its being made intelligible. Such a fear is certainly unworthy. The masters have never felt it. In lucidity and directness of speech and in general intelligibility Tyndall, Huxley, and Darwin were not surpassed by any men of their generation. To whom are we as much indebted for the great advance of science in their day as to these very men?

If the scientist neglects this popularizing of science, the sciolist is sure to take it up, and his work in this field always makes the judicious grieve. Is there not possible danger that this phase of scientific work and the function of the association corresponding thereto are losing consideration to some extent?

But instead of its being true that the scientific work of the country has outgrown the need of the association, is it not rather true that we are in far more urgent need of its unifying agency than even the founders were fifty years ago? We have all the divisions of science that were then recognized, and half as many more. Physics and chemistry could then be classed in one section without offense, and zoölogy and botany were assigned without protest to a single heading. Now, not only does every science demand recognition by and of itself, but all are represented by separate societies as well—as the Mathematical Society, the Chemical Society, the Geological Society, etc. These societies hold meetings, publish bulletins, reports, and sometimes monthly journals, and, in short, aim to cover the entire field for the branches which they represent. They are generally affiliated with the association, and it is becoming usual for them to hold joint summer meetings of society and section. Their annual meetings are held in the winter, and, as their membership is more select than that of the association, standing as it does in all cases for published or recognized work already in evidence, these winter meetings are coming to be preferred for the

presentation of technical papers. Those who read them feel sure of "fit audience, though few."

These societies are all vigorous and successful. They obviously meet a "felt want" on the part of American science, but just what their effect will be upon the association remains to be determined. Certainly, with these centrifugal tendencies in growing activity, this is not the time for the attraction of our one centripetal force to be relaxed. More than ever do we need such a unifying agency as the association was designed to supply.

Some *modus vivendi* between section and society will doubtless be found. Perhaps the more abstract and technical papers will be reserved for the winter meetings, while those dealing with the larger phases, and especially those pertaining to the philosophy of the subjects discussed, will find their places in the joint meetings of the summer.

It would be well if the association meetings of whatever character could be made memorable by the announcement of important discoveries made during the preceding year. The custom of holding back such announcements is said to obtain in the transatlantic national associations, and notably in the British Association, which is the mother of all the rest. Those who were present at the Boston meeting of the American Association will remember the enthusiasm created there by the announcement of the discovery of a new element—etherion. If later discussions have thrown doubt upon the discovery of a new element, the alternative explanation suggested of the facts proves scarcely less interesting or important than the original claim.

Whether our eager American workers would be willing to hazard their claims to priority by holding back the announcements of their discoveries for months after they have been made is a question, but the foreign practice in this regard has certainly much to commend it.

It would be a calamity of real magnitude to American science if the sectional meetings of the association were abandoned to men who have not done enough approved work to entitle them to places in the several societies already named. The old title—The American Association for the Advancement of Science—might still be retained, it is true, but what a humiliating misnomer it would be if none of the men who *have* advanced science in the past by their labors and none of those who are prepared to

advance it in the future by their training were now included! It would be the omission of the part of Hamlet from the play.

The foremost men in all the societies, our leaders in the branches represented there, owe it to themselves, owe it much more to the great name of American science, to maintain and magnify their connection with, their service to, the American Association.

At the second meeting of the association it was the illustrious Joseph Henry who called the attention of his brethren to the fact that the organization was, by its very name, consecrated to the *advancement* of science—to the discovery of new truth. He reminded them that the association was not designed to furnish opportunity for the restatement of what was already known. Its purpose was rather to add to the existing body of knowledge in the world. Let not the hopes of the founders be brought to naught by allowing the organization from which they expected so much to be thus eviscerated!

We see, then, that the *social feature*, with what it legitimately includes, deserves to hold as prominent a place among the objects of the association at the end of the century as was given to it by its founders when first established.

Two other objects which were deemed worthy of being incorporated into the organic law of the association remain to be considered. To the treatment of each a few words will be devoted. Neither of them commands as high regard from us as they seem to have had at the beginning.

2. The second object of the association as declared by the founders was "to give a stronger and more general impulse and a more systematic direction to scientific research in our country."

It is not easy for those who were born after the middle point of the century to think themselves back into the conditions under which the words above quoted were written. At that time there were but two or three schools of science in the United States, and not one west of the seaboard. The degrees of bachelor, master, and doctor of science were unknown. There was but one journal of science published in the country, and foreign scientific journals and reviews, comparatively weak and few at the best, seldom

found their way to the New World. The men who cultivated science were widely separated, and for the most part rarely met their peers. As a natural consequence, there must have been more or less misdirected effort. Many a worker must have attacked problems already solved, or have attacked them by inadequate or obsolete methods.

How great the changes that fifty years have wrought in this country, in the world indeed, in all these respects! Now there is not a State in the Union that has not at least one fairly equipped school of science, and in some of the older States such schools can be counted by the dozen or the score. These schools are manned by teachers trained at the foremost centers of science in this country and Europe, familiar with all the great problems and with all the most improved methods of research. Moreover, on the library table of every one of these schools are the latest periodicals and special reports of the two continents in which science is cultivated. The untrained and isolated investigator can no longer justify his existence. There is no occasion for the survival of such qualities as these terms imply.

This wonderful transformation in educational scope and methods effects to a great degree just what the founders hoped to accomplish through the agency of the association. The ground has thus been cut from under the second of the objects of the association as avowed in its constitution. In other words, while the result aimed at deserved the prominence given to it fifty years ago, it no longer depends on the association for its accomplishment.

3. The third of the objects which the association was organized to accomplish was "to procure for the labors of scientific men increased facilities and a wider usefulness." This clause evidently refers to the endowment of science by founding and equipping institutions, professorships, laboratories, museums, and the like, and to a more cordial and general appreciation of the results of scientific work.

In this direction, also, such immense progress has been made in the country at large that the need of special effort in this line no longer exists. Munificent gifts to science from private fortunes are now the order of the day. It is a poor year for science in America when such contributions do not exceed a million dollars. This work was begun in the large way under the

elder Agassiz, and the Museum of Comparative Zoölogy at Cambridge is its first important monument. It has gone forward in the addition of scientific departments worthy of the name to the older institutions of learning, and in the establishment of new institutions wholly devoted to science.

Such beneficent use of private wealth, the unparalleled increase of which during the last fifty years has become a matter of grave concern to the whole body politic, does more than anything else can do to reconcile the public to the conditions which make such accumulations possible. Still more significant is the policy which the General Government entered upon, forty years ago, of establishing, in conjunction with the several States, schools of general and applied science. The State colleges and universities thus founded have already become potent factors in American education, and science lies at the heart of them all. It would be hard to overrate their influence on the development of science for time to come.

When the American Association was established, fifty years ago, a new day was breaking on the world. The men who were cultivating science then saw something of the conquests over Nature that the new method—the method of science—rendered possible. They were wise in demanding that all who use this method should recognize the common bond. The association was the outcome of that demand.

At the end of the century we who have shared in the mighty advance and who have been taught by our experience to discard limitations in the possibilities of the future, feel the same and an even more urgent need of some unifying and interpreting agency for the ever-widening fields to which the method of science is now applied.

RACE QUESTIONS IN THE PHILIPPINE ISLANDS.

By FERDINAND BLUMENTRITTE.

When I published my article on the History of Separatism in the Spanish colonies, in the *Deutsche Rundschau* for July, 1898, I said that the colored peoples of a colony would always be inclined to struggle for the independence of their native country, because the rule of the mother country of the colony makes their access to the highest positions in the state impossible. I declared, further, that in the Philippine Islands the contempt manifested toward the colored tribes by the Spanish press had contributed very much toward making the gulf between rulers and ruled progressively deeper and harder to bridge. The natural conceit and sensitiveness of the colored races in America could never weigh as heavy in the scale as those of the colored Filipinos do, because in America the creoles and their numerously represented crosses were the real upholders of separatist ideas, so that when the idea ripened into an act they held the leading of the movement in their hands. Indians and negroes have there never been more than the *plebs contribuens*, or the tributary class, and "food for cannon." Only in single exceptional cases have leading spirits ever risen from out of these lower castes; and where the separatist movement has been confined to these colored primitive races, as in Haiti, it has led not only to cutting loose from the mother country, but also to a more or less complete renunciation of European civilization. In saying this I cast no condemnation upon the negroes, for, whenever in our civilized states the proletariat and the populace have struck down or cast out all the cultivated and half-cultivated classes, the same sort of "nigger management," with only differences corresponding with the environments, has gained place among us as in the great islands of the Antilles.

Very different are the conditions in the Philippine Islands; and, in view of the importance which the "skin question" plays in the conflict raged by the Americans, I think it proper to deal further with this fundamental question

of Philippine politics, especially since the journals and the politicians, at least those of America, have given very little attention to the matter.

The small number of creoles, of whom, besides, the principal part live in the city of Manila, which the Americans have in their power, would not alone explain why the war of independence and the formation of the Philippine republic must be spoken of as pre-eminently the work of Christian, civilized Malays and mestizos. For there are in America countries, like Paraguay, where the number of whites is even smaller than in the Philippine Islands, and yet the separatist movement and the foundation of the state were the exclusive work of the creoles.

Why has it been thus? Because the Indians and the negroes do not possess that inclination toward civilization and that capacity for assimilation that are evident in the colored populations of the Philippine Islands. It is supposed that the Philippine Malays have Japanese blood in their veins; but, all the same, whether the supposition is founded or unfounded, it is certain that not only do they resemble the Japanese more or less in features, but that also many mental traits are common to them with these wide-awake Orientals, and they even excel them in a moral respect. The school statistics show them superior to their Spanish lords. The Filipinos have no larger percentage of illiterates than Spain of those who can not read and write. And, as a bishop exclaimed with astonishment, there are in those islands villages where it would be hard to find a person unable to read. The pressure of the colored people to the higher studies and the special schools far exceeds the percentage which one would anticipate from their proportion to the whole population. And if we add to these those who seek their education in Spain and other foreign countries we shall find Malays and mestizos in the first line, and the creoles in the last. It should be remarked on this point that many more natives would have gone to Europe for education if the Spaniards, and especially the monks, had not perceived conspirators in all Filipinos who studied away from home. The fear of persecution deterred many fathers from sending their sons over the sea.

More than ten years ago a prominent monkish writer showed how the professions of medicine and the law were crowded with Malays and mestizos. But besides these two professions and that of the secular clergy the colored Filipinos turned also to engineering and art. With respect to art,

I am not thinking of the skillful goldsmiths and silversmiths of Manila, although these artificers are among the best, but I refer to artists of divine gifts, among whom the mestizo F. Resureccion Hidalgo, resident in Paris, and Don Juan Luna, of the tribe of Ilokans of northwestern Luzon, brother of the Philippine minister Antonio Luna, are most conspicuous. Luna is not unknown to us Germans, for the Leipsic *Illustrirte Zeitung* some time ago published a wood engraving of his great prize-crowned picture Spoliarum. The best testimony to his eminence is the fact that the Spanish Senate honored this artist, who was then living in Paris, with the commission to paint for its chamber a pendant to Padilla's famous picture Boabdil Surrendering the Keys of Granada to the Catholic Queen, and he painted The Battle of Lepanto. And among the Filipino poets the name of the great Tagal, Dr. Rizal, has become known to the whole world through his skill in tragedy.

There is no need of mentioning any other names, for those we have given are enough to show that these Malays and mestizos are susceptible of cultivation, and, as Bismarck used to say, "carry a rocket-charge in their bodies."[6]

As the Spaniards who came to the archipelago were for the most part only monks or officers, trade, so far as it was not in the hands of foreigners, was dependent on the participation of the colored population, particularly of the mestizos. And what of large land ownership the monkish orders had not absorbed likewise belonged for the most part to the colored races. None but foreigners and colored took part in all the great enterprises of the country. The Spaniards only ruled.

This position of the colored population in the country was the more perilous to the Spaniards, because the Spanish press, particularly the monkish journals, systematically treated them with scorn, called them anthropoids, and denied their capacity to attain European civilization. The educated Filipinos foamed with rage when spoken to about these attacks upon their race. "Besides," they said, "it makes the color of our skin a stigma with the Spanish lords, and with all Europe too; why thus insult us and in so cowardly a way, when the censorship at Manila makes it impossible for us to defend ourselves?"

But all these noisy revilings of their race could only outwardly, not inwardly, disturb the self-esteem of the Malays, because their leading spirits had by critical psychological studies of the white race confirmed the opinion of the simple Tagal peasants that the whites are made out of the same earth as the colored, and that the latter could, under equal conditions, have done as well as they. Only the whites have adopted that lordly code of morals which, like the flag with contraband goods, covers the grossest breaches of right and other outrages, which a white gentleman would not venture, indeed, to commit upon his peers, but which, in the treatment of colored men, belong, so to speak, to good tone, to "European smartness."

The educated brown man generally feels in his intercourse with the European that uneasiness, that poorly concealed embarrassment, which the parvenue with us feels in the presence of one of the blue-blooded aristocracy. He feels every instant that the white man's critical eye is upon him, and knows that the criticism will be pitiless and harsh to injustice. He knows, further, that this criticism in every case does not apply only to him, the individual, but that conclusions are drawn at once from his errors, even though they may be only presumed, that are applied to his whole race or caste—conclusions which are never flattering, but always culminate, in agreement with the scorn of the superior, in a severe condemnation.

This consciousness of running the gantlet before the eyes of Europeans often causes the brown man to commit mistakes in European society, which refuses to pass him among people whose favor he would be sure to enjoy.

The opinion which Europeans living in the tropics form of the brown men is generally unfavorable and unjust to them. We Europeans, or rather our nations and states, already judge one another harshly and in a more than partisan manner, because we see first only the weaknesses, often even only the fancied weaknesses, of our neighbors. How, then, could we expect anything better when a European has to pass an opinion on a brown man? We should not forget that only those Europeans go to the tropics who display special energy and force of will—a kind of chosen lot among our race—while the natives there include all the levels of the people. If we add to this that all the Europeans believe in their own superiority and in the inferiority of the brown men, it will seem quite natural that when the

Europeans begin to make comparisons between themselves and the natives the comparisons will always be flattering to those who make them.

In the Philippine Islands, on the other hand, the reaction of the natives against this extreme self-conceit of the whites has been making itself felt for more than twenty years. This has come to pass since the philosophical heads among them have carefully studied the whites in the various countries of Europe, and have in consequence lost faith in the divine likeness of the Caucasians.

Single examples of the studies of these men have been published, such as that of the war minister of the Philippine republic, Don Antonio Luna, a pure-blooded Malay like his brother the painter. Luna studied in Spain and in Paris (under Pasteur), and lived a little while in England, so that he had opportunities to become acquainted with three civilized nations at their home. His literary works are represented to us in the garb of novels and *feuilletons*, the sarcasm of which, while it certainly escapes the uninitiated European, will be all the more effective and precious upon those who are acquainted with the purpose of the brilliant author, which is to satirize the depreciatory accounts by European travelers of the land and people of the Philippine Islands. This he does by telling of his rummaging through the critics' home and finding all the weaknesses and faults which are accredited to the brown men as signs of their incapacity no less prevalent in Europe than in the Philippine archipelago; and arguing that therefore the whites and the browns differ only in the color of their skin, in build, and in language, but not in mind.

If space allowed I should be glad to follow my inclination to repeat some of Luna's descriptions, which are given in a style that reminds one of Maupassant's. I shall only say that Luna has drawn within the circle of his observations the movements of all classes in the aristocratic saloon and in the workman's beerhouse, and remarks that everything that has been charged against the brown man appears likewise in the European. The first sketch is excellent. European travelers speak in their works of the "stupid staring" at their white-skinned, thoughtful faces by the "brown savages." Luna, whose pen-name is Taga-ilog,[7] parodies these stories by simply relating that on his arrival in Europe and during his earlier residence there the people on the streets stared at him, and some of the boys threw stones or

stuck out their tongues at him. He did not, however, care for that, while he expected that the better circles would convince him of the superiority and the innate tact of the lordly race by their more refined behavior. But it did not turn out so. He saw the ladies in the saloons tittering behind their fans and making merry over "the queer man." And then at the table! How plain was the expression of astonishment among the gentlemen of the saloons that the brown man behaved in his eating just as the whites did! They had apparently anticipated that the "black" would act as if he were tearing live pigeons to pieces and swallowing them. The indolence of the Europeans is shown up no less amusingly. Luna finds it apparent in all conditions, prevailing in the highest and the lowest social strata. He asks what would become of the industry and activity of the European peoples if they were suddenly given the climate and the fruitfulness of his native land. These two examples are all we can give. Likewise interesting are the studies of my Tagalog friends Don Marcelo H. del Pilar and Don Mariano Ponce. The former, an advocate from the province of Bulakan, in the island of Luzon, and a descendant of King Lakandola, of Manila, was the leader of the Reformist party and the chief editor of the journal *La Solidaridad*, published in Madrid, which he directed with a remarkable skill that was recognized by his opponents. He died in Barcelona in the summer of 1896. His compeer, Ponce, is now living in Japan and is no less distinguished than Pilar for his keen wit and his zeal in research.

These two Malay jurists carefully examined the criminal records of Europe. Why? Because, whenever an extraordinary or especially heinous crime was committed in the Philippine Islands, the Spaniards were accustomed to use it to confirm their conclusions as to the innate inferiority of the Malay race. "That could occur only among a people of inferior intelligence," was their standing phrase. Del Pilar and Ponce gathered the accounts of trials from the European journals, and were able to reply to the Spaniards quietly: "No, that is not so. All these crimes occur among you Europeans, and relatively more frequently than with us. Your conclusion is therefore false, or else you too have a defective intelligence such as you ascribe to us." Del Pilar, from his studies of the colonial enterprises of all peoples, came to the conclusion that "the Europeans founded most of their colonies at a time when the holding in vassalage of men of their own race by whites and the slavery of negroes and Indians were not regarded as offenses. If, now, we look at

colonies in which, as in the Philippine Islands, agricultural populations are living with a civilization of their own, the development of the native races will depend on their religion. In a colony where Islam or a dogmatized heathen religion prevails no assimilation between Europeans and natives can take place. It is otherwise in countries like the Philippines, where the natives accepted Christianity at a time when religion had more importance among Europeans than now; a common basis was formed for the co-operation of both parts, the whites and the colored. But the circumstance that rulers and ruled had the same religion and the same official language may have led directly to another evil—that the colors became marks of condition, the whites being the Spartans, the mestizos the perioikoi, and the colored men the helots or servile people. So long as no pressure toward higher ambitions occurred from among those of the perioikoi and the helot grades, and so long as the whites were able to keep their prestige freely recognized by their dependents, the view of the whites, that the colored were both socially and intellectually a lower caste, seemed to be justified. The case has been different in the present century, especially in the second half of it. People of our (Philippine) race attended the high schools, appropriated to themselves the civilization and the knowledge of the whites, and still the brand of inferiority stuck to them. And this happened, too, when the quality of the whites had deteriorated. They were no longer exclusively *señors*, but there came bankrupted Spaniards or those of the lowest classes into the country, among them persons who could not read and write, who should be rated as beneath our school-trained people. And yet these illiterates claimed, by virtue of their color, to be respected as lords of the land, an absurdity which left the idea of 'European prestige' without justification, for how could beggars, spongers, bummers, rowdies, and illiterates impress anybody? The decent Spaniards committed the mistake of avowing their solidarity with the sorry fellows of their caste, instead of rejecting them and holding aloof from them and sending them back to Spain. So the Spaniards have brought it to pass, through a mistaken policy, that the Filipinos on their side, too, throw the good elements of the Spanish population into the same pot with the foul. Another reason why a Spanish prestige can not be thought of among us is that, with the exception of the tobacco companies, all the great enterprises in our country are carried on by foreigners and Filipinos. We owe all that is called progress not to the Spaniards, but to our own force or to foreigners."

When the painter Juan Luna attracted so much attention with his picture Spoliarum it was not known that the artist was a Malay, and the work was therefore regarded and criticised from a purely artistic point of view. But as soon as the race of the painter became known, European prejudice made itself manifest. It was said that the choice of a tragic subject could unquestionably be traced back to the descent of the artist from "savages." But when did artists of the white race ever shrink from such subjects? Luna has had cause enough to complain of European injustice. The natives are charged with not being independent in art. "They can only imitate," it is said. But how many European nations one would have to strike out of the list of the civilized if that title is to belong only to those which have an art of their own! It should not be forgotten that the Spaniards have, during their three hundred years' rule, impressed a Spanish mark on the native artistic tendencies. The ethnographer who is acquainted with the woven and carved designs of the heathen tribes which have remained free from the Spaniards and from Christian civilization will certainly not be able to deny that the Malays of the Philippine Islands have a great talent for ornamental art. But if the reproach is cast against the Filipinos that they have tried to Europeanize themselves in plastic art as well as in music, they have not done differently from the Europeans—that is, they denationalize themselves and come into the great international circle of civilization, a thing that can hardly be charged as a sin against them. It is very remarkable, they say, that Europeans condemn in the Filipinos, as a mark of inferiority that which they regard in themselves as a sign of progress.

Rizal also has spoken of the injustice of the judgments which Europeans pass upon Philippine conditions. I have published his views on this subject in the tenth volume of the *Internationalen Archivs für Ethnographie*, and will therefore on the present occasion only give a sketch of them, with a few additional observations to complement them. Dr. Rizal says that most Europeans judge the natives from their servants, which would be as false as if anybody should form his conception of the German people from the complaints which German housewives are always ready to make concerning their domestics. At one time while he was visiting me we strolled out of town. He gathered some wild flowers and asked me their names. I had to confess respecting many of them that I knew neither their common nor their botanical names. He laughed and said: "Well, you are a

cit; let us ask a countryman." We met a peasant, but he could not give us any information about any of the flowers. "Why," Rizal said, "is this the first time you ever saw the flowers?" The peasant replied that he knew the flowers very well, but did not know what they were called. When the countryman had gone, Rizal said to me: "How fortunate you Europeans are as compared with us poor Tagals! If such an experience as I have just gone through should happen to a European among us he would write in his notebook that 'the stupidity of these people shows itself in the fact that they do not know or have no names for many of the flowers which they see every day and tread upon with their clumsy feet. What can not be eaten or put to some immediate use has very little value or interest to these fellows, and such dull-witted folk as these want reform and autonomy!' And he would be only a modest traveler. Another one would write a whole chapter over the incident, as illustrating the inferiority of all our people."

I might continue at greater length on this theme, but I believe that the reader will sufficiently apprehend from what I have said that the European and American whites have not made a good impression on the colored Filipinos, and that the Philippine creoles feel as one with their colored brethren; that there is no spirit of caste in the matter like that which existed in the old colonial times, but they all call themselves simply Filipinos, and that the rule of the American Anglo-Saxons, who regard even the creoles as a kind of "niggers," would be looked upon by educated Filipinos of all castes as a supreme loss of civic rights.—*Translated for the Popular Science Monthly from the Deutsche Rundschau.*

DO ANIMALS REASON?

By EDWARD THORNDIKE, Ph. D.

Probably every reader who owns a dog or cat has already answered the question which forms our title, and the chance is ten to one that he has answered, "Yes." In spite of the declarations of the psychologists from Descartes to Lloyd Morgan, the man who likes his dog and the woman who pets a cat persist in the belief that their pets carry on thinking processes similar, at least in kind, to our own. And if one has nothing more to say for the opposite view than the stock arguments of the psychologists, he will make few converts. A series of experiments carried on for two years have, I hope, given me some things more to say—some things which may interest the believer in reason in animals, even if they do not convert him.

In trying to find out what sort of thinking animals were capable of I adopted a novel but very simple method. Dogs and cats were shut up, when hungry, in inclosures from which they could escape by performing some simple act, such as pulling a wire loop, stepping on a platform or lever, clawing down a string stretched across the inclosure, turning a wooden button, etc. In each case the act set in play some simple mechanism which opened the door. A piece of fish or meat outside the inclosure furnished the motive for their attempts to escape. The inclosures for the cats were wooden boxes, in shape and appearance like the one pictured in Fig. 1, and were about 20 × 15 × 12 inches in size. The boxes for the dogs (who were rather small, weighing on the average about thirty pounds) were about 40 × 22 × 22. By means of such experiments we put animals in situations seeming almost sure to call forth any reasoning powers they possess. On the days when the experiments were taking place they were practically utterly hungry, and so had the best reasons for making every effort to escape. As a fact, their conduct when shut up in these boxes showed the utmost eagerness to get out and get at the much-needed food. Moreover, the actions required and the thinking involved are such as the stories told about intelligent animals credit them with, and, on the other hand, are not far removed from the acts and feelings required in the ordinary course of animal life. It would be foolish to deny

reason to an animal because he failed to do something (e. g., a mathematical computation) which in the nature of his life he would never be likely to think about, or which his bones and muscles were not fitted to perform, or which, even by those who credit him with reason, he is never supposed to do. So the experiments were arranged with a view of giving reasoning every chance to display itself if it existed.

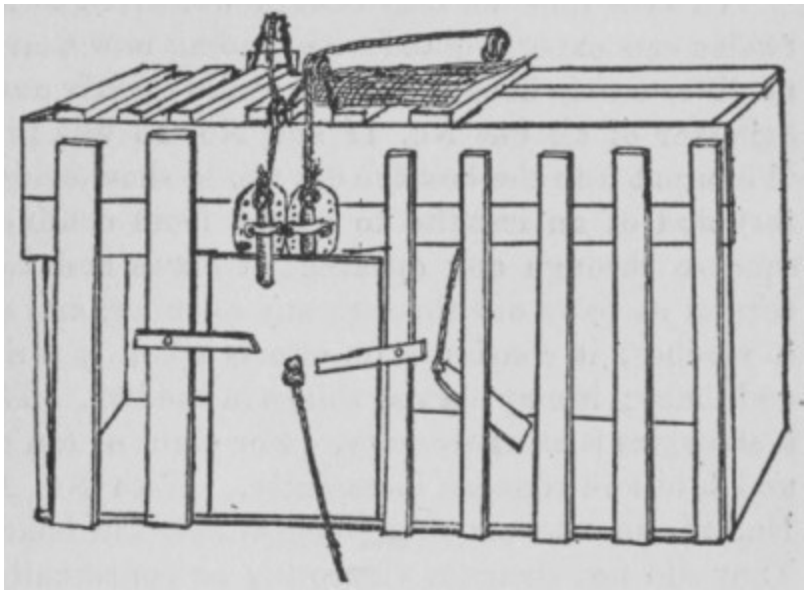


FIG. 1.

What, now, would we expect to observe if a *reasoning* animal, who is surely eager to get out, is put, for example, into a box with a door arranged so as to fall open when a wooden button holding it at the top (on the inside) is turned from its vertical to a horizontal position? We should expect that he would first try to claw the whole box apart or to crawl out between the bars. He would soon realize the futility of this and stop to consider. He might then think of the button as being the vital point, or of having seen doors open when buttons were turned. He might then poke or claw it around. If after he had eaten the bit of fish outside he was immediately put in the box again he ought to remember what he had done before, and at once attack the button, and so ever after. It might very well be that he would not, when in the box for the first time, be able to reason out the way to escape. But suppose that, in clawing, biting, trying to crawl through holes, etc., he happened to turn the button and so escape. He ought, then, if at once put in again, this time to perform deliberately the act which he had in the first trial

hit upon accidentally. This one would expect to see if the animal *did* reason. What do we really see?

To save time we may confine ourselves to a description of the twelve cats experimented with, adding now that the dogs presented no difference in behavior which would modify our conclusions. The behavior of all but No. 11 and No. 13 was practically the same. When put into the box the cat would show evident signs of discomfort and of an impulse to escape from confinement. It tries to squeeze through any opening; it claws and bites at the bars; it thrusts its paws out through any opening, and claws at everything it reaches; it continues its efforts when it strikes anything loose and shaky; it may claw at things in the box. The vigor with which it struggles is extraordinary. For eight or ten minutes it will claw and bite and squeeze incessantly. With No. 13, an old cat, and No. 11, an uncommonly sluggish cat, the behavior was different. They did not struggle vigorously or continually. (In the experiments it was found that these two would stay quietly in the box for hours, and I therefore let them out myself a few times, so that they might associate the fact of being outside with the fact of eating, and so desire to escape. When this was done, they tried to get out like the rest.) In all cases the instinctive struggle is likely to succeed in leading the cat accidentally to turn the button and so escape, for the cat claws and bites all over the box. These general clawings, bitings, and squeezings are of course instinctive, not premeditated. The cats will do the same if in a box with absolutely no chance for escape, or in a basket without even an opening—will do them, that is, when they are the foolishest things to do. The cats do these acts for just the same reason that they suck when young, propagate when older, or eat meat when they smell it.

Each of the twelve cats was tried in a number of different boxes, and in no case did I see anything that even looked like thoughtful contemplation of the situation or deliberation over possible ways of winning freedom. Furthermore, in every case any cat who had thus accidentally hit upon the proper act was, after he had eaten the bit of fish outside, immediately put back into the box. Did he then think of how he had got out before, and at once or after a time of thinking repeat the act? By no means. He bursts out into the same instinctive activities as before, and may even fail this time to get out at all, or until a much *longer* period of miscellaneous scrabbling at last happens to include the particular clawing or poking which works the

mechanism. If one repeats the process, keeps putting the cat back into the box after each success, the amount of the useless action gradually decreases, the right movement is made sooner and sooner, until finally it is done as soon as the cat is put in.

This sort of a history is not the history of a reasoning animal. It is the history of an animal who meets a certain situation with a lot of instinctive acts. Included without design among these acts is one which brings freedom and food. The pleasurable result of this one gradually stamps it in in connection with the situation "confinement in that box," while their failure to result in any pleasure gradually stamps out all the useless bitings, clawings, and squeezings. Thus, little by little, the one act becomes more and more likely to be done in that situation, while the others slowly vanish. This history represents the wearing smooth of a path in the brain, not the decisions of a rational consciousness.

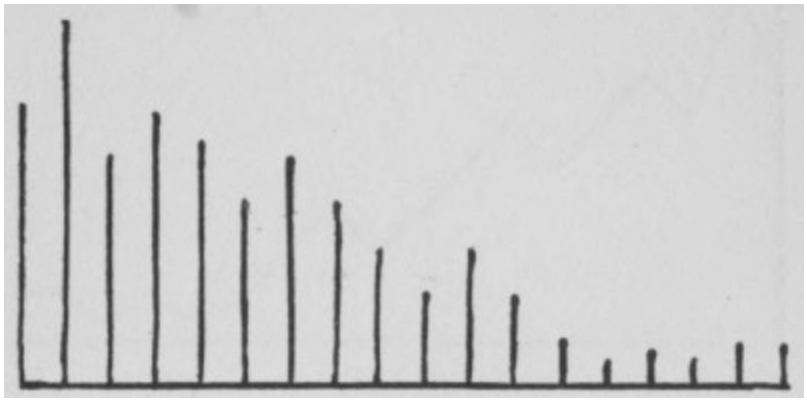


FIG. 2.

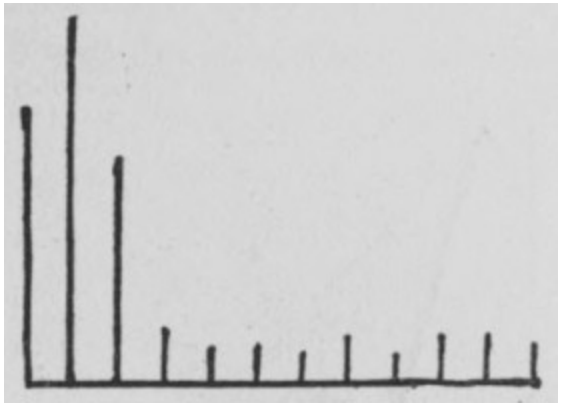


FIG. 3.

We can express graphically the difference between the conduct of a reasoning animal and that of these dogs and cats by means of a time-curve. If, for instance, we let perpendiculars to a horizontal line represent each one trial in the box, and let their heights represent in each trial the time it took the animal to escape (each three millimetres equaling ten seconds), the accompanying figure (Fig. 2) will tell the story of a cat which, when first put in, took sixty seconds to get out; in the second trial, eighty; in the third, fifty; in the fourth, sixty; in the fifth, fifty; in the sixth, forty, etc. This figure represents what did actually happen with one cat in learning a very easy act. Suppose the cat had, after the third accidental success, been able to reason. She would then have the next time and in all succeeding times performed the act as soon as put in, and the figure would have been such as we see in Fig. 3. The thing is still clearer if, instead of drawing in the perpendiculars, we draw only a line joining their tops. Fig. 4 shows, then, the curve for the real history, and Fig. 5 shows the abrupt descent, due to a rational comprehension of the situation. I kept an accurate record of the time, in seconds, taken in every trial by every cat in every box, and in them all there appears no evidence for the presence of even the little reasoning that "what let me out of this box three seconds ago will let me out now." Surely, if an animal could reason he would, after ten or eleven accidental successes, think what he had been doing, and at the eleventh or twelfth trial would at once perform the act. But no! The slope of the curves, as one may see in the specimens shown in Fig. 6, is always gradual. So, in saying that the behavior of the animals throughout the experiments gave no sign of the presence of reasoning I am not giving a personal opinion, but the impartial evidence of an unprejudiced watch. The curves given in Fig. 6 are for cats learning to escape from the box already described, whose door was held by a wooden button on the inside.

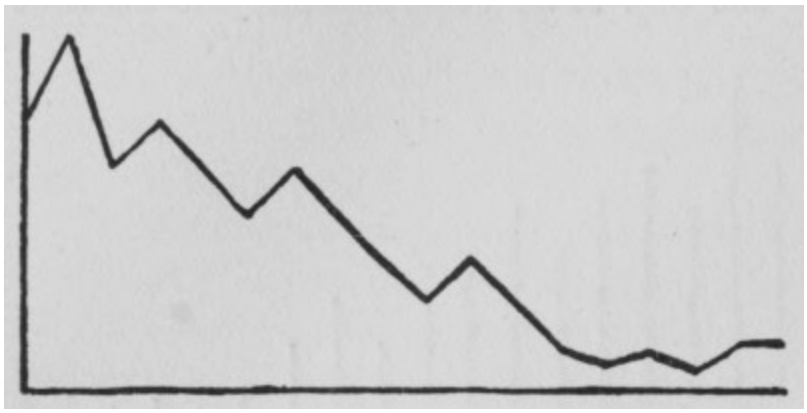


FIG. 4.

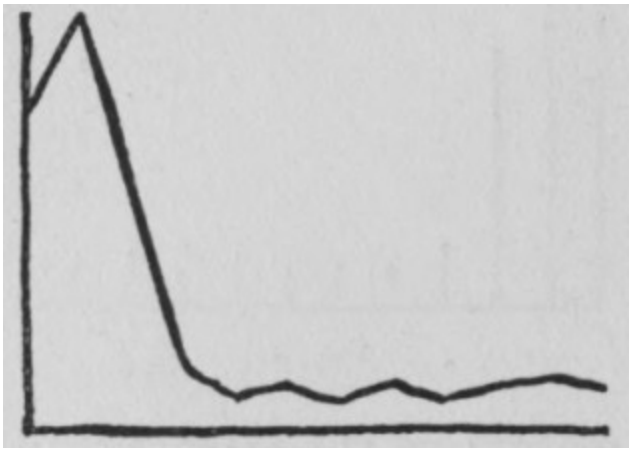


FIG. 5.

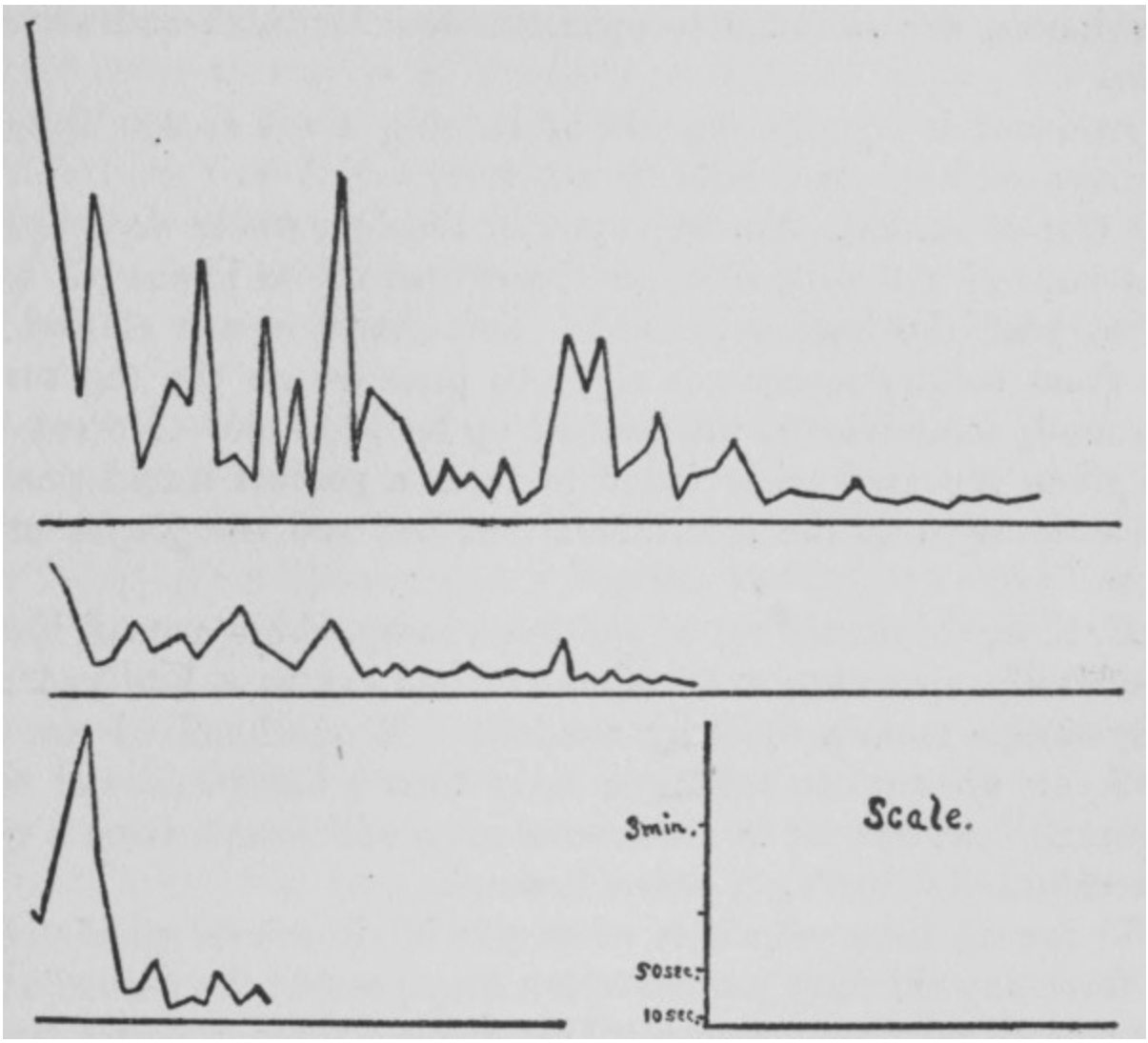


FIG. 6.

Some one may object that, true as all this may be, the intelligent acts reported of animals are in many cases such as could not have happened in this way by accident. These anecdotes of apparent comprehension and inference are really the only argument which the believers in reason have presented. Its whole substance vanishes if, as a matter of fact, animals can do these supposed intelligent acts in the course of instinctive struggling. They certainly can and do. I purposely chose, for experiments, two of the most intelligent performances described by Romanes in his Animal Intelligence—namely, the act of opening a door by depressing the thumb-piece of an ordinary thumb-latch and the opening of a window by turning a swivel (see pp. 420-422 and p. 425 of Animal Intelligence, by G. J.

Romanes). Here I may quote from the detailed report of my experiments (Monograph Supplement to the Psychological Review, No. 8):

"G was a box 29 × 20-1/2 × 22-1/2, with a door 29 × 12 hinged on the left side of the box (looking from within), and kept closed by an ordinary thumb-latch placed fifteen inches from the floor. The remainder of the front of the box was closed in by wooden bars. The door was a wooden frame covered with screening. It was *not* arranged so as to open as soon as the latch was lifted, but required a force of four hundred grammes, even when applied to the best advantage. The bar of the thumb-latch, moreover, would fall back into place again unless the door were pushed out at least a little. Eight cats (Nos. 1, 2, 3, 4, 5, 6, 7, and 13) were, one at a time, left in this thumb-latch box. All exhibited the customary instinctive clawings and squeezings and bitings. Out of the eight, *all succeeded, in the course of their vigorous struggles, in pressing down the thumb-piece*, so that if the door had been free to swing open they could have escaped. Six succeeded in pushing both thumb-piece down and door out, so that the bar did not fall back into its place. Of these, *five succeeded in also later pushing the door open, so that they escaped and got the fish outside*. Of these, three, after about fifty trials, associated the complicated movements required with the sight of the interior of the box so firmly that they attacked the thumb-latch the moment they were put in."

In the cases of No. 1 and No. 6 the combination of accidents required was enough to make their successes somewhat rare. Consequently weariness and failure offset the occasional pleasure of getting food, and after succeeding four and ten times respectively they never again succeeded, though given numerous opportunities. Their cases are almost a perfect proof of the claim that accident, not inference, makes animals open doors. For they hit upon the thing several times, but did not know enough to profit even by these experiences, and so failed to open the door the fifth and eleventh times.

Accident is equally capable of helping a cat escape from an inclosure whose door is held by a swivel.

"Out of six cats who were put in the box whose door opened by a button, *not one failed*, in the course of its impulsive activity, to push the button

around. Sometimes it was clawed one side from below; sometimes vigorous pressure on the top turned it around; sometimes it was pushed up by the nose. No cat who was given repeated trials failed to form a perfect association between the sight of the interior of that box and the proper movements."

If, then, three cats out of eight can escape from a small box by accidentally operating a thumb-latch, one cat in a hundred may easily escape from a room by accident. If one hundred per cent of all cats are sure to sooner or later turn a button around when in a small box, one cat in a thousand may well escape from a room by accidentally turning a swivel around.

So far we have seen that when put in situations calculated to call forth any thinking powers which they possess, the animal's conduct still shows no signs of anything beyond the accidental formation of an association between the sight of the interior of the box and the impulse to a certain act, and the subsequent complete establishment of this association because of the power of pleasure to stamp in any process which leads to it. We have also seen that samples of the acts which have been supposed by advocates of the reason theory to require reasoning for their accomplishment turn out to be readily accomplished by the accidental success of instinctive impulses. The decision that animals do not possess the higher mental processes is re-enforced by several other lines of experiment—for example, by some experiments on imitation.

The details of these experiments I will not take the time to describe. Suffice it to say that cats and dogs were given a chance to see one of their fellows free himself from confinement and gain food by performing some simple act. In each case they were where they could see him do this from fifty to one hundred and fifty times, and did actually watch his actions closely from ten to forty times. After every ten chances to learn from seeing him, they were put into the same inclosure and observed carefully, in order to see whether they would, from having so often seen the act done, know enough to do it themselves, or at least to try to do it. In this they signally failed. Those who had failed previously to hit upon the thing accidentally never learned it later from seeing it done. Those who were given a chance to imitate acts which accident would sooner or later have taught them learned the acts no more quickly than if they had never seen the other animal do it

the score or more of times. The animals, that is, could not master the simple inference that if, in a certain situation, that fellow-cat of mine performs a certain act and gets fish, I, in the same situation, may get fish by performing that act. They did not think enough to profit by the observation of their fellows, no matter how many chances for such observation were given them.

Equally corroborative of our first position are the results of still another set of experiments. Here the dogs and cats were put through the proper movement from twenty-five to one hundred times, being left in the box after every five or ten trials and watched to see if they would not be able at least to realize that the act which they had just been made to do and which had resulted in liberation and food was the proper act to be done. For instance, a dog would be put in a box the door of which would fall open when a loop of string hanging outside the box was clawed down an inch or so. Animals were taken who had, when left to themselves, failed to be led to this particular act by their general instinctive activities. After two minutes I would put in my arm, take the dog's paw, hold it out between the bars, and, inserting it in the loop, pull the loop down. The dog would of course then go out and eat the bit of meat. After repeating this ten times (in some cases five) I would put the dog in and leave him to his own devices. If, as was always the case, he failed in ten or twenty minutes to profit by my teaching I would take him out, but would not feed him. After a half hour or so I would recommence my attempts to show the dog what needed to be done. This would be kept up for two or three days, until he had shown his utter inability to get the notion of doing for himself what he had been made to do a hundred or more times. The mental process required here need not be so high a one as inference or reasoning, but surely any animal possessing those would, after seeing and feeling his paw pull a loop down a hundred times with such good results, have known enough to do it himself. None of my animals did know enough. Those who did not in ten or twelve trials hit upon an act by accident could never be taught that act by being put through it. And, as in the case of imitation, acts of such a sort as would be surely learned by virtue of accidental success were not learned a whit sooner or more easily when I thus showed them to the animal.

An interesting supplement to these facts is found in the following answers to some questions which I sent to the trainer of one of the most remarkable

trick-performing horses now exhibited on the stage. The counting tricks done by this horse had been quoted to me by a friend as impossible of explanation unless the horse could be educated by being put through the right number of movements in connection with the different signals.

Question 1.—If you wished to teach a horse to tap seven times with his hoof when you asked him "How many days are there in a week?" would you teach him by taking his leg and making him go through the motions?

Answer.—"No!"

Question 2.—Do you think you *could* teach him that way, even if naturally you would take some other way?

Answer.—"I do not think I could."

Question 3.—How would you teach him?

Answer.—"You put figure 2 on the blackboard and *touch him, on the leg* twice with a cane, and so on."

The counting tricks of trained horses seem to us marvelous because we are not acquainted with the simple but important fact that a horse instinctively raises his hoof when one pricks or taps his leg in a certain place. Just as once given, the cat's instinct to claw, squeeze, etc., you can readily get a cat to open doors by working latches or turning buttons, so, once given this simple reflex of raising the hoof, you can, by ingenuity and patience, get a horse to do almost any number of counting tricks.

Probably any one who still feels confident that animals reason will not be shaken by any further evidence. Still, it will pay any one who cares to make scientific his notions about animal consciousness to notice the results of two sets of experiments not yet mentioned. The first set was concerned with the way animals learn to perform a compound act. Boxes were arranged so that two or three different things had to be done before the door would fall open. For instance, in one case the cat or dog had to step on a platform, reach up between the bars over the top of the box and claw down a string running across them, and finally push its paw out beside the door to claw down a bar which held it.

The animal's instinctive impulses do often lead it to accidentally perform these several acts one after another, and repeated accidental successes do in some of these cases cause the acts to be done at last in fairly quick succession. But we see clearly that the acts are not thought about or done with anything like a rational comprehension of the situation, for the time taken to learn the thing is much longer than all three elements would take if tackled separately; and even after the animal has reached a minimum time in doing the acts, he does not do the things in the same order, and often repeats one of the acts over and over again, though it has already attained its end.

The second set comprised experiments on the so-called "memory" of animals. I will describe only one out of many which agree with it. A kitten had been trained to the habit of climbing the wire-netting front of its cage whenever I approached. I then trained her to climb up at the words "I must feed those cats." This was done by uttering them and then in ten seconds going up to the cage and holding a bit of fish to her at its top. After this had been done about forty times she reached a point where she would climb up at the signal about fifty per cent of the times. I then introduced a new element by sometimes saying, "I must feed those cats," as before, and feeding her, and at other times saying, "I will not feed them," and remaining still in my chair. At first the kitten felt no difference, and would climb up just as often at the wrong signal as at the right. But gradually (it took about four hundred and fifty trials) the failure to get any pleasure from the act of climbing up at the wrong signal stamped out the impulse to do so, while the pleasure sequent upon the act of climbing up at the other signal made that her invariable response to it. Here, as elsewhere, the absence of reason was shown by the cat's failure at any point in these hundreds of trials to think about the matter, and make the easy inference that one set of sounds meant food, while the other did not. But still better proof appears in what is to follow. After an interval of eighty days I tried her again to see how permanent the association between the signal and act was. It was permanent to the extent that what took three hundred and eighty trials before took only fifty this time, for after fifty trials with the "I will not feed them" signal, mixed up with a lot of the other, the cat once more attained perfect discrimination. But it was not permanent in the sense that the cat at the first or tenth or twentieth trial felt, as a remembering, reasoning consciousness

surely ought to feel, "Why, that lot of sounds means that he won't come up with fish." For instead of at first forgetting and for a while climbing up at the *I will not feed them*, and then remembering its previous experience and at once stopping the performance it had before learned was useless, the cat simply went through the same gradual decreasing of the percentage of wrong responses until finally it always responded rightly.

What has so far been said is true regardless of any prejudice or incompetence on my part, for the proof in all cases rests not on my observation, but on impartial time records or such matters of fact as the escape or nonescape, the climbing or not-climbing of the animals. I may add that in a life among these animals of six months for from four to eight hours a day I never saw any acts which even *seemed* to show reasoning powers, and did see numerous acts unmentioned here which pointed clearly to their absence.

All that is left for the fond owner of a supposedly rational animal to say is that though the average animal, the typical dog or cat, is by these experiments shown to be devoid of reasoning power, yet *his* dog or *her* cat is far above the average level, and is therefore to be judged by itself. He may claim that just because my average animals failed to infer, we have no right to deny inference to all, particularly to his. Is it not fair to ask such a one to repeat my experiments with his supposedly superior animal? Until he does and systematically tries to find out how its mind works and what it is capable of, has he any right to bear witness? It may also be said that of the number of people who witnessed the performances of my animals after they had fully learned a lot of these acts, but had not seen the method of acquisition, all unanimously wondered at their wonderful intellectual powers. "How *do* you teach them?" "Where did you get such bright animals?" "I always thought animals could think," and such like were common expressions of my visitors. The fact was that the dogs and cats were picked up in the street at random, and that no one of them had thought out one jot or tittle of the things he had learned to do. The specious appearance of reasoning in a completely formed habit does not involve the presence or assistance of reasoning in the formation of the habit.

Here, at the close of this account, I may signify my willingness to reply, so far as is possible, to any letters from readers of the Popular Science

Monthly who may care to ask questions about any feature of animal intelligence.

In a discussion of the question "How Education fails," Dr. J. T. Searcy, of Tuscaloosa, Alabama, speaks of the tendency of too much education as being to make the pupil too machine-cut. "The successful, the progressive, the aggressive men, families, and races are not the manufactured ones, but the self-made ones." In the conditions and complexities of human society, the accumulating data of knowledge change so rapidly that educators can not anticipate the future in the elements and curricula of prescribed education. The advancing man, who is able to keep up in his day and generation, shows his excellence in his ability to readjust to his changing environment. The schools can not give this faculty, but rather have a tendency to weaken it; yet on it, more than anything else, rests the success of the man and the race. "Too much ought not to be demanded of the schools, nor ought they to assume too much to themselves."

THE UNITED STATES NATIONAL MUSEUM.

By Hon. CHARLES D. WALCOTT,

DIRECTOR OF THE UNITED STATES GEOLOGICAL SURVEY.

A national museum should be the center of scientific activity in the country in which it is located. In England the British Museum is the Mecca of scientific men. In Paris, Copenhagen, Vienna, Berlin, and other capitals of Europe the national museum stands in similar relations to the scientific work of its own country. Such a relation our National Museum should hold to scientific men and affairs in America. It should receive and take care of all material that has been or may be valuable for investigation or for the illustration of the ethnology, natural history, geology, products, and resources of our own country, or for comparison with the material of other countries. It should furnish material for all kinds of scientific investigations which deal with specimens or types, and give aid to such researches and publish their results. It should present by illustration such of the results of the scientific investigations of its corps of officers as are susceptible of such representation. It should co-operate with all the higher educational institutions of learning in the country, and assist in the promotion and diffusion of knowledge in all lines of investigation carried on by it. It should provide library facilities, and aid all post-graduate students who may wish to take advantage of the provisions made by the Government for scientific research.

History and Present Organization.—Beginning in a small way in the Patent-Office building early in the century, the "Government" collections of "natural products" were transferred to the custody of the Smithsonian Institution in 1858, where they were installed along with the larger and more valuable collections of the institution. Twenty-three years later, in 1881, the present National Museum building was ready for the great mass of material that had accumulated in the Smithsonian building, and had been transferred from the Centennial Exhibition at Philadelphia. Out of these heterogeneous collections Dr. G. Brown Goode, under the direction of

Secretary Baird, of the Smithsonian, organized a museum of broad scope, based on all that had proved best in museum experience to that time. Faithfully he carried forward the work until September, 1896, when his health broke under the strain of too many duties, and one of the best museum administrators the world has yet produced, if not the very best one, passed from us. In January, 1897, I was placed in temporary charge of the administration of the museum as an acting Assistant Secretary of the Smithsonian Institution, and remained in charge until July 1, 1898.

On July 1, 1897, in order to meet changed conditions, a new plan of organization went into effect. The various divisions and sections of anthropology, biology, and geology, which had previously been conducted independently of one another, the curators and custodians reporting directly to the assistant secretary in charge of the museum, were united under three head curators—one of anthropology, another of biology, and a third of geology. This secured direct expert supervision, and correlated the work of each department. Before this such correlation had been impossible, owing to the large number of independent heads of sections and divisions in each department, who planned and executed the work more or less independently of one another.

In the department of anthropology the system of installation inaugurated by Prof. W. H. Holmes is somewhat elaborate. The primary arrangement is founded, first, on the geographical or ethnographical assemblage, and, second, on the developmental or genetic assemblage. Other methods may be classed as special; they are the chronologic, the comparative, the individual, etc. The primary methods are adapted to the presentation of the general truths of anthropology, and the special methods are available for limited portions of the field.

In many ways the department of biology, under the charge of Dr. F. W. True, was, at the date named, in much better condition than either of the other two departments. Many of the zoölogical divisions had been in existence since the reorganization of the museum in 1883, and several of them for a much longer period, and as the biological specimens had been in charge of curators and assistants who followed well-defined and long-established methods, the reorganization of the department was a relatively simple

matter, no radical changes in the scientific methods or in the business administration being required.

To the organization and administration of the department of geology, Dr. George P. Merrill brought the results of a recent study of various European museums. He found it necessary to make a systematic examination of the written and printed records of the various Government exploring expeditions and surveys, with a view to ascertaining what geological material had been collected which could properly be considered the property of the Government, and what disposition had been made of the same. The law[8] provides that collections made for the Government shall, when no longer needed for investigations in progress, be deposited in the National Museum. It was found that this law had not in all cases been strictly enforced, and that several important collections had not been transferred to the museum, although some of the earlier exploring expeditions had passed out of existence, and in several instances the individuals making the collections had likewise passed away. This investigation has resulted in the transfer to the museum of several car loads of specimens no longer needed elsewhere.

The National Museum is unique among permanent museums in having large sections of its collections almost constantly away from it. It made displays at London in 1883, at Louisville in 1884, at Minneapolis in 1887, at Cincinnati and Marietta in 1888, at Madrid in 1892, at Chicago in 1893, at Atlanta in 1895, at Nashville in 1896, and at Omaha in 1898. The injury to the museum resulting from the packing and transportation of specimens and from the interruption of systematic work and development has been keenly felt at times by the scientific staff. The advantages have consisted in showing to the people of many sections of the country what the museum is doing, in securing collections that otherwise would not have been obtained, and in extending the educational sphere of influence.

Relations to the Smithsonian Institution.—The museum is a child that has by its vigorous growth already overshadowed the parent institution in the extent of its buildings, its expenditures, and its direct influence upon the people of the United States. In the larger fields for which the Smithsonian Institution was organized, for the purpose of increasing and diffusing knowledge among men throughout the world, the museum is subordinate to

the institution, and if the latter is administered in the future as it has been in the past, it will continue to hold a unique place among all institutions for the increase and diffusion of knowledge.

In 1877 Prof. Asa Gray, as chairman of a special committee of the Regents of the Smithsonian, submitted a report which recommended that a distinction between the institution itself and the museum under its charge should be made as prominent as possible. The fear was expressed that if the museum was developed to its full extent and importance within the Smithsonian Institution it would absorb the working energies of the institution, and it was thought that such a differentiation would pave the way to entire separation of administration or to some other adjustment, as the Board of Regents might think best or be able to accomplish. Professor Baird, in 1878, in his report to the regents, called attention to the frequent mention in the reports of his predecessor of the relations existing between the Smithsonian Institution and the National Museum, and remarked that "it is only necessary to mention briefly that the museum constitutes no organic part of the institution, and that, whenever Congress so directs, it may be transferred to any designated supervision without affecting the general plans and operations connected with the 'increase and diffusion of knowledge among men.'"

During the administration of the museum by Dr. Goode, under the direction of Professor Baird, and later Professor Langley, no movement was made toward the separation of the museum from the Smithsonian. On the contrary, Dr. Goode was strongly opposed to any such action, and in this he was heartily supported by Secretary Langley. He felt that the result of placing the museum under the control of one of the great departments of the Government, or leaving it to be buffeted about in the sea of politics as an independent organization, would be the destruction of its scientific character.

I have been intimately acquainted with the administration of the museum since 1886, and less so with the administration of other scientific bureaus of the Government, one of which, the Fish Commission, is independent of departmental control. After a careful reconsideration of the subject of the relations of the National Museum to the Smithsonian Institution, I have come to the conclusion that the present welfare and the future development

of the museum will be best served by administrative connection with the Smithsonian Institution. Under the present organization there is no necessity for large demand upon the time and energies of the secretary by the affairs of the museum. If in the future it should become otherwise, relief could readily be secured by action of the Board of Regents, requiring the officer in charge of the museum to report to them through the secretary, much as the various bureaus of the departments report through their respective secretaries to Congress. It is not probable, however, that this will become necessary, for at any time an assistant secretary could be appointed to take sole charge of the museum, thus relieving the secretary of all but the most general administrative supervision.

Relations to a National University.—A national museum should radiate an educational influence to the remotest portions of the country. It should set the standard for all other museums, whether in public school, academy, college, university, or the larger museums under municipal and State control. Its influence should be exercised largely through its publications and through those who come to study its collections and the methods of work of the investigators connected directly or indirectly with its scientific staff. In its library system the student should have access to the literature bearing upon the subjects with which the museum is concerned. In its exhibition halls each object should be labeled and arranged with the view of presenting, by graphic illustration and concise description, all that it is capable of teaching, either as a discrete object or as one of a series of objects telling the story of the evolution of the group to which it belongs. Such a museum is not a place where the uninformed student may obtain the elements of a university training; it is an institution where the post-graduate student can secure access to material for study and research in connection with men who are carrying forward scientific work of the highest type. Dr. D. C. Gilman would go further than this. He says:[9]

"Any person of either sex, from any place, of whatever age, without any question as to his previous academic degree, should be admissible; provided, however, that he demonstrate his fitness to the satisfaction of the leader in the subject of his predilection."

Dr. Gilman thinks that such an organization "may be developed more readily around the Smithsonian Institution, with less friction, less expense,

less peril, and with the prospect of more permanent and widespread advantages to the country, than by a dozen denominational seminaries or one colossal university of the United States.

"To the special opportunities that the Smithsonian and its affiliations could offer, every university, at a distance or near by, might be glad to send its most promising students for a residence of weeks, months, or years, never losing control of them. Many other persons, disconnected with universities, but proficient to a considerable degree in one study or another, would also resort with pleasure and gratitude, and with prospect of great advantages, to the rare opportunities which Washington affords for study and investigation in history, political science, literature, ethnology, anthropology, medicine, agriculture, meteorology, geology, geodesy, and astronomy."

I fully agree with him, but would make the National Museum the center of activity, rather than the Smithsonian Institution. It would then be under the control of the Board of Regents, through the secretary or the assistant secretary, who could have direct charge. It seems to me that the function of the Smithsonian Institution is to aid at the beginning of such a movement, and then place the administration in charge of one of its bureaus or transfer it to some other suitable organization.

With the National Museum as a center or base, the student in Washington may avail himself of the Library of Congress and of the facilities offered for study and investigation by the various scientific bureaus of the Government, such as the Fish Commission, the Zoölogical Park, the Geological and Coast and Geodetic Surveys, the Naval Observatory, and the Weather, Botanical, Biological, and Entomological Bureaus of the Department of Agriculture, and systematic courses of lectures will place before him the most advanced ideas and conclusions of the largest body of scientific investigators in the world.

A single well-trained man, with a few assistants, could render invaluable aid to hundreds of post-graduate and special students, whose only need is direction as to the best means of pursuing studies and investigations. Such an organization could be located in the administrative building that it has been proposed to erect as a nucleus of the National University. From this beginning a national university of the broadest type could be developed

with as much rapidity as the educational interests of the country might demand.

The National Museum can not at present give facilities to more than a score of students, but with the erection of a modern museum building, well equipped with laboratory space and a suitable staff to conduct the necessary work of installation and investigation, the scientific side of the National University would be established. It should be remembered that many of the officers of the scientific bureaus of the Government are directly connected with the museum staff as honorary curators and custodians, and that a number of them have laboratories within the museum building.

NEED OF A NEW BUILDING.—The growth of the United States National Museum was rapid under the successful administration of Dr. Goode. When the character of the building and the funds available for the maintenance of the museum are considered, it compares favorably with any modern museum. It has received large collections from the scientific departments of the Government, by private contribution, by purchase, and by exchange, which have been accommodated as well as possible in the inadequate laboratories, storerooms, and exhibition spaces. During the fiscal year 1897-'98, accessions to the number of 1,441 were received, containing upward of 450,000 specimens—the largest number for any one year since the museum was opened. The total number of specimens recorded to July 1, 1898, exceeds four million. The galleries just completed have added sixteen thousand square feet of floor space, which is available for the spreading out and proper exhibition of material that has previously been crowded in the exhibition halls and courts on the floor; but, as an illustration of the present congested conditions, it may be stated that the anthropological collections now in the possession of the Government, illustrating the development and progress of man and his works, if properly placed on exhibition, would occupy the entire space in the present museum building. The great collections in biology, botany, economic geology, general geology, and paleontology should be placed in a building properly constructed for their study and exhibition. A considerable portion of the collections are still in the Smithsonian building, where the crowding is scarcely less than in the museum building.

Moreover, in the present building there is great deficiency in laboratory facilities. Curators and assistants are hampered for want of room in which to lay out, arrange, classify, mount, and label specimens. There should also be rooms in which students could bring together and compare various series of objects, and have at hand books and scientific apparatus. The present museum building contains a few rooms suitable for the purposes mentioned, but the majority have to be used as storerooms, laboratories, and offices, and are therefore too much crowded to serve in any one of these capacities. Owing to the pressure for space, courts, halls, and galleries intended for exhibition purposes, both in the Smithsonian building and in the museum building, are unavoidably occupied to a considerable extent as laboratories and storerooms. There is also need of storage room, an increase of the scientific staff, and a purchasing and collecting fund. The American Museum of Natural History expends annually $60,000 for the increase of its collections; the National Museum has from $3,000 to $4,000 for the purpose.

The immediate and greatest need, however, is a suitable museum building. The present building is 375 feet square. The space on the ground floor is 140,625 square feet, and that in the galleries 16,000 square feet; exhibition space, 96,000 square feet. The entire cost is $315,400.

For comparison with the above figures, the following statistics relating to the American Museum of Natural History in New York are given: Total floor space, 294,000 square feet, divided as follows: Exhibition space, 196,000 square feet; laboratories, library, etc., 42,500 square feet; workrooms, storage, etc., 42,000 square feet; lecture hall, 13,500 square feet. These figures include the portions of the building now being completed. The total cost of the museum to date, including the completion of the new wings, is $3,559,470.15. The buildings, and the care of them, are provided for by the city of New York. The expenses of the scientific staff, increase of collections, etc. (the income for which for the present year is approximately $185,000), are defrayed from endowments, membership fees, and contributions. In the capitals of Europe, museum buildings are generously provided for.

The National Museum building was erected with the view of covering the largest amount of space with the least outlay of money. In this respect it

may be considered a success. It is, in fact, scarcely more than the shadow of such a massive, dignified, and well-finished building as should be the home of the great national collections. There is needed at once a spacious, absolutely fireproof building of several stories, constructed of durable materials, well lighted, modern in equipment, and on such a plan that it can be added to as occasion arises in the future. The site for such a building is already owned by the Government; only the building needs to be provided for. What the Capitol building is to the nation, the library building to the National Library, the Smithsonian building to the Smithsonian Institution, the new museum building should be to the National Museum. There should be available:

	Sq. ft.
Department of biology	190,000
Department of geology	83,000
Special laboratories for students	5,000
Rough storage, workshops, etc.	20,000
Lecture hall	6,000
Total	304,000
Present museum space to be devoted to the department of anthropology	96,000
Grand total	400,000

FUTURE DEVELOPMENT.—With suitable buildings provided, the immediate development of the National Museum naturally lies in four directions: (1) The occupation of the present building by the anthropological collections; (2) the housing, developing, and installing of the large biological collections; (3) the development of a great museum of practical geology; and (4) the development of the scientific side of a National University.

1. The collections in anthropology, as they stand to-day, cover a wide field in a broken and disconnected way. It is difficult to use them effectively to illustrate the great features of this branch of science. They do not present a connected story of the peoples and cultures of the world. This arises from the gaps in the collections and the absence of suitable laboratory and

exhibition space. This department should have adequate representations of the American peoples and their culture, not only of our own country, but of the whole American continent. Our nation is the only one in America that can reasonably be expected to do anything of importance toward the preservation of the materials necessary for the illustration of this vast field; and as the American race is a unit, of which the tribes in our own territory constitute a considerable part, it appears to be our duty to take up this work in a comprehensive way. Thus would be built up not only a National Museum, but an American Museum in the widest sense. This applies not only to anthropology, but to the other great departments of the museum. It will be impossible to carry on such a work without turning over to the Department of Anthropology the entire present building, with all its laboratory and exhibition space.

2. The Department of Biology now occupies a large exhibition space in the Smithsonian building and 55,000 square feet in the museum building. Large collections are stored in laboratories and inclosed spaces in the exhibition halls which would be placed on exhibition if space were available. As has already been explained, in a new building there should be available for the Department of Biology 190,000 square feet of exhibition, laboratory, and storage space.

The present exhibit is more complete than that of the other departments of the museum. Of birds there is a large mounted series, one of the finest in existence, but it is so indifferently housed that it fails to make the impression it should. Of mammals there is a good North American series, and there are some excellent examples of exotic species. There is a good and rather large exhibit of the various groups of the lower forms of animals, including an especially fine series of corals and sponges. These are the only series at present exhibited which can be considered at all comprehensive. Of the great groups of fishes, reptiles, and amphibians there is room only for an outline representation. The wonderful variety of form among insects can be scarcely more than suggested in the space available. Of plants there has hitherto been no exhibit worthy of the name, and the space which it has now been possible to set aside is entirely out of proportion to the vast extent and importance of this great kingdom of Nature.

Every natural-history museum of the first class should have at least two comprehensive exhibition series. The first, the *Systematic Series*, is a series representing the natural groups, among which all animals and plants, from the highest to the lowest, are divided. The second, the *Faunal and Floral Series*, is a series showing the animals and plants characteristic of each of the grand divisions of the earth's surface, which naturalists have established as a result of their study of these two kingdoms of Nature. These two great comprehensive exhibits should be supplemented by a number of *Special Series*, illustrating the more interesting phenomena and phases of life, such as the macroscopic and microscopic structure of animals and plants and their development from the germ to the fully adult individual, and special modifications of form and color by which animals are protected from their enemies; the adaptations for peculiar environments and modes of life; the characteristics of youth, maturity, and old age; the variation in form, size, and color among individuals of the same species; the domiciles and other works constructed by birds, mammals, insects, and the like. To these series should be added another of great importance, the *Economic Series*, representing the animals and plants as related to the activities and needs of man. Any one of these principal series in its full development would more than fill the entire space now available.

3. There should be developed a museum of practical geology in the broadest sense, which will be of service to every producer and consumer of American mineral products, and to all students of geology who are engaged in either economic or purely scientific investigations.

In addition to the series of rocks and fossils illustrating the stratigraphy and succession of the sedimentary rocks and the systematic collection of minerals and ores, an exhibit showing how geologic work benefits the daily life of the people should be developed. An illustration of this would be a representation of the artesian-water supply of the semi-arid region, showing the stratification and structure of the sedimentary rocks, and how hydrographic and geologic investigations clearly indicate the regions in which artesian-water development may be carried on successfully. Mining and areal geology could also be illustrated in such manner as to place before the student and intelligent observer the import and value of such work.

In most museums the principal effort has been to make a collection of useful mineral products. This is desirable, but, from the broad view of illustrating the practical in addition to the scientific side of geology, it should be secondary. The best basis for classification on the practical side of the museum exhibit appears to be the finished mineral product. For instance, if pig iron be taken as a key material in classification, the iron ores from which it has been obtained should be arranged so as to show the various kinds whose combination has resulted in the pig iron. In connection with this should be grouped the geologic phenomena, which should include any geologic conditions connected with the original deposition and the occurrence of iron ores. This might include the conditions which have led to the oxidation of pyrite and other sulphur compounds of iron, and to the development of hydrous oxides of iron; also an illustration of what has been demonstrated in regard to the solution of widely distributed minerals in certain rocks, and their subsequent concentration in ore bodies by metasomatic action. All the metals could be arranged under such a classification, as also the nonmetallic products. The preparation of such an exhibit would require many years of work, the details of which would be considered as each mineral product was taken in hand.

4. The fourth direction of development is toward the requirements of a National University, which has already been sufficiently dwelt upon in this connection.

CHILDREN'S MUSEUM.—The children gain a fair amount of information from the general exhibit in any well-arranged museum, but it is desirable that their interest should be aroused by having certain exhibits made expressly for them. I would have a space set aside in each of the three departments in which nothing should be exhibited except for the children. It might be called a Museum Kindergarten.

Some of the preceding suggestions have been adopted by the museum authorities and partially put into execution, and the carrying of them out is dependent upon enlarged facilities for laboratory work and exhibition space. During the administration of Dr. Goode the museum developed as far as possible under the conditions surrounding it. No one knew better than he that only by securing new buildings and expanding the museum could it take the place in America that the several national museums of Europe have

taken in their respective countries. It is well recognized that a public museum is a necessity in every highly civilized community, and that, as has been so well stated by Dr. Goode, "the degree of civilization which any nation, city, or province has attained is best shown by the character of its public museums and the liberality with which they are maintained." At present New York city is, in this respect, in advance of all other American cities and of the national Government. Whether the latter will take its proper place by developing the National Museum as it has developed the National Library remains to be seen. The question whether they are willing to be represented by the museum as it is to-day is one that the American people should consider and decide at an early date; meantime, it is the duty of all interested in the advancement of science and education to aid by every means in their power the development of a National Museum that will be truly national and American.

ARE JEWS JEWS?

By JOSEPH JACOBS,

PRESIDENT OF THE JEWISH HISTORICAL SOCIETY.

In the December (1898) and January (1899) numbers of Appletons' Popular Science Monthly Prof. William Z. Ripley concludes the remarkable series of articles on the Racial Geography of Europe, originally delivered as Lowell Institute lectures, by a couple of articles on the Jews. Strictly speaking, the articles might seem to have no right in the particular series in which Professor Ripley has included them, since their main object is to show that the Jews are not a race but a people, and have therefore no claim to be considered in the racial geography of any continent. But one can not regret that a daring disregard for logic has caused Professor Ripley to conclude his interesting series with the somewhat startling paradox that Jews are not Jews, in the sense of the word in which both their friends and their enemies have hitherto taken it. As Professor Ripley has been good enough to refer to me as having written with some authority on the subject, and as I have not been convinced by his arguments against the comparative racial purity of the Jews, I am glad of an opportunity to discuss the question, which is of equal theoretic and practical interest.

The theoretic interest, with which alone we need concern ourselves here, seems to me of two kinds. Professor Ripley, as a student of anthropology, declares, as the result of his inquiries, that there has been so large an admixture of round skulls with the (hypothetically assumed) original long skulls of the Hebrews that all signs of racial unity have disappeared. I, on the other hand, who have approached the subject as a student of history,[10] see no evidence of any such large admixture of alien elements in the race since its dispersion from Palestine, and have come, therefore, to the opposite conclusion—that the Jews now living are, to all intents and purposes, exclusively the direct descendants of the Diaspora. Here, then, anthropology and history—if Professor Ripley and I have respectively interpreted their verdicts aright—appear to speak in two opposite senses,

and no conference at La Hague or elsewhere can appoint a court of appeal which can decide between contrary propositions by two different sciences.

But the point in discussion seems to me to raise also a problem of exceeding interest within the anthropological sphere itself. Professor Ripley assumes that round heads beget round heads, and long heads descend from long heads for all time unchanged. That appears to carry with it the assumption that no amount of brain activity can increase the mass of brain, that skull capacity has no relation to mental capacity, and that alone among the organs of the body the brain and skull are incapable of growth, change, or development. The *crux* of Jewish anthropology raises this problem, as I shall proceed to show, and, if I have interpreted history aright, offers valuable material toward its solution.

I might have met Professor Ripley's arguments on narrower grounds, which would have enabled me to evade this larger question. His main, I might say his solitary, argument is that contemporary Jews are predominantly brachycephalic, or round-headed, whereas contemporary Arabs, whom he takes as the type of the Semites, are as predominantly dolichocephalic, or long-headed. Accepting Professor Ripley's own criterion of purity of race, I might point to the almost universal round-headedness of the Jew as a proof of their racial unity. The fact that Arabs do not share that quality really does not affect the question. Linguistically and geographically the Hebrews of history were associated with the Aramæans and Assyrians of Asia Minor, and Professor Ripley himself allows that Asia Minor was mainly brachycephalic. Till Professor Ripley brings forward craniological evidence that the cephalic index of the ancient Hebrews was below 77.8, his reference to the contemporary Arab must be ruled out of court. But, quite apart from this, the Arabic evidence would be of little significance, since the chief characteristic of Moslem civilization has been the predominance of marriage by capture and descent from slave concubines. Every caravan that has entered Arabia for the last twelve hundred years has had its contingent of female slaves of alien race, mainly from dolichocephalic Africa. I must confess my surprise that Professor Ripley has based his main argument on the shifting sands of Arabic racial purity.

The only attempt Professor Ripley makes toward a proof that the pure Hebrew is dolichocephalic is a half-hearted endeavor to claim that quality

for the Sephardim, or Spanish and Portuguese Jews, descended in the main from Jewish refugees from Spain and Portugal in 1492. As a matter of fact, the largest number of measurements of Sephardic heads has been made by Mr. Spielman and myself,[11] and of the fifty-one heads examined by us only eight were long-headed. Professor Ripley gives a portrait of a Tunisian Jew, with index 75, who is also probably of Sephardic origin, like most of the Jews of the Mediterranean littoral. But, curiously enough, there is far more evidence for the mixture of race among contemporary Sephardim than of any other branch of Jews. Even while they were living in Spain as avowed Jews they were persistently accused of intermarriage, chiefly with the Moors, while a large number of contemporary Sephardim are descended not from refugees of 1492, but from the so-called Marranos—Jews who remained in Spain, professing Christianity and marrying tolerably freely among the surrounding population. If one wished to be hypercritical, one could trace the long-headedness of a minority of Jews to this admixture of race from Spain.

After all, I must insist that it is to history one must go to determine a question of this sort. Jews have shown such marked individuality throughout their career for the last two thousand years among the nations—they have been so much in the world's eye throughout that time—that any appreciable degree of intermarriage would not have escaped notice, both by themselves and by their enemies. Now there is practically no evidence of this kind during the Christian era. Religious antipathy has been so strong throughout that period as to form an almost insurmountable barrier to intermarriage and the consequent proselytism to Judaism which is necessary for a valid Jewish marriage. Sporadic cases doubtless occur, but their very infrequency drew attention to them, and all that historical research can discover is under one hundred cases throughout the middle ages, scattered through Europe. Jewish nomenclature has special formulæ to name the proselyte, and yet, though we have hundreds of the mediæval lists of Jewish communities and martyrologies, it is the rarest thing in the world to find one of these names referred to as "sons (or daughters) of Abraham our father." In earlier days, doctors of the Talmud, when discussing hypothetical cases, dismissed that of the proselyte as being so rare.[12] In my Memoir in the Journal of the Anthropological Institute for 1885 I have taken the marriage statistics of modern Algeria as most nearly representing the most

favorable conditions that one could imagine at any time during the middle ages, and have found that during nearly half a century (1830-'77) there were only thirty mixed marriages out of an average population of twenty-five thousand Jews—not one a year. The only instances of proselytism on a large scale are those of the Chozars in southern Russia, converted to Judaism in the eighth century, and the Falashas of Abyssinia, about the same time. Yet these are an indirect proof, by the method of difference, of the comparatively pure descent of the rest of the Jews, for neither the Karaites, who are the descendants of the Chozars, nor the Falashas show any of the characteristic Jewish features or expression.

Those who contest the purity of the Jewish race lay great stress upon the Chozars as forming the nucleus of the Russian Polish Jews, who are, as is well known, a predominant majority among present-day Jews, probably ninety per cent of whom either dwell in the Russian dominions or are descended from former inhabitants of old Poland. Yet against this is the absence of any reference to Jews in Poland during the time the Chozars flourished (eighth to eleventh centuries), while the very speech of the Polish Jews—the so-called "Yiddish," really archaic German mixed with Hebrew —indicates their true source, the German kingdoms and principalities. Professor Ripley throws some doubt upon the possibility of such large numbers as those of the Polish Jews having been derived from Germany. Nowadays there are probably five millions of Jews in the regions once possessed by Poland, but the remarkable fertility of Jews is one of the most striking characteristics of their vital statistics, to which, indeed, Professor Ripley has called attention in his remarks upon their vitality. The development of a generation depends, as is well known, upon the relative number of deaths under five years of age, and it is just at this period that Jewish mortality presents so favorable an aspect, owing to the care of Jewish mothers and the absence of alcoholism among the fathers. I have estimated that the Jewish population of the world in 1730 (six generations ago) was only 1,300,000, whereas at the present moment it is at least nine times as much. If one could assume the same rate of progress to have existed through the middle ages the Jewish population in the fourteenth century would have been not much more than 25,000. Such a rate of progress is, however, extremely unlikely, considering the large losses by persecution, which in Poland alone, during the disastrous Cossack inroads

between 1648 and 1656, is said to have removed no less than 180,000 Jews. But, making every allowance for this disturbance in the rate of progress, it would have been quite possible for 50,000 Jews who had migrated to Poland in the thirteenth and fourteenth centuries to increase to over half a million at the beginning of the eighteenth. Americans, who have seen nearly half a million Russian Jews land upon their shores within the last twenty years after crossing nearly half the world, need not be incredulous as to the possibility of one tenth of that number passing over the borders between Germany and Poland in a couple of centuries during the middle ages, when, if means of transit were less numerous, intensity of persecution and motives for emigration were ten times as strong as even under the iron rule of the Russian Czar.

History, then, as I read it, has nothing to say against the purity of descent of contemporary Jews from those of the Bible. What has anthropology, as interpreted by Professor Ripley, to produce against this negative evidence of history? Mainly, it would appear, the fact that Jews of the present day are predominantly brachycephalic. Of the fact there can be little doubt. The list given by Professor Ripley in the Popular Science Monthly (vol. liv, page 340), of over twenty-five hundred heads, would be sufficient to establish this. But the very uniformity of the index is almost sufficient by itself to refute the deduction Professor Ripley draws from it. If there had been any general amount of admixture, that would have tended rather to produce variety than uniformity. Surely Professor Ripley does not contend that the Jewish young men and maidens, who, on his theory, so freely welcomed outsiders into the family circle, have never fallen in love with long-headed persons of the opposite sex. His argument requires that the original Jews of the Diaspora were long-headed, and that they have uniformly intermarried with the broad-headed varieties of the genus *homo*. Now, he adduces no evidence whatever that Jews originally were dolichocephalic, and even if he succeeded in proving this he would have the further difficulty of finding a European race with skulls so broad as to raise the average index of the race considerably over 80. If we assume that the original index of the Jewish skull was 75, Professor Ripley would have to find some race with an average index of nearly 90 before the mixture would raise the contemporary Jewish skull to its present broad-headedness. Dr. Ammon has shown[13] that

there are only two small regions in Europe where such abnormally broad skulls exist, neither of them centers of Jewish population.

But Dr. Ammon has shown more. By comparison with the skulls found in the long barrows in Germany, he shows that the index of German skulls has risen from 77 to no less than 83 during the last thousand years or so; and he further shows, by reasoning similar to that which I have just given, that this rise in index can not be due to any admixture of race. Now, to what is this rise in head index due? Dr. Ammon, who is a professed disciple of Weismann, does not go into the question of causation, but the simplest and most obvious explanation is that cranial capacity has followed brain development, and that, roughly speaking, brachycephalism implies intellectual development. A few instances may be given, confirming this impression of the superior intellectual capacity of the broad-headed. Prof. Karl Pearson, in his Chances of Death (vol. i, page 205), has given the following sexual ratios of the superiority of English, German, and French men over the opposite sex:

	English.	German.	French.
Brain weight	1.120	1.117	1.125
Skull capacity	1.179	1.126	1.164
Stature	1.081	1.078	1.069

In other words, men's skulls contain about eight per cent more and their brains weigh four per cent more than women's, even allowing for the difference in height. So, too, there is a uniform increase of cubic capacity from the skulls of the Australians (75 cubic centimetres) up to the Teutons (93.5 cubic centimetres).[14] The same authority gives the average weight of brain in a number of brachycephalic individuals as 1,314 grammes, as against 1,287 grammes for dolichocephalic cases.[15] Professor Pearson points out that the higher the caste in India the broader the skull, the Brahmans being highest, with an index of 78.86, according to the measurements of Risley. The same writer gives a long list (page 290) of the indexes of skulls of some thirty-seven races, ranging from Australians at the bottom of the list, with 70.34, and headed by mediæval Jews (only twelve skulls), with an index of 84.74. Every indication seems to point out that in races where progress depends upon brain rather than muscle the brain-box

broadens out as a natural consequence. Little investigation has as yet been made as to the influence of brain development on the form of the skull, but what little has been done all points in the same direction. Dr. Giulio Chiarugi[16] has made some careful measurements of twenty-one brains, and has shown that in every instance there is much greater complexity of the cerebral convolutions in the brachycephalic as compared with the dolichocephalic skulls, in which the brains were contained. From the nature of the sutures of the skull it is tolerably obvious that if brain capacity produces an enlargement of brain, the consequent internal pressure on the skull will be lateral and tend to produce brachycephalism. The application of all this to the case of Jews seems obvious. If they had been forced by persecution to become mainly blacksmiths, one would not have been surprised to find their biceps larger than those of other folk; and similarly, as they have been forced to live by the exercise of their brains, one should not be surprised to find the cubic capacity of their skulls larger than that of their neighbors. When it is remembered that they are, owing to their persecutions, the shortest of all European folk, their relative superiority in brain comes out even more strikingly.

The conclusion I have thus drawn from anthropological data receives remarkable confirmation from the results of an inquiry I made on the Comparative Distribution of Jewish Ability, and contributed to the Anthropological Institute in 1886. Applying the methods of Galton, I compared the celebrities produced by the Jewish race during the last hundred years with those of Englishmen and Scotchmen, and came to the conclusion that the race, as a whole, took rank between Scotchmen and Englishmen in intellectual capacity, while if the comparison had been confined to western Jews, who alone have had an opportunity of displaying their talents, they would have come out superior to both. From the anthropological side we should expect that the brachycephalism of Jews would show itself in superior mental capacity, and this is confirmed by the number of distinguished persons of Jewish blood recorded in the European dictionaries of biography.

The anthropological and sociological importance of this result, if confirmed by further inquiry, seems to me of very great significance for the science of anthropology, and for this reason I have insisted so much upon it. Skull capacity and cephalic index are not so much indications of race as of

intellect. If it is found that, as a rule, each race, and even each people, tends to have a uniform cephalic index, that would merely imply that the sociological conditions of the said race or people were tolerably uniform as regards intellectual development. Australians, who have had no opportunity of pitting their wits against any other competing race, and have depended for their existence on the fleetness of their legs and the capacity of their stomachs to carry food from one orgy to another, have used their brains less than all other human races, and have the narrowest skulls of all. Teutons, who have had the largest sphere for intellectual rivalry with their neighbors, have the broadest skulls of all except the Jews, who have, so to speak, lived by their wits the last two thousand years. The evidence produced by Professor Ripley of long-headed Jews among the lower developed communities only shows that where the brain is not much exercised the skull is not broadened.

So far, then, from history and anthropology giving contrary verdicts with regard to the racial purity of the Jews, the above considerations would seem to show that they rather confirm one another's interpretation of the facts. If brain capacity and skull index follow the intellectual struggle for existence, we should not be surprised to find the Jews mostly broad-headed. If there had been much intermixture with races who had less cause to exercise their brains in the struggle for existence, we might expect a greater admixture of dolichocephalism among them. To my mind a much stronger case could have been made out for the admixture of the Jews by the large number of blondes among them, ranging to about twenty per cent, but, as a rule, in Europe blond types are dolichocephalic, and the evidence of admixture that could be drawn from the admixture of blue eyes or brown hair among the Jews is counterbalanced by that very evidence of their uniform round-headedness, upon which Professor Ripley lays so much stress. In the memoir I have frequently quoted I have given reasons for believing that there was a blond as well as a brunette type among the ancient Jews, and till evidence is shown to the contrary the presence of the fair Jew is only an indication of descent from the earlier blond strain of the race.

Professor Ripley has scarcely taken into account the more positive arguments I have adduced in my memoir for the comparative purity of Jewish descent. I have pointed out a definite class of Jews—the Cohens, or priestly descendants of Aaron—who can not, according to Jewish law,

marry proselytes. These still constitute, I have calculated, some five per cent of Jews even at the present day. He appears to think that this is merely a matter of name, and asks how I would explain the existence of quasi-Jewish names, such as Davis, Harris, Phillips, and Hart, among Christian populations of the Anglo-Saxon world. As a matter of fact, it can be proved that, on the contrary, these names among the Jews have been adopted for "mimicry" reasons from the corresponding Christian names which are mostly derived from the Bible. But, at the best, Professor Ripley's argument would merely prove a certain amount of Jewish blood among the Christian populations of Europe and America, which nobody would deny. That Jews, under the pressure of persecution or for other reasons, have abjured their faith, married Christian wives, and become merged in the surrounding populations, is undoubtedly a fact, but does not in any way affect the relative purity of the "remnant" which has remained true to its faith. It certainly does not affect the very important fact that the ancestry of at least five per cent of Jews at the present day can not have married proselytes, owing to the rigid requirements of Jewish law.

So far as I understand the latter part of Professor Ripley's second article, he appears to contend that the remarkable similarity of the Jewish physiognomy all over the world has no force in proving their racial unity. This is, of course, from the popular point of view, the strongest argument which Professor Ripley has to meet. Speaking generally, one can always tell a Jew or Jewess by the Jewish features and expression. So marked is this that Andrée mentions an instance where the negroes of the Gold Coast even distinguish between other whites and Jews by its means, saying not "Here are three whites coming," but "Here are two whites and a Jew." So marked a community of expression and appearance would be, to an ordinary mind, an absolute proof of unity of race, but Professor Ripley prefers to judge by the skull beneath, rather than by the expression and features on the surface. He hints at some obscure embryological process by which Jewish mothers can stamp on their offspring the Ghetto expression, whatever be the racial formation of skull. According to him, it would appear that noses are more plastic in this regard than skulls. I do not quite see how this would work out in detail. Are we to suppose that a pair of snub-nosed converts to Judaism would produce offspring with the characteristic Jewish nose because the lady convert had her imagination influenced by the hook-noses surrounding

her? Are we to suppose that round heads can only beget round heads, but that snub noses can produce the hooked variety as a mere result of imagination?

Mere expression one could understand could be produced by sociological causes, and it is certainly my impression that Jews who mix more with their fellow-citizens lose a good deal of the characteristic Jewish expression, but that Jewish features should be influenced in this way few people would be prepared to allow. Jewish "nostrility," as I have termed it, and the "Jew's eye," can not be affected by change of environment. They can be affected, I grant, by admixture with races snub-nosed or dull-eyed, but as they have persisted throughout the ages they are themselves a striking proof of the absence of such admixture.

Altogether I remain unconvinced by Professor Ripley's arguments as to any large admixture of alien elements among contemporary Jews as unvouched for by history, and not necessarily postulated by anthropology. The broad skulls of the Jews, if they differ from those of earlier date (of which Professor Ripley has produced no evidence whatever), are due to the development of Jewish capacity, owing to their consistent attention to education and to the conditions under which they have pursued the struggle for existence. The persistence of Jewish features throughout the ages and the existence of an influential minority who are not allowed by Jewish law to marry outside their race is further proof of the position for which I have throughout contended. If there has been a tolerably large admixture of Jewish and alien blood throughout the Christian centuries it has been by conversions to Christianity or Islam, not by adoption of Judaism, and it is confirmed by history that the offspring have wandered away from the Jewish race and have not affected the more conservative remnant.

The significance of this result for the science of anthropology can not be overrated. The great question of the science is that expressed by Dr. Galton as "the struggle between Nature and nurture"—the difference that social influences can produce on men of the same race. Jews afford the science almost the sole instance in which this problem can be studied in its least complex form. My own investigations have shown that social environment has a direct influence on such anthropometrical data as height and breathing capacity. The Jews of the West End of London, though of the same race as

those of the East End, are superior in height and other external qualities, and this superiority can thus be shown to be due entirely to nurture. Similarly, if the argument I have previously adduced is correct, the brachycephalism of the Jew is a proof that intellectual development produces broad heads, and that, roughly speaking, the cephalic index is a key to intellectual capacity. I should rather reverse Professor Ripley's main contentions: breadth of skull is not a criterion of race, but of intellectual development; whereas features, which are not directly influenced by social or intellectual characteristics, are the true index to racial purity.

SOME PRACTICAL PHASES OF MENTAL FATIGUE.

By Prof. M. V. O'SHEA.

I.

Modern studies in neurology have contributed much to our knowledge of the function of the nervous system as a whole and of its several parts, and also of the relation of psychical activity to cerebral conditions and processes. The architecture of the neural mechanism delineated by these investigations is not only interesting in itself on account of the marvelous unity of things apparently diverse, but it is at the same time suggestive respecting its office as the physical instrument through which mind must express itself in this world. Psychologists now quite generally conceive of a living being, human or otherwise, as a reacting organism, receiving impressions from its environment and responding to them in some characteristic manner. To be fitted for this office an individual must be provided with appliances alike for the reception of stimulations and for their transformation into incitements to muscular activity. In the human species Nature has ordained that action need not follow immediately and inevitably upon any sense stimulus; fortunately, it may be deferred, so that when it does finally occur it will be the resultant of any given present impression modified by others previously received and treasured up in memory, as we say. To accomplish this really great feat, Nature had to devise an elaborate contrivance, interposed between incoming messages and outgoing impulses, to act as a moderator or transformer of a very extraordinary and intricate character—the central nervous system, comprising the brain and spinal cord. That it may be able to meet the requirements of its office, this system must be equipped with two principal kinds of apparatus—cells, which will serve as storehouses of energy to be employed in keeping the machinery running, and association fibers or pathways, which will put any one cell into communication with others in the cerebral community.

The item which will engage our attention principally here relates to the primary function of the nerve cell—to store up vital forces in the form of highly unstable chemical compounds,[17] which may upon slight disturbance be broken down, the static energy represented in their union thus becoming dynamic. Those who have given special attention to the matter seem to agree that all activity, physical as well as mental, involves the expenditure of a portion of this energy.[18] It may perhaps be mentioned in passing that when this conception was first being presented some persons hastily constructed the theory that what people had been calling mind was nothing more nor less than a certain mode of manifestation of this mysterious but yet physical force. While abundant evidence, gained from various sciences by recent research, leads one to the conviction that in some unknown manner psychical and neural processes are closely co-ordinated, yet not a single investigator of standing claims that they are identical. There is doubtless among some in our day too great a tendency, unconscious though it may be for the most part, to declare that a description of the physical correlates or antecedents of mental phenomena fully accounts for the latter in respect alike of their nature and their modes of manifestation; but those who find themselves coming to such conclusions might be both interested in and benefited by examining the opinions of great naturalists and psychologists who have reflected long and profoundly upon the world-old problem of the connections between body and mind—such men as Lotze,[19] Darwin,[20] Romanes,[21] Wallace,[22] Fiske,[23] Drummond,[24] Wundt,[25] and many others of equal scientific attainments.

The architecture and chemical constitution of the neural elements indicate unmistakably, it seems, that they were so constructed that in their functioning they would be amenable to the law of the conservation of energy, and recent investigations have produced some experimental evidence in support of this view. Hodge,[26] who succeeded in making microscopical examinations of living nerve cells while under stimulation, demonstrated that the cell by this treatment was depleted of its contents, as revealed in the gradual reduction of its size. In corroboration of these results it was found that the cerebral cells in animals were larger in the morning than after a day's activities, indicating that depletion must have taken place during waking life, followed by recuperation in sleep. Some interesting data relating in a way to this matter are easily gained in the laboratories by the

use of the plethysmograph, which is designed to record the degree of blood pressure in different parts of the body. This instrument may be put upon the wrists and head, for instance, and it may be observed, when a person is subjected to certain influences whether, there is any alteration in blood supply in either region. It may be noticed, as a matter of fact, that when one is required to think diligently upon any problem, or being asleep is awakened or even disturbed by a noise in his environment, the volume of blood decreases in the wrist and increases in the head.[27] This same phenomenon is shown by experiments with the scientific cradle.[28] The inference from these data seems reasonable, that mental activity causes an expenditure of nerve force, which Nature seeks to replenish by inciting an unusual flow of nutritive-bearing fluid to the cerebral cortex. It has been shown, in further illustration of this law, that thought increases the temperature of the head, indicating that heat is generated through molecular activity; and also that psychical action increases waste products in the system, which may be derived only from the degradation of substances in nerve cells.[29] So information obtained from various other sources points toward the conclusion that in all activity energy stored in nerve cells is dissipated.

Recent experimental studies have given us reasons for believing that nerve cells in different individuals yield up their energy in response to stimulation with varying degrees of readiness.[30] Experience corroborates what Professor Bryan[31] has said: that some persons possess a leaky nervous system, wherefrom their vitalities flow away without issue in useful results. In such individuals activity will be likely to be in excess of that which the stimulus occasioning it should normally produce. Every one must have seen children, and adults as well, who when they hear a slight noise, for instance, which others do not mind, react with great vigor by jumping or screaming; or, when spoken to unexpectedly the face flushes, the lip quivers, and they become physically uncontrolled in a measure. In these instances the persons are unduly profligate in the expenditure of their means, and, in consequence, their capital is relatively soon exhausted.[32]

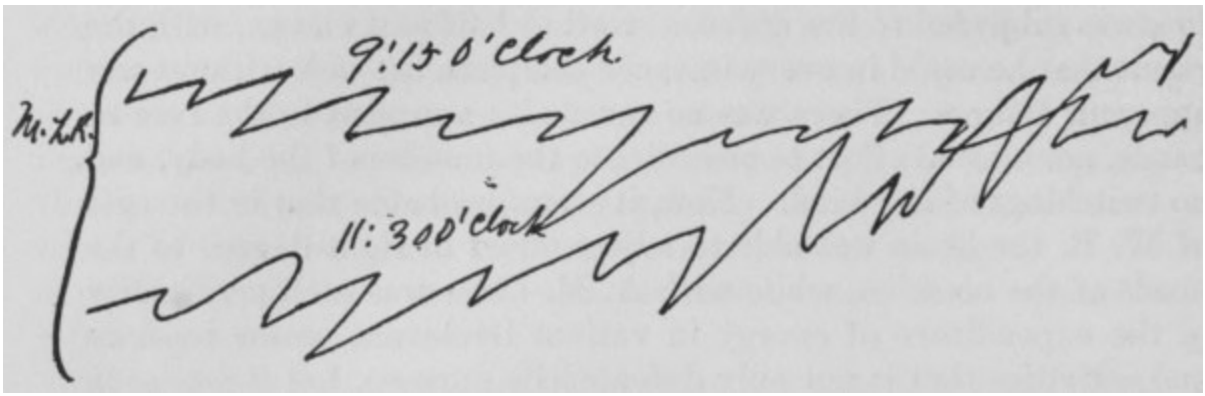
The writer last year conducted some experiments upon school children which yielded results that appear to confirm the view here set forth. Scripture's steadiness gauge was used in one test. This is designed to

investigate stability of control by requiring a person to direct a light rod under guidance of the eye upon a point several feet distant, failure to accomplish this being announced by the ringing of an electric bell. The subject is usually required to make the trial fifteen times at a single test, and the number of successful attempts is taken to be in a way, although not always reliable, an index to his power of co-ordination. But more important than the success or failure in accomplishing the task is the index it affords of the nervous condition of the subject as revealed in the expressions of face and body. Tests were made in the morning, shortly following the opening of school, and again at half past eleven o'clock, or thereabouts, after the pupils had been working over their lessons for about two hours. One boy of eleven years, A. M., is a fair illustration of what might not inappropriately be called an exhaustive type, wherein nervous energy is readily depleted because of incessant waste. In the morning tests he was well controlled and accurate. A record of five tests made at half past eleven all show that after four or five attempts to place the rod upon the point the hand became very unsteady, the lips compressed, the region about the eyes showed unusual constraint, and the hand not being used was tightly clinched. Ten trials were usually sufficient to produce twitchings or *tics* in the face and body, although nothing of this was ever noticed at other times. This boy invariably made hard work of the task, and all the physical accompaniments indicated excessive motor stimulation following, of course, upon an unduly excited condition of the cerebral cells. At the close of the experiments he generally seemed exhausted, and upon three occasions it was thought best not to permit him to make the entire fifteen trials.

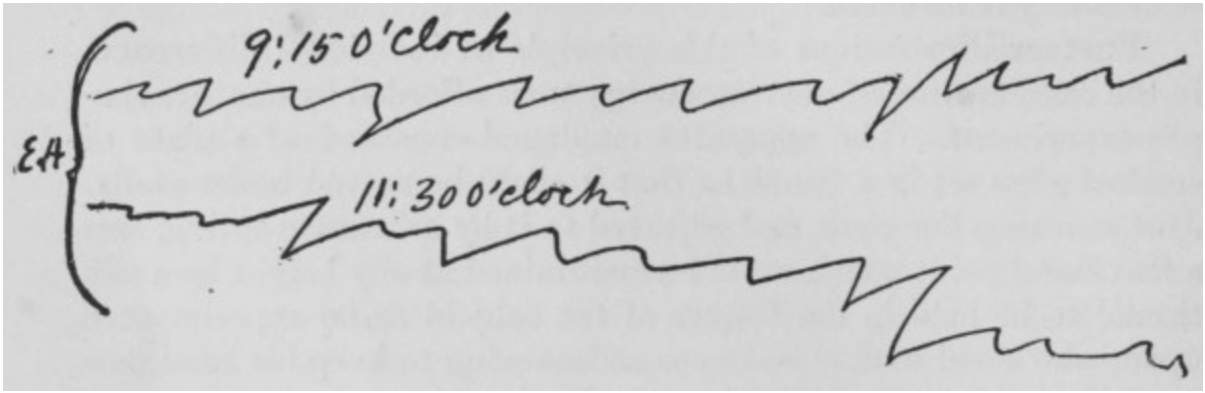
Another pupil, W. R., two years younger, illustrates a different type. In the morning trials he was no better than A. M., but he, too, was subjected to five different tests at half past eleven, with the result that he could in every instance complete the task without any apparent fatigue. There was no constraint apparent in the face or hands, no unusual effort to co-ordinate the muscles of the body, and no twitchings of any kind. Now, it seems probable that in the case of W. R. the brain was able to adjust effort in right degree to the needs of the occasion, while with A. M. there was such prodigality in the expenditure of energy in various irrelevant motor tensions and activities that it not only defeated its purpose, but it was soon largely spent. A. M. showed this tendency to nervous extravagance in all the work of the school.

While an unusually bright boy, he yet became fatigued in the performance of duties that W. R. could discharge with no evidence of overstrain; indeed, the latter boy seemed never to reach a point beyond which he could not go with safety if he chose.

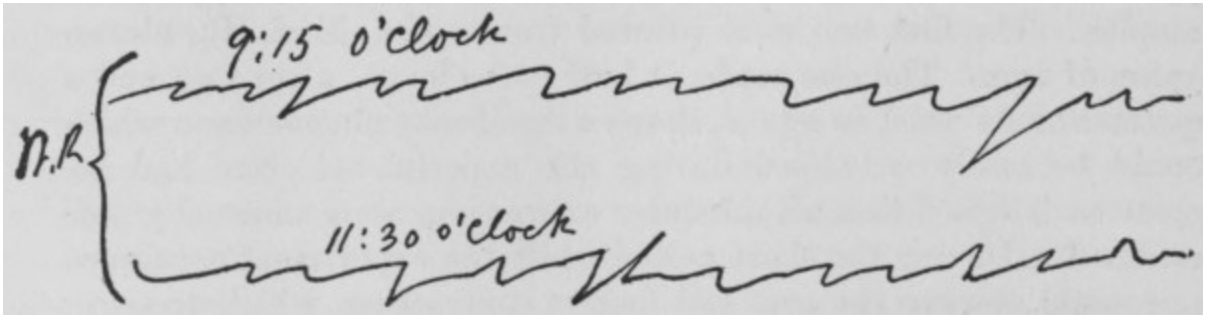
Further illustrations of this principle of individual differences in the conservation of nervous energy were afforded by another simple experiment. The apparatus employed consisted of a plate of smoked glass set in a frame so that it could be moved horizontally. Just touching the glass, and adjusted to it by a delicate spring, was a fine metal point which could be maintained at any height by a silk thread to be held in the fingers of the subject to be experimented upon, who stood with closed eyes endeavoring to keep his hand perfectly quiet for one half minute. During the test the glass was moved slowly in the frame, the metal point thus tracing a line which was a faithful index to most of the movements, at any rate, of the subject's hand. Five sets of experiments were made upon a number of pupils in the morning soon after the opening of school, and again just before the noon recess. The accompanying tracings are reproductions of those gained at one of the tests, and are typical examples. The first two were secured from a girl, M. L. R., eleven years of age. The one made at half past eleven, after two and a quarter hours' work in school, shows a significant phenomenon which could be easily witnessed during the experiment. She had become so fatigued that all muscular expressions were unusually constrained. During the short period while the experiment continued one could observe the arm and fingers contracting, which accounts for the upward direction of the tracing. The body swayed almost to the point of falling, the fingers of the hand not employed were clinched, and all the expressions indicated great tension. The second set of tracings, gained from a girl, E. H., twelve years of age, shows evidences of marked fatigue after a few hours' work; but the effect upon the bodily activities is quite in contrast with that of the case just mentioned. Here there was relaxation of the muscles, a general letting go of the whole body, revealed in the tracings taking an abrupt downward direction. The third group of tracings was gained from W. R., whose characteristics have already been adverted to, and who indicated here, as in the other tests, that his morning's duties had had no serious effect upon his nervous energies.



M. L. R.



E. H.



W. R.

It should be said in passing that the principle of healthful mental growth and activity seems to require that in education of any sort cerebral cells should be freely exercised up to the point of fatigue, but never beyond; for after this there is not only no progress, but what has been gained by previous training may even be lost. And, what is more serious, the undue depletion of the nerve cell renders its recovery extremely slow, and investigation has shown that school children when overtaxed return to their studies day after day in a fatigued condition, their energies not being fully restored until the long vacation brings the needed rest.[33] Those who train athletes realize

that the fatigue limit must not be passed if possible, and this law is recognized as well in the training of racing horses,[34] One who has observed his experience in learning to ride the bicycle must have discovered that practice pursued when in a condition of exhaustion operates rather to retard than to promote facility. So in matters of the mind activity carried to excess, which point is further removed in some cases than in others, results in retardation of growth, even though no more serious consequences ensue.

II.

As might be readily inferred, even if we were lacking experimental evidence, fatigue interferes with the normal activities alike of body and mind. One of the earliest and most conspicuous effects may be observed by any one in the people about him—a decrease in the rapidity of physical action. The child depleted of nervous energy, for whatever reason, will usually be slower than his fellows in performing the various activities of home or school. If observed during gymnastic exercises it may be noticed that his execution of the various commands is delayed; in responding to signals he is behind his comrades whose nervous capital is not so largely spent. And what is here said of the child is, of course, equally true in principle of the adult; the effect of fatigue in his case will be revealed in less lively, vivacious, and vigorous conduct in the affairs of business or of society. Mosso,[35] Burgerstein,[36] Scripture,[37] Bryan,[38] and others have been able to confirm by scientific experiment what people have thus long been conscious of in a way—that cerebral fatigue renders one slower, more lethargic in his activities. It seems clear, to hazard an explanation, that when nerve cells become depleted up to the point of fatigue Nature designs that they should be released from service in order that repair may take place. This rhythm of action and repose seems to be common to all forms of life. The phenomenon of sleep is an expression of this principle, and is characterized by almost entire absence of activity.

Again, fatigue disturbs the power of accurate and sustained bodily co-ordinations, particularly of the peripheral muscles, or those engaged in the control of the more delicate movements of the body, as of the fingers. Every one must have had the experience that consequent upon a period of exacting labor (physical or mental), or worry, the hand becomes unsteady, as

revealed in writing or other fine work, the voice is not so perfectly controlled as at other times, and perhaps involuntary twitchings or *tics* make their appearance in the face or elsewhere. Ordinarily people regard these phenomena as evidences simply of "nervousness," but, as commonly used, this term does not take account of the neural conditions responsible for these abnormal manifestations. Warner[39] points out that nerve cells in a state of fatigue become impulsive or spasmodic in their action; there is not such perfect balance as usually exists between them when in a normal, rested condition, and this results in lessened power of inhibition. Scripture[40] and others have shown by experiments in the laboratory that fatigue renders co-ordination less sustained and accurate. If, now, one observes a group of people, young or old, in which some or all have passed the fatigue limit, he can see the cause of many of those occurrences which give the teacher in the school, for example, continual trouble. The children will doubtless be moving incessantly in their seats, books and pencils may be dropping upon the floor, and various signals are responded to slowly and in a disorderly manner. The restlessness is probably due for the most part to the effort of the pupils to relieve the tension of muscles induced by overstrain, while inability to accurately co-ordinate the muscles employed in holding pencils and books causes objects to slip out of the pupils' hands upon the floor. One has but to observe his own experience, and he will soon realize that when nervously exhausted he is not so certain of retaining securely small objects which he handles. This accounts for what is sometimes regarded as carelessness in school children as well as in adults, exhibited in slovenly writing, in breaking dishes, and in similar occurrences. Any task demanding delicate and sustained adjustment of the finer muscles on the part of one fatigued will be liable to be performed in a careless manner, as we are apt to feel. Often more than not the term carelessness probably denotes impaired neural conditions, as well as consequent mental dispersion, if one may so speak, leading to inaccurate and intermittent mental and physical adjustments to duties in hand.

Cowles[41] observes that the first prominent and serious mental concomitant of nervous depletion is revealed in the inability to direct the attention continuously upon any given subject; and James has said that when one is fatigued the mind wanders in various directions, snatching at everything which promises relief from the object of immediate attention. Experiments

in the laboratory upon the keenness of sense discrimination of data appealing to sight, hearing, touch, and the other senses, show that there is lessened ability in conditions of fatigue;[42] and this is accounted for probably by the waning power of attention. The mind can be held to one thing, excluding irrelevant matters. This phenomenon is further illustrated in the following simple experiment: The pupils in a large graded school in Buffalo, N. Y., were required upon three successive days, at half past nine o'clock and again at half past eleven in the morning, to trisect a line three inches long. The results, calculated for one hundred and fifty children, show that on the average they were several millimetres nearer correct in the morning trisections than in those just before the midday recess.[43] It seems that this test measured the degree of attention which pupils were able to exert at different hours during the day, and it confirmed what must in a way be known to every one—that a day's work in school reduces the energy of attention. Doubtless every instructor has remarked how much more difficult it is at half past eleven than at ten to hold the thoughts of students to the subject in hand, and if recitations in intricate studies occur late in the forenoon, progress will be slower and more errors will be made, simply because pupils are unable to attend so critically.

The significance of this latter effect of fatigue must be apparent when it is realized that attention is at the basis of all the intellectual processes. If one can not attend vitally, he can not perceive readily or accurately; he will be unable to recall fully or speedily what has formerly been thoroughly mastered; and, most serious of all, he can not so well compare objects or ideas to discover their relationships—that is, he is not so ready or accurate in reason. In fatigue, then, one really becomes stupid. Suppose a fatigued pupil in school working over his spelling lesson, for instance; he will be liable to make errors both in copying from the board and in reproducing what he already knows. In recitations in history, memory will be halting; what has apparently been made secure some time before now seems to be out of reach. In those studies requiring reflection, as arithmetic, grammar, geography, and the like, the reasoner will be unable to hold his thoughts continuously to the matters under consideration, and so will be unable to detect relationships between them readily and accurately. When one considers, in view of what is here set forth, that many persons, adults as well as students, are for one cause or another in a constant state of fatigue,

he can see the explanation of the stupid type of individual, in some instances at any rate.

The effects upon the emotional activities, while not so easily detected by experimentation, may yet be readily observed in one's own experiences and in the conduct of persons in his environment. Cowles,[44] Beard,[45] and others assure us as physicians that neurasthenia gives rise to irritability, gloominess, despondency, and sets free a brood of fears and other kindred more or less abnormal feelings. Wey,[46] in his studies upon the physical condition of young criminals, has found that in the majority of instances there appears to be some neural defect or deficiency, mostly of the nature of depletion, which he believes contributes to alienate the moral feelings of the individual. There is little doubt that viciousness has a physiological basis. It is probable that in such a case the highest cerebral regions, through which are transmitted the spiritual activities last developed in the race, becoming incapacitated first by fatigue, are rendered incapable of inhibiting impulses from the lower regions, which manifest themselves in an antisocial way.

III.

It follows from what has gone before that cerebral fatigue is a most important matter to be reckoned with in all the affairs of life, but especially in education, where the foundations for nervous vigor or weakness are being permanently established, and where relatively little can be accomplished in either intellectual or moral training unless the physical instrument of mind be kept in good repair. It needs no argument to beget the conviction that we should if possible ascertain what circumstances produce fatigue most frequently in the schoolroom, so that they may be ameliorated and their injurious consequences thus avoided. What, then, are the most important causes? It is well to appreciate at the outset that every individual has a certain amount of nervous capital which, when expended, leaves him a bankrupt, and it is of supreme import to him that something should always be kept on the credit side of his account. If we would deal most wisely with a pupil, then, whose activities we are able to direct, we should know just what demands we could make upon his energies without fatiguing him. But we can not hope at the present time and under present conditions to discover with accuracy the fatigue point of each individual, and even if we

were able to do so, we would doubtless find it next to impossible to observe it at all times in our teaching, especially in our large graded schools. But we can at any rate adjust our requirements with some degree of accuracy to the average capacity of the whole.

Regarding the number of hours of mental application per day which may be safely expected of a pupil in school, investigations have tended to show that there is a danger of requiring too many. When pupils return to school morning after morning without having recovered from the previous day's labors, it is evident that too heavy draughts are being made upon their nervous capital. It may be said in reply that many factors conspire to produce this depleted condition, as insufficient sleep, inadequate nutrition, and outside duties; but the answer is that under such unfavorable circumstances less work may be demanded. As the curriculum is planned in many places, alike in graded and ungraded schools, the pupil is expected to be employed in the school for five or six hours a day no matter what may be his age, and to this work should be added studies at home for the older students. Now, as Kraeplin[47] has justly observed, Nature ordains that a young child should not give six hours' daily concentrated attention in the schoolroom, but, rather, she has taken pains to implant deeply within him a profound instinct to preserve his mental health by refusing to attend to hard work for such a long period. Consequently, in such an educational *régime*, the mind of the pupil continually wanders from the duties in hand. The most serious aspect of this is apparent, that when attention is constantly demanded and not given, or when a pupil is pretending or attempting to keep his thoughts turned in a given direction, yet allows them to drift aimlessly because he is practically unable to control them, he is acquiring an unfortunate habit of mental dissipation. It seems certain that healthful and efficient mental activity requires that a child apply himself in a maximum degree for a relatively short period, the duration differing with the age of the individual and the balance of nervous energy to his credit; and then he should relax, attention being released for a time.

Experiments conducted by Burgerstein[48] and at Leland Stanford Junior University[49] emphasize a particular phase of this principle—that too long continued mental application without relaxation induces fatigue more readily than when there are comparatively short periods of effort, followed

by intermissions of rest. Thus when pupils (and the younger they are the more is this true) have a given amount of work to do requiring their attention say for an hour and a half they will accomplish most with least waste of energy by breaking up this long stretch into several parts, interspersing a few minutes of free play. With adults application may profitably continue for longer periods, but even here the rhythm of concentration and relaxation must be observed in order that effort may have the most fruitful issue. There would assuredly be less dullness, carelessness, and disorder in our schools, high and low, and in our homes, if this law were observed in the arrangement of the activities of daily life. The writer knows of a normal school where the work begins at half past eight in the morning and continues until one o'clock, with a pause of only ten minutes in the middle of the session. During the passage of classes from room to room at the close of recitations, monitors are placed in the halls to prevent any exhibition of freedom in communicating with one another or in the movements of the body. Here there is little if any relief to the attention, since pupils are under practically the same constraint as when reciting in Latin, Greek, or geometry. This enthronement of discipline, which we all seem natively to think necessary that we may prevent the reversionary tendencies of youth, is sure to breed in some measure the very maladies—stupidity and disorder—which various agencies in society are striving to cure by all sorts of formulæ.

In the normal, well-organized adult brain the various areas are closely knit together by association pathways or fibers,[50] which renders it possible to employ in particular direction the energies generated over large regions. But this development comes relatively late and is not fully completed under about thirty-three years of age, it is now believed. It is in a measure, then, impossible for the young child to utilize the energies produced in one part of the brain in activities involving remote sections. One who observes little children in their spontaneous activities can not fail to note evidences in plenty in illustration of this principle. It should be apparent, then, why a school programme so arranged that a lesson in writing is followed by one in written language, this by written number, and this in turn by written spelling, or possibly by a written reproduction of a lesson in Nature or literature, is admirably suited to exhaust the overused areas of pupils' brains, whereupon the mental and physical effects of fatigue make their

appearance. In one of the large cities of our country the amount of time spent in writing was calculated for all the grades in the schools, and it was found that at least one hour was required of the children in every grade, and in the fourth and fifth grades they were engaged for two hundred minutes every day in writing in some form or other.

Doubtless every one has observed how readily he becomes fatigued when he is engaged in activities demanding very delicate muscular adjustments—threading a needle, for instance. Work of this character involves particularly the higher co-ordinating areas of the brain, those controlling the more precise and elaborate adjustments of the body, and this work makes large demands upon one's nervous energy. This seems to be pre-eminently true of the child, in whose brain the highest regions are yet comparatively undeveloped, so that much exercise of them leads quickly to exhaustion. Those activities, then, which compel a great amount of exact co-ordination of young children will easily fatigue them. The writer has for some time been observing the effect of various sorts of playthings upon the activities, particularly upon the emotions, of two young children. He has noticed that those plays requiring most accurate co-ordination, as stringing kindergarten beads with small openings or writing with a hard lead pencil, will quickly produce fatigue, shown in irritability, discontent, and lack of control; while those plays which employ the larger muscles, as working in sand or drawing a cart, are more enduring in their interest and are not attended by such disagreeable after effects. It is customary, however, in many homes and schools to require of the youngest children the finest work in the management of the smallest tools and materials, such, for instance, as writing on very narrow spaced paper, greater freedom being permitted in this respect as the pupil grows older—an inversion of the natural order. The mode of development of the nervous system indicates unmistakably that in all training the individual should proceed gradually from the acquirement of *strength* and *force* in large, coarse, and relatively inexact movements to the acquisition of *skill* in precisely co-ordinated activities.

Any reference to the remediable causes of mental fatigue would be incomplete without allusion to the harmful influence of certain personal characteristics in the people with whom we associate. By virtue of a great law of our being, that of suggestion, the importance of which we are appreciating more fully from day to day, we tend ever to reproduce within

ourselves the activities of the things in our environment.[51] Now, when we are forced to remain in the presence of one fatigued, as pupils too frequently are in the school and children in the home, and this fatigue manifests itself in irritability, impatience, tension of voice, and constraint of face and body—in such an environment we become overstimulated ourselves and rapidly waste our energies. Especially true is this of children, who are more suggestible than adults; and, in view of this, one can appreciate the necessity of placing in our schoolrooms, and if we could in our homes, persons possessing an endowment of nervous energy adequate for the demands to be made upon it without inducing too readily fatigue with all its train of evils.

BEST METHODS OF TAXATION.

By the Late Hon. DAVID A. WELLS.

PART II.

In passing from the tariff, or duties on imports, to the internal or excise taxes imposed by the Federal Government, there is evidently a distinct change in purpose. However subject to abuse the tax on distilled spirits has proved, and however frequently its agency has been invoked to exaggerate the profits of interested parties, there has never been an open and avowed intention of turning it to private gain. The policy that has become almost inseparable from the customs tariff, and is by most people regarded as inherent in all customs legislation, has not been transferred to the internal revenue taxes save in one or two instances of recent application and secondary importance. The danger of permitting taxation to be employed by either State or Federal Government for a purpose other than that of raising necessary revenue has been dwelt upon. When a police power is exercised in conjunction with a tax framed for revenue, and is regarded as the more important function to be performed, the policy requires careful examination. If revenue is the real object, the method of imposing the tax and the determination of the rate which will give the highest return with the least interference in the production, distribution, and export of the commodity taxed remains to be defined. If restriction in manufacture, sale, or consumption is intended, the question is no longer one of taxation proper, but of police regulation. The Federal taxes on oleomargarine, filled cheese, and mixed flour are of the nature of police inspection, and the tax on the circulation of State banks, amounting, as it has, to prohibition, is a still more extreme exercise of the same power. The imposition and collection of these duties have a penal quality, an intention to restrict or prohibit the production or sale or use of some article. They are not properly taxes; they are not a proper application of tax principles, but have originated, in private interest, or in the deliberate intention to constitute a monopoly, State or other.

The approach of war, or its actual presence, is made the excuse of an extension of taxes, and the Federal Government tacitly admits its inability to increase indirect taxes on consumption by its general resort to an extension of the internal taxes and excise. The instrumentalities of business offer a fair field for stamp taxes, and these, when not so burdensome as to invite evasion, are acceptable because of the ease with which they are assessed and collected. A specific duty on the more important acts of commerce and daily business may be evaded, it is true, but not when the paper or instrument taxed must become public evidence. Stamps of small denomination on bonds, debentures, or certificates of stock and of indebtedness; on a bill of sale or memorandum to sell; on bank checks, drafts, or certificates of deposit; bills of exchange, draft, or promissory note; money orders and bills of lading; on express and freight receipts, on telegraph messages, and a large number of legal and other instruments, such as leases, mortgages, charter party, insurance policies—these are simple duties, productive of large returns, and not unequal in their weight. The law of 1898 included such stamp taxes, as well as others on proprietary articles and wines. It was not simple to predict the incidence of these rates, and the distribution has been unequal. The charges of one cent on telegraph messages and express packages are paid by the sender in the larger number of cases, the companies merely adding a penny to their rates. This was not the intention of the law, and the courts have held that it was not so intended. The individual is powerless in a few transactions, and only the great concerns are able to avail themselves of this decision. The duties for seats or berths in a parlor car or for proprietary medicines, are paid by the company or manufacturer, though in certain preparations the price to the consumer was advanced on the passage of the act. With all their drawbacks, and they are not few in number, these stamp duties afford a ready means of obtaining a good revenue without increasing unduly the general burdens of taxation. The law of 1898 was modeled after that of 1863, and many of the rates and descriptions will undoubtedly be incorporated into the permanent internal revenue system of the country—a measure enforced by the remarkably unequal returns derived from the customs.

The existing system of internal duties is even more defensible than the tariff as a source of revenue. Its inequalities, due to the haste in which the measure was prepared and the inexperience of those who framed the

provisions and fixed upon the rates, are worn away in use, and where the rates are moderate and are not infected with a penal quality, the community adapts itself to them, accepting them as a necessary convenience. In the United States this spirit of acquiescence is most marked, not only because of a natural patience of tax burdens, but because of as natural a fear of other untried and more radical or oppressive measures. The situation of "business" when a general tariff bill is pending in Congress is one almost of panic, and the scramble to protect interests or to obtain some special advantage against rivals has become a scandalous feature of tariff revision. Except in the instances named, as oleomargarine and filled cheese, the internal revenue system presents less of a field for such an exhibition of greed and self-interest; but the spirit duties, and even the tobacco rates, may be used in such a way as to favor the large manufacturer against the small concerns, and are to that extent misused and applied for purposes antagonistic to those properly pertaining to taxation. In a time of tax revision the suggestions for new taxes and ideas for changing the old are freely offered, and do not stop short of absolute prohibition of an industry, of total destruction of interest. The vagaries of a legislative body under such suggestions have instilled into the public mind a wholesome fear of its possible acts and fully explain the timid and uneasy condition of "business" when a general tax measure is under discussion. Whether it be the manufacturer or producer seeking protective duties, or the Granger or Populist asking for taxes of confiscation against capital and accumulated property, the spirit is the same—a desire to turn taxation to improper purposes.

The tendency of Federal taxation to turn to taxes on capital and the instruments of "business"—direct, rather than indirect taxes—found its most extreme illustration in the income tax of 1894, the principles of which have already been discussed. It finds a more moderate and restricted exercise in certain graduated duties under the act of 1898, and especially in the duties on legacies and distributive shares of personal property. It was no sentimental or even theoretical argument based upon the right of inheritance or the inequality of taxation that led to the adoption of these duties in 1898; it was only a blind following of the provisions of the earlier act, and the consciousness that revenue must be had at every cost, and no possible source of income should be overlooked. Yet the legacy tax is essentially a

tax of democracy and defensible for much the same reasons as a tax, whether graduated or not, upon income might be.

By the act approved June 13, 1898, entitled "An act to provide ways and means to meet war expenditures, and for other purposes," the national Government imposed a tax upon legacies and distributive shares of personal property. This tax has been one of the features of the tax law of 1862 (§§ 111-114), but in a much simpler form and in a form better calculated to produce a revenue. This earlier law imposed a duty on all legacies exceeding one thousand dollars in amount, but very properly made a distinction in the rate according to the degree of connection between the person from whom the property came and the receiver of the legacy. Thus, lineal issue or lineal ancestor, brother or sister, should pay at the rate of seventy-five cents for each and every hundred dollars of the clear value of the interest in the property. A descendant of a brother or sister of the decedent paid double this rate; an uncle or an aunt was taxed three dollars for every one hundred dollars passing; a great-uncle or a great-aunt, four dollars; and persons in any other degree of collateral consanguinity, or a stranger, or a body politic or corporate, five dollars. The only exemption made was in favor of a wife or husband. As only personal property was intended to be reached, all land and real estate escaped the duty.

The law of 1898 made important modifications in these rates and manner of assessing. In the first place, the rates fell only on legacies in excess of $10,000, a limit ten times larger than that of the law of 1862. The degrees of relationship were the same, the rates were copied from those of the earlier act, and the same exemption of property passing between husband and wife was admitted. But the idea of a progressive tax was ingrafted into the law. Thus, the old rates applied only to legacies of more than $10,000 and not more than $25,000. When the property passing was valued between $25,000 and $100,000 the rates were multiplied by one and a half; between $100,000 and $500,000, they were multiplied by two; between $500,000 and $1,000,000, they were multiplied by two and a half; and by three when the property was in excess of $1,000,000. In restricting the tax to personal property passing by inheritance the measure aims at a crude means of making the burdens of personal more nearly approach those of real property. No such consideration controlled the views of those responsible for the act, and, after all, it offers only a question of theoretical interest. The

inheritance tax collected in many of the States may have owed their adoption to such an idea, but the United States, in taking up these duties, merely saw a means of obtaining revenue without regarding the actual results of the tax on the estates paying it.

"The inheritance tax in one form or another has come to stay, and new States are being added every year to the list of those which have adopted it. Five years ago it was found in only nine States of the Union—Pennsylvania, Maryland, Delaware, New York, West Virginia, Connecticut, Massachusetts, Tennessee, and New Jersey. During the first half of 1893 Ohio, Maine, California, and Michigan were added to the list, though the Michigan law was afterward annulled because of an unusual provision in the State Constitution which was not complied with. In 1894 Louisiana revived her former tax on foreign heirs; Minnesota adopted a constitutional amendment permitting a progressive inheritance tax which has not yet been given effect by the Legislature; and Ohio added to her collateral inheritance tax a progressive tax on direct successions. In 1895 progressive inheritance taxes were adopted in Illinois and Missouri, and an old proportional tax was revived in Virginia; and last year Iowa adopted in part the inheritance tax recommendation of her revenue commission."[52]

The real problems are to be encountered in local taxation. The many different methods used in the different States, the want of uniformity in the local divisions of each State, and the extraordinary diversity in the interpretation or application of tax laws by the courts and executive authorities of the States have introduced a confusion, to end which, many would invoke the intervention of the Federal Government. The haphazard manner in which the laws have been framed and passed is only the least notable explanation of the variety of phrase and interpretation to be found. Even were the Federal Government to establish definitions, and frame rules of uniform assessment, there would still be room for difference. The customs tariff is known to be variously applied in the different ports of the country, and there is greater certainty in the tariff rate than could be found in a tax resting on the assessed valuation of land, for example.

The difficulty encountered by France in its attempt to determine the net income from land for the purposes of taxation carries an important lesson. Failing to obtain uniformity of appraisement of this net income under the

crude method first employed—of basing it on the character of soil and nature of cultivation, deducting the expenses of cultivation—a *cadastre* was decreed.[53] In this *cadastre* each particular piece of property was recorded, with its boundaries, its manner of cultivation, and its net rental. Begun in 1807, it was not completed until 1850, and proved of little value, as no provision had been made for recording the changes in cultivation, rentals, or other conditions, except those of ownership, buildings, and exemption from taxes. Instead of proving a successful means to a desired end, it "turned out to be a stupendous disillusionment." "The experience of both the western Prussian provinces and of France showed that the newly constructed *cadastre* was of considerable service in equalizing the land tax within a relatively small area, but not as a basis for alterations in the contingents to be paid by large and widely separated regions. The officials in charge of the *cadastre* on the Rhine, as well as those in France, themselves admitted that any computation of net income was uncertain; that the coincidence of the figures obtained by the cadastral computation with the actual net income could never be assured; that the figures afforded by the *cadastre* were rather of the nature of a proportion, while uniformity of assessment was to be attained rather by observation of the business transacted than by depending on the figures obtained by computation."[54] This effort to discover and record the net income from land was a failure.

So thorough an experiment, carried through so long a time, and presenting an example to be avoided, was in fact imitated by Prussia under a law of 1865. In each division (*Kreis*) was appointed a commissioner, who was chairman of a committee, the size of which ranged from four to ten members, according to the size of the division. One half of this committee was appointed by the representatives of the division and one half by the central Government. A number of divisions formed a department, with its commissioner and committee of similar composition as in the division, and above all was a central committee, presided over by the Minister of Finance. The valuation was accomplished in less than four years. The method was applied only to land employed in agriculture or forests; a separate law provided for the taxation of buildings and gardens. In the end the results were no better than those obtained in France. In either case a plan too refined to work to advantage had been employed, and, apart from its simplest function, that of making a general survey of the land and the

uses to which it was applied, it could not advance the theory of a proper land tax. No modification could make it a better instrument of taxation. The gross income from land as a taxing basis would involve heavy injustice, and further supervision by government officers could not do away with the mechanical difficulties of securing uniformity. The English plan of making rental value the foundation is more easily applied and gives better results.

If land be difficult of assessment, personal property offers a very much more difficult problem. On this particular question this country has much to learn from the experience of other governments. In Great Britain a Royal Commission has been making a study of local taxation, and, in a preliminary report, concludes that an alteration in the law for the purpose of obtaining a uniform basis of valuation in England and Wales is a necessary preliminary to any revision of the existing system of local taxation. It has been already stated that the poor rate constituted the basis of valuation of property for local rates. In its development the system has become more complicated. Two valuations of the same property may be made for raising imperial taxes—namely, one for the income tax, and one for the land tax. Three valuations of the same property may be made for raising local rates—namely, one for the poor rate, one for the county rate, and one for the borough rate. Here, then, are five different valuations in activity.

Of these the parish was the first and most important division, having been introduced in the sixteenth century, when the dissolution of the monasteries had raised the question of poor relief. It was adopted for convenience, as the contributions were at first entirely voluntary; but as the problem of the poor increased in importance, compulsion was applied, and at the beginning of the seventeenth century, by the acts of Elizabeth of 1597 and 1601, compulsion was fully established and the parish adopted as the area for levying rates for the relief of its poor. It now became necessary to define more specifically the persons liable for this rate, but the law framed no system by which assessments were to be made or rates collected. A distinction was made between the occupier of certain properties (such as lands, houses, coal mines, or salable underwoods) and an inhabitant of the parish. The occupier was to be taxed upon the basis of the annual benefit arising from the property situated in the parish; but the inhabitant was taxed not in respect to any specified subjects, implying an intention to tax them upon some other basis. This raised the question of "ability," and how that

question was to be determined. The act said nothing that could point to personal property, "and it was only on the ground of his being an inhabitant that any owner of personal property could be rated for that property, because there was no word in that statute to include him, except the word inhabitant. Under that statute, therefore, there was necessarily a distinction between residents and nonresidents, because the resident would be ratable for his personalty within the place, the nonresident not. The distinction, however, under that statute applied only to those kinds of property which the statute did not specify, for the occupier of lands, houses, etc., and whatever the statute enumerated, was ratable whether he were resident or not."[55] And when the judge of assize was asked to give an opinion he decided that lands should be taxed equally and indifferently, but an additional tax could be laid on the "personal visible ability" of the parishioner. Further, "all things which are real, and a yearly revenue must be taxed to the poor." Yet there were limitations on this apparently wide interpretation, and as early as 1633 it was only visible properties, both real and personal, of the inhabitants within the parish, and only within the parish, that could be taxed. The property to be assessed must be local, visible, and productive; it must consist only of the surplus left after deducting debts; it must be rated according to the profit produced; and its nature must be distinctly specified. "Consequently, such subjects as wages, pensions, easements, profits derived from labor and talent, profits from money invested or lent elsewhere, and furniture, were exempt."

The absence of all attempts to tax or value property other than what was visible and tangible continued to the reign of Queen Anne, when a single decision of the court pointed to the taxation of the stock in trade of a tradesman, a decision that does not appear to have been acted upon. As late as 1775 Lord Mansfield said, "In general, I believe neither here nor in any other part of the kingdom is personal property taxed to the poor." At all events, it could not be taxed unless usage could support it. Toward the end of the century, when taxation for the Napoleonic wars was touching more intimately the concerns of the people, the idea of subjecting personal property to the poor rate was favored, but nearly half a century passed before it attracted attention. In their report for 1843 on local taxation the poor-law commissioners gave the following summary of the status of this question:

"The practice of rating stock in trade never prevailed in the greater part of England and Wales. It was, with comparatively few exceptions, confined to the old clothing districts of the south and west of England. It gained ground just as the stock of the wool staplers and clothiers increased, so as to make it an object with the farmers and other rate payers, who still constituted a majority in their parishes, to bring so considerable a property within the rate. They succeeded by degrees, and there followed upon their success a more improvident practice in giving relief than had ever prevailed before in England.... When the practice of rating stock in trade was fully established in this district, the ancient staple trade rapidly declined there and withdrew itself still more rapidly into the northern clothing districts, where no such burden was ever cast upon the trade."

A final determination of the question was imposed upon Parliament by the pressure of the manufacturing and commercial classes arising from a decision in the case of R. *vs.* Lumsdaine, in 1839, looking to the taxation of personal property. In consequence, an act was passed (3 and 4 Vict., c. 89), and has remained in force until the present time, exempting an inhabitant from any tax "in respect of his ability derived from the profits of stock in trade or any other property, for or toward the relief of the poor." Thus it is that the English local taxation has managed to keep clear from the bog of assessing personal property, and the annual value of immovable property, such as lands and houses, within the parish has come to be selected as the simplest and most practicable basis for assessments. The history is of high importance, because the basis of the poor rate was adopted as the basis for all other rates levied in local taxation. Whatever confusion has been introduced has arisen from other causes, such as the constituting poor-law unions containing more than one parish, the levying of county rates, a county having a boundary other than a parish or a union, and the assessing for rates by parish officers who acted independently of each other. Many efforts have been made to introduce a uniform system of assessment, but without success. One of the clearest thinkers on this subject was Sir George Cornewall Lewis. In appearing before a committee on taxation, in 1850, he said: "We have never recognized the principle of having one valuation for all the different rates. If that principle were once admitted, the inducement to have an accurate and complete valuation would be at its maximum, because then you would know that whatever charge might be imposed it

would be imposed upon that valuation, whereas if there is one assessment for one rate and another assessment for another rate, and an amended assessment for a third rate, no one cares much about making any assessment perfect. This is one defect of the present system of valuation."

The defect has persisted and become more aggravated each year. In 1870 a special commission came to the resolution that "the great variety of rates levied by different authorities, even in the same area, on different assessments, with different deductions and by different collectors, has produced great confusion and expense; and that in any change of the law as regards local taxation, uniformity and simplicity of assessment and collection, as well as of economy of management, ought to be secured as far as possible." When it is considered that for the five independent valuations for raising rates on property there are in England and Wales more than one thousand valuation authorities, the hopelessness of obtaining uniformity is apparent. With such a multiplicity of agents it is useless to look for good results. There is no fixed or necessary time for making the valuation lists; no uniform system of or scale for making deductions for arriving at the ratable values of certain classes of property; exemptions and allowances are said to be given unduly, through undue pressure on the assessing authorities; and the assessment committees have no statutory power to ascertain from owners or occupiers the rentals and other particulars needed to determine values. The reforms needed are a geographical redistribution of taxing limits and uniform rules of assessments.

If so great confusion can occur where the property to be valued for taxation is visible and tangible property, and where the principles underlying the assessment are few and comparatively simple, what is to be expected when the attempt to reach invisible and intangible property is added?

Constitutional provisions have not secured equality of valuation, and the statute laws are powerless to make effective the sounding phrases of the Constitutions. "Property shall be assessed for taxes," says the Constitution of New Jersey, "under general laws and by uniform rules, according to true value." The Assembly sought to embody this principle or rule in the laws of the State. "All real and personal estate within this State, whether owned by individuals or corporations, shall be liable to taxation at the full and actual value thereof, on the day in each year when by law the assessment is to

commence."[56] Such assertions of the basis of taxation need no further explanation, for the intention of the framers of constitution and law is unmistakable—equal and uniform taxation, a common burden involving a common obligation to discharge it. The practice at once creates the necessity for recognizing the inaptitude of the instruments called upon to carry the law into execution. More than four hundred separate assessors and boards of assessors determine the taxable values upon no uniform system and in defiance of law and Constitution. "In practice they value real estate all the way from twenty-five to seventy-five per cent of its true value, depending on its location, income, etc., and their personal or political prejudices, and value different contiguous areas at different valuations, though of equal values really; and as to personal property, I regret to say, they appear to make no earnest or honest effort to reach it anywhere, except in the agricultural districts, and even there very imperfectly."[57]

Enough has been said in these articles to show that this defect of method is not peculiar to one State, but is to be found in all. The remedies proposed or adopted have proved ineffectual to produce a better result. It is asserted that the more careful selection of the assessors, a higher salary for service, and a more strict accountability for their acts would introduce a reform; but this could, even under the most favorable of conditions, be only a partial reform. A State assessor with power to remove the assessors has been recommended, but this officer could not become so conversant with conditions throughout the State as to be able to decide on the many questions of assessments coming before him. Certain descriptions of property could be dealt with by such an officer and with an approach to fair and equal treatment. The valuation of the "main stem" of the New Jersey roads was made by civil engineers, and it is believed to have met the constitutional provision as to "true value." In the valuation of a vast quantity of other property no such expert knowledge could be applied, and especially is this true as to "personal property." Real estate might be approximately valued and a *cadastre* or record prepared, but after twelve months the most carefully compiled valuation would be out of date. Before personal property the assessor would still stand powerless. No multiplication of officers or no system of control over the many local assessors can solve this question in a manner satisfactory to justice to both State and taxpayer.

It would seem, then, as if an abandonment of what has been regarded as almost essential features of the State tax systems alone offers relief. No such abandonment can be effected unless an adequate revenue from other sources be provided. The "general property tax," with its futile and laughable incompetency to reach the most profitable sources of revenue, should be modified, and even eliminated as far as is possible. The general principle underlying it, of taxing every form of property, was suited only to a time when the bulk of a man's estate consisted in visible and tangible objects—lands, houses, live stock, and furniture. With every creation of a credit instrument, with the immense development of corporations, the principle has become weaker, until it now stands confessedly inapplicable to at least four fifths of the personal property in existence, and this proportion grows larger each year.

PHASES OF PRACTICAL PHILANTHROPY.

By HARRIET A. TOWNSEND.

The annual reports of the "Conference of Charities and Corrections" indicate a growing interest in the study of scientific philanthropy. That there has been marvelous progress in methods of charitable work during the past decade no one will deny, but, gratifying as this is (or appears to be on the surface), we find a somewhat discouraging feature in the tendency of the present to multiply institutions, to inaugurate new and extravagant enterprises where theories may be proved, and which threaten to become burdensome to a generous public and to absorb energy in the financial struggle to maintain them which is sorely needed for the more vital issues of the work. The purpose of this article is to give information about simple and practical efforts which have met the test of usefulness and are worthy of imitation. They are being used in four different lines—namely, protection, education, domestic training, and employment.

Protection.—The first protective agency was organized in New York city in 1864; it is truly an American idea, and before that date no organization of its kind had been known in England or on the European continent.

As a result of the civil war many women were thrown upon their own resources, with children to support, and much suffering was endured in the effort to obtain adequate compensation for labor performed. The objects of the parent protective association—"to secure justice for women and children, to give legal advice free of charge, and to extend moral support to the wronged and helpless"—appealed forcibly to practical philanthropists, and there now exist similar agencies in many other large cities in America, such as Boston, Philadelphia, Chicago, Buffalo, and San Francisco. The women's educational and industrial unions, which work "to increase fellowship among women in order to promote the best practical methods for securing their educational, industrial, and social advancement," have all adopted the protective work as an important branch of their endeavor. To give detailed statistics of all that has been accomplished in this line since

1864 would be impossible; indeed, so much of the work is of a private nature which can never be revealed that one must "read between the lines" of the annual reports; suffice it to say that by the protective department of one women's union during a period of fourteen years more than twelve thousand dollars unjustly withheld from working women (mostly in small sums) has been collected, police matrons appointed in three local stations, women given places on public boards, a law passed compelling the appointment of women physicians in all the State insane hospitals, and a law making the guardianship of the mother equal to that of the father (passed by the State Legislature without a single negative vote). All this has been done with little expenditure of money, but through the wise effort of courageous men and women whose service has been rendered not for charity alone, but in the cause of justice, "that each should have what he has justly earned is the first necessity of social life."

One province of the protective work is to endeavor to make more clear the obligation of the employer and employee, and especially in the domain of household service to place the relation on a commercial basis. The problem of unskilled labor in the home is the principal difficulty in the way of such reform, and until the household economic and kindred associations shall bear more fruit it may prove an insurmountable barrier to complete success. During the last ten years the attention of the humanitarian has been frequently called to the injustice of our laws regulating the "age of consent." In some States the age has been raised to sixteen or eighteen years and penalties increased, but through widespread ignorance of the law it is often a dead letter in both small towns and large cities. A law so constantly broken and with impunity provides little protection for the young of both sexes, in whose interest it is framed, and it is a *dead* letter because of the indifference of the public. To spread abroad a knowledge of and help to enforce these laws, which so intimately affect the purity of the home, is worthy the consecrated effort of the noblest and most cultivated women in our land. For this and other like ends the number of protective agencies should be largely increased. In every town, or at least in every county, such an association might be formed. There are only required a few women with brave hearts and clear heads, willing to give one afternoon or evening a week, the free services of one or more able lawyers (which will never be found lacking), a small room for a meeting place, and the work can begin.

Let notice be given through the press or in the churches that a protective agency is formed and stands ready to offer sympathy and advice to all women in need. Methods of work are very simple: printed blanks are important to properly record the cases, and letterheads which shall give names of committee and those of the attorneys; when a claim for wages is presented, a courteous letter stating the fact that the wage-earner has asked the assistance of the protective agency, and requesting the defendant to answer personally or by letter and to state his side of the case, will generally receive response; great care must be observed to be just to both parties, and not to make hasty nor unwarrantable decisions.

The laws affecting the rights and property of women of New York have been briefly compiled for the use of protective associations, and it is very easy to obtain in any State a copy of the laws regulating domestic service for reference in making decisions. The Legal Status of Women, compiled by Jessie J. Cassidy (a graduate of Cornell), will be found useful. If in the beginning the work of protection should be misunderstood and resented it matters not; in time it will win the respect and co-operation of the best elements in any community. What a moral force would an "endless chain" of such workers prove in the struggle for universal brotherhood! To give courage to the most humble beginning we have the word of our philosopher that "every reform was once a private opinion."

Domestic Training.—Scientific domestic training or household science is becoming a subject of great interest to all who believe that a truer development of home life lies at the foundation of all social and moral progress.

Three large institutions—Pratt, of Brooklyn; Drexel, of Philadelphia; and the College of Teachers, in New York city—present opportunities for the thorough training of teachers in this comparatively new branch of popular education.

Clubs for the study of household economics are multiplying year by year; the Association of Collegiate Alumnæ has given earnest thought to the domestic problem, and as a result, and in spite of much prejudice, courses of cookery have been made a part of the public-school curriculum in a few of our large cities. The Board of Regents of New York State has recently

adopted a syllabus for a course in home science to be used in the high schools. While the movement, as yet, may be said to be in the experimental stage, it is safe to assert that sentiment in favor of the new idea is increasing. The difficulties in the way of a rapid growth are formidable and make the outlook somewhat discouraging.

To properly equip a school for scientific domestic training is in the beginning a considerable expense; the number of skilled teachers ready for the field is small, and their services too valuable to be given without adequate compensation. The cooking schools so far established have not proved self-sustaining, and until more sensible ideas as to the dignity of household labor shall prevail, limitations will continue.

In all reforms we must "dig at the roots" if we would insure a steady and healthful growth. The kitchen-garden idea, originated by Miss Emily Huntington in 1887 for "the purpose of giving the little daughters of the poor attractive instruction in housework," has proved one of the best means of practical philanthropy ever discovered. The New York Kitchen-Garden Association was formed in 1880, and from that, as its crowning work, we have the New York Training School for Teachers. The kitchen-garden lessons are very simple; they include how to make beds and take care of sleeping rooms, set and wait on table, wash and iron clothes, care of a baby and the nursery, how to build fires, clean lamps, sweep and dust, instruction in house-cleaning, marketing, and the care of the person—all taught by miniature utensils to the accompaniment of songs and exercises, which give enthusiasm and variety to the work. The training of the kitchen-garden teacher is not difficult, and young women in any community, by a few lessons as to the methods and a study of kitchen-garden literature, may soon become efficient.

Children of the ages of from five to eleven are eligible for the training, and both girls and boys enjoy the classes. After the various lessons have been mastered, the next step for girls is into the cooking class, and if on account of the expense or for any other reason the scientific teacher is *not* available, the courses may be given by housekeepers. Very practical results were thus obtained by one organization of women. A class of fourteen young girls graduated from a kitchen garden were given instruction for twenty weeks on every Saturday morning; the lessons were divided into four short

courses; five each were given in the preparation of breakfast, luncheon, dinner, and supper. Every fifth morning was devoted to a practice lesson, when the little cooks prepared and served a meal without assistance.

While the number of kitchen gardens is increasing there are yet many localities where the good seed has not taken root; no better work in village or town could enlist the faithful service of King's Daughters or of societies for Christian Endeavor. An inexpensive outfit of kitchen-garden utensils can easily be procured and the work begun. When a class is ready to graduate from the kitchen garden the voluntary service of half a dozen notable housekeepers, who will give the simple lessons in cooking once a week, will yield a most satisfactory harvest. The unconscious tuition of the cultivated house mother is often of greater value than all else. A little girl of eleven years given such opportunities enthusiastically exclaimed, "I've taught my mother how to make bread!" The mother, a peasant woman from across the sea, had passed her childhood and youth in the fields, and, like many of her class, had received no training for the responsibilities of motherhood. To the large number of foreigners, who are constantly seeking homes in our free land, the privileges of the kitchen garden and the free cooking school would prove an inestimable blessing. When housework shall take its proper place among the professions, the chaos which now abounds in a majority of American homes will be forever banished. In home making, regarded as one of the noblest objects of every woman's life—in fact, *the* object whenever possible—lies the hope of the future. To this end God speed the kitchen garden and the cooking school!

EDUCATION.—The public school and kindergarten, free libraries, art galleries and museums, cheap literature, and compulsory education laws would seem, to the casual observer, to leave little need for the philanthropist in the field of education. A philosopher of to-day looks forward to the time when "the object of all free education shall be the emancipation of the individual," and to the time "when general education shall be supplemented by special schools for the special vocations of life."

The trend of the present system of education may be in that direction and the prospect more or less hopeful, but that the schools and other opportunities mentioned do not now reach all who need instruction is demonstrated by the success of the various clubs, classes, and lectures

which form so important a part of the humanitarian associations of to-day. Everywhere are found men and women of middle age who can not read or write, who were denied even a common-school education in youth; to reach such as these and make them not ashamed to accept and make use of the privileges for which they have secretly longed is practical philanthropy. Among the foreign-born population many children are early forced to help earn the necessities of life, and are taken from school as soon as the law will allow.

The college settlements have already accomplished much for this class, but their work has been confined to thickly settled districts in large communities. The story of The Abandoned Farm in New England is familiar, and bears its own pertinent lesson. Because of the opportunities for education, entertainment, and varied employment which the large city offers, the young people desert the farm, home ties are broken, and many lives ruined. Of the low ideals which prevail in many country districts there are striking illustrations.

A bright woman sojourning for a winter in a small town found that there were two hotels or taverns where liquor was sold, two churches where only occasional services were held, a single school-house kept open during the winter months, no hall except the ballrooms of the hotels (used only for dancing), no library, and no entertainments of a literary order. This woman organized a club or debating society, and after a few months of careful guidance she allowed the members to select their own topic for the last meeting of the season; to her great surprise, a debate was announced on the subject, "Whether it is better for a young man upon coming of age to have one thousand dollars or a good education." The majority decided that it would be better to have the money, because he could then speculate and gain a fortune!

What better missionary work could be done in behalf of education than to establish a "thought center" in every farming region or small town? The system of traveling libraries, a recent and encouraging movement, makes it possible (in some States) to place the best books and current literature in the homes of the farmers and of the inhabitants of the smallest towns. The books can be obtained, made use of, and exchanged for others, so that the interest may be perpetuated; the conditions are not difficult, and the fact

that a room or rooms must be provided for the safe keeping and the circulation of the library is important. A traveling library once secured, a "thought center" is established. Lectures, clubs, and classes will follow; they are a natural sequence. In addition to literary topics, talks on personal purity, physical culture (respect for the body as the temple of the soul), and on home ideals (plain living and high thinking) may be given. Good men and women, fitted to speak well on these subjects, will be ready to give their services. Where enthusiasm is once aroused, seed can be sown by such nonsectarian gatherings which fails to take root in the churches.

We are taught that the highest authority within man is the conscience. Rosenkranz, in his Philosophy of Education, gives this fine definition of conscience: "Conscience is the criticism which the ideal self makes on the realized self." To discover and quicken the ideal self wherever possible is one of the noblest aims of practical philanthropy.

EMPLOYMENT.—A recent report of the United States Labor Commissioner, Hon. Carroll D. Wright, states that the number of women laborers is increasing, but that women are more generally taking the places of children than of men; that the encroachment of women upon the occupations held by men is so far very slight, and only in conditions where women are better adapted for the particular work in which they are employed.

"Women," he says, "are considered by many employers to be more reliable, more easily controlled, neater, more rapid, industrious, polite and careful, and less liable to strike than men. Wyoming and Utah are cited as the only States which have laws according to men and women equal wages for equal work. There is still much economic injustice as to compensation for women's work, although some progress has been made within the last few years."

The agitation of the question of "equal pay for equal work," if it has not as yet accomplished much for the woman wage-earner, has at least revealed the fact that women as a class are not as well trained for the work they attempt as men. The number of unskilled women in all branches of trade presents a problem which may well engage the attention of the philanthropist. The necessity of earning to "keep the wolf from the door," the pleasure resulting from financial independence, and a desire to add to

"pin money" have all tended to increase the number of girls and women who are seeking employment outside the home. The fever has extended to the smaller towns, and even to the farmers' wives and daughters, until the supply greatly exceeds the demand in many localities, and the women really in need are often crowded to the wall in this inadequate race. In the passing of old ideas as to the proper status of woman much good has been evolved; it is no longer considered degrading to earn one's living, and the woman worker in every field is winning her way to the respect and recognition which she deserves.

What can be done to raise the standard of woman's work, to give more thorough training in vocations for which women are best fitted, to dignify important occupations which suffer from the lack of skilled service and which are not overcrowded because of mistaken ideas, and, above all, to make women ashamed to receive compensation which they do not fully earn?

The employment bureaus connected with the various organizations of women are endeavoring to answer these questions. Their object, as outlined, is to advise and adopt such methods as shall best assist women in their chosen vocations; to also provide a bureau of registration where applications can be received and information given.

A committee of practical women supervises the work and endeavors not only to secure temporary positions, but to confer permanent benefits on those who seek their aid. The applicants usually include stenographers, typewriters, copyists, clerks, governesses, matrons, nurses, housekeepers, seamstresses, laundresses, cooks, and housemaids. It is the rule, and not the exception, to find a girl or woman *specially* fitted for the position she seeks. The majority are not fitted even to do *one* thing well, and the ignorance and assumption shown are appalling.

To discover latent ability, to stimulate the desire to excel, to explain the rights of the employer and employee, and the moral obligations of both, is a part of the privilege of the women who give time and thought to the employment problem.

The Boston Women's Educational and Industrial Union has been able to render excellent service by the distribution of circulars cautioning women

against advertisements which offer large returns for work done at home. Its list of fraudulent firms, obtained by thorough investigation, has been sent to other associations, and has already proved of inestimable value to many women who would otherwise have been tempted to send money, allured by the attractive advertisements.

The list compiled gives the names of one hundred firms which are a "delusion and a snare," and which, on account of some trifling technicality, the law seems unable to touch.

To exalt the home and raise the standard of domestic service is another important object—perhaps the most important of all. From the ordinary intelligence office to the employment bureau under the guidance of educated women is a long step for progress.

In all humane effort, the more scientific the methods employed the better will be the results. According to Charles Kingsley, "scientific method needs no definition—it is simply the exercise of common sense."

HERBERT SPENCER AT SEVENTY-NINE.

The portrait of Herbert Spencer, which forms the frontispiece to this number of the Monthly, is from a photograph taken soon after he reached the age of seventy-eight. Though of late years his health has been unusually feeble, this is scarcely reflected in the face, which still retains in a marked degree the expression of intellectual strength that was so characteristic of his prime.

About the time Mr. Spencer completed the Synthetic Philosophy, or, as it is better known, the Philosophy of Evolution, with the publication of the third volume of the Principles of Sociology, we gave an account of The Man and his Work, from the pen of Prof. William H. Hudson, who had for a number of years acted as his secretary, and was so familiar with his thought that he afterward published an Introduction to the Philosophy, which Mr. Spencer himself has cordially commended. It was naturally supposed by his many friends that having practically carried out his original plan as laid down in his prospectus thirty-six years before, Mr. Spencer would throw off the cares and vexations of authorship, to enjoy the rest and relaxation that his arduous and long-continued labors had earned. But this, it seems, he was not inclined to do. Apparently as active intellectually as ever, he has kept at work to the full extent of his physical ability, devoting himself mainly to such additions and modifications of his published writings as new knowledge and the advance of thought have made necessary. This persistent industry, unusual, to say the least, in one so far advanced in life, the presentation of his latest portrait, and the interest which the world takes in the doings of a man who has so profoundly influenced the thought of his time, make this a fitting opportunity to refer to some of the later incidents in his career.

Though never inclined to plume himself on the importance or the grandeur of his great undertaking, wondering now that he ever had the "audacity" to begin it, and regarding its completion as more an "emancipation" than a triumph, Mr. Spencer is nevertheless entitled to the satisfaction which comes from the contemplation in the evening of a long life of the

fulfillment of the purpose to which that life has been devoted. Although he speaks of the series of works comprising the Synthetic Philosophy as "complete yet incomplete," because more things might have been put into it, Mr. Spencer has the unquestionable right to look upon his "system" as finished in all the essentials of a symmetrical and self-sustaining structure; and more than this, he finds it generally accepted as a masterpiece, embodying, if not all the truth, yet a fundamental truth manifested in the growth and order of the universe of matter and mind.

When we regard the comprehensiveness of Mr. Spencer's system, embracing everything there is, and the multitude of the details that had to be considered in the course of its preparation, we wonder at the magnitude of the aggregation that may be formed by the repetition of small daily tasks. The portions of time he was able to give to work were at most very brief, and would be regarded by the majority of workers as insufficient for any great accomplishment; and when the frequent and sometimes long interruptions that occurred are considered, seem absolutely insignificant. Yet in these small fragments of two or three hours a day with many lost days in the year, and several lost years, one of the greatest works in the history of the human mind was carried to its end. The old figure of the dropping of the water on the stone and the fable of the tortoise and the hare are newly illustrated.

Outside of his work in the composition of the Philosophy, Mr. Spencer has always taken a vital interest in leading public questions, making them the subjects of frequent communications to the press, and seeking the co-operation of others when opportunity offered either in combating some needless innovation or aiding some important reform. True to the teaching of his philosophy, it will be observed that in any attempts of the kind his reliance has always been on the power of gradual development, rather than abrupt changes by acts of Parliament or otherwise, to bring about desired conditions. Before his visit to the United States, in 1882, he interested himself in forming an Anti-Aggression League, for the purpose of opposing schemes for extending the lines of British dominion in various parts of the world. Among his associates in this effort were Mr. John Morley, Mr. Frederic Harrison, and the Rev. Llewellyn Davis and Canon Fremantle, now Dean of Ripon, liberal-minded clergymen of the Church of England. The movement found little public sympathy, and no adequate support. Mr.

Spencer, severely taxing his strength in promoting it, suffered another breakdown (from which he has never fully recovered), in consequence of which the next number of his Philosophy—Part VI of the Principles of Sociology: Ecclesiastical Institutions—did not appear till the close of 1855. It is worthy of remark in connection with this incident that it seems to have been left for non-Christians almost alone in a professedly Christian community to take the advance in inculcating and disseminating one of the central ideas of the Christian religion; as now, in the United States, with the orthodox church people almost unanimous in supporting war and the wildest schemes of aggression, it has been left for a few New England Unitarians first to dare to speak in protest against an iniquitous and perilous crusade for foreign dominion. Mr. Spencer has never neglected an opportunity to express in unmistakable terms his aversion to militancy, and has been at great pains to demonstrate, as in his Sociology, that the true road to all higher development of society is through encouraging the growth of its industrial factors.

A disposition manifested among English legislators to favor the passage of acts embodying some of the ideas of the socialists led to the publication of a series of magazine articles showing the demoralizing tendencies of measures of paternalism and foreshadowing the disastrous ultimate results that would ensue from the unnecessary interference of the state. These were afterward collected and published under the title of The Man *versus* the State, and are now bound up with the revised Social Statics.

From the spring of 1886 till 1889, when conditions of health compelled entire suspension of the work on the Philosophy, and it was even doubtful whether it could ever be continued, Mr. Spencer dictated the larger part of his autobiography. This has since been completed and put in print, but will not be published during his lifetime. It will comprise two considerable volumes.

Not finding life in a boarding house in all respects suited to his wishes, Mr. Spencer for many years entertained the idea of establishing himself in a home of his own in the suburbs of London, but had been deterred from so doing by the prospective troubles of housekeeping. In the summer of 1889, however, after making such arrangements as promised to relieve him in great measure of these cares, he finally carried out the idea by taking a

house in the neighborhood of Regent's Park. But though for some years the bachelor household was a success, we understand it eventually ceased to be so, though it was continued until Mr. Spencer changed his residence to Brighton two years ago. There was wanting in those who had immediate charge of details that feeling of identity of interests and that disposition to co-operate which belong to the ordinary family, and as a consequence differences grew up that could not be permanently composed, and that on the whole did not conduce to domestic tranquillity.

About the time his housekeeping experience was entered upon, Mr. Spencer found himself well enough to go on with the composition of his Philosophy. As he relates in the preface to the Data of Ethics and to Justice, he had already, ten years before, in the imminent doubt of ever being able to complete the work as it had been laid out, determined to devote his attention first to the end and ultimate object of the system—to that part of it to which all the rest was intended to lead up; the purpose, "lying behind all proximate purposes," of finding a scientific basis for the principles of right and wrong in conduct at large. When, now, the question arose again of what work to undertake first, completion of the Principles of Ethics was at once decided upon. As it was still doubtful whether he would be able to accomplish even this, he took up the part which seemed most important—Justice. This was published as Part IV of the Ethics in the summer of 1891. No further serious interruptions occurred in the execution of the work. Parts II and III, completing the first volume of the Ethics, were finished in the spring of 1892; and a year afterward Parts V and VI were added, forming, with Justice, the second volume.

The ethical part of the Philosophy as contemplated by Mr. Spencer having been completed, only two divisions remained to be worked out—Professional Institutions and Industrial Institutions, parts of the Principles of Sociology—to fill out the whole plan. A subsidiary discussion of considerable importance for the integrity of the theory of evolution now intervened to be disposed of before these parts of the work could be proceeded with. Prof. August Weismann had published a book in which he denied the transmission of acquired characters; or, as Mr. Spencer would word it, the transmission of functionally-wrought modifications—a very vital point in all Mr. Spencer's philosophy. Mr. Spencer took the matter up at once, and published several incisive essays refuting Professor

Weismann's positions. He opened his argument against the neo-Darwinian position with essays on the Inadequacy of Natural Selection, and on Professor Weismann's Theories, and followed them, at intervals of a few months, with the additional articles, A Rejoinder to Professor Weismann, and Weismannism Once More. Anxious that the question should be brought to the notice of every biologist, Mr. Spencer had reprints of these essays distributed among the teachers of the science all over Europe and America.

The work on the final stage of Mr. Spencer's great undertaking was begun about the middle of 1894. The reading of an editorial in the Popular Science Monthly having suggested to him that it would be desirable to do so, he published the chapters on Professional Institutions—serially in this periodical and in the Contemporary Review. The chapters on Industrial Institutions did not appear till the third volume of the Sociology was issued in November, 1896—the volume which was the culmination of the work so persistently prosecuted in the face of the most formidable and even seemingly hopeless difficulties. In these departments of the system, the argument was pursued, consistent with that which prevails in all the other departments, that in the professions and the industries the principle of evolution operates just as surely and completely as in the derivation of an animal species from its ancestral form.

Appreciation of the value of Mr. Spencer's work had been growing for many years, and its influence was gradually making itself felt in movements of various kinds in the active world. Whatever he wrote or said received attention at once, was discussed, or influenced action. The completion of his Philosophy was deemed worthy of formal notice and a proper subject for felicitation wherever science was known, and in England was regarded as a suitable object for a national memorial. An address of congratulation was prepared for presentation to him, and with it went a request that he would have his portrait painted to be presented to the nation. It has always been his principle to decline offers of testimonials, on the ground that the custom had become an abuse, and persons invited to participate in presentations were often put under a kind of moral obligation to comply, to which he would not be, even incidentally, a party. Consistently with this attitude and not realizing the real nature of the movement in favor of a testimonial and how really spontaneous it was, he wrote to its promoters repeating his objections and asking that it be not pressed. But when the address was

presented and he saw the list of illustrious names attached to it, including those of men who had been his antagonists, he yielded to what was evidently a spontaneous feeling of the representative men among his countrymen, and sat for his portrait as soon as circumstances permitted, or about a year afterward, to Mr. Hubert Herkomer. The following is the letter of congratulation and the request for his portrait, with the names of the distinguished signers, and Mr. Spencer's reply:

THE CAMP, SUNNINGDALE, *December 16, 1896*.

DEAR SIR: We, the undersigned, offer you our cordial congratulations upon the completion of your System of Synthetic Philosophy.

Not all of us agreeing in equal measure with its conclusions, we are all at one in our estimate of the great intellectual powers it exhibits and of the immense effect it has produced in the history of thought; nor are we less impressed by the high moral qualities which have enabled you to concentrate those powers for so many years upon a purpose worthy of them, and, in spite of all obstacles, to carry out so vast a design.

To the many who, like us, have learned to honor the man while profiting by his writings, it would be a satisfaction to possess an authentic personal likeness of the author. It has therefore occurred to us that the occasion might be appropriately marked by requesting you to permit us to employ some eminent artist to take your portrait, with a view, to its being deposited in one of our national collections for the benefit of ourselves and of those who come after us.

We hope that your health may be benefited by the leisure which you have earned so well, and that you may long continue to enjoy the consciousness of having completed your work.

W. DE W. ABNEY, R. E., C. B., D. C. L., F. R. S., Pres. Physical Society.

ROBERT ADAMSON, M. A., LL. D., Prof, of Logic, Glasgow University.

GRANT ALLEN, B. A.

ALEXANDER BAIN, M. A., LL. D., Professor of Logic, Aberdeen University.

Sir George S. Baden-Powell, K. C. M. G., M. A., M. P.

Right Hon. Arthur James Balfour, P. C., D. C. L., F. R. S., M. P.

Sir Robert Stawell Ball, LL. D., F. R. S., Lowndean Prof. Ast., Camb.

H. Charlton Bastian, M. A., M. D., F. R. S., Prof. Medicine, Univ. Coll., London.

Frank E. Beddard, M. A., F. R. S., Prosector Zoölogical Society.

John Beddoe, M. D., F. R. S.

Sir Walter Besant, M. A.

E. W. Brabrook, Pres. Anthropological Institute.

Bernard Bosanquet, M. A.

C. V. Boys, F. R. S., Assistant Prof. Physics R. C. S.

T. Lauder Brunton, M. D., D. Sc., F. R. S.

Edward Clodd.

F. Howard Collins.

Sir J. Crichton-Browne, M. D., LL. D., F. R. S.

W. H. Dallinger, LL. D., D. Sc., F. R. S.

Francis Darwin, M. A., M. B., F. R. S.

George H. Darwin, M. A., LL. D., F. R. S., Plumian Prof. Ast. and Exp. Physics, Cambridge.

W. E. Darwin, B. A.

James Donaldson, M. A., LL. D., Principal University St. Andrews.

Right Hon. Sir M. E. Grant-Duff, P. C., G. C. S. I., F. R. S. Earl of Dysart.

Sir John Evans, K. C. B., D. C. L., LL. D., D. Sc., Treas. R. S.

Sir Joshua Fitch, LL. D.

Michael Foster, M. A., M. D., LL. D., D. C. L., Sec. R. S., Prof. Physio., Cambridge.

Edward Frankland, M. D., D. C. L., LL. D., F. R. S.

Right Hon. Sir Edward Fry, P. C., LL. D., D. C. L., F. R. S.

Sir Douglas Galton, K. C. B., D. C. L., LL. D., F. R. S.

Francis Galton, M. A., D. C. L., D. Sc., F. R. S.

Richard Garnett, LL. D.

Sir George Grove, C. B., D. C. L., LL. D.

Albert C. L. G. Günther, M. A., M. D., F. R. S., Pres. Linnean Society.

Frederic Harrison, M. A.

James Edmund Harting.

Right Hon. Lord Hobhouse, P. C.

Henry Hobhouse, M. A., M. P.

Shadworth Hodgson, late Pres. Aristotelian Society.

Sir Joseph Dalton Hooker, K. C. S. I., C. B., M. D., D. C. L., LL. D., F. R. S.

William Huggins, D. C. L., LL. D., F. R. S.

J. Hughlings Jackson, M. D., LL. D., F. R. S.

William Knight, LL. D., Prof. Moral Philosophy, St. Andrews.

Andrew Lang.

E. Ray Lankester, M. A., LL. D., F. R. S., Linacre Prof. Anatomy, Oxford.

Sir Trevor Lawrence, Pres. Royal Horticultural Society.

W. E. H. Lecky, M. A., LL. D., D. C. L., M. P.

J. Norman Lockyer, C. B., F. R. S., Prof. Astr. Physics, R. C. S.

Right Hon. Sir John Lubbock, P. C., D. C. L., LL. D., F. R. S., M. P.

Vernon Lushington, Q. C.

P. A. MacMahon, R. A., F. R. S., late Pres. Math. Society.

James Martineau, D. D., LL. D., D. C. L.

David Masson, M. A., LL. D., Emeritus Prof. Rhetoric, Edinburgh.

Raphael Meldola, F. R. S., Pres. Entomological Society.

C. Lloyd Morgan, Prin. University Coll., Bristol.

Right Hon. John Morley, P. C., M. A., LL. D., F. R. S., M. P.

C. Hubert H. Parry, Prin. R. Coll. of Music.

General Pitt-Rivers, D. C. L., F. R. S.

Edward B. Poulton, M. A., F. R. S., Prof. Zoöl. Oxford University.

Sir William O. Priestley, M. D., LL. D., M. P.

Lord Reay, G. C. S. I., G. C. I. E.

Lord Rayleigh, M. A., D. C. L., LL. D., F. R. S., Prof. Nat. Philos. Royal Institution.

David G. Ritchie, M. A., Professor of Logic St. Andrews University.

Sir Henry E. Roscoe, LL. D., D. C. L., F. R. S.

J. S. Burdon Sanderson, LL. D., D. C. L., F. R. S., Reg. Prof. of Medicine Univ. Oxford.

George H. Savage, M. D., F. R. C. P.

E. A. Schäfer, F. R. S., Prof. Physio. Univ. Coll. London.

D. H. Scott, M. A., Ph. D., F. R. S., Hon. Keeper Jodrell Laboratory, Kew.

Henry Sidgwick, M. A., Litt. D., D. C. L., Prof. Moral Philos. Univ. Camb.

W. R. Sorley, Prof. Moral Philos. Univ. of Aberdeen.

Leslie Stephen, M. A., Litt. D., LL. D.

G. F. Stout.

James Sully, M. A., LL. D.

W. T. Thiselton-Dyer, C. M. G., C. I. E., M. A., F. R. S.

John Venn, Sc. D., F. R. S.

Sydney Howard Vines, M. A., D. Sc., F. R. S., Prof. Botany Univ. Oxford.

Sir Willoughby Wade, M. D., F. R. C. P.

Alfred Russel Wallace, D. C. L., F. R. S.

Beatrice Webb.

Lady Victoria Welby.

Samuel Wilks, M. D., LL. D., F. R. S., Pres. R. College of Physicians.

Hawarden, *November 30, 1896*.

My Dear Sir: It has long been my rule to decline joining in groups of signatures, nor do I think myself entitled to bear a prominent part in the present case. But I beg that you will, if you think proper, set me down as an approver of the request to Mr. Spencer, whose signal abilities and, rarer still, whose manful and self-denying character, are so justly objects of admiration.

I remain your very faithful,

W. E. Gladstone.

F. Howard Collins, Esq.

2, Lewes-crescent, Brighton, *December 19, 1896*.

My Dear Hooker: If, as may fitly be said, the value of congratulations increases in a geometrical progression with the eminence of those offering them, I may, indeed, be extremely gratified by the accumulation coming from men standing so high in various spheres. And an accompanying pleasure necessarily results from the good wishes expressed for my health and happiness during my remaining days.

The further honor offered has caused in me some mental conflict. Eight years ago, to the inquiry whether I would sit for a subscription portrait to be painted by Millais, I replied negatively, assigning the reasons that the raising of funds to pay the costs of conferring marks of approbation had grown into an abuse; that the moral coercion under which contributions were in many cases obtained was repugnant to me; and that I objected to have my known and unknown friends asked to tax themselves to the required extent. These reasons survived, and, swayed by them, I recently sent a copy of the letter in which they had been stated to the gentleman with whom the proposal now made originated, thinking thereby to prevent further trouble. I was unaware to how large an extent the proposal had been adopted and how distinguished were the numerous gentlemen who had given it their support. I now find myself obliged either inconsistently to waive my objection or else rudely to slight the cordially-expressed feelings and wishes of so many whose positions and achievements command my great respect. Between the alternatives there seems to be practically no choice. I am compelled to yield to the request made in so sympathetic a manner by signatories so eminent, and at the same time must express to them through you my full sense of the honor done me.

I am, my dear Hooker, sincerely yours,

Marks of honor offered to Mr. Spencer from time to time since 1871 have included doctor's degrees from the Universities of St. Andrews, Bologna, Cambridge, Edinburgh, and Buda-Pesth; and elections as foreign member or correspondent of the Academies of Rome, Turin, Naples, Paris, Philadelphia, Copenhagen, Brussels, Vienna, Milan, and the Prussian order "*Pour le Mérite*." Mr. Spencer has been prompted year after year to decline these various honors by the conviction that instead of being, as commonly supposed, encouragements to literature and science, they are discouraging. He contends that they constitute a system of inverse handicapping. In physical competitions it is usual to give the younger a certain artificial advantage when they are set against the elder; but in these mental competitions between the rising men and the men who have risen the reverse practice is followed—the men who have risen have an artificial advantage, and the younger men, who of necessity have much to struggle against, have their difficulties artificially increased by the absence of titles which their competitors possess. Mr. Spencer is quite aware that the course he has persistently followed has cost him much, since a list of honors on the title-pages of his books would have greatly increased the attention paid to them by critics and others. Nevertheless, he has continued to make this practical protest.

Since completing his Philosophy, Mr. Spencer has occupied his working hours with the revision of the Principles of Biology, making the modifications and incorporating the new facts which the progress of the science demands. He recognizes that the advance has been more rapid in this branch than in any other; and that while it might be almost hopeless for him at his time of life to bring a work on biology at large up to date, the case is different in an exposition of the Principles of Biology. The additions to the work include a chapter on Metabolism supplementing the discussion of vital changes of matter; a chapter on the Dynamic Element in Life, to render less inadequate the conception of life previously expressed; some pages on Structure; an account, under the head of Cell Life and Cell Multiplication, of the astonishing actions in cell nuclei which the microscope has revealed; a further chapter on Genesis, Heredity, and Variation, in which certain views enunciated in the first edition of the book are qualified and developed; a review of various modern ideas under the

title of Recent Criticisms and Hypotheses; a rewriting of most of the chapter on The Argument from Embryology; and a number of changes incorporated as sections in pre-existing chapters. The articles on Weissmannism are incorporated in an appendix. In performing this work assistance was needed, and the author sought and received criticism and help from different persons, each taking a division falling within the range of his special studies: Prof. W. H. Perkin in organic chemistry and its derived subjects; Prof. A. G. Tansley in plant morphology and physiology; Prof. E. W. MacBride and Mr. J. T. Cunningham in animal morphology; and Mr. W. B. Hardy in animal physiology. The first volume of this work, recently published, has been received with favor by persons of all shades of opinion respecting the questions it touches. The London Times, in not the friendliest of criticisms, says that even persons who do not accept the author's Philosophy will rejoice that he has been able to complete it, and adds that as it stands it "is a marvel of erudition: every page exhibits the wealth and variety of illustration for which Mr. Spencer is justly famous." The latest notice of it that we have observed, a French one in the *Revue Scientifique*, says that in consulting it biologists "will not lose their time, and many will find valuable ideas in it, suggestions by which their experimental work can not fail to be greatly benefited. And, like us, they will be filled with admiration for a work so condensed, and at the same time so admirably co-ordinated, so replete with facts and ideas, of the philosopher who has exercised so great an influence on the science of his times, and who is one of the finest intellectual glories of his country and of the present epoch." Perhaps one of the most significant of recent testimonials of appreciation of the Synthetic Philosophy is the announcement of the publication of a complete translation of First Principles into Japanese by Mr. Fujii, who has devoted several years to the work. "Mr. Spencer's works," it is added, "have long had a great attraction for Japanese translators." Mr. Spencer is now engaged upon the second volume of the Biology.

It was formerly Mr. Spencer's custom to spend about nine months of the year in London and the three summer months in the country, but for several years past he has found the fogs and other gloomy winter conditions of the metropolis too trying. The confinement enforced upon him by increasing feebleness has, moreover, precluded his enjoyment of the social privileges,

particularly of the Athenæum Club, which were one of the attractions that made a town residence tolerable. He therefore, at the beginning of 1898, took up his residence in Brighton, where he has a house looking upon the sea, and giving him the benefit of the flood of light which that place enjoys.

At present Mr. Spencer is able to give very little time to work, and being confined to the house most of the time, the routine of his daily life admits of little variety. His first business in the day is to hear the morning paper read; then he attends to his correspondence, and if well enough does a little work. If any matter is going through the press he will generally be seen with a proof close by. His afternoon is spent in such relaxation as is afforded by scanning the illustrated papers and magazines, listening to music, which must always be classical, or, if sufficiently well, a drive; and he retires at ten o'clock.

It is often asked, Miss Mary H. Kingsley says in her West African Studies, whether Christianity or Mohammedanism is to possess Africa —"as if the choice of Fate lay between these two religions alone. I do not think it is so, or at least it is not wise for a mere student to ignore the other thing in the affair, fetich, which is, as it were, a sea wherein all things suffer a sea change. For, remember, it is not Christianity alone that becomes tinged with fetich, or gets ingulfed and dominated by it. Islam, when it strikes the true heart of Africa, the great forest belt region, fares but little better, though it is more recent than Christianity, and though it is preached by men who know the make of the African mind."

President Charles W. Dabny, Jr., of the University of Tennessee, once said in an address that when in school, where the work was all done "at the point of the hickory, so to speak," the best teacher he had "was the kindly old neighborhood loafer," who roamed the woods with him, told him of the times of the wild flowers and the habits of the birds, and taught him to shoot the long rifle. He followed the "natural method, and showed a pupil how to do a thing by doing it."

Editor's Table.

SCIENCE AND THE STATE.

It is probably not too much to say that the true measure of the intelligence and efficiency of a government is the extent to which, in the various spheres of activity which it controls, it recognizes the authority and adopts the methods of science. There is one department of Government—the remark might be applied to nearly all civilized governments, and very pointedly to our own—in which science receives a large and serious recognition, and that is the Navy Department. We have lately had a striking exhibition, which the world at large has watched with great interest, of the high state of efficiency to which a navy can be brought in a comparatively short space of time. If the question is asked how it was done, there is but one answer: it was done by recognizing science and working on scientific lines. To work on scientific lines is simply to study carefully, in the light of the best available knowledge, the means for accomplishing a desired end, and having found the best means, to adopt them in practice. Our naval administration has fortunately been able to repel if not wholly, at least to a remarkable extent, the intrusion of "political" influence, and has consequently been able to apply itself without serious distraction to the accomplishment of its own special tasks. It has called science to its aid not only as regards purely physical questions, but as regards questions of organization; and the result is that it has succeeded in giving the nation not only ships and guns, but the men who are fitted by knowledge, by training, and by discipline to make the best possible use of the ships and guns.

Next to the navy in the recognition accorded to science, but yet a long way off, comes the army. We are speaking now, of course, of our own army; and what the "long way off" meant in waste of money and of human life, in the suffering and misery of brave men, is a too familiar tale. Had science governed the operations of the land forces and presided over their whole organization to the same extent that it did over the operations and organization of the navy, a certain recent page of history would have borne

a very different record, and would not have been so burdened as it is with shame and heartache to patriotic citizens.

Killing and being killed are serious matters, and everybody understands that the business can not safely be trifled with. That is why science is allowed to have its own way almost entirely in the navy, and to exercise a large measure of control in the army, with the effect of rendering the first a nearly perfect machine, and giving to the latter a high degree of efficiency for its own purposes. But have we not here object lessons which ought to be applied to other departments of the Government? Is it only in the matter of killing that the aid of science is required? Can the public at large not rise to the conception that, if science can make splendid killing machines, it might also, if allowed fair play, make excellent administrative machines for peaceful purposes? We have departments which deal with such important matters as currency and finance, agriculture and statistics, the administration of justice, the control of railway traffic, the erection of public buildings and the improvement of waterways, the carrying out of geodetic and geological surveys, the representation of the country abroad, the protection of the public health, and, finally, the great question of public education. It must be obvious to every thoughtful person that, if science could have its say and its way in relation to these matters, it would put them all on the best footing which the existing condition of knowledge permits. It would ask, "What are the objects to be accomplished?" and would proceed to select the persons and adopt the means best fitted to realize those objects. The country would then have a civil service in which economy and efficiency would be equally conspicuous, and which would furnish examples for imitation in private enterprise of the best ways of doing things.

It is needless to say how far removed the present condition of government business is from anything like scientific organization. If killing must be done scientifically, the injured feelings of the politician find relief in insisting that nearly everything else within the sphere of government action shall be done most unscientifically. In the filling of important positions the first thing considered is not the question of fitness for the work to be done, but the question of party advantage. It is not too much to say that a prejudice frequently exists against a man conspicuously qualified by knowledge, experience, and character for a given post. There is an

uncomfortable feeling that such a man might not be sufficiently pliable afterward in the hands of those who had appointed him—that the preposterous idea might get into his head that, having obtained the office on his merits, he was at liberty, in the execution of his duties, to think only of the public interest. The preference of the politician, therefore, for "the boys" is easily understood; but "the boys" and science do not work hand in hand.

Our universities are turning out year by year men possessing the highest scientific qualifications, men who have studied both in this country and in Europe, and who are prepared to take any positions in which scientific work is required. Some of these are absorbed by the teaching profession, but the great majority find employment in the various industries of the country. Unfortunately, the attainments of such men give them no special advantage as regards employment in the public service of the country; to qualify for that they must graduate in another school entirely, and get certificates from a very different class of professors. We are far from holding the opinion that men of high education should dissociate themselves from the political life of the country; but it is unhappily true that the kind of interest which an intelligent man who places the nation above party can take in politics is not likely to recommend him to those who have the dispensing of places. The fact should, however, be emphasized that if science does not receive due recognition in connection with the public services, it is not because of any lack of native-born citizens capable of representing it with credit and even with distinction. In this respect America has placed herself fully abreast with the most advanced nations of the modern world, and the Government has only to say what service it requires in order to have its choice of men possessing every qualification to render that service in the most competent and satisfactory manner.

In the last resort, it must be admitted, the fault rests with the people. It is with reluctance that the average elector acknowledges—if he can be brought to acknowledge at all—that any public office requires special qualifications. Such an idea seems to be at war with true democratic doctrine, and to imply a serious abridgment of the powers of the people's representatives. It is readily conceded that private industries and enterprises of all kinds call for training and experience and special knowledge on the part of those who conduct them; but Government business is supposed to be so simple that a wayfaring man, though a pronounced fool, need not err

therein. There is more or less hypocrisy, however, in the pretension. The real underlying thought is that, outside of the two great killing departments, no very serious harm can be done by official incompetence, and that the great thing is to provide for "the boys." No idea could be more false. The evil that can be done by unwise economic measures, for example, is incalculable. The army and navy are brought into action only when the dogs of war have been let loose; but the influence of the civil departments of the Government acts unceasingly, and touches the life of the people at a thousand points.

In the matter of public education science has never had the recognition to which it is entitled; nor will it have until the people as a whole know better what science is—until they cease to think of it as a thing of mysteries and technicalities, and come to understand that it is simply the organization of knowledge and the rendering of it available for guidance in the business of life. Meantime, wherever circumstances are favorable, the education of the young, even of the youngest, should be given as far as possible a scientific character. We are strongly inclined to the opinion that, in a country whose fundamental industry is agriculture, an effort should be made in all schools to impart a few sound elementary ideas as to the principles of agriculture. What better starting point could there be for scientific instruction than the soil out of which we derive, mediately or immediately, all that goes to sustain life? It seems to us that no human being should be permitted to be wholly ignorant of the conditions upon which the successful cultivation of the soil depends, and we are persuaded that the subject might, by proper treatment, be made deeply interesting to the vast majority of school children.

A prominent Englishman, Mr. Boyd-Kinnear, has lately been discussing this matter in a London paper. He points out that a knowledge of the scientific principles of agriculture is of fundamental importance, and that whatever else is taught in the national schools, the sciences on which farming rests—physics, chemistry, mechanics, and the physiology of plants and animals—should hold a principal place. He observes that in order to know agriculture it is necessary to understand, first of all, the elements and the action of the soil and the air. There is urgent need, he contends, for teaching what is known on these subjects and for pursuing research into the much larger field of the unknown. In these remarks we entirely concur, and we believe

that it would be a happy thing for this country, and for every country, if education could be so administered that, instead of tending, as it so often does, to separate human beings from the soil, it should tend to establish in their minds a sense of their dependence on it and an intelligent, if possible a loving, interest in the operations by which the living of the world is won and the face of Nature is beautified. Here, as we conceive, is where scientific teaching should begin. Such a system of instruction would do much more than increase the intelligence of the farming community, though that would be a benefit of the first magnitude; it would so transform public opinion in general that the divorce we now see between science and the State would no longer be possible. The whole national life would be placed on a sounder basis; and it would probably be found that the result of doing other things scientifically was to diminish very greatly the importance of the arrangements for scientific killing. A nation governed by science would be a peace-loving and peace-maintaining nation.

AGRICULTURE AND NATIONAL LIFE.

Some very interesting points of view are presented in an article on the food supply of England which appeared a few months ago in The New Century Review of London. The writer, Mr. Richard Higgs, Jr., is very unwilling to admit the commonly accepted view that Great Britain must be dependent upon other countries for the food her people require. He holds that all that is required to make the production of grain profitable in England is the application of higher intelligence and more businesslike methods to the work of the farm. "Speaking generally," he says, "agriculture has been of late a despised industry; intellectual activity has not been brought to bear on it; the men of force and enterprise have failed to recognize that it offers an absolutely unrivaled sphere for the exercise of personal initiative, skill, and knowledge.... Agriculture has not been regarded as a means of assisting human development, but rather as a hindrance to progress. A low type of manhood and a slow, unprogressive condition of life are usually regarded as indispensable to agriculture, and consequently it has been neglected by reformers who desire to further the progress of the race."

The writer proceeds to describe the various ways in which, as he believes, agriculture might be made more profitable, partly through lowering of the

cost of production, and partly by improvement of the yield; and, finally, he sets forth the disagreeable and very serious conclusions which flow from the proposition—if it is to be accepted as established—that Great Britain can not feed herself by the remunerative production of wheat in the face of low prices. In the first place, the national policy must be one of "bluff and weakness toward other nations: bluff, because it will not answer our purpose to appear weak; and weakness, because, seeing that possible enemies are our largest feeders, we are not in a condition to deal with other nations on equal terms, but must ever face the galling necessity of being dependent upon the good will of a few powerful nations for our daily bread." A nation so situated must be "in the front rank of the nations which are engaging in the mad scramble after markets"; must give itself over "to all the orthodox requirements of diplomacy by engaging in bullying, cringing, lying, deceit, and massacre, in order to secure an outlet for its manufactured goods." Such a fact further implies "the eternal persistence on the face of the land of those hideous monstrosities—our manufacturing towns; those excrescences which, like the dragon of old, are daily vomiting fire and smoke, and by their foulness are blasting and cursing the lives of the people and causing the physical, mental, and moral deterioration of the race.... It banishes the poetry, the music, and the glories of an agricultural life, and condemns untold millions to the artificial and unhealthy moral atmosphere of our towns."

It may be said that all this has not much application to the state of things in these happy United States. It has application to at least this extent, that our towns too are becoming bloated and our country places starved. We are fully at one with the writer in his estimate of the agricultural life, and believe that no greater service could be rendered to any country than to place its agriculture on the moral and intellectual, as well as on the economic, level which it has a just claim to occupy. It is the application of science to agriculture that will bring about this result.

Scientific Literature.

SPECIAL BOOKS.

The Theory of the Leisure Class[58] of Mr. *Thorstein Veblen* is primarily an inquiry into the place and value of the leisure class as an economic factor in modern life. Hardly less attention, however, is given to the origin and line of derivation of the institution, and to features of social life not commonly classed as economic, into the very heart of some of which the study goes. The institution of the leisure class, which is defined generally as that class whose occupation is not industrial, is found in its best development at the higher stages of the barbarian culture, as in feudal Europe or feudal Japan. Whichever way we go from this point it is modified. Its origin appears at a very early stage in history, and appears in the germ in the savage division of the occupations of men and women. The women carried on the industries, and the men went to the hunt or to war—occupations with which the idea of prowess or exploit was associated, giving the stamp of aristocracy. In the highest development of this distinction, the nonindustrial upper-class occupations may be roughly comprised under the heads of government, warfare, religious observances, and sports. In the sequence of cultural evolution the emergence of a leisure class coincides with the beginning of ownership, ownership of women being one of the most conspicuous forms in earlier times, then ownership of property and its symbols. Among the signs of wealth are conspicuous leisure, which includes social distinction and functions and conspicuous consumption, or the possession of fine things not necessaries, and plenty of them. These lead to the setting up of a pecuniary standard of living and pecuniary canons of taste, and the adoption of dress as an expression of the pecuniary culture. In the chapter on Industrial Exemption and Conservatism we are introduced to the reason of conventionalism and of its power. "The fact that the usages, actions, and views of the well-to-do leisure class acquire the character of a prescriptive canon of conduct for the rest of society gives added weight and reach to the conservative influence of that class. It makes it incumbent upon all respectable people to follow their lead." Hence it exerts a retarding

influence on social development, stiffening the resistance of all other classes against innovation. Further, the code of proprieties in vogue at any given time or in any society has the character of an organic whole, and any important infringement upon it is likely to derange it. This conservative quality goes so far as to tend toward spiritual survival and reversion. The idea of prowess survives in our barbaric admiration of military exploits, in the taste for sports, and in the gambling tendency, which is based on belief in luck and is enhanced by the desire to triumph at the expense of another. A connection is traced between the admiration of prowess and the cultivation of the devotional spirit which, joined with the fondness for display, leads all worshipers eventually to elaboration of rituals. A further development, classed as Survivals of the Non-Invidious Interest, is that of beneficences. The Higher Learning was primarily the exclusive privilege of the leisure class, and has still attached to it a mass of ritual in the shape of paraphernalia, ceremonies, degrees, and privileges which grow more elaborate as the college and the community become richer. Devotion to classical learning, which is practically useless, is a form of "conspicuous leisure" and "conspicuous expenditure," but now encounters a rival in athletics, which is equally useless and conspicuous and more costly.

The American Economic Association, at its meeting in Cleveland, Ohio, in 1897, authorized the appointment of a committee to inquire into the scope and method of the eleventh census, with a view of determining what ought to be attempted in the twelfth. In order to make an adequate review of the eleventh census this committee invited a certain number of critical articles on particular portions of the work; and further, in order to discover what might seem weak points in the work and what inquiries it might seem desirable to elaborate in the twelfth census, addressed a circular letter of questions to all the members of the association. Only about sixty replies were received to the questions, but a generous response was made to the invitations to contribute reviews, the result of which is a series of papers by independent authors upon specific topics which are regarded as constituting a very valuable commentary on the Federal census and on statistical methods in general. These criticisms are now embodied in a book[59] of more than five hundred pages, containing twenty essays by authors each of whom is specially interested in the particular topic of which he treats. These articles include a general review of the statistics of population, by Walter F.

Wilcox, and special articles on the negro population, by W. Z. Ripley; the North American Indians, by Franz Boas; Age, Sex, Dwellings, and Families, and Urban Population, by George K. Holmes; Illiteracy and Educational Statistics, by Davis R. Dewey; Statistics of Occupation, by Richard Mayo-Smith; Various Aspects of the Vital and Social Statistics, by Cressy L. Wilbur, Irving Fisher, Roland P. Falkner, and Samuel M. Lindsay; of Agriculture and Farms, by N. I. Stone and David Kelley; Transportation, by Emery R. Johnson and Walter E. Weyl; Manufactures, by S. N. D. North, William M. Stewart, Worthington C. Ford, and Charles J. Bullock; Wealth, Debt, and Taxation, by Carl C. Plehn; Municipal Finance, by Henry B. Gardner; and the Scope and Method of the Twelfth Census, by William C. Hunt. A number of general conclusions are pointed out by the committee as deducible from the papers contributed by these writers. The criticism throughout touches not so much the accuracy of the census as the treatment of the data and the lack of continuity from census to census—both defects believed to be largely due to the insufficient time allowed by law for preparing plans and schedules. The work of the census is believed to be seriously impeded by the number and variety of the investigations ordered, in consequence of which fundamental inquiries can not receive attention. A number of subordinate inquiries might advantageously be transferred to established bureaus or departments under whose scope they would properly fall, and some of which already publish annual volumes of kindred statistics. Among classes of defects or weaknesses in method pointed out in the criticisms are a lack of comparability in data from census to census, lack of co-ordination, certain specified faults in method, and faults in the textual analysis of the figures. A summary of the answers received to the circular letter of questions is appended, particularly of the answers to the request to suggest what special information might be furnished by the twelfth census which is not in the eleventh. Many of the writers point to the desirability of a permanent census bureau. The committee has a right to congratulate itself, as it does, "upon this noteworthy collection of papers—the result of the scientific zeal and effort of so many men."

GENERAL NOTICES.

The qualification of Mr. *Frederick A. Ober* to write a book about *Puerto Rico and its Resources*[60] is indicated by the facts that he visited every

point of importance on the island in 1880, and revisited it as West Indian Commissioner for the Columbian Exposition. To the fruits of observations made during these two visits he has added information gathered from the books that have been written about Puerto Rico by Spanish and other officers. A plain, concise account of the island is presented, without sensational exaggerations and free from apparent padding. It begins with the consideration and estimation of the commercial and strategic value of the island. Next its coastal features, rivers—of which it seems to have a relatively good supply—and harbors are described. Then the climate, which is "hot and moist, yet in the main less injurious to the health of white people than that of adjacent islands"; seasons, which are not very variable; and hurricanes, which appear to be rather an important feature. As to products, they are of course tropical, and grow, as in Mexico, in three zones of climate and vegetation. Considering these more specially a chapter is given to Sugar, Tobacco, Coffee, and Cacao; another to Fruits, Spices, Cereals, and Food Plants; and a third to Dyes, Drugs, Woods, and Minerals. The chapter on Natural History includes accounts of game and insect pests. The topographic description begins with San Juan, the capital, and takes in the cities and towns of the coast and the inland towns and routes of travel. A few words are devoted to the government as it has been, and the general characteristics of the people are briefly sketched. Accounts of their foods, drinks, diversions, etc., are given, after which the author passes to the Indians of Puerto Rico. Two chapters relate to the general and the recent history of the island respectively. Considerable information of a statistical character is included in an appendix.

President *D. S. Jordan's Footnotes to Evolution*[61] is made up of popular essays or addresses on the general subject of organic evolution which were given originally as oral lectures before University Extension Societies. Three of them have been also published in this Monthly, and as many in another magazine. Besides the author's own twelve essays, he has inserted in this volume three other papers of special importance, setting forth the present state of knowledge concerning the methods of evolution and of heredity. These are on the Factors of Organic Evolution as displayed in the Process of Development, by Prof. E. G. Conklin; the Physical Basis of Heredity, by Prof. F. M. McFarland; on The Testimony from Paleontology, by Prof. J. P. Smith. President Jordan's own essays begin with a discussion

of the kinship of life. This is followed by three articles on evolution, relating to its nature, elements, and factors from the point of view of embryology, and an application of the subject in the paper on The Heredity of Richard Roe, in which the rise of race types from the survival of the existing race with its best results modified and preserved by the survival of the fittest is illustrated. In the seventh essay certain facts of animal distribution as related to the origin of species are considered; in the eighth (Latitude and Vertebrata) the curious biological problem of the possession of more numerous vertebræ by northern than by tropical fishes is considered—a problem the solution of which on any other hypothesis than that of the derivation of species would be impossible. The evolution of mind is then taken up as the sum total of all psychic changes, actions, and reactions, and this development is extended to nations the laws of whose greatness "expand themselves from the laws which govern the growth of the single cell." In the essay on Degeneration a lesson is drawn in favor of individual initiative. Hereditary Inefficiency is discussed in view of the danger from pauperism. Some of the aspects of the woman question are considered in another of the essays. In the paper on The Stability of Truth some recent enunciations of Lord Salisbury, Mr. Balfour, and Haeckel respecting science are criticised. The last essay is on The Struggle for Realities, and concerns the relations of science and conservatism, the Church, etc.

Mr. *Robert P. Porter's* volume on *Industrial Cuba*[62] deals with living questions of the island. It aims to give a description of Cuba as it appeared to the author when he visited it in the fall of 1898 as special commissioner of the United States to report on its industrial, commercial, and financial condition. It is the result of nearly seven months' inquiry and hard work, in which the island was visited three times, more than five hundred witnesses were examined, and "numerous statements" were studied and analyzed. Among the special subjects treated of are the political and economical condition of Cuba, the outlook for labor, the population, sanitary work, Colonel Waring's report, municipal problems in Havana, banks and currency, the revenue and tariffs, commerce, sugar, tobacco, mines and mining, agriculture and stock, timber and fruit, transportation, navigation, education and religion, and the outlook for the future.

Naturalists and bibliophiles have reason to be grateful to Mr. *Call* for his verbatim reproduction of Rafinesque's *Ichthyologia Ohioensis*.[63] The book is of importance as constituting, in the language of the editor, the foundation of fresh-water ichthyology in America. No book dealing specifically with the Ohio Valley area as a region has since been published. The original description of many fish forms which are now recognized by ichthyologists as good species were first given in this book, and many have not since been reprinted. Further, the book contains the first and most complete description, to date, of the Ohio River from Pittsburg down, with notices of all its tributaries. Its value as a book about fishes is not limited to the Ohio River, for the species of that stream are found, to a greater or less extent, throughout the Mississippi Valley, so that it is in effect a necessity to all students of the fresh-water fishes of that territory. The editor regrets that Rafinesque did not preserve in some manner the types of his genera, instead of which, when the technical description was completed and some common form, if one was known, was referred to, the specimen was discarded or rejected. Hence his descriptions can not be compared conveniently with prepared specimens in cabinets or with descriptions made from them, but the student must go to the river and look up the living fish. The original papers of Rafinesque on fishes were published in The Western Review and Miscellaneous Magazine, Lexington, Ky., in 1819, 1820, and 1821. The matter was then arranged in book form from the same type. Two different systems of pagination resulted. These have both been indicated in the present edition by the insertion of the numbers at their proper places. The reprint is an exact copy of the original, including even typographical errors, excepting only the style of type. Of the original edition only eight copies are known to exist, so that the republication was desirable to preserve the book, as well as for the facilitation of reference, and of this only two hundred and fifty numbered copies are printed for the market.

Mr. *Douglas Houghton Campbell* has endeavored, in his *Lectures on the Evolution of Plants*,[64] to present in as untechnical a manner as seemed feasible the more striking facts bearing upon the evolution of plant forms, believing that it will fill an existing want among English text-books. The substance of the work was given originally in the form of lectures to classes in Leland Stanford Junior University. After an introduction, in which a few fundamental principles are presented, elementary structures are defined, and

accepted classification is mentioned, the conditions of plant life are treated of as relating to food substances, water, life, division of labor, and movements, of which all plants exhibit more or less marked ones, that may be spontaneous. While in the simple unicellular plants all the functions are performed by a single cell, a gradual division of labor takes place as we go up, first in a separation of the vegetative and reproductive cells, and later a further specialization of both vegetative and reproductive functions, culminating in the seed plant. This course is described as exemplified in the simplest forms of life, algæ, fungi, mosses and liverworts, ferns, and seed plants of the different classes. The study of the geological relations, fragmentary as their teachings are, has yielded most important evidence for tracing the succession of plant forms. Observation of geographical distribution casts much light on the subject. The relations of animals and plants have an important bearing. The influence of the environment embraces many factors, and is often shown in conspicuous features of form and structure adapting plants to certain sorts of conditions and enabling them to resist others. Plants have thus succeeded in adapting themselves to almost every environment.

Prof. *Augustus de Morgan's* book *On the Study and Difficulties of Mathematics*,[65] though originally published more than sixty years ago, is still fresh and suggestive and full of matter valuable alike to students and teachers, and possesses qualities of clearness of reasoning and intelligibility from which many mathematical treatises are unfortunately free. Its purpose is to notice particularly several important points in the principles of algebra and geometry which have not obtained their due importance in elementary works in those sciences. Metaphysical points are avoided, and the method of explaining by reference to some particular problem, with hints as to more general adaptation, is adopted. Among the points taken up and classified are the nature and objects of mathematics, arithmetical and algebraic notation, rules and principles, equations, the negative sign, roots and logarithms, geometrical subjects, and application of algebra to measurements. The editor of the present edition, Mr. Thomas J. McCormack, has corrected the errata of the old edition and incorporated such changes as the progress of time and mathematical literature have made seem proper. An excellent portrait of De Morgan is given.

The purpose of *Carpenter's Geographical Reader, North America* (American Book Company), is to give its readers a living knowledge of some of the wonders of the country and continent in which they live. They are taken by the author, Mr. *Frank G. Carpenter*, on a personally conducted tour through the most characteristic parts of the American continent, studying the most interesting features of life and work among the people, learning how they are governed, and how they make their living. Much information is also given concerning the natural resources and the physical features of the countries visited.

The *Japan-American Commercial Journal* is a monthly periodical started with the beginning of the year, with an especial view to the opening of the empire of Japan to unrestricted foreign trade and residence, for the advancement of the reciprocal interests of Japan and the United States. It is printed in English and Japanese, and is published at Tokio by the Japan-American Commercial and Industrial Association, for $2.50 a year.

The Anglo-Saxon is a monthly magazine, the first number of which is dated November, 1898, "devoted to the identity of the Anglo-Saxon race with the house of Israel." It is edited by *George E. Inglis*, and published by the Anglo-Saxon Publishing Company, Chicago. The title of the first paragraph —"Cui bono"—seems to us to suggest a very appropriate question. The argument seems to be that the house of Israel was appointed to universal dominion, and the Anglo-Saxon race, between England and the United States, with its late war "as nearly a Christian war as any war might be," is getting it.

Among the general papers in the second volume, containing Parts II and III, of the *Report of the Commissioner of Education* for 1896-'97 are those on Federal and State Aid to Higher Education, the First Common Schools of New England, the Learned Professions and Social Control, and the Beginnings of the Common-School System in the South. Statistics of foreign universities are given, with a paper on the Teaching of Geography in certain foreign countries, and consular reports on educational topics. Professor Boas's paper on the Growth of Toronto Children is included. Educational matters of interest in various States are reported upon. An Eskimo vocabulary is introduced. A special report on education in Alaska appears. Part III is devoted to statistical matter.

The *Occult Science Library* is a course of seven essays on the subject of practical occultism by *Ernest Loomis*. The author assumes that the rules based on the occult principles of Nature would, if fully applied, enable any person to invoke the assistance of occult forces in every practical rule of life, and that they may with like success be applied in matters of health, the acquisition of knowledge, the formation of plans, and the solution of religious and ethical enigmas. The publishers claim that the maxims of the book have proved their efficiency to the satisfaction of thousands who have read them. (Published by Ernest Loomis & Co., Chicago.)

Mr. *James G. Needham* has furnished, in *Outdoor Studies* (American Book Company), one of the fullest and most systematic guides or "reading books," as he calls this one, for Nature study that we have seen. Recognizing that there is no lack, in numbers, of books offering object lessons, etc., for children of the earlier years intervening between the primary and the high school, he has prepared this book to supply for the later years of that period "a few lessons of greater continuity, calling for more persistence of observation and introducing a few of the simpler of our modern conceptions of Nature at large." The lessons presuppose some years of experience of life and some previous training in observation; they are given simply for the sake of the interest and educative value of the facts and phenomena of Nature which they set forth; and they have been written more for the boys and girls than for the teachers. The things described—birds, insects, plants, etc.—are such as can be seen anywhere. Mr. Needham tells how to study them and learn what they mean.

In *Commissioner Hume, a Story of New York Schools*, a sequel to Roderick Hume, the Story of a New York Teacher, Mr. *C. W. Bardeen* has undertaken to give a picture of rural New York schools, or rather of the administration of school affairs by commissioners as they were in 1875, and he declares it to be accurate. He represents, however, that the general tone of the commissioners has vastly changed in the period that has intervened since then, and the conditions described in the volume no longer prevail. The book is offered, therefore, as a contribution to educational history. (Published by C. W. Bardeen, Syracuse, N. Y.)

The southern half of Missouri and the Black Hills of South Dakota offer exceptionally delightful regions for the study of caves, or speleology, as

well as of geology and geography. Each of these regions has its peculiar geological history and its own scenery, and possesses a number of truly wonderful caves. Some of the more important of these caves and the scenery amid which they lie are described by Mrs. *Luella Agnes* Owen in the book *Cave Regions of the Black Hills* (Cincinnati: the Editor Publishing Company), and we have been much interested in reading the accounts. The descriptions are introduced by summaries of the methods of the formation of caves and of the results of the geological and topographical explorations of the regions in which they are situated, as presented in official reports and scientific memoirs. The descriptions are for the most part relations of the author's personal explorations of the caves. The most important of these caves are Marble Cave, "the finest yet explored in Missouri," and Wind Cave, in South Dakota, said to be the largest known after the Mammoth Cave. Others are Fairy, Powell, Stone County, Oregon County Caves and the Grand Gulf in Missouri, and the Onyx and Crystal Caves in South Dakota. Many illustrations are given. The author has fine descriptive powers, but her literary style needs discipline. She is the first American, and the only woman, so far, elected to membership in the Société de Speleologie of Paris.

A valuable paper on *Sympathetic Strikes and Sympathetic Lockouts* is published by Mr. *Fred S. Hall* as the first number of the eleventh volume of the Columbia University Studies in History, Economics, and Public Law. In it, the author having fixed the definition of sympathetic strikes and lockouts as distinguished from those not sympathetic, and having found the difference between a strike and a lockout, discusses the origin and development of the two sympathetic movements, analyzes them, and forecasts the future as it is indicated by the past. Illustrations are freely drawn from the important strikes and lockouts that have occurred in the United States and abroad for a number of years past.

The Year Book of Colorists and Dyers, in the opinion of the author, Mr. *Harwood Huntington*, supplies a want, for, so far as he is aware, there are no other portable works in the English language to which the color-chemist can refer and find the information which he requires the oftenest. The object of the present publication is to meet the demand for a review of the advances made annually in the special field worked in by dyers and colorists—in the bleaching, dyeing, printing, and finishing of textiles—and

it endeavors to do this with accuracy and brevity. (Published by the author, New York.)

The first number of *The Socialist Almanac and Treasury of Facts* has been issued in accordance with a decision of the National Convention of the Socialist Labor Party, held in New York in July, 1896. It has been prepared by *Lucien Sanial*, to whom the task was assigned by the National Executive Committee. A large proportion of it is historical, and consists mainly of monographs presenting views of the movements and condition of "militant socialism" in Germany, Austria, Italy, Spain, and Belgium, from its beginning to the present day. Special attention is invited by the author to the monographs on Italy and Spain as tracing the struggle between socialism and anarchism to its beginning. The second part of the book contains statistical matter and comments on economical and social conditions, which, if the argument on "Who owns the Savings?" is a specimen of its quality, must be accepted with many reservations.

Prof. William Wadden Turner, a native of England who came to this country at an early age, became an eminent scholar in Oriental literature, and in 1842 a professor of that subject in Union Theological Seminary. He was called thence to Washington in 1852 to organize the library of the Patent Office, where his work was of great value. Thence he was taken by Professor Baird to catalogue and arrange the library of the Smithsonian Institution. He associated his sister with him in this work and as recorder of scientific collections and exchanges in 1858. She continued there after his death the next year, and served the library faithfully and efficiently, going with it to the Congressional Library when it was removed there, till 1886, when she resigned on account of age. She died in 1896. A *Memorial* of the two and of their elder sister Susan has been prepared by Mrs. *Caroline H. Dall* and has been printed privately.

The author of *What is This?* after a brief discussion of the personality of Jesus and the present degenerate condition of Christianity, goes on to say: "We must have another revelation, therefore. It seems to be a necessity. But what troubles me is this: can it be possible that any part of this revelation can come through one as humble as myself? What have I seen and what have I heard?... I have often pondered the great questions of man's origin and future; never until now, never until I heard this voice, have I had any

glimmer of a solution of this great puzzle. I know I am nothing, but can not the Supreme Being use a mere nothing to accomplish his purpose?" Notwithstanding the author's avowed unworthiness, he seems to have been selected, and we have from his pen a new and considerably detailed book of genesis.

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Fragments of Science.

Climate and Acclimatization.—In view of the rapid growth of West Indian and South American commerce and the considerable emigration to Cuba and neighboring islands, which our present relations with them will probably bring about, the following extracts from an editorial in the London Lancet are of interest: "The American nation has entered upon a new and, in a sense, imperial policy, which may be regarded as forming an epoch in its history. This brings it face to face with the problem of colonization and acclimatization—a problem which we have had to confront long ago and toward the solution of which we have ever since been slowly fighting our way by following on the lines of the best practical measures of hygiene known to us. 'The white man's burden' has proved a tragical one in its drain on the life of the young manhood of this country, notwithstanding the very large measure of success which has attended our sanitary efforts in this direction. The Americans, having taken up their burden, will, no doubt, like the practical people they are, set about their task in a practical way. The four principal factors in the production of climate, according to Buchan, are distance from the equator, height above the sea, distance from the sea, and prevailing winds. The equatorial region has the most equable climate; tropical regions have much greater variations of temperature than those near the equator, and have a hot and cold or dry and rainy season. The isothermal lines of mean temperature do not supply a graduated measure of the effects of temperature on animal life. So far as climate is concerned, no single meteorological influence appears, however, to equal the effect of temperature upon health, and its range is of more importance than its mean. The European under a tropical climate suffers from anæmia, diseases of the digestive system, especially of the liver, from malaria, dysentery, typhoid fever, and yellow fever. It is not at all easy to say, however, how much of the excess of mortality of Europeans in tropical and subtropical countries is simply attributable to climatic heat *per se*, and is consequently inevitable and not the effect of malaria, or how much of it is the direct consequence of habits of life and of the neglect of sanitary laws and of personal hygiene. As Arnould rightly said, the *habitudes alimentaires* of the Anglo-Saxon

constitute one of the stumbling-blocks to health, but by far the most important is malaria, compared with which the rest are relatively insignificant. Mr. Chamberlain was right when he said the other day that 'the man who shall successfully grapple with this foe to humanity and shall find a cure for malarial fever and shall make the tropics livable for the white man, will do more for the world and more for the British Empire than the man who adds a new province to the wide dominions of the Queen.'"

"**Picture Telegraphy.**"—The following account of the new so-called picture telegraphy is from the New York Electrical World and Engineer: "The apparatus consists of a receiver and transmitter, similar in appearance and in mechanism. The picture to be transmitted is drawn on a heavy piece of metal foil, the lines of the drawing being made with an insulating ink. The foil is then secured on the circumference of a horizontal cylinder on the transmitter, the cylinder being of about the size of a typewriter rubber roller. There is a similar cylinder on the receiver, on whose surface is clamped the paper upon which the drawing is to be reproduced; over this is superposed carbon paper, which is covered in turn by a sheet of thin paper. A stylus actuated by an electro-magnet is adjusted close to the surface of the latter, and each time a current is passed through the electro-magnet the stylus is forcibly pressed against the moving surface of the cylinder, and a corresponding mark is made on the two sheets in contact with the carbon paper; the outer sheet serves merely to offer a smooth surface to the stylus and to enable the operator to see that the picture is being properly reproduced. The transmitting cylinder passes under a similar stylus, which latter closes the circuit between the receiving and transmitting ends when it rests upon the foil, and opens the circuit when it passes over the lines drawn with insulating ink, in the latter case actuating the stylus magnet at the receiving end, which leaves a mark on the paper of the receiving cylinder in the form of a line corresponding to the width of the insulation over which the transmitting stylus is passing. The stylus at each end of the line is simultaneously advanced at the end of each revolution of the cylinders by a screw of small pitch. From the description it will be seen that if the surface of the foil on the transmitting cylinder were entirely insulated the receiving stylus would merely draw a number of parallel lines on the paper corresponding to the turns of the screw, and separated a distance corresponding to the pitch of the screw and the angle through which it is

turned at each operation. Four different rates of advance may be given to the stylus, corresponding to as many different angles of advance that may, by appropriate mechanism, be given to the screw. The two cylinders have synchronous motion, so that all the marks or lines on the receiving cylinder correspond to widths of insulating ink traced over on the transmitting cylinder. Synchronism is obtained as follows: Connected with both receiver and transmitter is an electric motor which, at the end of every revolution of the cylinder, raises a weight, which acts on a clock train when falling and thus gives motion to the cylinder. At the end of each revolution of the transmitting cylinder a contact is made which locks for an instant the receiving cylinder when it arrives in a position corresponding to a similar position of the transmitting cylinder. Thus it will be seen that each cylinder begins its revolution from identical positions and at the same instant, and as the clockwork of both receiver and transmitter are duplicates, approximate synchronism is maintained during a revolution. Owing to the use of carbon paper, the lines made by the receiver are of considerable width, with the consequence that the resulting picture does not have the appearance of being made up of parallel lines, as in the case of reproductions by the original Caselli picture telegraph, of which the system described is a modification. The Hummell apparatus appears to be entirely practicable, the simplicity of its synchronizing mechanism giving it a great advantage over former types of Caselli picture telegraphs. The apparatus has been worked duplex with success. In one instance, a few days ago, a picture was sent from New York to St. Louis while one was being received from the same place in New York, the latter picture in addition being received simultaneously at Boston."

The Charges on Country Checks: an Economic Mistake.—An article in the May issue of the Yale Review, discussing the recent adoption by the New York banks of a rule imposing a "collection charge" on all country checks handled, takes the view that the new rule is a mistake. After reviewing the history and present position of the Bank of England; calling attention to the fact that although it is a private enterprise its position is used as a governor, so to speak, of English finance; the similarity to it in position and power for good or evil of the association of banks known as the New York Clearing House is pointed out; the review goes on to say: "In the associated banks of New York, as in the Bank of England, is kept a very

large part of the reserve on which the great financial transactions of a whole country are based. The system of 'reserve cities' for holding large deposit accounts of country banks, in which New York is by far the most important center, is but the recognition in the national banking law of this great fact of a central reserve, and the power of utilizing such deposits, indirectly extended by the law which allows and encourages country banks to hold a large part of their legal reserve in the form of deposits in New York, probably constitutes a much more valuable privilege than the rights of note issue enjoyed by the Bank of England. In extraordinary emergencies the parallel is even closer. Just as the Bank of England is encouraged to expect a modification of the restrictions on its right of note issue, as a means of extending its effective currency reserve in times of panic, so the New York banks, by their system of clearing-house loan certificates, are encouraged and expected to evade those provisions of our national banking laws which restrict their power of issuing notes to meet an emergency.... The exercise of this function of holding a reserve for clearing the business of the country is attended with some expense, as well as with much profit. One of the most vexatious of these expenses has been the cost of collecting country checks.... Under these circumstances they have adopted a rule imposing such charges on country checks as to compel a large part of the remittances to be made in the form of bank drafts on New York city, rather than individual checks on country banks supposed to have accounts with some New York bank. This rule will save the New York banks something like two million dollars annually. It will not prevent any solvent man from making remittances, for if he has a deposit in his local bank and his local bank has a deposit in New York he can buy a draft to send as a remittance, which will pass through the New York Clearing House without question or expense. Yet, in spite of these plausible arguments, we believe the action of the New York banks to be a mistake of very serious magnitude, an inconvenience to the public, a probable loss to deposit banking in the long run, and, worst of all, a serious blow to the cause of sound currency throughout the country. It seems to us, in short, a case where narrower duties and economics have been allowed to crowd broader ones out of sight." The review then goes on to show how great an amount of inconvenience and loss of time in the aggregate the new rule is going to cause, and finally says: "In a popular government the greatest safeguard against soft money—we may fairly say the *only* real safeguard—is to prevent the growth of a demand for soft

money. And of all the means of prevention at our command the most effective is the encouragement of the habit of paying by checks. The habit of paying by check is very general in all large business centers, and has been rapidly extending into the smaller centers, and the most serious public danger in the action of the New York banks is that it seems likely to deal a severe blow to such progress."

La Nature's Second Scientific Excursion.—A second scientific excursion to an interesting district of France is planned, by M. Henri de Parville, of *La Nature*, to start from Bayonne August 25th. It will spend about two weeks, following the chain of the Pyrenees from the ocean to the Mediterranean. Among objects of interest enumerated are the scenery at Biarritz, Pau, Cauterets, and Bigorre; fine architecture at Toulouse, Carcassonne, Elne, etc.; glacial phenomena and thermal waters along the whole mountain chain; manufactories, including iron works at Bouchain, woolen mills at Bigorre, cigarette factories at Perpignan, and the Arago Maritime Laboratory and the sanitarium at Banyuls. The excursion will be "personally conducted" by the eminent anthropologist and archæologist, M. E. Cartaillac. The excursion last year, to the Central Plateau and the Tarn, was an eminent success. The programme of the present one seems equally attractive. M. de Parville and his associates deserve great credit for their sagacity and enterprise in inaugurating these excursions, which now promise to become annual. We can conceive nothing more profitable and conducive to real pleasure in a vacation than the tour in the company of men having a common interest in the pursuit of knowledge of Nature and art, through such magnificent regions as that of the Pyrenees or through a country so full of natural wonders and novelties as that of last year's excursion. And it will be an incalculable advantage to be under the guidance of so eminent a student and one so familiar with the remarkable features and the antiquities of southern France as M. Cartaillac.

The American Association Meeting.—The forty-eighth annual meeting of the American Association for the Advancement of Science will be held at Columbus, Ohio, August 19th to 26th. The association headquarters will be in University Hall, of the Ohio State University, and the headquarters of the council will be at the Chittenden Hotel. The president of the meeting will be Prof. Edward Orton, of the Ohio State University. The vice-presidents or chairmen of sections will be: Mathematics and astronomy, Alexander

Macfarlane; physics, Elihu Thomson; chemistry, F. P. Venable; mechanics and engineering, Storm Bull; geology and geography, J. F. Whiteaves; zoölogy, S. H. Gage; botany, Charles R. Barnes; anthropology, Thomas Wilson; social and economic science, Marcus Benjamin. The Permanent Secretary is L. O. Howard, Cosmos Club, Washington; General Secretary, Frederick Bedell, Cornell University; Secretary of the Council, Charles Baskerville, Chapel Hill, N. C.; Treasurer, R. S. Woodward, Columbia University, New York. The address of retiring President Putnam will be delivered Monday evening, August 21st. Saturday, August 26th, will be devoted to excursions to Fort Ancient and elsewhere. Receptions and shorter excursions will be provided at hours that will not conflict with the appointments of the association.

The Desire for Notoriety a Cause of Crime.—Under the title *Luccheni Redivivus* the London Lancet gives some interesting psychological data which have been obtained since the imprisonment of Luccheni, the assassin of the Austrian Empress. Twice since his trial and conviction he has attempted suicide. Within the last few days (May 13th) his moral condition has undergone a change confirmatory in a significant degree of the diagnosis which found vanity or megalomania at the root of his crime. The cantonal juge d'instruction in an attempt to ascertain if possible his associates in the crime, visited him in his cell and approached the subject with what seemed to himself due dexterity and caution. At once the previously downcast and abject creature brightened up, his eyes sparkling with gratified self-importance. "*I giornali riparlano di me?*" (So the journals are talking of me again) he exclaimed interrogatively. The judge disclosed the object of his visit. Luccheni thereupon dallied with his interlocutor, smiling at his reminiscences of the crime, assuming airs of reticence, even indulging in self-contradiction to tease if not torment his judicial antagonist. It was learned, however, that in the preliminaries leading up to the assassination he really had accomplices; beyond this nothing new was elicited from him. The point of chief importance, however, to be observed in this account is the large part which vanity and a desire for the widespread public attention which such crimes bring about plays in reconciling the criminal to his fate, and even leading to the commission of the crime in cases where the mental balance is very unstable. Hence this class of criminals should always be tried and punished with as

little publicity as possible, not only because this policy deprives the individual of a show, with himself as the center, but also because every such public trial is liable to lead to the commission of similar crimes by other mentally unsound degenerates, who are sure to attend such spectacles whenever it is possible.

Bounties and Free Trade.—Much discussion is going on in England over the question of bounties and the propriety of putting a tariff on those imported articles which, owing to bounties or other form of government aid at their place of manufacture, can be sold "too cheaply." The following paragraphs are taken from an article in the London Spectator: "In our opinion there can be no question between the policy of free and open market and the policy of only allowing goods to be sold here 'at the natural price of the world's market.' We hold that the maintenance of an open and unhindered market is essential to our welfare; ... that is the real principle involved, and that is the ground on which this question of bounties must be fought out. It is not Cobdenism or free trade that is involved, but that which underlies them both—the great principle of the free and open market.... We attach such immense importance to the open market because we believe not only that our internal prosperity is essentially bound up with the right, not merely of consumers, but of producers, to buy as cheaply as they can and where and how they will, but that the empire itself rests upon the preservation of a free and open market. Mr. Morley never spoke a truer word than when he insisted that Cobden and Bright and the old free traders were empire builders. That they were so and that our empire could not possibly have grown up except with the help of free trade and a market always open must be clear to all whose eyes are not blinded by that evil and foolish spirit of commercial jealousy under which a man, in order to injure his neighbor, wounds himself. Free trade made our empire possible and created what the world before had never seen, overwhelming commercial power wielded without jealousy or narrowness and based on wide and liberal ideas. How long would our colonies have tolerated the connection with us had we been forever worrying them with tariffs and excluding this or that product because it was unnaturally cheap?... As it is, we bid all men welcome in our markets and none are aggrieved.... Foreign powers may hate us for our wealth and prosperity, but not one of them would care to spoil their best market. How would the commerce of France, or Germany,

or Russia get on if England were ruined and the English market destroyed? The principle of maintaining a free and open market, coupled with our moral and physical energy, and our liberal aims and aspirations have given us a great and splendid empire. Are we to risk its destruction because the sugar refiners grumble, and because the words of Cobden on another subject may possibly be interpreted to show that he would not, were he alive, have voted against the imposition of countervailing duties?"

Forest and Animal Life of the Catskills.—The interior region of the Catskill Mountains surrounding Kaaterskill Junction is assigned, by Dr. E. A. Means in a paper of the United States National Museum, to the Canadian faunal region, with a slight mixture of the Alleghanian in the farming lands on the banks of Schoharie Creek. A few mammals of the Upper Austral zones, however, such as the New England cottontail, the deer mouse, and the gray fox, appear to have extended their ranges into the locality by following up the clearings. Though the region is now again well wooded, only the barest tags and remnants yet remain of the splendid forests that once covered the area. All is second growth except in the rockiest gulches, whence the lumber can not be extracted, and about the rocky summits of a few mountains of the East Jewett ranges. While the original forests seem to have been of conifers, the woods are now very thoroughly mixed, and the succession of trees according to altitudes, with its strongly marked division lines, is no longer seen. Specimens of fifty-eight species of trees and shrubs have been collected and placed in the National Museum. Only ten species of mollusks, one crustacean (the common crawfish), probably a dozen fishes (the author identifies eight and mentions others), eight batrachians, two snakes, and a turtle have been found. Of mammals, thirty-five species are described as known to occur at the present time, and eight as of doubtful occurrence now.

Geology of Block Island.—In a study of the geology and natural history of Block Island, of which Arthur Hollick gives a summary in the Annals of the New York Academy of Sciences, the most important problem was whether the Amboy clay series was represented in the island. Of fifteen species of fossil leaves and fruit capable of identification, represented by about twenty-five specimens, at least nine were typical of the Amboy flora. Observations on dip and strike of strata tended to emphasize the fact of contortion of glacial action, the dip in all cases being toward the north,

indicating that the strata had been pushed southward in a series of overthrust folds by the advancing ice front. The flora may be divided physiographically into that of the hills, the peat bogs and pond holes, the salt marshes, the sand dunes, and the salt water. Trees are rare, and such vegetation as is dependent on forestal conditions is absent. The bulk of the surface is that of a typical morainal region, with rounded hills and corresponding depressions, many of the depressions being occupied by swamps or ponds, often without any visible outlet. Running streams are few and insignificant, and permanent springs occur only in a limited number of localities. The soil is bowlder till and gravel, with sand in the dunes and beaches, and there are no outcrops of rock. The flora is morainal in its general character, except in the peat bogs and on the limited sand dunes and sea-beach areas, and has its nearest analogue in that of Montauk Point. "In fact, if we could imagine Montauk Point to be despoiled of its few remaining trees and converted into an island it would bear a striking resemblance, geologically and botanically, to Block Island." Considering the geological features of Long Island, Block Island, Martha's Vineyard, and Nantucket, and comparing their floras, we find that all except Block Island have some of the plain region remaining with them, on which a characteristic flora finds a home. Block Island has lost all its plain region and accompanying flora, and is now merely an isolated portion of the terminal moraine, with small areas of modern sand beach and dune formations, affording a home only for such species as can exist under such conditions. The island appears to have been extensively wooded before it was settled, and large stumps, together with roots and branches, are found in some of the peat bogs. The scarcity of animal life on the island is sure at once to attract the attention of the observer from the mainland. Tree-living birds are absent, but robins, bank swallows, red-winged blackbirds, and meadow larks occur with some frequency. Among mollusks, the periwinkle of the Old World, an importation or migration, is the most abundant. Frogs and spotted turtles are plentiful, and a few small striped snakes were seen by Mr. Hollick. The archæology of the island is being studied by persons specially interested in the subject.

The Claims of the High School.—In considering the right of the public high school to be a just charge upon the public treasury, Mr. Frank A. Hill, of the Massachusetts State Board of Education, finds that less than one fifth

of the school money raised in the State is expended on account of these schools, whereas if the number of pupils in each of the thirteen grades of school was equal and the money was evenly divided, the higher grades would be entitled to four thirteenths, or nearly one third of it. To an objection sometimes raised against the high-school system that the "toiling millions" will have no use for more than the teaching of the elementary grades, Mr. Hill asks, Who has a right to decide whether one child shall have a greater or less amount of instruction than another? "And so freedom of choice, when the question of what one's life work shall be comes up, is a basic thing in government by the people. Upon the wisdom of this choice turns the welfare of each unit in the State, and therefore of the State itself." Hence the State has no right to refuse to one any opportunity of preparing himself to exercise this freedom of choice which it accords to another. There has never been a time since 1647 when the laws of Massachusetts did not require certain towns to maintain grammar schools, of which the high schools are the modern equivalents, at public expense, and when the colony became a State a perpetual obligation was imposed upon the Legislature and magistrates "to cherish the interests of literature and the sciences and all seminaries of them, especially the university at Cambridge, public schools, and grammar schools in the towns."

Degeneration.—Dr. William C. Krauss, in a paper on The Stigmata of Degeneration, describes degeneration as meaning, in pathology, the substitution of a tissue by some other regarded as less highly organized, less complex in structure, of inferior physiological rank, or less suited for the performance of the original function. The same definition may apply equally well, according to Dr. Krauss, in human ontogeny, "where we can regard a normal man as possessing a certain number of units of strength capable of supplying or exerting a certain number of units of work or force, varying of course according to the environment, education, and fixity of purpose of the individual. It would be obviously unfair to compare a professional man or a brain-worker, whose units of work are intuitively manifold more than a hand-worker, and declare the latter a degenerate because his force and energy, as measured by the world's standard, are not as productive as the former. The questions of money standard and time-worth are foreign to the laws of degeneracy, and are not to be regarded in any way. The degenerate must be considered solely and alone upon the

physical, mental, and abnormal stigmata which brand him as an abnormal or atypical man, and prevent him from exerting himself to the highest limit commensurate with his skill and development." The author's paper treats in detail of the various aspects of degeneracy.

Birds as Pest Destroyers.—The French journal, *Le Chasseur*, puts in a plea for the animals that should not be killed. "Why destroy spiders, except in rooms, while they check the increase of flies? Why tread on the cricket in the garden, which wars upon caterpillars, snails, and grubs? Why kill the inoffensive slowworm, which eats grasshoppers? Why slay the cuckoo, whose favorite food is the caterpillar, which we do not like to touch? Why destroy the nuthatch and de-nest the warbler, foes of wasps? Why make war on sparrows, which eat seeds only when they can not get insects, and which exterminate so many grain-eating insects? Why burn powder against starlings, which pass their lives in eating larvæ and picking vermin from the cattle in the fields? (But they eat grapes too.) Why destroy the ladybird, which feeds on aphides? Why lay snares for titmice, when each pair take on an average one hundred and twenty thousand worms and insects for their little ones? Why kill the toad, which eats snails, weevils, and ants? Why save the lives of thousands of gnats by destroying goat-suckers? Why kill the bat, which makes war on night moths and many bugs, as swallows do on flies? Why destroy the shrew mole, which lives on earthworms, as the mouse does on wheat? Why say the screech owl eats pigeons and chickens, when it is not true, and why destroy it when it takes the place of seven or eight cats by eating at least six thousand mice a year?"

The Yang-tse-Kiang.—In a lecture before the London Foreign Press Association Mrs. Isabella Bishop describes the Yank-tse-Kiang as one of the largest rivers of the world, it draining an area of 650,000 square miles, within which dwell a population of 180,000,000. In the journey to the far East, the scenery at Szu-chuan changed from savage grandeur and endless surprises to the fairest scenes, with prosperity, peace, law, and order seeming to prevail everywhere. Erroneous ideas were often entertained about Chinese social life and surroundings. China had many trade associations, which were often strengthened by alliance with guilds. They were composed of men in any particular trade or employment, who bound themselves for common action in the interest of that trade. They might rightly be called trade unions, for through their elected officers they

prescribed hours of labor and minimum wages and made trade rules, the breach of which was punishable by fine and expulsion. The Chinese people displayed much benevolence and social kindness one to another, and had societies for providing free coffins and seemly burial in free cemeteries for the poor, soup kitchens, foundling institutions, asylums, orphanages, and medical dispensaries. Throughout the whole of the Yang-tse basin the author was impressed with the completeness of Chinese social and commercial organization by the existence of patriotism or public spirit, by great prosperity, and by the absence of the decay often attributed to the nation. Of the prevailing "expansion" or territorial robbery fever Mrs. Bishop said that we were coming to think only of markets and territories, and to ignore human beings, and were breaking up, in the case of a fourth of the human race, the most ancient of the earth's existing civilizations without giving for our supposed advantage a fair equivalent.

"Somewhat" Poisonous Plants.—In Prof. B. D. Halsted's paper in the State Agricultural Experiment Station Bulletins on The Poisonous Plants of New Jersey, besides the descriptions of plants recognized as poisonous internally and to the touch, a list is given of "many somewhat poisonous plants." Among these the catalpa and ailantus produce emanations that are disagreeable and sometimes poisonous, and catalpa flowers, when handled, will produce an irritation of the skin. The thorn of the Osage orange leaves a poisoned wound. The young leaves of the red cedar and the arbor vitæ are irritating to the skin and may produce blisters, and the pitch of the spruce causes itching. Balm of Gilead may cause blistering. The green bark of the club of Hercules is irritating to the skin. The herbage of oleander affects some persons like poison ivy, the bark of the daphne causes blisters, and the juice of the box produces an itching with many persons. To some the herbage of the wild clematis is acrid and unpleasant. Many of the wild herbs have acrid properties, among them skunk cabbage, Indian turnip, cow parsnip, several of the mustards, and the juice of red pepper and stonecrop. Garden rue and the short bristles of the borage are irritating. Some persons have had their skin inflamed by handling the garden nasturtium. Other plants not always pleasant to handle are meadow-saffron bulbs, garlic, juice of bloodwort and celandine, the smartweed, the herbage of the poke, monkshood, larkspur, bearberry, some of the buttercups, anemone, star cucumber, various burs, daisy flowers, hairy plants, the nettles, sneeze-

weed, the corpse plant, and some of the toadstools. Flax spinners have a flax poison, jute workers a rash, hop pickers a disagreeable irritation of the hands, and the grinders of mandrake root find the powder irritating to the face. It is not unusual for persons who gather plants in field and forest to receive sensations akin to those produced by mosquitoes, which are often chargeable to the plants. Other animals than man are less susceptible to the effects of contact poisons.

The Dangers of Hypnotism.—In a review of the medico-legal aspects of hypnotism Dr. Sydney Kuh inquires whether the hypnotized can be injured physically or mentally by hypnotization, and whether they can fall victims to crime. Summing up a number of cases cited as bearing on the former question, he finds that hypnotism is now generally conceded to be a pathological and not a physiological condition; that its use, when resorted to too frequently, is liable to bring on mental deterioration; that it may be the cause of chronic headache or of an outbreak of hysteria; that at times it has an undesirable effect upon pre-existing mental disease; and that in some cases it may even produce an outbreak of insanity. He has learned of a few cases on record in which hypnotism was directly or indirectly responsible for the death of the patient. On the other hand, "we all know that hypnotism is a useful therapeutic agent practically only in cases of functional disease which only very rarely endangers the patient's life." Seeking simpler, less dangerous methods of treating maladies for which hypnotism has been recommended, the author has experimented upon the use of suggestion in the waking state, with results that encourage him. A large series of cases convinced him that a hypodermic injection of *aqua destillata*, given under proper precautions and circumstances, so as to impress the patient deeply, will produce very nearly, if not quite, as many cures as hypnotization. As for the other question, laboratory experiments indicate that a hypnotized person may be induced to commit acts bearing the aspect of crime, but that when the case becomes a serious one something will most likely occur in the mind of the patient or the conditions to prevent the consummation. The result is too uncertain and difficult, and the risks are too many and various, even to permit the use of hypnotism as an instrument of crime to become common or really dangerous. And the author's conclusion is that the dangers of hypnotism lie much more in its use for experimental and therapeutical than for criminal purposes.

Instruction of the Deaf and Dumb.—Of the two principal methods of instructing deaf-mutes in this country, as defined by Mr. J. C. Gordon, of the Illinois Institution, in the sign method, deaf-mutes are taught a peculiar language of motions of the arm and upper part of the body, to which they learn to attach signification through usage. For instance, to teach the word *cat* to a deaf child a sign teacher would show the child a cat or a picture of a cat. He would next direct attention to the cat's whiskers, drawing the thumb and finger of each hand lightly over them. "A similar motion of the thumb and hand above the teacher's upper lip at once becomes a sign for cat." After the sign has become familiar the child is trained to write the word cat on a slate, blackboard, or sheet of paper, and by frequent repetition the pupil associates the written word with the sign for cat, so that the written word recalls the gestural sign, and the gestural sign serves to recall the concept cat. This language is acquired more readily than any other means of communication. The other method is the intuitive, direct, or English-language method, and, while it would require the use of the living cat or the recognition of the picture of a cat by the deaf child, would connect the written or spoken word directly with the object, without the intervention of any artificial finger-sign. Wherever this method prevails the English language in its written or spoken forms, or in its finger-spelled form, becomes the ordinary means of communication between teachers and pupils, so that every step in instruction requires the use of the English language, which is practically both the instrument and the immediate end of instruction. All the schools called oral use this method. It can be used in connection with finger-spelling, but not with the sign method.

Experiments in Nature Study.—Some very interesting features of school children's Nature study—not the teaching of science, but the seeing and understanding of the common objects of the external world—are illustrated in a report of Cornell Agricultural Experiment Station, from incidents of school life in some of the New York schools. The children in the sixth grade of one of the schools of Saratoga Springs provided themselves with eggshells filled with earth and sown with wheat. "The botanical side was made a lesson well flavored with active interest. The pride of ownership and a plant coming from a spoonful of earth had the charm of a creation all the pupil's own, and it was much more real to study the thing itself than to read about it and make a recitation." Geographical applications were made

by tracing the introduction and extension and transportation of the crop, and by means of the exchange of correspondence the wheat belt could be traced and plotted in every State of the Union. The children of Corning gathered seeds and divided them into classes as indicated by the means of travel with which they are provided. A small boy felt himself a profound investigator when he discovered the advantage some seeds have in being able to float and ride on the water. It required no hard drill to learn the names. The summer planting of flowers by the children of Jamestown resulted in a flower show in the fall. Many children took the tent caterpillar, reared it from the eggs, and learned all about its metamorphoses. "Nature study can be made elastic. In the kindergarten it can be idealized so as to approach a fairy story. It can be intensified so that in the high school it will have all the solidity of pure science." The best proof that the idea is bearing fruit is that teachers are asking for definite instruction on the subject, and a course has been provided for them. The study should be so informal as not to admit of systematic examination.

Chemistry Teaching in Grammar and High Schools.—At the fourth meeting of the New England Association of Chemistry Teachers, held in Boston in January, 1899, preliminary reports were made on grammar-school and high-school courses in chemistry. The grammar-school course was defined as intended to give its pupils first-hand knowledge of the more obvious and important facts and principles of chemical changes, with emphasis placed on those facts which are illustrative of the changes that are going on all about the pupil in the home and in outdoor Nature. While the point of view should be that of Nature study rather than of science, the selection of material and method of study should be such as to make the course of greatest value to those who are to pursue the subject in higher institutions. For high-school study the report insists that, before everything else, the course be intelligible to the pupil. Whatever experiment or work is undertaken, it must be such that the pupil shall be able to understand its aim and the steps in its pursuit, and it must not be too intricate in demonstration or abstruse in application. It should require at least five hours a week, and, if possible, too, of these periods consecutive, and should come as late in the curriculum as possible, following physics. The general work may be divided into the heads of historical, informational (qualitative and quantitative), and theoretical, the second division having ordinarily the

larger part of the time. The belief is expressed that only part of the demonstration work should be done by the teacher in the class, but most of it should be performed, as far as practicable, by each pupil in the laboratory. Lastly, the report recommends that the humanistic side of the science be made as prominent as possible. Whenever facts in chemistry can be related to human life or activity this should be done.

MINOR PARAGRAPHS.

In a recent report on the educational work of the Passaic (New Jersey) public schools, Superintendent F. E. Spaulding points out one of the worst faults of our present public-school system. "The true function of education is to foster and direct the growth of children, not to teach so many pages, rules, facts, or precepts of this subject or of that. And the one adequate rule of practice is constantly to meet the growing needs of this and that individual child, not to teach this class of children as a class. From this proposition there follows the corollary, which is amply substantiated in practice, that the time, order, method, and extent of presenting any subject can be rightly determined only by the interest and capacity of the child for whose benefit it is to be presented, not by the logic and practical importance of the subject itself."

Dr. Sir James Grant, of Ottawa, has been led, by his studies of the alimentary canal in its function of discharging the secretions of the various glands, to a high appreciation of the importance of its operation in connection with the elaborate and complex nervous system associated with it. It is reasonable, he believes, to suppose that the activity of these nerves is injuriously affected by noxious influences long before any evidence of organic disease appears, and that, hence, want of care in the digestive process can not and does not fail "to bring about results of a most telling character in the very process of sanguinification." Believing that irregularities of the digestive process in the alimentary canal are more frequent than is generally supposed, he holds that "the internal sewage of the system" can not be too critically examined with a view of preventing the ill effect of toxic accumulations upon the nerve centers. "That the recently discovered neurones," he adds, "play an important part in the vitalizing of nerve energy is a reasonable deduction. A path is now open in which life,

under ordinary circumstances, *may be prolonged*, provided no organic disease is present."

The courses in biology in the University of Pennsylvania have been arranged with reference to the needs of students who desire instruction in the biological sciences for general culture, as a preparation for teaching or original investigation, or as a foundation for the professional course in medicine. They include in the courses in arts and sciences the electives, the biology-chemistry group, and the botany-zoölogy group, each set including several classes; the four-year course in biology, which appeals particularly to students who wish to become teachers or to take up special work as investigators in biology, and the two-years' course in biology, which is designed especially for those who desire some systematic training in natural science before taking up the study of medicine. Both of these courses are open to men and women alike. An ample equipment is provided for the biological department in the shape of spacious class rooms and laboratories, a botanic garden, an herbarium, a vivarium, zoölogical and auxiliary collections, a marine laboratory at Sea Isle, New Jersey, tables at Woods Holl, library facilities, two serial publications, and clubs and societies.

We learn from the London Lancet that besides the special ward of twelve beds at the Royal Southern Hospital of Liverpool, which was formally opened by Lord Lister on April 29th last, arrangements have been completed for a school for the study of tropical diseases at Liverpool. Lord Lister, on the occasion of the school's foundation, said: "The medical student in the ordinary hospital has rare opportunities of seeing these diseases, and for a man who is about to practice in the tropics it is essential that he have opportunities for studying them here before embarking on his tropical career. The possession of tropical colonies makes such institutions in the home country very necessary, not only for preparing the colonial doctors, but for the protection of the home population, which is sure to be brought into contact more or less with the infectious tropical diseases."

An interesting paper by Mr. C. J. Coleman on The Electrical Protection of Safes and Vaults is described in the Electrical World and Engineer. He divided the methods into two systems, in one the alarm depending on the opening and the other on the closing of a circuit—the latter of the two being the one most in use. Among the curious devices mentioned are cementing

narrow tin-foil strips on the inner surfaces of window glass, so that any breakage or fracture of the glass will open the circuit; the use of glass tubes filled with mercury and connected in circuit, or tubes filled with water or compressed air. In reply to questions as to the use of electricity in perforating safes it was stated that a five-ply chrome steel safe, seven inches and a half thick, was burned through by three hundred ampères in twenty-five minutes, and holes were burned through a solid block of vault steel twelve inches thick in twenty-six minutes with three hundred and fifty ampères, and in fifteen minutes with five hundred ampères.

NOTES.

The Royal Institution of Great Britain, on the occasion of its one hundredth anniversary, has elected as honorary members the following Americans: Prof. Samuel Pierpont Langley, astronomer, Secretary of the Smithsonian Institution, Washington, D. C.; Prof. Albert Abraham Michelson, physicist, of Chicago; Prof. Robert Henry Thurston, mechanical engineer, Director of the Sibley College of Cornell University; Prof. J. S. Ames, of Johns Hopkins University; George Frederick Barker, physicist, Professor of Physics at the University of Pennsylvania, Philadelphia; and Prof. William Lyne Wilson, President of Washington and Lee University, ex-Congressman, and Postmaster-General.

The foundation stone of an oceanographic museum, instituted by Prince Albert of Monaco, was laid in that city April 25th. The museum is designed, primarily, to receive the large and valuable collections obtained by the prince in the voyages of ocean exploration which he has conducted, and to become a general depository for oceanographic spoils. The principal address was made by the governor-general, who glorified the prince's meritorious scientific career. The German Emperor, who is named a patron of the museum, and the French President were represented on the occasion by deputies.

The City Library Association of Springfield, Mass., has been holding, during April, May, and June, an elaborate and instructive exhibit of geographic appliances of special interest to teachers in the elementary schools. The exhibition included a number of sets of wall maps, relief maps and globes, models for use in structural geography, pictures, photographs,

etc., of geographical features, aids in teaching, geographical texts, manuals and treatises, books of travel, and an exhibit of geographical work done in the elementary schools of Springfield and vicinity. The association has also published a brief Bibliography of Geographical Instruction, which was prepared by W. S. Monroe, of the State Normal School at Westfield, Mass.

Dr. Daniel G. Brinton has presented to the University of Pennsylvania, where he is Professor of American Archæology and Linguistics, his entire collection of books and manuscripts relating to the aboriginal languages of North and South America. The collection represents the work of twenty-five years, and embraces about two thousand titles.

Mr. Andrew Carnegie has offered to complete, with a contribution of £50,000, a fund which Mr. Joseph Chamberlain is trying to raise in order to make the scientific school the principal department of the University of Birmingham, England.

A noteworthy experiment in bird protection has been made in a boys' school at Coupvray, France, by forming a society of the pupils for that purpose. The president, vice-president, and secretary of the society are selected from among the pupils of the first division, and all the other pupils are members. Meetings are held every Saturday afternoon in March, April, May, June, and July, under the presidency of the teacher, to hear the reports of members and record the nests protected and noxious animals destroyed in a notebook kept for the purpose. In 1898, 570 nests were protected by the school, and more than 400 mice, rats, weasels, and dormice were destroyed. Such societies cost nothing, and are capable of rendering great service.

Ernest D. Bell, whose formula for determining animal longevity by the length of the period of maturity was published in a recent Monthly, has sent a later communication to Nature, changing his constant from 10.5 to 10.1, the latter figure giving much better results.

The report of Mr. J. C. Hopkins on the Clays and Clay Industries of Western Pennsylvania is the second one of a series of economic reports on the natural resources of the State in course of publication by the Pennsylvania State College. The first report, published in 1897, was on the Brown Stones of Pennsylvania. The report represents that a capital of nearly $7,000,000 is invested in the clay industries about Pittsburg, of which more than

$3,000,000 are in the fire-clay industry. The value of the annual output of material is nearly $4,000,000, more than fifty per cent of the capital invested. The 139 companies employ 4,403 men.

Herr Hansemann, of the University of Berlin, who examined the skull of Helmholtz, reports in the *Zeitschrift für Psychologie* that he found the head about the size of Bismarck's, and a little smaller than Wagner's. By metrical standards the brain weighed about 1,700 grammes with the coagulated blood, and about 1,440 grammes without it—about 100 grammes more than the average. The circumvolutions, which are now thought to have more relation to mental capacity than mere weight, were particularly deep and well marked. The skull was 55 centimetres in circumference, 15.5 centimetres broad, and 18.3 centimetres long, and the cephalic index was 85.25.

Our obituary list for this month includes the names, among persons known in connection with science, of Miss Elizabeth M. Bardwell, Professor of Astronomy in Mount Holyoke College, who died May 28th, aged sixty-seven years; G. F. Lyster, long Engineer-in-Chief of the Mersey Docks and Harbor Board, and author of valuable improvements in the Liverpool docks, member of the Royal Society of Edinburgh and of the Institute of Civil Engineers, aged seventy-six years; Prof. Lars Fredrik Nilson, Director of the Agricultural Experiment Station at Stockholm, Sweden, May 14th, aged fifty-nine years; M. Adolphe Lageal, a French geologist, killed by natives while making explorations in the French Soudan; Sir Frederick McCoy, Professor of Natural Science in the University of Melbourne, died in May, aged seventy-six years; he was a member of the Geological Survey of Victoria, founder of the Melbourne National Museum, and author of numerous papers on Victorian geology; before going to Australia he was Professor of Geology in Queen's College, Belfast, and had already attained a high reputation as a geologist by the work he had done as assistant to Sedgwick and by the publication of important memoirs in geology and paleontology; and Lawson Tait, an eminent English surgeon, author of numerous books of a high order relative to his profession, and an active worker in practical sanitary matters; he died at Llandudno, Wales, June 13th, aged fifty-four years.

FOOTNOTES:

[1] The Popular Science Monthly for February, 1894.

[2] Report of General James Appleton to the Legislature of Maine, July 15, 1837.

[3] General Appleton was commander of the First Brigade of the Second Division of Massachusetts infantry in the War of 1812-1815, his resignation dating 1828.

[4] Perhaps for convenience of reference the figures heretofore found so startling may be repeated. Of 4,234 deaths collected by the British Medical Association, divided for reference into five classes—namely: *a*, total abstainers; *b*, habitually temperate; *c*, careless drinkers; *d*, free drinkers; *e*, habitual drunkards—the ages of death of those in each class were registered, together with the causes of death; and the average of death for each class computed with the following result:

Total abstainers lived on an average	51.22	years;
Habitually temperate lived on an average	62.13	"
Careless drinkers lived on an average	59.67	"
Free drinkers lived on an average	57.59	"
Habitual drunkards lived on an average	52.03	"

To cancel such a statement as this, some industry is required on the other side; at least a collection of 4,234 other cases. Anybody can say that a laboriously tabulated statement is false. But it requires patience to demonstrate it.

[5] A New View of the Temperance Question. By Edwin Reed, Boston, 1889.

[6] Einen Raketensatz im Leibe führen.

[7] From over the water; or it may be derived from Ilokos, or Tagal.

[8] "And all collections of rocks, minerals, soils, fossils, and objects of natural history, archæology, and ethnology, made by the Coast and Interior Survey, the Geological Survey, or by any other parties for the Government of the United States, when no longer needed for investigations in progress, shall be deposited in the National Museum...."—*Supplement to the Revised Statutes of the United States*, vol. i, second edition, 1874-1891, p. 252.

[9] Century Magazine, vol. lv, 1897, p. 156.

[10] To prevent misunderstanding, I should perhaps add that I have not neglected the anthropological aspects of the question. My paper on The Racial Characteristics of Modern Jews, which appeared in the Journal of the Anthropological Institute for 1885, contained, I believe Professor Ripley would allow, the fullest account of Jewish anthropometry collected up to that date.

[11] On the Comparative Anthropometry of English Jews, in the Journal of the Anthropological Institute for 1889.

[12] Babylonian Talmud, Gittin, 85a.

[13] Die Natürliche Auslese beim Menschen, Jena, 1883.

[14] Topinard, Éléments d'Anthropologie, 1885, p. 612.

[15] Ibid., p. 568.

[16] La Forma del Cervello umano e le variazioni correlative del Cranio, Siena, 1886.

[17] For chemical formulæ of some of the compounds, see Ladd, Outlines of Physiological Psychology, p. 13.

[18] For the opinions of investigators, as Mosso, Lombard, Maggiora, Kraeplin, and others, see Pedagogical Seminary, vol. ii, No. 1, pp. 13-17; Scripture, The New Psychology, chapter xvi; and Educational Review, vol. xv, pp. 246 *et seq.*

[19] Microcosmus, p. 162.

[20] Descent of Man, p. 66.

[21] Mental Evolution in Man, pp. 218 *et seq.*

[22] Darwinism, p. 469.

[23] Destiny of Man in the Light of his Origin.

[24] Ascent of Man.

[25] Human and Animal Psychology, pp. 5-7 and 440-445.

[26] For a complete statement of methods and results, see Hodge, American Journal of Psychology, vol. ii, pp. 3 *et seq.*; and vol. iii, pp. 530 *et seq.*

[27] See Pedagogical Seminary, vol. ii, pp. 12 *et seq.*

[28] Ibid., *op. cit.*

[29] Cowles, Neurasthenia and its Mental Symptoms, pp. 17 *et seq.*

[30] Educational Review, *op. cit.*

[31] Addresses and Proceedings of the National Educational Association, 1897, p. 279.

[32] *Cf.* Warner, The Study of Children, chapters viii and ix.

[33] Educational Review, *op. cit.*

[34] Bryan, Addresses and Proceedings of the National Educational Association, 1897.

[35] Pedagogical Seminary, vol. ii, pp. 20 *et seq.*

[36] Ibid., *op. cit.*

[37] The New Psychology, pp. 128-132.

[38] The Development of Voluntary Motor Ability, p. 76.

[39] Mental Faculty, pp. 76, 77.

[40] The New Psychology, pp. 236-248.

[41] *Op. cit.*, p. 47.

[42] See Educational Review, *op. cit.*; Galton, Journal of the Anthropological Institute, 1888, pp. 153 *et seq.*

[43] Since this article was written extensive investigations on school-room fatigue have been made in the schools of Madison, Wis., under the writer's direction, and the general principles here mentioned have been corroborated.

[44] *Op. cit.*, pp. 47 *et seq.*

[45] *Op. cit.*, pp. 36-117.

[46] Papers in Penology, 1891, pp. 57-69; *cf.* Collin, also in same, pp. 27, 28; Wright, American Journal of Neurology and Psychiatry, vols. ii and iii, pp. 135 *et seq.*

[47] A Measure of Mental Capacity, Popular Science Monthly, vol. xlix, p. 758.

[48] *Op. cit.*

[49] Pedagogical Seminary, vol. iii, pp. 213 *et seq.*

[50] Donaldson, The Growth of the Brain, chapters ix to xiii.

[51] *Cf.* Sidis, The Psychology of Suggestion; and Vernon Lee and C. A. Thompson, Beauty and Ugliness, Contemporary Review, vol. lxxii, pp. 544-569 and 669-688.

[52] Max West, in North American Review, May, 1897, p. 635.

[53] The word *cadastre* was derived from the Latin *capitastrum*, or register of *capita*, *griga*, or units of territorial taxation into which the Roman provinces were divided for the purposes of *capitatio terrena*, or land tax. It is of modern use and is locally found in Louisiana.

[54] Cohn, Science of Finance, p. 477.

[55] Abbott (Chief Justice) in R. *vs.* The Hull Dock Company, 3 B and C, p. 525.

[56] General Statutes of New Jersey, p. 3929, section 62.

[57] James F. Rusling, in the New Jersey report of 1897.

[58] The Theory of the Leisure Class. An Economic Study in the Evolution of Institutions. By Thorstein Veblen. New York: The Macmillan Company. Pp. 400. Price, $2.

[59] The Federal Census. Critical Essays by Members of the American Economic Association, collected and edited by a Special Committee. Published

for the American Economic Association by the Macmillan Company, New York. Pp. 516. Price, $1; cloth, $2.50.

[60] Puerto Rico and its Resources. By Frederick A. Ober. New York: D. Appleton and Company. Pp. 282, with Map.

[61] Footnotes to Evolution. By David Starr Jordan. With Supplementary Essays by Edwin Grant Conklin, Frank Mace McFarland, and James Perrin Smith. New York: D. Appleton and Company. Pp. 392. Price, $1.

[62] Industrial Cuba. Being a Study of Present Commercial and Industrial Conditions, with Suggestions as to the Opportunities presented in the Island for American Capital, Enterprise, and Labor. New York: G. P. Putnam's Sons. Pp. 428. Price, $3.50.

[63] Ichthyologia Ohioensis: or Natural History of the Fishes inhabiting the River Ohio and its Tributary Streams. By C. S. Rafinesque. A Verbatim and Literatim Reprint of the Original, with a Sketch of the Life, the Ichthyologic Work, and the Ichthyologic Bibliography of Rafinesque. By Richard Ellsworth Call. Cleveland: The Burrows Brothers Company. Pp. 175. Price, $4.

[64] Lectures on the Evolution of Plants. By Douglas Houghton Campbell. New York: The Macmillan Company. Pp. 319. Price, $1.25.

[65] On the Study and Difficulties of Mathematics. By Augustus De Morgan. New edition. Chicago: The Open Court Publishing Company. Pp. 288.

Transcriber's Notes:

Obvious printer's errors have been repaired, other inconsistent spellings have been kept, including inconsistent use of hyphen (e.g. "long-continued" and "long continued") and proper noun (e.g. "Yang-tse-Kiang" and "Yank-tse-Kiang").

Some illustrations were relocated to correspond to their references in the text.

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