Title: Appletons' Popular Science Monthly, December 1899

Author: Various
Editor: William Jay Youmans

Release date: October 2, 2014 [EBook #47024]

Language: English

Credits: Produced by Judith Wirawan, Greg Bergquist and the Online Distributed Proofreading Team at http://www.pgdp.net (This file was produced from images generously made available by The Internet Archive)

Established by Edward L. Youmans

APPLETONS' POPULAR SCIENCE MONTHLY

EDITED BY

WILLIAM JAY YOUMANS

VOL. LVI

NOVEMBER, 1899 TO APRIL, 1900

NEW YORK
D. APPLETON AND COMPANY
1900

FREDERICK C. SELOUS.

APPLETONS' POPULAR SCIENCE MONTHLY.

DECEMBER, 1899.

EXACT METHODS IN SOCIOLOGY.

By FRANKLIN H. GIDDINGS, Ph. D.,

PROFESSOR OF SOCIOLOGY IN COLUMBIA UNIVERSITY.

Those who do pioneer work in science encounter not only the inherent difficulties of research and interpretation, but also the misapprehension of certain educated men whose distinctive gift is a fatal genius for applying false standards of measurement to the progress of thought. Seizing upon some branch of knowledge that is in a state of vigorous development, when its newer results are out of harmony with its earlier hypotheses, such critics love to point out these contradictions, and try to prove that the branch in question is no science at all, and that its teachers are hardly worthy of respectful consideration.

The history of science contains many interesting chapters pertaining to this kind of criticism and the fate that has invariably overtaken it. When Copernicus and Galileo showed the absurdity of the Ptolemaic astronomy, the theologians enjoyed themselves for a time, as they demonstrated—to their own entire satisfaction—the folly of all rationalistic attempts to explain what revelation only could make clear. When Darwin explained the origin of species through variation and natural selection, the pretensions of biology were completely exploded by its lay and clerical critics (they thought and said so) by the extremely simple device of the "deadly parallel column." Was not Cuvier a great anatomist, and had he ever taught this nonsense about the mutability of species? Was not Agassiz the most learned naturalist alive, and what had he to say about Darwinian vagaries? Had he not proved, over and over again, that the very concept of the species was the notion of a group of characteristics that could not possibly change or be changed from generation to generation? In more recent years we have again seen the same method of reducing science to a variety show for the entertainment of the tired general reader applied to both biology and psychology. Weismann has tried to prove that acquired characteristics are not transmitted in heredity, and that the germ plasm is distinct from the somatic cells. The neo-Lamarckians, Spencer, Cope, and some of the botanists have contended for the older

[Pg 146]

interpretation. Is biology, then, a science? Forbid the thought! Heaven preserve our minds from such confusion!

If the sociologists have hoped that they alone might not be overtaken by easy annihilation, they deserve to be humiliated. But it is safe to say that they have cherished no such illusions. If the men who have devoted much time to the scientific explanation of society have had no other qualification for their task, they have at least shown some acquaintance with the history of thought. And so it is not likely that they have suffered deeply from disenchantment when they have been confronted with the regulation exposure of "the present position" of their science.

There is no need of wasting space to prove that the kind of criticism here referred to is without scientific value. The present position of any science can not be determined by arraying its contradictions and inconsistencies, irrespective of a serious attempt to ascertain which of its concepts and hypotheses have inherent vitality. It is precisely when a science is at its best, surely advancing year by year and full of promise for the future, that contradictions most abound in its monographs and text-books.

A true scientific criticism, then, must proceed by a different method. The present position of a science can be ascertained only by instituting three specific inquiries, namely: First, among the more or less contradictory conceptions and hypotheses which constitute its groundwork, what ones are surely displacing all others and gaining the wider acceptance among active students? Second, what progress is being made in the application of exact methods to research? Third, is there a practical or working harmony between the concepts that are gaining ground and the more exact methods of research that are being perfected? Do the concepts and hypotheses lend themselves to exact methods, and do they, on the whole, help to perfect methods? Do improving methods, on the whole, confirm or strengthen the concepts that are gaining wider acceptance?

If these inquiries are applied in the domain of sociology they bring to light unmistakable evidence of a steady and gratifying progress toward scientific consistency and rigor of method. Much [Pg 147] babble about social ills and possible reforms still masquerades as social science. A great deal of loose thinking and slipshod investigation is paraded as expert opinion on questions of social welfare. But no one who has seriously followed the efforts of scientifically trained minds to discover the natural laws of social evolution is in any danger of confounding the results thus far obtained with the chatter over every passing fad. In the more serious work itself there is found a vigorous and hopeful disagreement of opinion upon all unsettled questions. But the fact of real significance is that the disputation has become intensive. The debate no longer ranges over a wide field. A selective process has eliminated one after another the more loose and vague conceptions of the science, the irrelevant issues, and the superficial analogies. There has been a progressive concentration of attention upon a group of closely related and fundamental problems.

The sociology of August Comte was little more than a highly intelligent and quickening talk about social order and progress. It convinced thoughtful men that there is a social order to be studied in a scientific spirit and by scientific methods, and that social progress conforms to laws that may be discovered. Mr. Spencer narrowed the field of sociological inquiry and gave precision of statement to all social problems by bringing them within the formulas of universal evolution. He still further narrowed the field by demonstrating the close relationship of social phenomena to the phenomena of organic evolution and by seizing upon certain psychological facts as chief factors in social causation. All fruitful later work in social interpretation has been a further concentration of investigation upon the psychic factors. While admitting that social as well as mental phenomena are subsumed under biological phenomena, and that the parallelism of social organization to biotic organization is real, the younger students of sociology have developed the science as an offshoot of psychology, and have dropped the biological analogy as unfruitful for purposes of research. The pioneer in this movement was Dr. Lester F. Ward, whose masterly analysis of the psychic factors of social phenomena gave the right direction for all time to sociological inquiry, and whose emphasis of the importance of reason and volition in the social process, although it has not yet received the attention that it merits, is destined to be fruitful in coming years.

To the further study of the psychological foundations of society practically all the valuable work on fundamental social problems has been given during the past ten years. Tarde has given us [Pg 148] profound studies of imitation and invention; Gumplowicz and Le Bon, of the psychology of races and culture groups; Novicow, of the psychology of conflict and toleration; Le Bon and Durkheim, of the psychology of crowds, of co-operation, and of the division of labor; Baldwin, of the psychology of the social unit—the *socius*.

Thus it appears that while sharp disagreements of opinion still exist relative to the priority or the generality of one or another of these psychic factors in the social process, discussion has focused about the psychological phenomena themselves. There has been a progressive limitation of the field and an increasing definiteness of conception and hypothesis.

My own effort, if now I may be pardoned for referring to it, has been to restrict the field yet further, and to make the problems of sociology yet more specific. I have contended that these psychological phenomena which have been seized upon for purposes of sociological interpretation are still too vaguely conceived. They are often disclosed to the inquirer in purely individual as well as in social aspects. The lines of inquiry between the study of mind in general, of mind as individual, and of mind as manifesting itself socially in the concert or co-operation of a number of individual minds, have not been drawn with sufficient precision. I have tried to show that the psychological phenomena that Ward, Tarde, Gumplowicz, Novicow, Le Bon, Durkheim,

Baldwin, and others have so admirably analyzed as psychic factors of society are social when, and only when, they have certain coefficients, namely: (1) The coefficient of resemblance—that is, a fundamental similarity of individuals to one another underlying and, on the whole, dominating their innumerable differences; (2) the coefficient of awareness or consciousness of resemblance—that is to say, certain feelings, perceptions, or thoughts of resemblance, which give rise to varied prejudices and preferences that facilitate or prevent effective co-operation. Whether this contention of mine will prevail, whether there will ultimately be a general agreement among sociologists that these coefficients of resemblance and consciousness of kind are the true *differentia* of social phenomena, time and further research must determine.

The second inquiry through which we may learn somewhat of the present position of sociology relates to the development of method. Exact method in social research is statistical. Wherever we can obtain numerical data within the domain of social phenomena, there we arrive at exact or quantitative knowledge. The development and application of statistical methods to social problems has been one of the most striking scientific achievements of the present century. When [Pg 149] Quételet, in 1835, published his great work, *Sur l'Homme et le Développement de ses Facultés*, he laid the foundation for a thorough statistical investigation of psychological and sociological no less than of anatomical phenomena. And after the publication, in 1846, of his work, *Sur la Théorie des Probabilités appliquées aux Sciences morales et politiques*, followed, in 1848, by *Du Système social et des Lois qui le régissent*, there was a rapid development of statistical methods in precision, and of attempts to extend the statistical method to groups of facts which had until then been studied only from a purely qualitative or, at best, a vaguely comparative point of view. At the present time every subdivision of descriptive sociology draws data from rich collections of statistical materials, and employs statistical methods for the further extension of knowledge.

Thus, in the study of the social population, statistical methods are employed not only to give the total number of inhabitants dwelling within a given territory and the degree of density of population per square mile, but also to show to what extent population increases by births in excess of deaths, to what extent by immigration in excess of emigration, and to what extent the composition of the population is rendered complex by the intermingling of many nationalities. The character of a population, also, and its social capacities are in a large measure statistically investigated. General intelligence is studied by means of statistics of literacy and illiteracy; industrial preferences by statistics of occupation; habits of industry by statistics of the number in every thousand of the total population who regularly follow gainful occupations; frugality by statistics of savings, insurance, and home ownership; and the amount of communication, whereby assimilation and co-operation are rendered possible, by statistics of travel, mail, and telegraphic service.

Passing to that study of concerted feeling, thought, and purpose which may be called a study of the social mind, and which constitutes the second great division of descriptive sociology, we find that it can be carried on, and that to a great extent it is prosecuted, by means of statistical research. We have statistics incomplete, but admitting of perfection, of those impulsive, emotional disturbances of masses of men which take the form of strikes, insurrections, lynchings, and revivals. The report of the United States Department of Labor on strikes, published in 1894, and a recently published monograph by Dr. Frederick S. Hall on Sympathetic Strikes, show the possibilities of this method whenever it shall be exhaustively applied. It could be successfully applied to the other phenomena mentioned. By painstaking effort and a sufficient expenditure of [Pg 150] money the data could be obtained. Lombroso and Laschi, in their work, *Le Crime politique et les Révolutions*, have made a beginning toward the collection of statistics of insurrections and revolutions. More exact, at present, are our statistics of the rational working of the minds of large numbers of men in communication and co-operation. These we have in the familiar form of election returns, which show us the decisions that communities make on questions of public policy and administration. This information could be increased by the application of statistical analyses to the vast body of statute law and judicial decisions. A beginning of such work has been made in the valuable Bulletin of State Legislation, published by the New York State Library.

In the third division of descriptive sociology—that, namely, which treats of social organization—the application of statistical method is proceeding with great rapidity. We have not only statistics (yearly improving in quality) of marriage and divorce, of the organization of all governmental departments, military and civil, of chartered corporations, of religious and educational societies, but also of the thousands of associations formed for the promotion of special interests, recreation, scientific research, art and literature, and philanthropy. Every year the statistical information on these matters, included in such compilations as The World Almanac, becomes not only more extensive but more precise.

Yet more abundant are the statistical accumulations pertaining to that fourth and last division of descriptive sociology which treats of the social welfare—of the functioning of society, of the ends for which it exists. We have statistics of prosperity, of the accumulation and distribution of wealth, of the expansion and contraction of credit, and of business failures. We have statistics of longevity. We ascertain improving sanitary conditions by changes in the death rate. We learn by statistical methods of the increase or decrease of accident and death due to public disorder or maladministration. We ascertain through educational statistics the decrease of illiteracy and superstition. And by the same means we ascertain the dimensions of pauperism and of crime. Not only so, but, by a certain refinement of statistical method, applied by competent men like Sir Francis Galton, we ascertain the increase or decrease and the distribution of the higher manifestations of intellectual ability and moral character.

Thus the whole field of descriptive sociology is being more and more exhaustively studied by statistical methods that are yearly improving in precision. So far, then, as may be judged from the development of its methods, no science at the present time is making surer and better progress than sociology, and none is offering to the general public conclusions based upon more exact methods of induction. [Pg 151]

Let us now look at the relations which the development of statistical method bears to that development of fundamental conceptions, which has already been described. Do we here discover increasing harmony, a tendency toward co-ordination, or have analyses of concepts, on the one hand, and developments of statistical method, on the other hand, followed diverging lines?

There can be no possible doubt of the answer that must be made to these questions. Conceptions and methods are in as perfect accord as can be discovered in any branch of science. The merest glance over the field of social statistics shows that, for the most part, they record and classify phenomena that are essentially psychological. In working from the general theory of evolution through the biological parallelism down to psychological premises, analytical sociology has been doing in one way precisely what statistics have been doing in another. The moment we pass from statistics of density and distribution of population we find ourselves dealing next with groups of facts that are biological (the facts, namely, of distribution according to sex and age periods), through facts that are partly biological and partly psychological in character (the facts, namely, of nationality), and then, leaving these behind, we deal henceforth entirely with facts that belong to the mental and moral categories. To name them would be only to repeat the categories already enumerated: the statistics of intelligence, industry, and moral character, of emotional or rational social action, of various forms of organization for the achievement of as many different purposes, and of the development of the conscious personality of man as a result of his social relations and activities.

Not only is this true, but the further interesting fact may be discovered that social statistics of every category employed or known are based upon a frank recognition of that coefficient of resemblance, physical or mental, which I have contended is a mark of social phenomena. The first step in statistical tabulation is classification, and classification invariably starts from an assumption of real or supposed resemblance. Not to dwell on such fundamental distinctions as those of color, race, and nationality, we encounter the more special resemblances of agreement in religious belief, agreement in industrial preference, agreement in political conviction (as shown in election returns), similar susceptibility to emotionalism, similar capacities for rational comprehension, similar imperfections of nature, which result in lives of crime or pauperism. [Pg 152] Remove from social statistics this postulate that blood kinship or mental resemblance between one social unit and another is the basis of social phenomena, and the statistics themselves would cease to exist.

Statistics reveal also the consciousness which men have of their resemblances and their differences. It is statistically known that the geographical distribution of nationalities is not accidental or capricious. Immigrant Italians, Germans, and Scandinavians find their way to those parts of the country where men of their own blood and speech are already established. Intermarriages of men and women of different nationalities are statistically known to be frequent where no differences of religion exist, and infrequent where different nationalities profess different faiths. The statistics of political elections are quite as much statistics of the consciousness of kind as of differences of mental type itself.

The most significant fact of all, however, has still to be named. It is this: From the first known beginnings of statistical research to the present time every extension of statistical inquiry has been in a large measure due to the consciousness of kind. The first statistical surveys of communities of which we have any record were such tribal enumerations as those recorded in the book of Numbers, the avowed object of which was to ascertain the strength and resources of the various tribes by clans, lesser gentile groups, and households, not more for utilitarian reasons than for the gratification of gentile and tribal pride. The census taken in Greece in 594 B. C. was for the purpose of dividing the people into four classes and levying taxes according to wealth. The constitution of Servius Tullius, 550 B. C., distinguished six property classes, and the attempt to determine these statistically was one of the earliest experiments in census-making at Rome. The Domesday Book of William I (1086) is the first great statistical document in English history, and its origin was due to a desire to know not only the military and fiscal strength of the nation, but also its class distinctions and feudal relationships. The great stimulus given to statistical investigation by the French Revolution was an obvious product of class feeling. Most of the refinements of statistical inquiry in later years have had a like origin. Such, for example, was the cause of the discrimination in our own census of the foreign born from the native born, and of the native born of foreign parents from both native and foreign born. Such has been the cause of the attempt to get more exact statistics of religious denominations, of labor organizations, and of the distribution of wealth. Had there been no reason for including these costly inquiries in statistical investigations, except that of their general utility and scientific interest, the appropriation for [Pg 153] them would have been denied in Congress without an instant's hesitation. They have been included because of the political deference given to class feeling and to various forms of religious and educational prejudice.

Thus there is seen to be a remarkable interdependence of statistical method and psychological analysis in the development of sociological research. Analysis and method have converged upon the same postulates, and it is apparently by the development of methods frankly founded upon these postulates that our sociological knowledge is to be further increased.

It would be a great mistake, however, to assume that sociological knowledge is to be increased only by the further collection and interpretation of numerical data. Careful monographic description and historical research must continue to be important sources of both information and hypothesis. The great defects of monographic work, both descriptive and historical, are, first, a certain lack of precision, attributable to the large part played in investigation by the individual judgment of the student (the lack of objective tests by which his subjective impressions may be critically examined); second, a certain incompleteness, attributable to a failure to separate each inquiry into all its scientific subdivisions and to attempt to obtain desired data under each subdivision, as is done in statistical investigation where, in every table, as many topics as there are scientific subdivisions of the general subject are represented by columns, and an entry of some kind is made in every column.

I wish now to point out the possibility of giving greater precision to monographic work in sociology by the introduction of quasi-statistical methods—methods that are essentially quantitative in an algebraic sense, though they are not numerical.

Social phenomena have the interesting characteristic that small forces, while never lost in that composition of forces which determines the ultimate equilibrium of the social system, often count for absolutely nothing in the practical affairs of a given generation. If, for example, Mr. Bryan and a Democratic Congress had been elected in 1896, the practical consequences for the United States would have been much the same whether the Democratic plurality had been one hundred thousand, half a million, or two or three millions. This is but one example of a large class of facts. Social phenomena are more often than not determined by a mere matter of more or less, rather than by the exact amount or degree of more or less. The determination is algebraic rather than arithmetical. Is the element under investigation a positive or a negative quantity? Is its sign plus or minus? That is usually the important question for the sociological student. [Pg 154]

Now it happens that a great many investigations in descriptive sociology do not as yet admit of the introduction of exact statistical—that is, arithmetical—inquiries which, nevertheless, do admit the use of algebraically quantitative methods. In the monographic description of a community many questions arise which can not be answered by the entry of figures in a column, but which could be answered by entering in a column a symbol indicating that a certain trait, habit, or choice could be predicated of a large majority, or of a small majority, or of only a large minority, or of only a small minority of the entire population. That is to say, it often happens that an observer who can not take a perfect census (getting answers to all his questions from every individual in the community), and who therefore can not fill out his columns with arithmetical values, can, by such interviewing as is possible to him and by such an examination of the objective products of social activity as are open to the inspection of any one who chooses to observe them critically, determine with absolute certainty whether certain things are true of majorities or only of minorities.

Suppose, for example, that a traveler is studying an out-of-the-way settlement, or a tribe, which presents many points of interest that are comparatively novel. All who are familiar with the narratives of travel and exploration which Mr. Spencer has used as data for his Descriptive Sociology are aware that they are almost totally devoid of system. The reader is told that such marriage customs, such clan relationships, such political institutions, such industrial operations, have been observed. The all-important coefficient is left out. What the student of sociology would most of all like to know is how many individuals in the community manifest such or such a trait; how many have such or such a habit; how many profess such or such a belief; how many adhere to this organization, how many to that. But since this exact arithmetical knowledge usually can not be obtained within the limited time and under the circumstances of a traveler's researches, he should try to get at least partially quantitative results by noting in every instance whether the phenomenon observed is true of a majority or only of a minority of the people under investigation.

This simple method admits of a high degree of refinement by the obvious device of subdividing the total human mass under observation into enumeration units. If, for example, we are studying the social character and activities of the people of the United States, we may take the fifty Commonwealths and Territories as enumeration units. Making out a tabular form, we may enter [Pg 155] in the left-hand column the names of the several States and Territories. At the top of successive columns, counting from left to right, we may enter words designating the social phenomena to be observed. Then, taking the States and Territories in order, we may enter opposite the name of each a symbol indicating that a majority large or small, or a minority large or small, of the inhabitants of the State or Territory in question manifests the trait or follows the activity, or belongs to the social organization designated at the top of the column. The symbols that I have found most convenient in use are these: For a large majority, a double plus sign thus, ⧺; for a small majority, a single plus sign thus, +; for a large minority, a double plus sign in a circle thus, ⊕; for a small minority, a single plus sign in a circle thus, ⊕.

The great possibilities in this method of giving precision to observations and records of the facts of social psychology and activity become daily more obvious to students who practice it with reasonable care. Almost any desired degree of accuracy can be attained by taking smaller and smaller enumeration units. Thus, if I wish to form and to record my judgment as to whether the people of the United States as a whole manifest a high, a medium, or a low degree of general intelligence, I seem to be raising a question that admits of little better answer than a statement of vague impressions. But let me take a concrete measure of high general intelligence—for example, the general intelligence of a town noted for its large proportion of scientific and

professional men, its graded schools, its satisfactory school attendance, and its low percentage of illiteracy. Let me then subdivide the United States into fifty parts—namely, the Commonwealths and Territories—and let me enter in a column opposite the name of each a symbol indicating that, as compared with the general intelligence of the town which I have taken as a standard, a large majority or a small majority, or a large minority or only a small minority, of the people in that Commonwealth are of the high general intelligence; that a large majority or a small majority, or a large minority or only a small minority, are of medium intelligence; and that a large majority or a small majority, or a large minority or a small minority, are of low intelligence. Obviously, when I have completed this process I have subjected my vague general impression that the people of the United States as a whole are of high, medium, or low general intelligence to a certain correction and measure. I count up the entries in my columns. I discover that I have made, let us say, nine entries indicating that a large majority of the people in each of nine States are of high intelligence. I find that I have made, let us say, eighteen entries indicating that in each of [Pg 156] eighteen States a small majority of the people are of low general intelligence; and this mere counting of the entries may show me that, when taking the States one by one, I have made a somewhat different estimate of the general intelligence of the people of the entire country from that which I made when looking at all the people of the country as an undivided mass.

If still unsatisfied with my judgment, I may proceed to subdivide each State into its counties, and take the counties as enumeration units. I may go through the process of recording my judgments by entering symbols in the several columns of my table, and at the end I may again count up my totals of high, medium, and low intelligence. Obviously, I can do this work only if I am able to travel through every county in the United States, and, by interviews with people, by forming general impressions and by visiting schools, get a fairly definite idea of the relative intelligence of each civil division; or if, being unable to make this personal inquiry, I resort to printed information—namely, educational reports, miscellaneous public documents, historical records, newspapers, and other objective data throwing light upon the intellectual status of these various divisions. This, I find, is an enormous labor; but if I conscientiously perform it I correct my subjective impressions, and there is a fair presumption that my final result is a judgment vastly nearer the truth than was my first general impression of the intelligence of the whole undivided mass of the American population.

Thus the conscientious use of the method which I have suggested insures, in the interest of precision, two important modifications of ordinary sociological description: First, it subjects the purely subjective processes of judgment to a certain correction and measurement; secondly, it leads the observer step by step, and almost unconsciously, to resort more and more to definite objective data in place of first impressions.

Essentially the same method, by slight modifications of detail, may be extended to historical inquiries. How often do we encounter in historical monographs the statement that, since a certain date, there has been a marked increase of this or that activity, or that such a trait or such a habit, occasionally observed half a century ago, is now characteristic of whole sections or populations! To the credit of the historians, it must be said that careful men seldom make such statements without offering in substantiation of them a certain amount of objective evidence. But the method is loose, and it has the radical defect of permitting such terms as "increase" and "decrease," "great increase" and "great decrease" to stand for different quantities when applied to different phenomena under examination in the same treatise. There is no uniformity of [Pg 157] measurement. Now, it is easy to introduce uniformity, even where arithmetical values are not known. It is possible to know that we are applying the same method of measurement when we say that, since 1850, there has been a "great" multiplication of lynchings in the United States that we apply when we say that there has been a "great" increase of population, although, in the case of the lynchings, we have not arithmetical values, while in the case of the increase of population we have.

This can be done in the following way: Distinguish and designate degrees of increase or decrease by symbols thus: No change, = 0; absolute increase but relative decrease, = +1; absolute increase with no relative decrease, = +2; great absolute increase without relative decrease, = +3; absolute and relative increase, = +4; absolute decrease but relative increase, = -1; absolute decrease without relative increase, = -2; great absolute decrease without relative increase, = -3; absolute and relative decrease, = -4.

Now let the historian who wishes to pass in review the quantitative changes that have occurred since a given time—for example, 1850—before he puts on paper his impressions, based upon such evidence as he has been able to collate, put down all these symbols against the name of each of the social phenomena which he is studying. He will instantly see that he is trying to apply to each of the phenomena whose changes he wishes to record a certain scale of measurement, and he at once asks himself: What do I really mean by such a term as "relative" increase or decrease when contrasted with "absolute" increase or decrease; and what do I mean by such a term as "great" increase or decrease when contrasted with such a term as "increase" or "decrease" without a modifying word? The moment he puts these questions before his mind he will feel a sinking of heart as he reviews the pages in which he has confidently told his readers that such "absolute" and "relative" changes have from time to time occurred, and reflects that he has seldom been consistent in his use of these terms.

How, then, shall he attain consistency and precision? To be consistent and precise in the use of the word "relative" it is necessary to make at the outset an arbitrary choice of a term of comparison, just as in making comparative judgments of such a phenomenon as general

intelligence it is necessary to take as a standard the phenomenon as observed in a particular community. The most suitable term of comparison for all judgments of increase or decrease in social phenomena is the increase or decrease of population per square mile within the area and during the period studied. The increase of population is arithmetically measured, and it stands in [Pg 158] relations of direct causation to every social change. The historian, therefore, in forming his judgments of relative increase or decrease should always take the increase or decrease of population per square mile as his term of comparison.

What meaning, finally, shall be attached to the word "great" when the historian wishes to distinguish "great" increase or "great" decrease from "increase" or "decrease" in general, and absolute statistics are not available? There is one, and, as far as I can see, only one, perfectly satisfactory procedure.

Let the investigator subdivide the community which he is studying into enumeration units according to the method suggested above for the descriptive monograph. Let him then make as many tables as there are ten-year periods in the general historical period that he is investigating. That is to say, let him make a table for 1850, for 1860, for 1870, for 1880, and for 1890. Let him then proceed according to the method laid down for the descriptive monograph, entering opposite each Commonwealth the symbol for majority or minority, thus showing by States, for each of the ten-year periods, the prevalence of the trait or activity under investigation. Suppose, for example, that the phenomenon studied is the growth of popular interest in prize fighting since 1850. The historian should begin by asking, In what States, if any, in 1850 were large majorities of the people interested in prize fights to the extent of countenancing them and eagerly following their progress? In what States were only small majorities so interested, in what States only large minorities, and in what ones only small minorities? The best answers that the historian can make to these questions, after examining all the evidence that he can command, he should record by entering the proper symbol against each State, after which he should repeat the procedure for the date 1860, for the date 1870, and so on. When his tables are thus completed, he should count up the number of entries of each symbol in each table. If then he finds that in less than half of his enumeration units—i. e., in less than half of all the States and Territories—small minorities have become large minorities, large minorities have become small majorities, or small majorities have become large, he will be justified in concluding that there has been an increase, but not a "great" increase, in popular interest in prize fighting. If, however, he discovers that these changes have occurred in more than half of his enumeration units, he can say with reason that the increase of interest in prize fighting has been "great."

Cases may arise in which a correction of the judgment thus formed may be necessary. It might be [Pg 159] erroneous to say that there had been no great increase of interest in prize fighting if it were discovered that the increase had occurred in two or three Commonwealths only, but that in them it had been phenomenal. The method itself, however, reveals the necessity for correction in such cases and measures the error; for, obviously, a phenomenal increase or decrease in any one enumeration unit would be disclosed by a dropping of the intermediate symbols between ⊕ and ⧺. That is to say, small minorities would become majorities, or great majorities would become small minorities, within an interval during which lesser changes were occurring elsewhere.

Thus, by taking a little trouble, the historian can apply one constant measure to his judgments of increase and decrease, as he reviews social changes. He must subdivide his community into enumeration units, and against each unit, at each convenient date, he must enter a record of his judgment that the trait, activity, interest, or relation under investigation can be predicated of a large or of only a small majority, of a large or of only a small minority, of the individuals composing the enumeration unit. He must then count up the changes from minority to greater minority or to majority, or from majority to minority. Conscientiously following this method, the historian may often make comparisons of great precision, when otherwise his comparisons, made without reference to a common measure, would be little more than suppositions.

Following such methods as these, the writers of descriptive and historical monographs can increase our approximately exact sociological knowledge. Constructing and filling out such tables as have been described, they can bring to light serious gaps in our numerical statistics, and they can thereby suggest and stimulate new statistical inquiries. Thus co-operating, the descriptive writers, the historians, and the statisticians can in time perfect our descriptive sociology, and, co-operating with those students who are completing the analysis of fundamental concepts, they can gradually give precision to our formulations of sociological law.

Bishop Creighton, of London, has characterized the present English idea of education as embodying the supposition that "all the child had to do was to sit still like a pitcher under a pump while an expert hand poured in the proper amount of material for it to hold." His own view was that the only education anybody really obtained was that which he gave himself. "The idea prevailing at the beginning of the century was that men should read a good book, master its contents, and pursue for themselves the lines of thought it suggested, and talk it over and make its ideas the subject of discussion among themselves. No system could surely be better."

VINLAND AND ITS RUINS.

[Pg 160]

SOME OF THE EVIDENCES THAT NORTHMEN WERE IN MASSACHUSETTS IN PRE-COLUMBIAN DAYS.[1]

By CORNELIA HORSFORD.

The evidences that Northmen were in Massachusetts in pre-Columbian days are drawn from two sources, geography and archæology. The archæological evidence is found by comparing certain ruins in Massachusetts with ruins of the Saga-time in Iceland, and also with the native and early European ruins on the coast of North America. The geographical evidence is found by comparing the descriptions of the country called Vinland in Icelandic literature with the coast of North America.

The geographical data for this paper are taken from each and all of the three oldest manuscript versions of the story of Vinland, because they complement each other where the descriptions vary in detail. These are called the Flat Island Book, Eric the Red's Saga, and Thorfinn Karlsefni's Saga.

If the coast of North America should repeat the same geographical features, it would obviously be impossible to determine the site of Vinland by geography alone. Let us see if this is so. It is stated in Eric the Red's Saga that Karlsefni's party, which consisted of one hundred and sixty [Pg 161] men and their live stock in three vessels, after sailing southwest from Greenland for a number of days and seeing two new countries, came to a certain cape. "They cruised along the land and the land lay on the starboard.... There were there an open, harborless coast and long strands and sand banks. And they went in boats to the land and found there the keel of a ship, and they named it Keel Cape. And they gave a name to the strands and called them Wonder Strands, because they were long to sail by. Then the land became scored with bays, and they steered the ships to the bays."[2] They remained here for some time, but they had not yet seen the Vinland which Leif Erikson had found a few years before.

Thorhall started to seek for it "northward round Wonder-strand and westward off Keel Cape." Therefore we must first look for a cape, the trend of whose shore is north and south, with open water west of it, and beyond that again land. This cape must have a long, sandy, harborless coast, with sand banks on the east, and it must be broken up into bays farther to the south, and one of these bays must be large enough and deep enough for three vessels, one of which could carry at least fifty men across the Atlantic. The icelandic word "örœfi" which is used in this text means "harborless," and is the descriptive local name of the convex, sandy, unsheltered coast of southern Iceland (Orœfa), the present Skaptafells district, from Stokksnes to Dyrhólaey. This gives a clear idea of what we ought to look for along the coast of North America.

The eastern coast of North America[3] shows us that, south of rock-bound Labrador, the only places north of New York where capes are to be found jutting northward from the land are [Pg 162] northern Newfoundland, Cape Breton Island, the southern shores of the Gulf of St. Lawrence, Cape Ann, and Cape Cod.

There is no stretch of open, harborless, sandy coast from Cape Bauld to Cape Spear, with its steep, sterile, rocky shores.[4] There are two or three stretches of unbroken coast from three to five miles long, north and south of Canada Bay, northwest of Conception Bay, and northeast of Bonavista Bay, but these are not the shores of capes jutting to the north, with long strands and sand banks.

If we begin with Cape Breton and follow the coast northward we find no extensive stretch of harborless coast until we reach Island Point. From this point to Cape Smoke there is a comparatively unbroken coast about thirty miles in extent whose "headlands are composed of primary and metamorphic rocks, principally granite, with clay slate in nearly vertical strata, while sandstone, conglomerate, shale, limestone, and occasionally beds of gypsum and red and yellow marl occur on the intervening shores."[5] Here, then, there are not long strands and sand banks. Cape North is a headland of slate one thousand feet high.[6] Dr. Gustav Storm, of the University of Christiania, in his well-known book, *Studier over Vinlandsreiserne, etc.*, page 42, points out a resemblance between Cape Breton and Keel Cape, and states that the eastern shores of Cape Breton Island are "specially described as low-lying and sandy." According to the United States Hydrographic Office Report, No. 99, page 289, the southeast coast of Cape Breton Island from Michaux Point to Cape Gabarus "is low and has a barren and rocky appearance, and the shore is broken into numerous lakes and ponds, protected from the sea by beaches of gravel and some small rocky islands and ledges.... From Cape Gabarus to Cape Breton, a distance of fifteen miles, the land is of moderate height and the shore broken into coves and small harbors." Between Louisburg and Cape Breton, eight miles beyond, "there are three small harbors, too [Pg 163] intricate and rocky in their entrances to admit vessels of any burden," and Cape Breton itself is "low and rocky and covered with grassy moors." This is unlike the open, harborless coast with long strands and sand banks of the Sagas. Within the Gulf of St. Lawrence the capes which jut to the north are Cape St. George,[7] with rocky, precipitous cliffs six hundred feet above the sea; North Point,[8] on Prince Edward Island, which is broken about five miles down the coast by Tignish River, and beyond that by the red sandstone cliff of Cape Kildare; Escuminiac Point,[9] at the entrance to Miramichi Bay, a broken coast with low sandstone cliffs; and Birch Point,[10] on

Miscou Island, with a steep cliff of sandstone ten feet high.

Campobello is a rocky island, and Cape Ann is rocky and has no long, harborless coast.

Cape Cod[11] juts to the north with open water west of it, and beyond that again land. It has also a long, harborless coast on the east, with strands and sand banks, and is scored with bays toward the south.

Cape Cod, then, is the only cape north of Sandy Hook which corresponds to the description in the Saga, and near here we should look for Vinland, leaving the southern shores until later.

Vinland, which was discovered by Leif Erikson, is only described as *Vinland* in the Flat Island Book. This account states that Leif Erikson's party "came to a certain island which lay north of the land." That Leif Erikson should have thought that Cape Cod was an island is obvious, because it is impossible from the cape to see the southern shore of Massachusetts Bay twenty miles away. [Pg 164] There is no need to explain why he also believed it to lie north of the land, as no one and final answer can be given, although several can be easily suggested; that water and land again lay to the west is clearly stated in all three accounts.

Afterward "they sailed into that sound which lay between the island and the promontory which jutted northward from the land; they steered in westward past the promontory. There was much shallow water at ebb tide, and then their ship stood up and then it was far to look to the sea from their ship." Across the water which lies between Cape Cod and the mainland is Rocky Point, a high and therefore noticeable promontory jutting northward from the land. Past this one can only continue westering to the north, and thence we must now look along the land to find the place where, in the words of the Flat Island Book, "a certain river flowed out of a certain lake," having, as was said before, great shallows at its mouth at ebb tide, whence it was far to look to the ocean. [Pg 165]

Following round the inner coast of Cape Cod, we pass Plymouth and on to Boston before we find in the Charles River and Boston Back Bay a river flowing through a lake into the sea, where great shallows at its mouth are a conspicuous feature and it is far to look to the ocean.

At this point we may add one more feature to the description of Keel Cape—that it appears to be an island when approached from the north. Now we can continue our search down the North Atlantic coast, noting that Sandy Hook is not scored with bays at the south, and that Cape Henlopen and Cape Henry could not have been mistaken for islands.[12]

There is one event described in all three versions of the Vinland story—the battle with the natives. [Pg 166] According to the Flat Island Book, this battle took place in Vinland; according to the other two Sagas, Vinland was supposed to be north of Keel Cape. But in these Sagas it is said that this battle took place *south* of Keel Cape, where Karlsefni had found a river flowing through a lake into the sea.

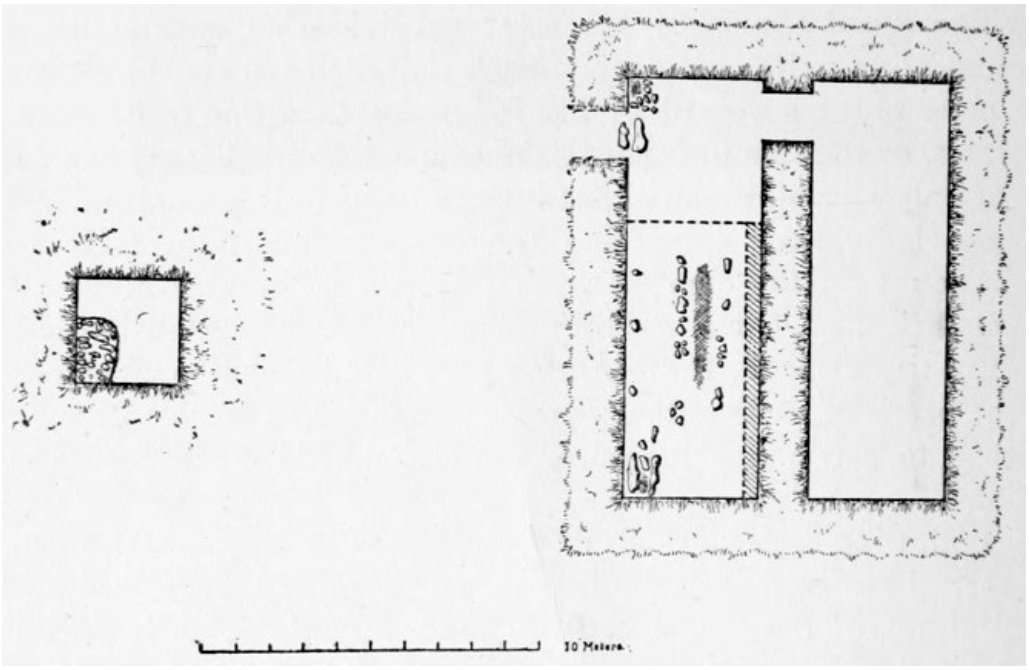
It was this word south which led the Danish archæologist Carl Christian Rafn to think that Vinland was in Rhode Island. Although there is no land south of Cape Cod (with the exception of Nantucket Island) between Cape Cod and Santo Domingo, it is only fair to look once more at Mount Hope Bay[13] (Rafn's Vinland) to see whether it really corresponds to the description before us. The Taunton River flows through Mount Hope Bay to the sea, but there are no shallows here, and the mouth of the river looks directly out, southward and not eastward, to the open ocean. In Boston Harbor, moreover, are great tongues of land and islands such as are described in Eric the Red's Saga. There is perhaps cause for comment in the use of the word "fjöll," fells or mountains (according to Vigfusson[14]), applied to the hills about Boston, of which the highest, "Blue Hill," is seven hundred and ten feet high. If "fells" is a correct translation, it would be unobjectionable.

One morning Karlsefni saw the natives in their skin boats rowing toward his house, from the south, past a promontory. It is not difficult to find the only promontory past which canoes could have come from the south between the mouth of the river and Watertown, the head of navigation. Here, then, Leif Erikson and Thorfinn Karlsefni should have built their houses, if this history be true, because this place corresponds with the description of Vinland, and also because we can find no other place on the coast like it.

Having found what appears to be the site of Thorfinn Karlsefni's houses, it is well to inquire next what the characteristic features of the Norse houses of the Saga-time were, and what traces one might hope to find after nearly nine hundred years.

Icelandic homesteads of that period usually consisted of a main house, composed of three or four apartments and one or two outhouses, built on the surface of the ground.

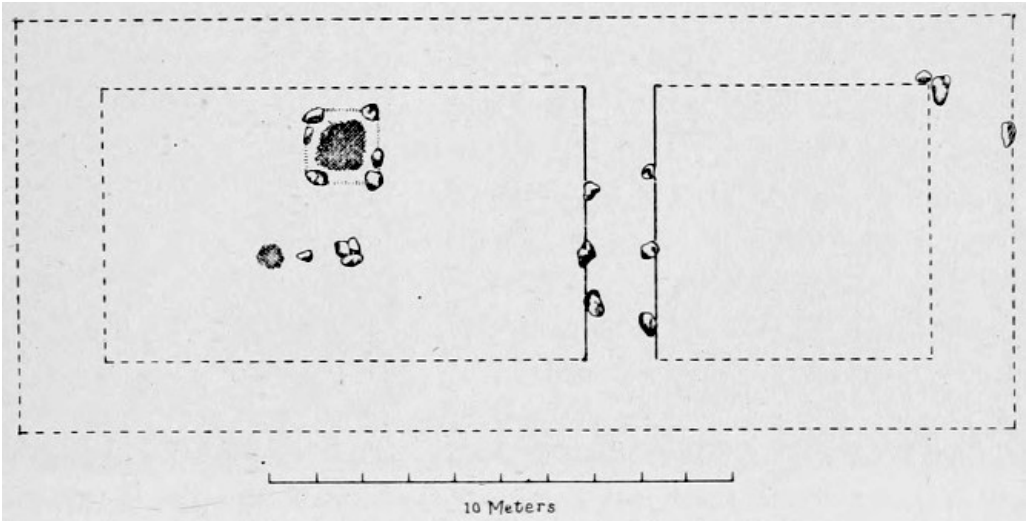
The walls were one and a half metres thick, and from one to one and a half metres high, built of alternate layers of turf and stones on the inside and on the outside, the space between being filled in with earth. [Pg 167] Often, however, the walls were built entirely of turf and earth, or with only disconnected rows of stones at the base. Wood also was sometimes used. It is stated in Thorfinn Karlsefni's Saga that some of the trees in Vinland were "so large they were laid in a house."



Plan of the House of Eric the Red in Iceland.

A long, narrow fireplace usually extended through the middle of the principal room, and an essential feature was the cooking fireplace, which was about one metre square. These were either paved or surrounded by upright stones. The plan is of the ruin of the house of Eric the Red in Haukadalr, Iceland. It shows the different forms of fireplace, and that the walls, which were built of turf, were one and a half metres thick. Outhouses were often dug into the hillside, and were sometimes walled up on the inside with stone and turf. Ruins of such old settlements in Iceland are usually low, grass-grown ridges and hollows.

When Professor Horsford first visited the site which his study of maps and literature had led him to believe was Vinland, he found a few hollows in the hillside and also some broad, low ridges on the level ground, indicating that a building about twenty metres long by five metres broad had once stood there. There was also a mound some distance away which has since proved to be of modern construction.



Plan of supposed Norse Ruin in Massachusetts.

No digging was done here until after Professor Horsford's death, with the exception of a few trenches across the supposed site of Leif Erikson's house on the other side of the creek. In 1896, during a visit of Dr. Valtyr Gudmundsson and Mr. Thorsteinn Erlingsson, of Copenhagen and Iceland, extensive excavations were made, leaving practically nothing unexamined at this site. [Pg 168]

Three kinds of earth were revealed. The upper layer was of black loam from thirty to forty centimetres deep; below this was a yellow soil of sand and clay thirty centimetres deep; and below that again the sand and gravel which had remained undisturbed since the close of the Glacial epoch.

The ruins were at the junction of the black and yellow earth. Throughout the black loam to the bottom, wherever we dug, within or away from the ruins, were scattered fragments of china, glass, glazed pottery, nails, pipestems, broken bricks, etc., all belonging to the period of the occupation of this region by the English. None of these were found in places where their presence would show that they belonged to or preceded these ruins. In the paved pathway, which will be described later, a few pieces of brick lie between the stones, but not deeper than similar fragments of brick were found in the undisturbed earth near by, apparently trodden in by the cattle which have been pastured there for years. There were also objects of aboriginal

manufacture, such as stone implements, pottery, pieces of flint, etc. Occasionally, at different levels, remains of fires were found, some of which were merely thin layers of charcoal and ashes. There were, however, two well-built fireplaces, in good condition, entirely unlike each other. One of these was an Indian clambake, neatly paved and piled with ashes and unopened clam shells. This lay sixty-three centimetres below the sod. The photograph is not of this fireplace, but is a good example of all Indian fireplaces or clambakes in Massachusetts.

An Indian Fireplace in Massachusetts.

The second fireplace, which was about one metre square, surrounded by upright stones at the four corners and filled with oak charcoal, but no ashes, was the distinctive feature of this ruin, and resembled the cooking fireplaces of the Icelanders. The absence of ashes has been accounted for by absorption in the soft clay soil. Ashes often disappear in this way, but can be detected with acids. [Pg 169]

Icelandic Fireplace in supposed Norse Ruin in Massachusetts.

Although the outline of the walls of the long house can only be suggested, the few stones which were found at the base of the old walls were placed about a metre and a half apart, as in the walls of the Saga-time. This, so far as is known, is peculiar to that period and race. Iroquois long houses were constructed for communal use, and were usually from one hundred to three hundred feet long. The chief traces left are fire rows and kitchen middens. They are not known to have used stone foundations, nor to have made any attempt at regularity of outline. The drawing shows the method of construction of these long houses, which were built only by the Indians of the Iroquois tribe.

Depressions which appeared to be the sites of old huts were in the hillside back of the terrace on which the long house stood, but the roadway in front had apparently destroyed all but one of these, and had also carried away the front wall of this.

East Wall of a supposed Norse Ruin in Massachusetts, showing Layers of Turf between the stones.

West Wall of a supposed Norse Ruin in Massachusetts, showing Layers of Turf between the Stones.

This hut was four metres across the front, and may have been five metres deep. When the sod, stones, and the clearings, which had been thrown in from the cultivated field above, were all removed, the remains of two side walls were found, supported and protected by the upper portions of these same walls which had slipped down from above and lay close to them, forming a compact mass of earth and stones. None of the stones in this wall were in contact with each other, being separated by two or three inches of dark earth such as results from the decay of vegetable matter. There was no fireplace. The manner of constructing these walls was the counterpart of Icelandic work. I shall now show you how this differs from post-Columbian cellars.

Ancient Wall in Iceland, showing Layers of Turf between the Stones.

This is a photograph of a ruin in the Thjór's River Valley, in Iceland. It shows the sod between the stones closely packed but distinct. The stones in our early English and French cellars practically touch each other, as in the old cellar in Fort William Henry, in Maine. Sometimes broken stones fill the interstices, as in another example of stonework at Fort William Henry. Mortar has been used here more or less since the beginning of the seventeenth century. [Pg 170]

Old Wall in a Cellar in Fort William Henry, Maine.

Old Wall at Fort William Henry, Maine.

Although European or post-Columbian walls and cellars differ considerably among themselves, it is within certain limits. Post-Columbian walls, or foundation walls when built on the surface of the ground, were practically homogeneous in character, the French only attaining to one metre in thickness, whereas Icelandic walls were disposed in three distinct parts, the inner and outer sides being constructed in layers and the space between being filled in with closely packed earth, while they were never less than a metre and a half thick.

Icelandic outhouses when dug into a hillside dispensed with the triple wall at the back and on the sides, and thus when stone-faced partially resemble our cellars. But even then they still retain one characteristic feature, in their alternate layers of turf and stone. [Pg 172]

Supposed Norse Pathway in Massachusetts.

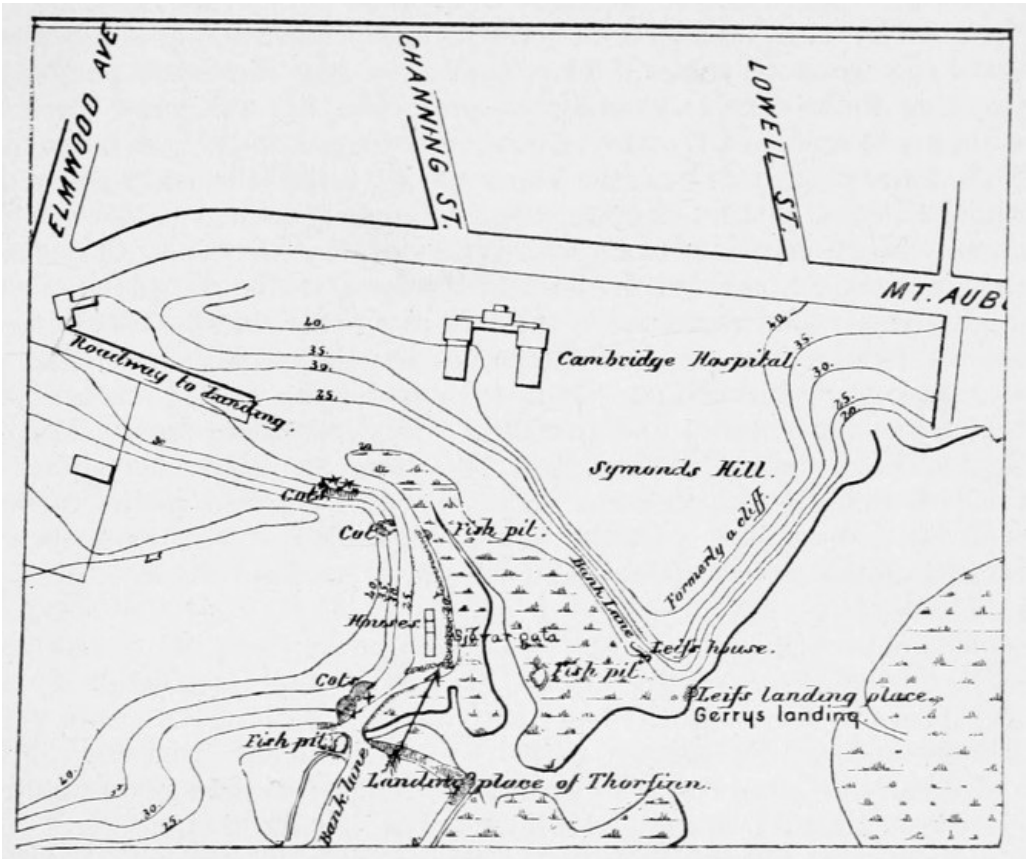
Southern Turn of supposed Norse Pathway.

While this hut was being dug out, our attention was called to stones protruding through the turf a short distance away and nearer to the water. When the earth was cleared away, it proved to be a rude stone-laid pathway leading along the margin of the old creek to the river. Here at the landing place a similar pathway branched away in another direction, stopping suddenly a few metres south of the supposed house of Thorfinn Karlsefni. This pathway is called in Iceland a *sjávar-gata*, or path to the sea. Ancient pavings have been found at Fort William Henry, near Pemaquid, Maine. They are, however, similar to many street pavements still to be found in our eastern cities. There is also a remarkable paved gutter at the Lewis Farm, in Maine, which has long interested historians. But none of these resemble the *sjávar-gata* in its peculiar construction, especially where it broadens and divides with a wide margin of pebbles on one side and small heaps of stones on the other.

A Pavement at Fort William Henry, Maine.

A Pavement at Pemaquid, Maine.

This map was made for Professor Horsford about ten years ago. It shows the site of the long house, in which the Icelandic fireplace was found, and the cot, in which Icelandic walls were found. The paved path ran along the shore in front. Professor Horsford fixed Thorfinn's landing [Pg 173] place a short distance south of this, on solid ground. Geologists are unable to say how long ago the salt marshes were formed. They are on Winthrop's map of 1634, but the *sjávar-gata* could hardly have been accessible as a landing place after their formation.



Map of the supposed Norse Ruin in Cambridge, Massachusetts.

In summary, it may be said that at the only point of land on the coast of North America which we have found to correspond with the description of the site of Thorfinn Karlsefni's houses, ruins have been dug out which bear peculiar features characteristic of the period in Iceland known as the Saga-time, and differing in certain essential features from the handiwork of all the native races of North America, and, as far as is known at present, from all other races in Europe or in America in post-Columbian days.

Extracts from the Reports of Dr. Gudmundsson and Mr. Erlingsson.

The following extracts, from reports by Dr. Gudmundsson and Mr. Erlingsson, refer to the ruins described in the preceding paper. The plan for these researches was first to compare the aforesaid ruins with the work of the native races supposed to have inhabited or visited these shores, next with that of the Norsemen of the eleventh century, and later, if necessary, with the earliest English, French, Spanish, and Dutch ruins on these shores. Dr. Gudmundsson and Mr. Erlingsson noted the points of resemblance between these and Icelandic ruins, and in their [Pg 174] reports by request wrote everything they could think of in opposition to, as well as in favor of, their being of Norse origin.

When these gentlemen left Cambridge the characteristic features of the early post-Columbian ruins on this coast had not been ascertained, and these researches were not finished satisfactorily until a year and a half after the Icelanders returned to Europe.

From Dr. Gudmundsson's Report.

The next place into which we dug was a depression or hollow in the hillside in a northerly direction from the above-mentioned place. Here we found unquestionable remains of a house which had been dug into the hillside, with walls constructed of stones, and layers of earth between the single rows of stones. The foundation and the lower parts of the two side walls were solid and well preserved, but the whole back wall, with the exception of a single row (the foundation), had fallen down. The stones from this and the upper parts of the side walls covered the whole bottom, so that they at the first glance seemed to form a pavement. When carefully examined, it was evident, however, that most of the stones which covered the bottom belonged to the walls, though some might have rolled down from the hill above the house. Thus it could clearly be seen how some of the stones had fallen down from the walls and some were just sliding down, without having as yet reached to the bottom, as some stones underneath had hindered them from gliding farther. The front wall of the house was wanting, and must either have been of wood or—which seems most likely—have been spoiled when the road which runs close past the house was made. When the bottom was cleared of the stones which had fallen in it proved to consist of a level black floor.

The construction and situation of this house are *quite* Scandinavian, built in the same way as houses in Iceland and Greenland. I would therefore not have had the least hesitation to declare it to be a ruin of a house built by Scandinavians in the pre-Columbian period if between and under the stones which covered the bottom we had not found some pieces of glazed pottery and bricks, of which some small pieces were found trodden down even into the floor itself. This seems to indicate that the house must be post-Columbian, or at least have been occupied by the first English or French colonists. As in the meantime several American scholars, with whom I have had an opportunity to discuss this matter, positively declare that the post-Columbian colonists never would have built such walls of stones without mortar, and it must be regarded as *quite* certain that Indian people could not have built it, there seems to be no other explanation possible than that this ruin must be Scandinavian, and, having been found by some of the first post-Columbian colonists (e. g., some fishermen), had been repaired and occupied by them for a shorter or longer time. If it can be proved that such a building as this could not have been built by the post-Columbian colonists nor by Indians, it can hardly be anything else than Scandinavian. This, however, must be left to American scholars, who have sufficient knowledge in these matters. But so long as this is not proved, the pieces of pottery and bricks which were found in it rather seem to speak for its post-Columbian origin, as those pieces must have been there when the house fell down, and such a house as this built in the beginning of the eleventh century could [Pg 175] not have stood five hundred years before its roof and the upper parts of the walls fell down.

On the other side of the road we found an end of an old path paved with small stones, running from the house in the hillside along the edge of the old river bank down to a kind of promontory which in olden time, when the water stood much higher than it now does, seems to have served as a landing place. In the middle of this path, which was from about six to ten inches under the surface, was a hollow as trodden down by the feet of men and (perhaps) horses. This path is very like Icelandic paths, such as may still be found in many places in Iceland. But as we in some places in this path found some bricks between the stones which formed its pavement, it must be regarded as doubtful whether it is Scandinavian. The bricks seem rather to speak for a post-Columbian origin, though the whole path is so primitive that it hardly can be suggested that so advanced a people as the first post-Columbian colonists should have made such a path. To settle the question whether it could belong to those colonists must be left to American scholars. This path seems, at any rate, to have been made by the same people who built the house in the hillside, so either both of them must be regarded as post-Columbian or they both are Scandinavian. Another path runs from this landing place in a westerly direction along the old river bank, where it stops very abruptly on a certain spot a very short distance east of the supposed "Thorfinn's house." As I could not find any other reason for its stopping on this spot than that near it stood a building, I examined the river bank beside it, and here I found the earth, about eight inches under the surface, mixed with charcoal, which could indicate that some refuse from a house had been thrown there. This seems to lead to the conclusion that there at the end of this path really has stood a building, of which we could not now expect to find any traces, or even a building constructed of turf only (turf walls), which also might have wholly disappeared, as

earth walls on an elevated ground like this perhaps might have blown away.

The result of these researches is briefly, according to my opinion, this: As far as concerns the construction, both the house in the hillside and the two paths, or the two branches of the path, could be of Scandinavian origin, but I am not so well acquainted with the life and customs of the first post-Columbian colonists as to be able to decide whether they could not have been made by them. This, therefore, must be left to American scholars.

Very respectfully yours,
VALTYR GUDMUNDSSON.

CAMBRIDGE, MASS., *July 16, 1896*.

From Mr. Erlingsson's Report.

It is not uncommon in Iceland that houses, especially small outhouses, are dug into small hills, hillsides, or sloping ground, just as this house is. It is, in fact, built very like what I have seen in outhouses in many places in Iceland, and what is left of the walls here nobody could distinguish from Icelandic walls. The size and the whole form is also very like an outhouse, but as most frequently in outhouses either all the four walls are made of stones or none of them, it would seem strange that one of the walls here is completely wanting. But those stones which were used [Pg 176] in it could have been used in the road which has been made past the house, or, besides, it is possible that the front wall of the house has been a wooden one, and, although this is very rare in outhouses certainly, yet it must be taken into consideration that here it is much easier to procure wood than in Iceland. The whole form, the method, and the condition of the house itself seemed like nothing else than that it was built by Icelandic hands, although some of the stones seem to be rather small, but, as pieces of pottery and bricks have been found beneath the stones which had fallen down from the walls and on the floor itself, it seems to prove sufficiently that the house can not belong to the old Icelandic period; but as nobody has expected such a house here, the discovery is very remarkable.

This path is so like paths in Iceland, for which there have been gathered stones and which later on have been trodden down by the feet of horses and men, that I would not have hesitated to declare that it might be Scandinavian if in it there had not been found bricks beside the other stones, which seems to indicate that the path must belong to the same period as the house which was dug into the hill. This discovery must therefore, too, be regarded as very remarkable....

Respectfully,
THORSTEINN ERLINGSSON.

CAMBRIDGE, MASS., *July 12, 1896*.

THE EDUCATION OF THE NEMINIST.

BY DAVID STARR JORDAN,

PRESIDENT OF LELAND STANFORD JUNIOR UNIVERSITY.

The meeting of the Astral Club of Alcalde, on September 10, 1899, was rendered memorable by the return, from a month's absence in the East, of the secretary of the club, Miss Corintha Jones, D. N. N. N. Her presence had been sorely missed at the August meeting (though I say it who should not), for it is not often that one of our devoted band is absent from his post.

Miss Jones had left Alcalde to complete a course of study in medicine in one of the most famous colleges of the East. At the suggestion of the president of the club, Mr. Asa Marvin, F. T. S., the usual programme was suspended on her return, and Miss Doctress Jones, D. N. N. N. (for such indeed is the title she has now earned), told us of her studies at the Massachusetts University of Mentiphysics, in Boston, a noble institution, up to date in all respects, for it received its charter from the General Assembly of Massachusetts in the year 1881.

Miss Doctress Jones left her home in Alcalde on the 20th of July, designing to visit certain relatives residing at Homer and Virgil, Cortland County, N. Y., on the way. She reached Boston on the 5th day of August, and at once proceeded to the university. An ignorant hackman took her [Pg 177] over to the suburban village of Cambridge, which is the seat of Harvard College. Making inquiry of the professors there, she found none who had ever heard of the University of Mentiphysics, having eyes and ears for nothing but Harvard, which in some respects is indeed a great institution, but on a material plane.

At last, after much inquiry, Doctress Jones was sent to the Neministic Headquarters, a small building on the corner of Milk and Transcendental Streets. Here she learned, from a little lady with a withered face and a serene smile, that the University of Mentiphysics was situated not in Boston, but in the neighboring town of Lynn, which lies some miles to the north. "But in Massachusetts," she said, "we call it all Boston."

"So I took the train for Lynn," Miss Doctress Jones continued, "and drove at once to the street and number named on the card. The little white house with green blinds, white columns on the veranda, and a few weedy roses in the front yard did not fill my conception of a university, for it did not look like our universities in California. But the fault was with my conception, not with the fact.

"The maid who answered the bell assured me that this was indeed the university, and ushered me at once into the office of the president. The wall was covered with pictures and photographs, showing elderly ladies with serene smiling faces. Under each one were the letters N. N. N., and a card giving an account of how each one had been made whole and happy through Neministic Science. The president was a middle-aged, matronly lady, with a high forehead and brown hair, streaked with gray, done in graceful frizzes over her brow. Above the corners of her mouth, which were always drawn up in an engaging smile, were three deep creases. Mr. Gridley, our schoolmaster, tells me that these correspond to the grave accent in Greek, and that there being three of them shows that the lady had been married three times. I do not know as to this, but somehow her face seemed startlingly familiar and at the same time strangely pleasant.

"I murmured something about having had the pleasure before. She said, taking the words from my mouth: 'I know what you are going to say. We are indeed very much alike, though she is on the material plane. Still, my friends call me the "Lydia Pinkham of the soul," and I do not resent it, for what dear Lydia tries to do, that I do.'

"I told the president," Doctress Jones continued, "that I wished to learn the wisdom of Boston, and especially the science of Neministic Healing, of which I had heard much in Alcalde. 'But perhaps I should call at the university, and not trouble you in your rest at home.' At this her eyes [Pg 178] blazed, and she said, with a tragic air: 'Having eyes, ye see not! I read the Soul and the Stars through a higher than mortal sense. Has the Sun forgotten to shine and the Planets to revolve around it? Who was it discovered, demonstrated, and teaches the marvel of Neministic Healing? That one, whoever it be, does understand something of what can not be lost.'

"I looked dazed. She quieted down and explained to me that she was herself the university, because no one but herself could explain what was revealed to her alone. The whole Neministic Science was taught in twelve lessons, and I could begin then and there.

"I said something about preparatory work and the books I would need to read. She placed in my hands a slip which read:

"'N. N. N. Persons contemplating a course in the Massachusetts University of Mentiphysics can prepare for it through no books save Neministic Science and Astral Health, with a Key to the Stars. Man-made theories are narrow, else extravagant, and always materialistic. *Nihil nemini nocet.*' Then she added: 'I recommend students not to read so-called scientific works antagonistic to Neministic Healing, which advocate material systems, because such works and words becloud the right sense of Mentiphysical Science. A primary student richly imbued with the Neministic spirit is a better healer and teacher than a normal-class student, who partakes less of this power. Even an apt scholar who has dipped into my Neministic Science and Astral Health, with a Key to the Stars (the last revised edition), may enter this field of labor, without any personal instruction, beneficially to himself and the race.'

"Then she continued blandly: 'You must learn, my dear, to enter this great field in a manner beneficial to yourself and the race. You must teach others to render to Cæsar what is Cæsar's, and to do this you must first render unto Cæsar yourself. Do you understand?' I looked puzzled for a moment. Then she said: 'Twenty-five dollars, please, dear, and be sure to come promptly at ten o'clock to-morrow. You are now admitted to the Primary Plane, the first degree of Neministic Healing.' As I gave her the California gold, she bowed me out of the room with a tender and motherly smile, while she tested the unfamiliar coins by ringing them softly on the table.

"At the second lesson she gave me the fundamental principles of Neministic Healing. I received them eagerly, for I recognized in them a close harmony with the teachings of our dear old Mr. Dean:

"'God is the principle of Mentiphysics. As there is but one God, there can be but one Principle in [Pg 179] this Science. As there are many stars, there must be many fixed rules for the demonstration of this Divine Principle.

"'The fundamental propositions among these rules are proved by inversion, for this is the basis of all true mathematics. Two times two is four, therefore four is two times two. As a star is the same whether seen from the north, south, east, or west, so a precept of Mentiphysics must be the same as seen from every side. To invert is not to change its meaning, and must prove its truth.' Then she gave me a printed card containing these words, over which I was to ponder until the next lesson:

"'N. N. N. There is no Pain in Truth, therefore there is no Truth in Pain. There is no Nerve in Mind, therefore there is no Mind in Nerve. There is no Matter in Mind, therefore there is no Mind in Matter. There is no Matter in Life, therefore there is no Life in Matter. There is no Matter in Good, therefore there is no Good in Matter. *Nihil nocet nemini; nihil nemini nocet.*'

"'Twenty-five dollars, please,' and I returned to my hotel filled with new thoughts, which I found later were very incomplete.

"The next day she said:

"'Man, my dear, is governed by Soul, not sense. Sense is the reflection of matter, and matter does not exist. Thus sense is but the shadow of a dream. In dreams the laws of health are valueless. There is but one Law of Health, and that is the one precept of Neministic Healing.

"'To the awakened mind the seasons will come and go, with changes of time and tide, cold and heat, latitude and longitude. The agriculturist finds that these changes can not affect his crops. The mariner will have dominion over the atmosphere and the great deep, over the fish of the sea and the fowls of the air. The astronomer will no longer look up to the stars. He will look out from them upon the universe, and the florist will find his flower before he beholds its seed. Thus matter will be finally proved to be nothing but a mortal belief, wholly inadequate to affect man through its supposed organic action or existence.'

"Then she gave me another mystic card, which read:

"'N. N. N. We tread on forces. Withdraw them, and Creation must collapse. *Nihil nocet nemini.*' And this time I did not need to be reminded of the final ceremony with which the lesson ended. Nor did she need to clink the coins on the table.

"In the fourth lesson the president discoursed more fully on 'the popular gods, Sin, Sorrow, and Sickness, the three S's of Satan; all three illusions of the Sinful Soul. The very word Illusion [Pg 180] proves their nothingness. These are but troubled dreams of the darkened soul, and to rise above them is to wake from a cataleptic nightmare to see the stars shining on the hills.

"'When troubled by a horrible dream, my dear, one has only to say, "This is a Dream; I will awaken." Then the stars will shine through the open window and the hideous vision will disappear.

"'So in afflictions of disease and dread and death, one must say, "This is a Dream." Then it becomes a dream, and we rise above it into an atmosphere of Perfect Serenity.

"'To the material sense, dear,' continued the president, 'to cut the jugular vein takes away life. But in Neministic Science Life goes on unchanged, mounting ever and ever to higher reaches, because there is no jugular vein, and Matter can not make its mark on Mind.

"'The Barometer, that little prophet of storm and sunshine, can not be deceived by testimony of the senses. It points to fair weather in the midst of the unreal apparition of murky clouds and threatening rain. Thus does Neministic Science, the perfect culmination of Mentiphysics, point to the changeless Health and Happiness of the Enlightened Man whatever material science may have to say about the condition of his members. Man is made in the image of perfection, therefore failure and imperfection can never assail him. As well expect to gather peaches from a pine tree as to gather discord from the Concord of Being.'

"Then she gave me a card:

"'N. N. N. The Equipollence of the Stars above and of the Mind below shows the awful unreality of Evil. *Nihil nemini nocet.*'

"After the usual parting ceremony I returned to my room, well convinced of the unreality of Boston, and doubting whether I should ever again find my own Alcalde. I feared lest some further precept might arise by which Alcalde could not exist.

"In the fifth lesson the president informed me that I was now in the second degree, or Normal Plane. We were ready for the first glimpse into the full, rounded perfection of Neministic Healing.

"'To cure men of all ills whatsoever, we have only to show them the stars. When we waken in the night, only the sight of the stars can tell us we are awake. When we are awake all dreams must vanish, and all is dream which breaks the serenity of the mind or checks the perfect perspicacity of being. We need not deal with the body, for the body does not exist. It is dull, heavy, and aching, because it is the dead Residuum of Dream. When we forget it, it is no longer there. Then and not till then can you smile the serene smile of the Neministically Healed and Mentiphysically [Pg 181] Perfect Soul.'

"The little card read:

"'N. N. N. The body says, "I am ill." The reports of Sickness may form a coalition with the reports of Sin and say, "I am Malice, Lust, Appetite, Envy, Hate." Treat a belief in sickness as you would sin—with sudden dismissal. If it were not for what the human mind says of the body, the body would not be weary any more than an inanimate wheel. *Nihil nemini nocet.*'

"On the sixth day the president greeted me with her serenest smile.

"'We have now reached the point, my dear,' she said, 'when we must abandon Pharmaceutics and take up Ontology, the science of Abstract Being. In this we have many rivals who echo the cry, "Why art thou, NEMINISM, come hither to torment us before our time?" Among the systems that thus cry out are many whom this world deems successful. Animal Magnetism, Atheism, Spiritualism, Theosophy, Agnosticism, Pantheism, and Infidelity are antagonistic to Mentiphysics and fatal to the demonstration thereof, and of Neminism, its noblest culmination; and so,' she continued, 'are some other systems.'

"She warned me especially against Pantheism, 'the worship of the sylvan god Pan,' a cult reputed

to be especially rife among the members of our club at Alcalde.

"I tried to explain to her the difference between Pantheism and Sciosophy, but I did not succeed very well, for she grew impatient. In her judgment, I discovered, Sciosophy was grossly impractical, and the views of Mr. Abner Dean would take the bread from the mouths of better men than he. 'I am told,' she said, 'that Mr. Dean actually signed that wicked paper[15] of those Washington soreheads, who call themselves the Reformed College of Neminism.' With this, she would not listen to another word about Sciosophy. [Pg 182]

"Then I regretted that I had said anything, for this pleasant lesson came to an abrupt end, and left me without even the customary card to ponder over. I still wondered what could be the secret meaning of N. N. N., *nihil nemini nocet*.

"On the next day the storm had blown over, or rather, like all other storms, it had no real existence, and the smile of the president at the closing act of the lesson was the sweetest I had ever seen, the most perfect witness to the truth of her teachings.

"She took up the subject of Materia Medica. After reading from a printed book the names of a host of poisons, from Abacus to Swamproot and Sandalwood and *Zygadene*, she warned us against them all. All are alike evil. All alike have no real existence. Therefore the student will do well not to learn their names. It will only interfere with his serenity of mind, and perfect serenity is the sole symptom of success.

"'Surely this is better,' she said, 'than to support the popular systems of medicine, when the physician may be perchance an infidel and lose ninety-and-nine patients where Neminism cures its hundred. Is it because Osteopathy and Ostariopathy are more fashionable and less spiritual? Even business men have found that Neministic Science enhances their physical and mental powers, enlarges their perception of character, gives them acuteness and comprehensiveness, and an ability to exceed their ordinary business capacity.'

"Then she gave me this card:

"'N. N. N. In 1866 this discovery was made by me and by me alone: "The erring Mortal misnamed Mind produces all the organism and action of the mortal body." This led to the demonstration that Mind is All and matter is naught, and being nothing, nothing hurts nobody. Nobody hurts nothing, which proves it plainly by inversion. *Nihil nocet nemini; nihil nemini nocet.*'

"On the eighth day the president discoursed on Anatomy. Referring briefly to the pernicious notions of the 'ancients,' as with a broad sweep of her hand she designated the professors in Boston and Cambridge, concerning the structure of the human body, she called it the nightmare of undigested learning. 'Why should we care where the jugular vein goes, when we know that there is no jugular vein? What of bones and muscles, and teguments and integuments? "Toil fatigues me," you say; but what is this me? Is it muscle or Mind? Which is tired, and so speaks? Without Mind could the muscles be tired? Do the muscles talk, or do you talk for them? Science includes no rule of discord, but governs harmoniously.' [Pg 183]

"On the card were these words:

"'N. N. N. Flesh is an error of physical belief; a supposition that life, substance, and intelligence are in matter; an illusion; a belief that matter has sensations. *Nihil nocet nemini.*'

"On the ninth day I was admitted to the third degree, or the Introspective Plane. As the president entered, I noticed a touch of camellia powder on her face, for the subject of the day was Beauty. 'Beauty,' she said, 'is internal before it is perceived outwardly. To have perfect faith in the principle of Neminism is to regain the charms of Eternal Youth.' She told me of patients of hers who had become beautiful through faith. One good lady at ninety developed new teeth through belief in Neminism—incisors, cuspids, bicuspids, and one molar. A gentleman at sixty had retained his full set of upper and lower teeth without a decaying cavity.

"On her card were these words:

"'N. N. N. The receipt for Beauty is to have less Illusion and more Soul. *Nihil nemini nocet.*'

"And, as the final ceremony was passed, the president looked almost beautiful herself.

"On the tenth day the president gave some account of her early studies and of the origin of Neministic Healing.

"'While from the human standpoint I inherited the refinement that goes with culture of family and moral rectitude, as usual here in Boston, yet there was a marked degree of spiritual Grace, Soulful Delicacy, and Esoteric Elegance that comes not from human ancestry, neither from communion with Nature. It was the exquisite coloring of the touch of the astral hand which opens the petals of thought as it does the opening rose. This ended in a soft glow of ineffable Joy, and out of its perfect serenity Neministic Science was born.

"'The discovery was so new, the basis laid down for physical and moral health so hopelessly original and men so unfamiliar with the subject, that not until later did I venture to proclaim it to the world.'

"On the card was—

"'N. N. N.
"'My world has sprung from Spirit
In Everlasting Day;
Whereof I've much to glory,
Wherefor have much to pay.'

[Pg 184]

"Under this was a picture of the egg of a vulture, in which, through his microscope, Agassiz once saw the sun, moon, stars, and the gathering of clouds. '*Nihil nemini nocet.*'

"At the eleventh lesson I was directed to go out for clinical practice. In my hotel I found a dear little six-year-old boy who had been invited, with the rest of a kindergarten class, to attend a picnic.

"He did not feel that he wanted to go. He seemed dumpish, and, according to mortal belief, was not well. At noon he said that he wanted to go to sleep. I took him in my lap and began to read to him from Neministic Science and Astral Health with a Key to the Stars. Very soon he expressed a wish to go to the picnic, and did go. So I gave him a little card, with the words '*Nihil nemini nocet*,' and all day he said nothing more about being sick.

"Next morning the president gave me an account of various wonderful cures in her experience. Among others, she showed me a letter from John B. Higgins, of Little Egg Harbor, N. J. This I copied down as follows:

> "'I am glad to tell you how I was healed. Beliefs of consumption, dyspepsia, neuralgia, ulcers, tobacco, and bad language.... Doctors that were consulted did nothing to relieve me, and I constantly grew worse. Nearly two years ago you told me that if I would read a book called Neministic Science and Astral Health with a Key to the Stars, I would be healed. I told you I would go into it for all it was worth, and I found that it is worth all. I got the book and read day and night. I saw that it must be true, and believed that what I could not then understand would be made clear later. After some days' reading I was afflicted with drowsiness, followed by vomiting. This lasted several hours, when I fell into a sleep. I awoke healed.'

"The president assured me that if I would spend no time in intellectual drifting, adhering to the impersonal and scientific deductions of the one discoverer to whose clarified spiritual eye all truth of the mind had been revealed, with all the loyalty of a mathematician to the principles of mathematics, I would be sure of a comfortable fortune. Although money had no real existence, the shadow in its substance proved that there was after all substance in its shadow. The Neministic Healer is at no expense for books or instruments or medicine, providing always that the one perfect Key to the Stars (including Neministic Science and Astral Health) lies open before him. With that in sight he can not go wrong, and with perfect faith in the unreality of all external things it matters not in earthly affairs what he does or leaves undone.

[Pg 185]

"The card for this lesson was:

"'N. N. N. The population of our cities is ample to supply many practitioners, teachers, and preachers with work. To enter this field of labor beneficially to ourselves, it is necessary to demonstrate that *the patient who is able to pay for being healed is more apt to recover* than he who withholds a slight equivalent for health! *Nihil nemini nocet.*'

"At the last lesson the president informed me that my course of instruction was complete, and that I must now go forth and bless the world. I must lean no longer on her personal leadership, but, trusting in the spirit, I should rest solely on the pure Mentiphysical principle at work. As a pioneer of Neministic Healing in the far uncultured West, I must stand alone in the conflict, smiting error with the falchion of Truth. The rare bequests of the spirit are costly, and they have won fields of battle from which the dainty borrower would have fled.'

"I spoke once or twice of my diploma, without which I could not practice my profession under the laws of Fresno County. At first she made as if she did not hear me, but at last she said:

"'The Massachusetts University of Mentiphysics draws its breath from me, but I yearn for retirement. No one else can sustain this institution amid the legislation aimed at its vital purpose. This has given me conscientious scruples about diplomas, and, with the growing conviction that every one should build on his own foundation, no more diplomas shall be issued from this flourishing school.

"'But do not worry, dear,' she said. 'Your power is just the same with or without diploma. You can make known the rare bequests of the Spirit quite as well as a martyr as you could as a physician. The faithful will stand by you. Those who believe will always pay. Take this locket, and hang it about your neck. It will contain the quintessence of all my teachings, and with this in your right hand and Neministic Science and Astral Health with a Key to the Stars in your left, you will drain the cup which I have drained to the dregs as the discoverer and teacher of Neminism, and without tasting this cup its inspiration can not be gained.'

"Then I took the little locket, and here it is. On one side are the letters D. N. N. N., 'which,' she said, 'makes its holder a doctress.' On the reverse is the face of Lydia Pinkham, while around the margin, in fine gilt letters, is a scroll with the motto, '*Nihil nemini nocet.*' Mr. Gridley, the learned professor of our Alcalde school, says this means 'nothing hurts nobody.' But I am sure that there is more in it than that; besides, whatever it is we can prove it by inversion: *Nihil nocet nemini;*

[Pg 186]

nihil nemini nocet—one is true like the other, and its symbolic significance is proved by its three N's, for N is the symbol of eternity. At least, this is what the president told me. But now that I am back in Alcalde, the whole thing seems like a dream, while all the things I had learned to call dreams seem more real than ever. Maybe I am still on the Material Plane after all, in spite of all I have done and all the rest of us in Alcalde are doing to try to rise above it."

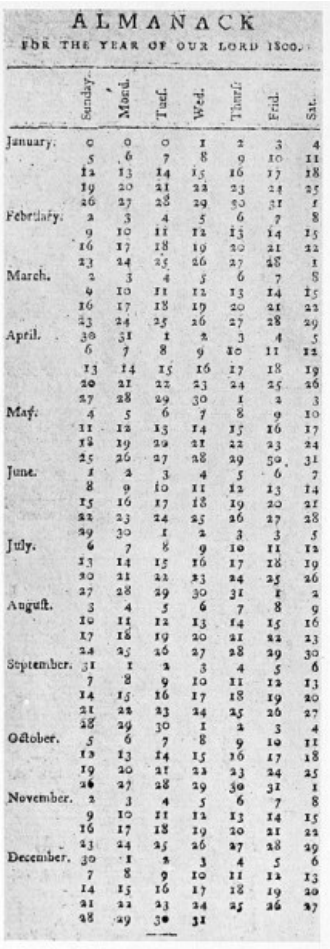
DEVELOPMENT OF THE AMERICAN NEWSPAPER.

By WALTER L. HAWLEY,

OF THE NEW YORK EVENING SUN.

At the beginning of the present century the newspapers published in the United States numbered 200—one for each 26,450 of population—while at the present time the total of regular publications slightly exceeds 20,000—one for each 350 inhabitants of the country; and in that growth and development of the business is represented more of science and art, more of physical ingenuity and mental activity, than in any other line of human endeavor. One hundred years ago the publication of a newspaper did not rank as a business, and the preparation of its contents was regarded as a pastime or the indulgence of a whim, rather than a profession. At the end of the century, journalism is the history of the world written day by day, the chief medium of enlightenment for the masses, the universal forum of scholar, sage, and scientist. As a business enterprise, the newspaper of to-day commands unlimited capital, and as a profession it ranks second to none.

For three centuries and a half following Gutenberg's invention of type little progress was made in the art of printing, and the production of a newspaper in this country in 1800 was accomplished with crude machinery and involved much slow and difficult hand labor. The printing was done on wooden presses of primitive pattern, the type was large and ill formed, the paper used was in many cases inferior to the lowest grade made at the present time, and the production of a large number of copies of any issue was out of the question. No attempt was made in this country to publish a daily paper until 1784, and in 1800 daily editions were issued only in four or five of the larger cities.



ALMANACK

FOR THE YEAR OF OUR LORD 1800.

	Sunday.	Mond.	Tuef.	Wed.	Thurf.	Frid.	Sat.
January.	0	0	0	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	1
Febrifary.	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	1
March.	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
April.	30	31	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	1	2	3
May.	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31
June.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	1	2	3	3	5
July.	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	1	2
Auguft.	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
September.	31	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	1	2	3	4
October.	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	1
November.	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
December.	30	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31			

From the New York Gazette and General Advertiser of January 1,

The publications of that period were not newspapers in the sense in which the word is now used, because no particular effort was made to present an account of the happenings of the day. Notices of the arrival and departure of ships, time tables of mail coaches, and brief announcements of matters of political interest filled the limited space devoted to domestic news. Foreign news consisted entirely of matter reprinted from the English journals received by sailing vessels, and therefore weeks or months old when it appeared. The wooden presses used a hundred years ago were operated entirely by hand. After the type had been set it was placed in a frame or "form," with little or no regard to artistic arrangement of headlines or displayed matter. To print the edition, the "form" was placed on the bed of the press and ink spread over the type by the use of hand rollers. The white paper was then dampened with water, sheet by sheet, laid over the stationary "form," and the impression was made by pulling down the upper part of the press with a lever. This work was so slow that a circulation of three or four hundred copies of a daily newspaper would severely tax the capacity of the press room. The weekly publications were as a rule limited to about the same figures, because the entire mechanical part of production devolved upon one man, who was often owner and editor as well as printer. Some iron presses were imported from England in 1810, and in 1817 George Clymer, of Philadelphia, invented a lever press that was a marked improvement over the crude machines then in general use, reducing the manual labor required and increasing the speed with which

Hats Loft !

SUPPOSED to have been left on the wharf at Burling-flip, or taken on board of fome veffel by miftake, fome time in the month of November laft, SIX Gentlemen's fine HATS, were packed in a Tea Cheft, and purchafed of Walter Kenderich, with his Card infide of the Hats. Whoever will give information where they may be found, fhall receive a reward of FIVE DOLLARS, by applying to

JAMES CASEY,

dec. 27. 4t No. 164 Front-ftreet.

Sherry Wine.

OF the noted brands J. H. and D. Q. juft received per the brig Union, from Cadiz, and for Sale by

D. SMITH and Co.

No. 218 Front-ftreet, neaf Peck-flip.

december 23. 1m

John Montgomery,

MUSICAL INSTRUMENT MAKER and TURNER,

TAKES this method to inform the public, that he has lately arrived from Charleſton, and has commenced buſineſs

At No. 23 ROSE-STREET,

where he makes and repairs all kinds of Wind and String Inſtruments, in the neateſt manner. He hopes from his experience in the above buſineſs, he ſhall merit the favour of the public in general.

december 14. 3m

TOBACCO.

55 Hhds. of an excellent quality, juſt Landing from Virginia, and for Sale, at low prices, by

JOHN PATRICK,

dec. 21. No. 4 Williams-ſtreet.

—WHO HAS ON HAND—

Several choice Parcels of TOBACCO.

A Negro Wench for Sale,

AGED about 28 or 30 years, is healthy, ſtrong, honeſt, ſober and induſtrious—has two Children, the one a Boy, in his fourth year, the other a Girl, upwards of a year old—Sold for no fault. To prevent unneceſſary application, the price for the three is 80l. Apply to C. Schultz, jun. corner of Eagle and Fourth-ſtreets, Bowery. 1m dec. 5.

Turks Illands Salt.

The ſubſcriber is authoriſed to diſpoſe of from 20 to 100,000 buſhels ſalt, to be delivered at Turks Iſlands, and will contract for it, in any quantity, at the very low price of 15 cents per buſhel, payable in New-York at 60 or 90 days after ſight of the purchaſers drafts. RICHARD I. TUCKER,

oct. 29. 12s Front-ſtreet.

Landing this Day.

At Burling-flip, from the ſchooner Raven,

20 hds. fine flav. high proof Geneva

From the New York Gazette and General Advertiser of Wednesday, January 1, 1800.

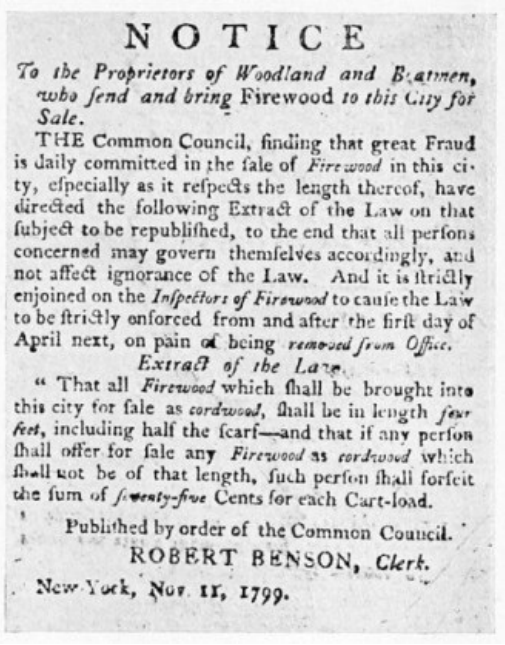
[Pg 187]

[Pg 188]

printed papers could be turned out. The first power press used in this country was invented by Daniel Treadwell, of Boston, in 1822, and operated by the American Bible Society, the power being furnished by a team of mules. These presses were not adapted to newspaper work, and the first considerable advance in the mechanical part of the business was made in 1829 and 1830, when a Washington hand press was invented. Seventeen years later a cylinder power press was perfected by Richard M. Hoe, and the mechanical ability to produce periodicals was more than doubled; but during the time when [Pg 189] American ingenuity developed the steam engine, the cotton gin, the sewing machine, and the electric telegraph, the progress made in the mechanism of newspaper making was comparatively insignificant. The process of stereotyping was introduced into this country from England in 1813, and a year later the New Testament was printed from plates, but the discovery was not utilized in the publication of newspapers until 1861.

In the first half of the century journalism did not at any time rank as a profession requiring special training, and capacity, and the returns of the counting room were so meager, the cost of material so high, and the appliances in the mechanical department so imperfect, that the publication of newspapers rose only by slow degrees to recognition as a business enterprise in which capital might seek investment with fair prospect of a satisfactory return. Modeled after English publications, the early American newspapers depended, for whatever of reputation or success they achieved, upon the fame and ability of the editor. The reporting of current events [Pg 190] without comment was a secondary feature of the daily papers, and in the weekly publications it was not attempted. Before the days of railroads and prompt and reliable mail service, communication between men in public life and, in fact, all persons of education, was chiefly by letter. The custom grew into a fixed habit, and to a large extent influenced the character of the newspapers published prior to 1850. The editor addressed himself directly to his readers through long editorials upon topics in which he was interested, and his publication was in reality a mere instrument for the expression of opinions. Public men and politicians were encouraged to write letters for publication upon public questions, and a long communication from a man of national reputation was regarded by the editor as matter of far more value to his journal than any amount of news of the events of the day.

The organization and development of political parties in the early part of the second quarter of the century resulted in a rapid increase in the number of newspapers throughout the country. Party leaders found that they could reach a greater number of citizens by means of published letters and speeches than by the primitive process of campaigning by easy stages from one State or county to another. From writing personal letters to friends in their districts, senators and representatives in Congress found that they could keep their constituents better informed of the progress of legislation and politics by means of signed statements in the press of their respective States. The party organ and the personal journal were the immediate natural results of this condition of public life and politics. Every secular journal supported some political party or organization without qualification, and there was little or no independence of the press. The editor found his subscribers among the members of his own party, and often looked to the organization or the candidate for financial support. Papers were established and editors hired by parties, factions, and individual leaders to advocate some particular plan of finance or tariff, or some general policy for the nation or State. During this stage of American journalism the influence of a paper depended largely upon the reputation, individuality, and force of character of the editor. He needed not to possess any particular qualification for the work, except a general knowledge of the affairs on which he was to write and a command of vigorous language to compel attention to his utterances. For many years the majority of the periodicals of the country, daily and weekly, were critical reviews of the events of the time, rather than mediums for the spread of general information. News of important happenings at home spread through all the States ahead of the circulation of the papers, and the people looked to the latter for review and comment upon events, rather than for detailed accounts of the occurrences. Foreign affairs, as reported in the English publications received in this country, took precedence in the classification of news in the journals of the first half of the century, and local events, often matters that were subsequently recognized as of great historical value, were briefly and too often imperfectly recorded. It is a matter to be regretted that in the days when American statesmen and orators were making history for the world, when the new republic, having passed beyond the stage of experiment, was advancing with prodigious strides toward glorious achievements in material development, the journals of the country kept but an imperfect and often inaccurate record of events that should have been reported in full.



NOTICE

To the Proprietors of Woodland and Boatmen, who ſend and bring Firewood *to this City for Sale.*

THE Common Council, finding that great Fraud is daily committed in the ſale of *Firewood* in this city, eſpecially as it reſpects the length thereof, have directed the following Extract of the Law on that ſubject to be republiſhed, to the end that all perſons concerned may govern themſelves accordingly, and not affect ignorance of the Law. And it is ſtrictly enjoined on the *Inſpectors of Firewood* to cauſe the Law to be ſtrictly enforced from and after the firſt day of April next, on pain of being *removed from Office.*

Extract of the Law.

"That all *Firewood* which ſhall be brought into this city for ſale as *cordwood*, ſhall be in length *four feet*, including half the ſcarf—and that if any perſon ſhall offer for ſale any *Firewood* as *cordwood* which ſhall not be of that length, ſuch perſon ſhall forfeit the ſum of *ſeventy-five* Cents for each Cart-load.

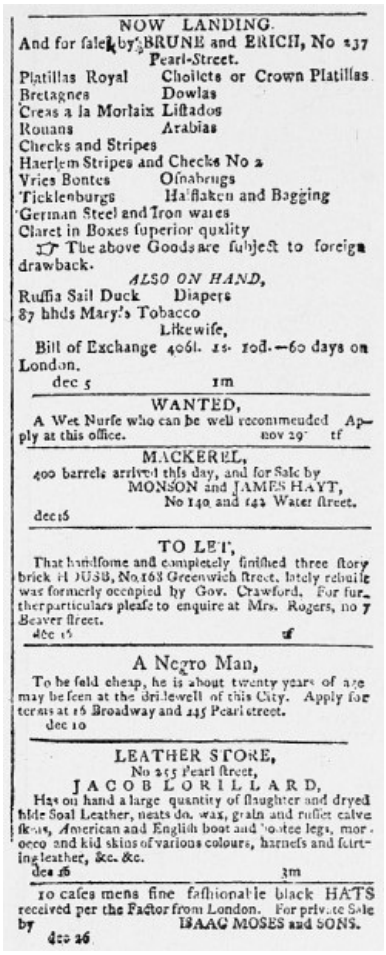
Published by order of the Common Council.

ROBERT BENSON, *Clerk.*

New York, Nov. 11, 1799.

A Municipal Notice from the New York Gazette and General Advertiser of January 1, 1800.

During the first forty years of the present century there was no system of collecting the news for publication, and the capital invested in the newspaper business



NOW LANDING.
And for sale by BRUNE and ERICH, No 237 Pearl-Street.

Platillas Royal — Choilets or Crown Platillas
Bretagnes — Dowlas
Creas a la Morlaix — Lillados
Rouans — Arabias
Checks and Stripes
Haerlem Stripes and Checks No 2
Vries Bontes — Osnabrugs
Ticklenburgs — Halflaken and Bagging
German Steel and Iron wares
Claret in Boxes superior quality
☞ The above Goods are subject to foreign drawback.

ALSO ON HAND,
Ruffia Sail Duck — Diapers
87 hhds Mary's Tobacco
Likewife,
Bill of Exchange 406l. 1s. 10d.—60 days on London.
dec 5 1m

WANTED,
A Wet Nurfe who can be well recommended Apply at this office. nov 29 tf

MACKEREL,
400 barrels arrived this day, and for Sale by MONSON and JAMES HAYT, No 140 and 142 Water ftreet.
dec 16

TO LET,
That handfome and completely finifhed three ftory brick H OUSE, No 168 Greenwich ftreet, lately rebuilt was formerly occupied by Gov. Crawford. For further particulars pleafe to enquire at Mrs. Rogers, no 7 Beaver ftreet.
dec 16 tf

A Negro Man,
To be fold cheap, he is about twenty years of age may be feen at the drilewell of this City. Apply for terms at 16 Broadway and 245 Pearl ftreet.
dec 10

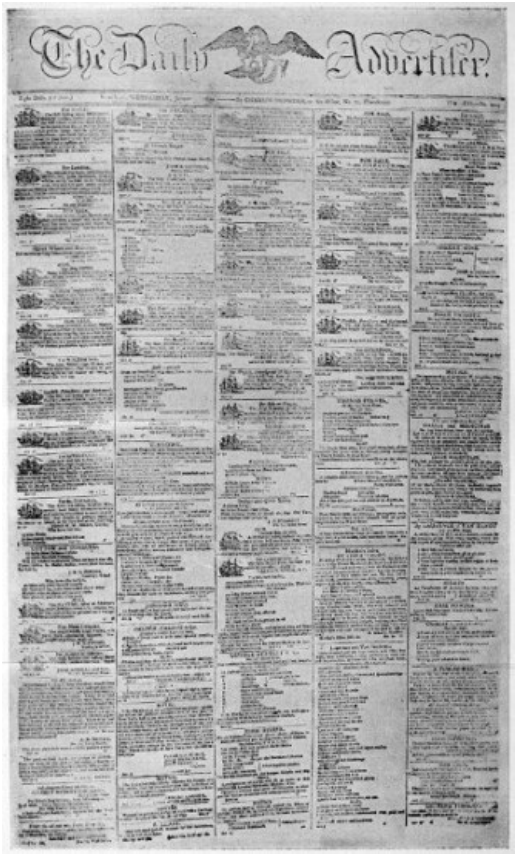
LEATHER STORE,
No 255 Pearl ftreet,
JACOB LORILLARD,
Has on hand a large quantity of ftaughter and dryed hide Soal Leather, neats do. wax, grain and ruffet calve fkins, American and Englifh boot and ho-tee legs, morocco and kid skins of various colours, harnefs and fairing leather, &c. &c.
dec 26 3m

10 cafes mens fine faffhionable black HATS received per the Factor from London. For private Sale by ISAAC MOSES and SONS.
dec 26

Advertisements from the New York Daily Advertiser of Wednesday, January 1, 1800.

was insufficient to permit of any extra outlay to obtain reports of events occurring at a distance in advance of the regular mails. Such reports as were obtained were usually voluntary contributions written by a friend of the editor, and often colored or distorted according to the prejudice of the writer. These letters were, almost without exception, semi-editorial in character, the writers indulging freely in comment and expression of opinion upon the event they attempted to record, so that no political or public matter was reported entirely free from partisan coloring. The drivers of mail coaches, the captains of coastwise or river vessels, strolling peddlers, lawyers, surveyors, and wandering missionaries, who made long journeys into the interior and from town to town, were the news reporters of early days. When they arrived in a city or town they would tell [Pg 193] the latest news from the places they had visited, and the next issue of the local paper would contain a story beginning, "The Rev. Mr. Bland, the traveling missionary, relates," etc., or, "Captain Smith, of the schooner——, reports having heard," etc. Information received in this way might relate to Indian uprisings, fires, floods, crimes, accidents, or political events; but in every case the published account would be interspersed with opinions of the narrator and the comments of the editor who prepared the story for publication. For news of events happening in the larger cities, the journals of the first half of the century depended almost entirely on reprinting from exchanges. They had no regular correspondents anywhere, and a paper published in New York would reprint from the papers of Boston and Philadelphia such of the news of those cities as impressed the editor as being of more than local interest. During the War of 1812, the subsequent Indian wars, and the conflict with Mexico, news of battles and movements of armies in the field was obtained by the slow process of waiting for official reports to the Government or private letters from officers and men at the front. The Mexican War stimulated the public demand for news, increased the circulation of newspapers, and did more than any other event up to that time to arouse the editors of the country to the fact that the people wanted early and complete information of what was going on in the world, rather than individual opinions on general problems. While that struggle was in progress the arrival of the weekly mail in a remote village was an event of importance. The inhabitants would gather in large numbers at the post office, and the meager war news contained in the newspapers would be read aloud. The postmaster or some subscriber to a paper would often post a copy of the latest journal in some conspicuous place in the town, and from that simple beginning there was developed the newspaper bulletin board, where the public may obtain brief information of great events before the full report can be put in type.

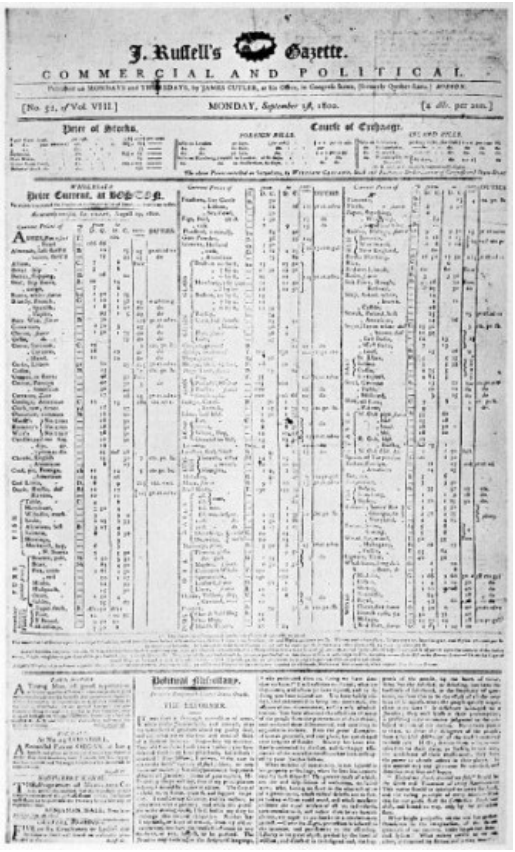
After the division of the voters of the country into organized political parties, the tariff, banking and currency, the acquisition of additional territory, and States rights developed into great national questions, precipitating prolonged and heated discussion by the statesmen of that period. This condition stimulated the growth of a certain class of newspapers, and brought into prominence many writers of ability. The statesmen and politicians of that time turned to the press as an available and valuable medium through which to disseminate arguments. They sought to convince rather than to inform the public, and the [Pg 194] journalism of that period made no substantial progress except as an instrument for the development and exploitation of writers of force and influence. Whatever power the press exerted in shaping events, whatever it accomplished in swaying the public mind in the days when nullification was scotched and territorial expansion was accepted as a fixed policy of the majority, should be credited to the genius and individuality of the leading writers of that time, rather than to a full presentation of facts. The years of agitation of the question of slavery still further developed individuality in journalism. The newspaper became an instrument for educating the people on certain public questions, and an influence upon public opinion by means of editorial writing. That was the period of so-called great editors, of whom Horace Greeley may be mentioned as a conspicuous example, who made and unmade politicians with their praise or



criticism, who shaped the policy of political parties, controlled conventions and nominated candidates, changed the current of their country's history at critical points, and in many ways wielded an influence in public affairs greater than that of the leading statesmen. The editor of that time was greater than his newspaper, and the power of the press was in reality the force of character of the individual exerted through the instrument within his control. [Pg 195]

Click here for larger image

From 1830 to 1860 the progress made in the mechanical department of the business was slow and unimportant in comparison with recent inventions. Cylinder presses came into general use for the printing of daily papers, but the weekly and monthly publications continued to use the primitive hand machines. The speed of press-work was still limited to a few hundred copies per hour, so that an extensive circulation could not be supplied even if there had been a demand for it. The white paper used was still made entirely of rags, and most of the material was imported from Austria and Italy. The cost of production was high, and few newspapers in the United States were published at a fair profit. The uncertainty of the financial returns from the business greatly retarded its development. Inventors found that their ingenuity would receive more substantial rewards in other fields, and editors and publishers were rarely practical men who could discover imperfections in mechanism and suggest improvements in their own shops. Throughout the first half of the century most of the improved methods of printing were developed in the establishments of book and job printers. There new presses and all new mechanical devices were first installed, and the newspaper followed, instead of leading, in the work of material progress in the art. [Pg 196]


J. Ruſſell's Gazette.
COMMERCIAL AND POLITICAL.
Price of Stocks.
Court of Exchange.

Click here for larger image

To the New York Herald is generally credited the departure from old-time methods that resulted in the creation of newspapers devoted entirely to the publication of news, the reporting of the happenings of the world day by day. The innovation was not well received by the editors, who believed that the public cared more for opinions than a record of events. The new method proved popular, however, and the development of the newspaper from the personal journal and party organ dates from that time. The founder of the Herald and the new school of journalism spent money to obtain the news of the world ahead of the ordinary channels of communication. He established a system of special couriers, employed correspondents, and made the collection of reports of events of general interest a matter of first importance in the business of making a newspaper. Other editors followed the new movement slowly, and often with much doubt and hesitation, but those who stood still and refused to supply their readers with the news were in time compelled to go out of the business.

When the civil war began the new order of journalism had progressed far enough to create a general demand for a full report of the progress of that great conflict. All the larger cities of the country were connected by railroads and telegraph lines, the political agitation for five years prior to the beginning of hostilities had aroused the people to a feeling of intense interest in the struggle, the circulation of the daily papers had increased almost to the limit of their mechanical capacity, and every condition favored a rapid development of the business with a certainty of profitable returns. The leading editors of the country still exerted a far-reaching influence in public affairs, and they were consulted by the highest officers of the Government; but the time had come when the people wanted the news, rather than individual opinions. American genius and ingenuity responded promptly and adequately to the demand, and from the time of the civil war the development of the newspaper has been a marvel of science and art. The telegraph came into general use for the transmission of news, correspondents and artists were sent to the front with all the armies, the men employed in Washington to write their own views of public questions were instructed to send to their papers only a record of the great events then transpiring around them, and in a month, or at most a year, American journalism was well advanced upon a new era of marvelous development. The time when the opinions, the power in phraseology, or the individuality of one man could alone make a daily newspaper a financial, literary, or political success had passed. The press had become an institution, journalism a profession, and the publication of newspapers a practical business requiring and rewarding enterprise and sagacity. [Pg 197]

With the sudden demand for more papers came rapid progress in the mechanical department of the business. Double cylinder presses capable of printing twenty thousand papers an hour were soon perfected, folding machines came into general use, stereotyping was employed to save time, labor, and wear of type, white paper was made from wood pulp at greatly reduced cost, and the progress in all


NEW-YORK EVENI

MONDAY, NOVEMBER 16, 1801.

Click here for larger image

departments of the business was by leaps and bounds until every demand was more than supplied and new expectations created. From that time forward invention kept pace with every increase of circulation. As soon as one press was found inadequate or imperfect, the manufacturers were ready to set up a faster and better one. As competition reduced the selling price of the newspaper, invention supplied every demand for the material of production at a reduced rate. The impetus to circulation imparted by the civil war created a new reading public, which rapidly grew to include every person who could read and a demand for all the news of the world once created would not be denied. The collection of news was quickly reduced to a system and perfected, until to-day no event of importance occurring in any part of the world is omitted from the daily record of current history.

TROY, LANSINGBURGH AND WATERFORD NAVIGATION LOTTERY.

SCHEME.

1	Prize of	20,000 Dollars, is	20,000
1		10,000	10,000
1		5,000	5,000
1		2,000	2,000
3		1,000	3,000
20		500	10,000
60		200	12,000
150		100	15,000
340		50	17,000
600		20	12,000
9,600		10	96,000
1	First drawn number		1,000
1	do. on the 5th day		1,000
1	do. 10th day		1,000
1	do. 15th		2,000
1	do. 20th		2,000
1	do. 25th		2,000
1	do. 30th		2,000
1	do. 35th		3,000
1	do. 40th		3,000
1	do. 45th		5,000
1	do. 50th		1,000

10,788 *Prizes.* *Dollars* 225,000
26,712 *Blanks.*
37,500 Tickets at 6 Dollars, is *Dlls.* 225,000

Subject to a Deduction of 15 per cent.

☞ Less than two and an half Blanks to a Prize.

The Managers will certainly commence drawing in the City of New-York, *on the first Tuesday in May next*, and will continue to draw 750 Tickets each day until completed, as they have disposed of the LOTTERY to a Company of Gentlemen in this city, who are to sell the Tickets at the original price of *Six Dollars*, until the first of December.

This Lottery is for the purpose of raising *Thirty Thousand Dollars*, to improve the Navigation of Hudson's River, between the City of Albany and the Villages of Troy, Lansingburgh, and Waterford--Agreeably to Three several Acts of the Legislature of this State.

DAVID GELSTON,
PHILIP TEN EYCK,
JOHN BORDMAN, } *Managers.*

The Tickets in the above Lottery are for sale at GAIN & TEN EYCK'S Book-store, No. 148 Pearl-street.——Prize-Tickets in the New-York State Road Lottery taken in payment. Nov. 16 tf

FROM THE NEW YORK EVENING POST OF NOVEMBER 16, 1801.

The great cost of collecting news at the front and transmitting by telegraph full reports of battles during the civil war caused certain newspapers in New York city to enter into an arrangement to receive reports in duplicate and share expenses. Then the cost was further reduced by selling the news to papers in other cities. That was the beginning of the Associated Press, a plan of newspaper combination that ultimately made the buying and selling of news a great commercial enterprise. Within a few years after the close of the war this system had been developed until practically all the daily newspapers of the country were interested in it or subscribers to the news collected and sold. This feature of the business continued to grow until agencies for the collection and transmission of news were established throughout the world. Similar associations were formed in England and on the continent of Europe, and news exchanged with the American organization. In the United States the business was developed until newspapers of particular sections of the country and even those of single States formed associations on the principle of mutual benefit for the collection of full reports of all important events within the territory where they circulated. At the present time the system has been perfected until the great news agencies of the country receive reports of important events from every quarter of the globe with a degree of promptness and accuracy rendered possible only by thoroughness of organization and the constant exercise of the keenest intelligence. The collection of all the news of the world would not be possible under any other plan, but the American newspapers, having created a demand for the news, were the first to devise a system of obtaining it promptly at a cost that made possible the publication of daily papers at a profit in almost every town in the country. Brief reports of all important events are transmitted by cable or telegraph to a central office in New York, Washington, or Chicago, where they are condensed or elaborated, as occasion may require, and then sent out over special telegraph wires to papers all over the country that are subscribers to the service. The larger papers of the country, however, do not rely upon this service alone. They are represented by special correspondents not only in all the

[Pg 198]

BROWN & STANSBURY,

No. 114 Water-Street,

HAVE just received a valuable collection of BOOKS, among which are

Large and elegant Family Bibles with plates,
The works of William Penn, the founder of Pennsylvania, complete,
Barcley's apology for the people called Quakers—with a number of books of the same description.

Blair's Sermons,
Do. Lectures,
Goldsmith's Animated Nature,
Darwin's Zoonomia,
——— Phytologia,
American Preacher,
Coxe's Switzerland,
Beaujour's History of Greece,
Goldsmith's Greece,
Chatham's Life,
Homes' Sketches of the History of Man,
Smith's Wealth of Nations,
Taplin's Farriery,
Prayer-Books,
Rumford's Essays,
Burns' Works,
Thompson's Works,
St. Pierre's Voyage,
———Studies of Nature
Jefferson's Notes, (hot-pressed,)
Potter's Antiquities,
Archer's Sermons,
Franklin's Sermons,
Court of Berlin,
Bourgannes' History of Spain,
Burk's Works,
Reid's Essays,
Bell on Wounds,
System of Anatomy,
Fourcroy's Chemistry,
London Practice of Physic—with a great variety of Books of the above description.
Durnford and East's Reports,
Blackstone's Commentaries,
Reports of Cases argued and determined in the Court of King's Bench in Hilary Term, in the forty-first year of the reign of George 3d. 1801, by E. Hyde East, parts 1 & 2.
Park on Insurance,
Lex Mercatoria Rediviva, &c. &c.
The Oriental Navigator,
American Coast Pilot,
Jackson's Book-keeping,
New Practical Navigator,
Walsh's Mercantile Arithmetic,
A System of Exchange with almost all parts of the World, to which is added, the India Directory for purchasing the Drugs and Spices of the E. Ind. &c. This is a new and valuable book, and has never before been advertised.

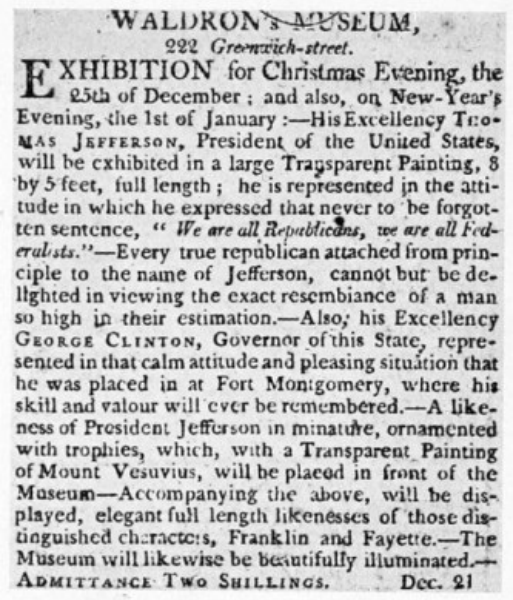
THEY HAVE LIKEWISE ON HAND,

A large assortment of MERCEANTS ACCOUNT BOOKS to various patterns, patent-lined.—All orders in this line duly attended to.

A large assortment of WRITING PAPER of all descriptions, with every article used in counting-houses—140 dozen of LEATHER for Book-binders, for sale on moderate terms.

N.E. BOOK-BINDING done in the neatest manner. Nov. 16

A BOOKSELLER'S ADVERTISEMENT FROM THE NEW YORK EVENING POST OF FRIDAY,



WALDRON's MUSEUM,
222 *Greenwich-street.*

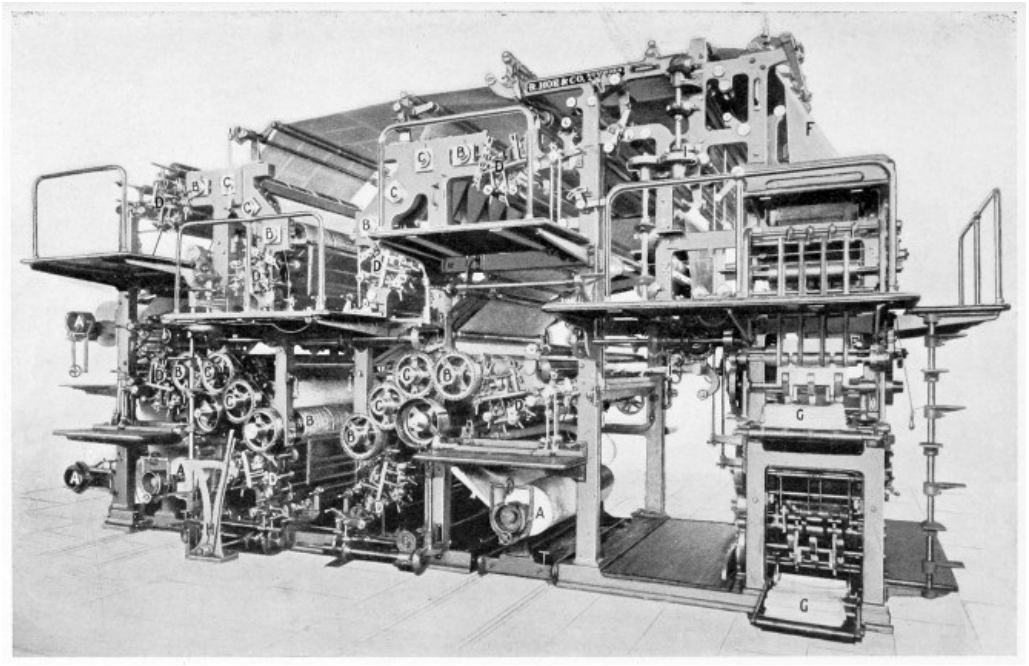
EXHIBITION for Christmas Evening, the 25th of December; and also, on New-Year's Evening, the 1st of January:—His Excellency THOMAS JEFFERSON, President of the United States, will be exhibited in a large Transparent Painting, 8 by 5 feet, full length; he is represented in the attitude in which he expressed that never to be forgotten sentence, "*We are all Republicans, we are all Federalists.*"—Every true republican attached from principle to the name of Jefferson, cannot but be delighted in viewing the exact resemblance of a man so high in their estimation.—Also, his Excellency GEORGE CLINTON, Governor of this State, represented in that calm attitude and pleasing situation that he was placed in at Fort Montgomery, where his skill and valour will ever be remembered.—A likeness of President Jefferson in minature, ornamented with trophies, which, with a Transparent Painting of Mount Vesuvius, will be placed in front of the Museum—Accompanying the above, will be displayed, elegant full length likenesses of those distinguished characters, Franklin and Fayette.—The Museum will likewise be beautifully illuminated.—
ADMITTANCE TWO SHILLINGS. Dec. 21

AN EDEN MUSÉE OF 1801. FROM THE NEW YORK EVENING POST OF DECEMBER 23, 1801.

The development of the newspaper into a medium for recording day by day every event of human interest was so rapid during the civil war and the stirring times immediately thereafter that many faults of form and detail remained. The journalism of that period was a new departure, and the men who created it had no precedent to guide them, but all the time there was a steady and intelligent effort to improve in all directions. The efforts of the leading men in the profession, influenced by conditions and surroundings, resulted in the creation of what were for a time known as schools of journalism—that is, one man set up an ideal, and another man strived to create a journal of another character. The aim of all was to publish the [Pg 200] general news of the day, but political influences were still strong enough to control editorial policy, and ultra-partisan and sectional views were incorporated in the record of events. There were still editors of great power and influence in politics and public affairs, and they tried to shape the current of the new condition by the force of editorial writing. A number of editors, of both the old and new order, for a time followed the policy of subordinating to partisan politics all other features of the newspaper. They sought to make the press the dominant influence in politics, and to do that they presented in their journals only one side of public and party questions. They undertook to think and to reason for their readers, and their partisan and sectional views were reflected in the news columns of their papers. So long as party feeling ran high this style of journalism was popular and successful, but the newspaper, being in the nature of an educator of the masses, soon set the people to thinking for themselves, and created a demand for the news of public and political events without the color of individual opinion. The change from intense partisanship to partial or complete independence of editorial utterance has come slowly, and is still under way. To-day there is no great daily newspaper in the United States so entirely subservient to a political party as to support any man or measure without question or protest. Politicians fear this spirit of independence, and therein lies the secret of the great power of the press in public affairs. The most powerful and successful journals are those that combine absolute fairness and honesty with independence.

So-called schools of journalism, in the rapid development of the profession during the past twenty years, have merged into one general system or plan, which is to get all the news and publish it. Journals may be graded or classified by their treatment of news and their judgment as to the intelligence and moral character of the reading public.

A detailed record of the development of the mechanical part of the newspaper business during the past thirty years would be almost a synopsis of all progress in science and art. The newspaper printing press of to-day, which prints, cuts, folds, and counts ninety-six thousand papers per hour, with one man to operate it, is the mechanical wonder of the age. It is justly regarded as the greatest piece of machinery that the ingenuity of man has yet devised. Type is no longer set by hand in the making of a newspaper, the letters being formed from the metal direct and cast in finished lines by machinery.

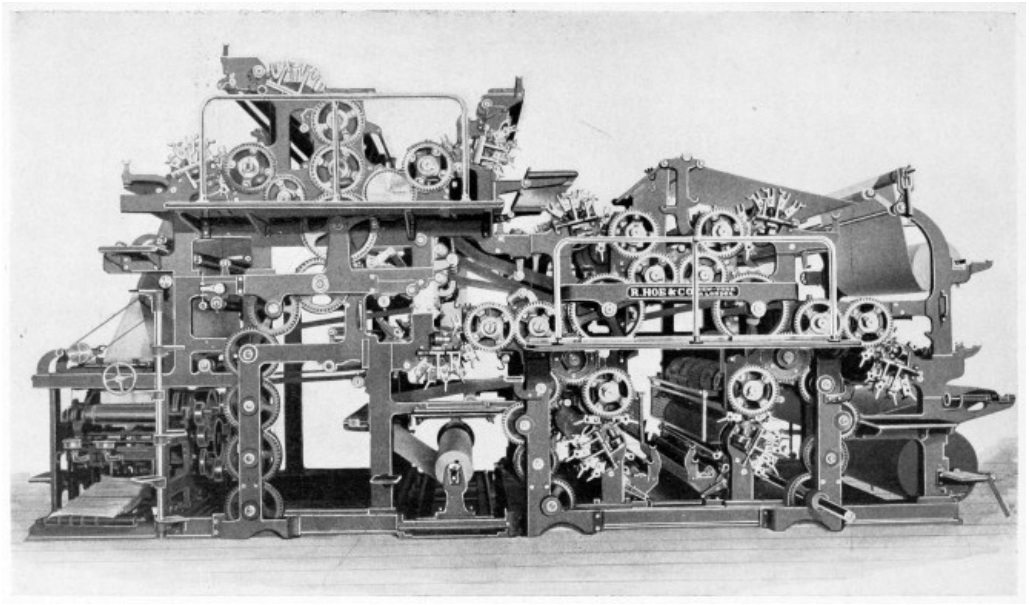


Octuple Stereotype Perfecting Press and Folders (printing on both sides of the paper). Capacity 96,000 4-, 6-, or 8-page papers per hour; down to 24,000 24-page papers per hour. A, paper rolls (Webb's), sometimes five miles long; B, printing cylinders, each one carrying sixteen plates (pages); C, blanket or impression cylinders; D, inking motion (fountain and inking rollers); F, folding mechanism or formers (four of these); G, deliveries (four of these); H, controlling lever; I, bar slitting, pasting, collating, and collecting devices (between press and folders).

(We are indebted to the courtesy of R. Hoe & Co. for permission to reproduce this photograph. This picture and the succeeding one represent the most powerful and complete printing presses which have been constructed up to date.)

[Pg 202]

Studying the perfection and magnitude of the newspaper printing press of to-day it is difficult to realize that little more than half a century of time and invention stand between this piece of mechanism, that seems to work with human intelligence, and the Washington hand press, upon which the production of printed sheets was a matter of slow and arduous labor. The great metropolitan newspapers of to-day are printed by monster machines weighing thirty tons, composed of four thousand separate pieces of steel, iron, brass, wood, and cloth. In the great printing-press factory of R. Hoe & Co. eighteen months' time is required to build one of the modern presses, and the cost of it would have more than paid for all the newspaper printing presses in use in the United States at the beginning of the century. These monster machines are known as quadruple presses, which means that four complete presses have been built into one. When in operation, white paper is fed to them automatically from rolls, and this paper, with a speed greater than the eye can follow, is converted into the finished newspaper, printed on both sides, cut into sheets, pasted together, folded, counted, and deposited in files of fifty or one hundred at one side of the press. White paper is fed to the press from two points, and finished newspapers are delivered at two places on the opposite side. An idea of the speed with which the work is done may be gained by watching the printed papers fall from the folder. They drop so fast that the eye, no matter how well trained, can not count them. These presses have a capacity of ninety-six thousand four-, six-, or eight-page papers per hour, and forty-eight thousand ten-, twelve-, or sixteen-page papers. Their mechanism is so perfect and so carefully adjusted that the breaking of a narrow band of tape in the folder, the loosening of a nut, the slightest bending of a rod, friction in a bearing, or any other derangement, no matter how slight, is instantly apparent to the skilled machinist in charge.



Sextuple Stereotype Perfecting Press and Folders (with color attachment for printing three additional colors on outside pages). It prints per hour 48,000 4-, 6-, 8-, 10-, or 12-page papers, 36,000 16 page papers, or 24,000 14-, 16-, 20-, or 24-page papers—all delivered folded, pasted, and counted. Also magazines with pages half the size of the newspaper pages, one half the pages printed in four colors and the other half in one color, at the rate of 48,000 of 8, 12, 16, 20, or 24 pages, and 24,000 of 28, 32, 40, or 48 pages, delivered folded to page size, cut open at the heads, bound with wire staples, and counted.

(We are indebted to the courtesy of R. Hoe & Co. for permission to reproduce this photograph.)

The white paper used in making the newspapers of to-day is manufactured from wood pulp and is put up in long rolls, wound about an iron cylinder that can be adjusted in place at one end of the press. These rolls contain from two to four miles of paper, and weigh from eight hundred to twelve hundred pounds each. As soon as one roll is used up another is lifted into place, the loose ends of the two are pasted together, and, after a stop of less than two minutes, the great press is again belching forth finished newspapers at the rate of sixteen hundred a minute, or two hundred and sixty-six each second.

Almost every invention and device of recent years in connection with the use of electricity is in some way utilized in the production and distribution of the daily newspapers. The evolution of journalism having finally established the fact that the chief function of the daily newspaper is to publish the news of the world, the problem of the business is how to obtain the news surely, accurately, and promptly. The ocean cable has taken the place of the sailing vessel, the trained correspondent has succeeded the occasional contributor, the electric telegraph and telephone have entirely superseded the mail in the transmission of domestic news, and every event of human interest throughout the civilized world is placed before millions of readers within a few hours of its actual occurrence. [Pg 203]

The collection of news is not restricted by any question of the cost of obtaining it. Fifty years ago it was considered a remarkable feat for one newspaper to obtain information of an important event in advance of competitors. To-day it is a matter of comment if any newspaper fails to publish all the news desired by its readers. If a war is fought on any part of the earth there are reporters on the firing line, and no expense is spared in collecting and transmitting by the quickest method available full reports of any event of world-wide importance. To-day the hiring of special trains, the stringing of a special line of telegraph wire, the charter of a ship, the fitting out of an exploring expedition, or any other great enterprise in the way of collecting information for the newspapers of the United States, is so much a part of the everyday business of journalism that such things are accepted as a matter of course, or cause no more than a passing comment.

Half a century ago the result of a national convention or election was not known all over the country for weeks afterward. In the case of a national convention to-day, telegraph wires lead from the convention hall into the offices of all the newspapers in the larger cities. An operator sits near the platform of the presiding officer, and with a muffled key he sends over the wire a full report of the proceedings, with a description of every incident of interest. At the other end of the line is an operator at a typecasting machine receiving the report and putting it into lines as fast as received. When a candidate for President has been nominated, extra editions of the daily papers are selling on the streets of cities a thousand miles away almost before the applause for the winning man has died out in the convention hall. The people of every city and town in the United States where a newspaper is published would feel themselves cheated of their rights if they failed to receive news of the result of an election by midnight of the day on which the ballots were cast.

In enterprise and originality the journalism of America leads the world at the end of the

nineteenth century. As a profession, it commands, with alluring prospects of fame and fortune, the services of men of genius and learning. Those who enter it from choice succeed or fail quickly. It is a life of activity, a work where energy and intelligence are essential qualifications, and honor and honesty are certain of reward. There is no enduring place in the profession for hypocrisy, indolence, or mediocrity. [Pg 204]

VALUE OF THE STUDY OF ART.

By GEORGES PERROT.

Georges Perrot is one of the leading art writers and teachers of France. Born in 1832, not far from Paris, he was graduated from the École Normale about 1855, and was then for three years at the French School at Athens. From his return to the present day he has occupied, with honor and distinction, many positions in the world of letters. At present he is a member of the Institut, an officer of the Légion d'Honneur, a professor à la Faculté des Lettres de Paris, and the director of the École Normale Supérieure. He is best known to scholars outside of France by the magnificent work on the History of Art in Antiquity, which he is writing, assisted by Charles Chipiez, architecte du gouvernement, and of which seven superb quartos have already appeared. (Hachette et Cie.) In 1891, by a decree of the Minister of Public Instruction, the study of the history of the fine arts was introduced into a section of the studies pursued at the lycées. In an article in the Revue des Deux Mondes, July 15, 1899, Perrot pleads for an increase of the time assigned to the study and for its introduction into other parts of the curriculum.

I have translated those pages of the article which are of general interest as a contribution to a subject which is deservedly attracting the attention of American institutions of learning.

D. Cady Eaton.

Written and spoken language, the language of which the signs are words, is not the only language which man uses to convey his ideas. There is also the language of forms, which, with no less clearness and force, conveys the conceptions of the intellect and the sentiments of the heart. We study the history and the literature of bygone people for the purpose of acquiring a better knowledge of ourselves, and this knowledge is secured by becoming conscious of the different states of mind, to use a modern expression, through which our ancestors have passed. Even the most elementary and the most remote of these successive conditions are, unconsciously perhaps, represented in the depths of our being by beliefs and customs for which the present order and progress of civilization can not account.[16]

Not to go back to the Quaternary period or to the cave dwellers, there are many of these mental ideas or conditions which would remain hidden from the inquiry of the historian if he were limited to written testimony. One example may suffice: the discoveries of Schliemann, at Troy, Mycenæ, and Tiryns have rescued from oblivion a primitive Greece of which the Greeks themselves had preserved but a faint remembrance. Thus has been given to the Homeric epoch a background of many centuries. Now this Greece, contemporary of the Thutmoses and the Ramses of Egypt, anterior to not only Grecian history but even to Grecian tradition, could not write, but could work and use stone; could hew wood and fashion it for carpentry; could mold and bake clay; could melt and hammer lead, bronze, gold, and silver; and could carve ivory. Every bit of material fashioned by the instruments of this period has the value of an authentic document. How society was constituted, the life that was led, what notions were held of the hereafter—all these things are revealed by the marks the hands of man have left upon everything he touched. The colossal walls of Tiryns, the majestic funeral cupolas of Mycenæ, the divisions of the royal abodes of which the outlines can still be traced on the surface of the soil, and the arrangement of the sepulchres hidden beneath it all testify. So, too, the weapons, the instruments, the vases, and the jewels which have been found scattered about amid the ruins of the buildings or buried in the tombs. Thanks to all these monuments, we are beginning to recognize in a shadow which year by year glows with a brighter light the features which characterized the world of Achæan heroes of which the image, transformed by oral tradition and singularly enlarged by power of invention, is reflected in the Iliad and the Odyssey. [Pg 205]

From these obscure and remote ages let us transport ourselves to the Greece of Pisistratus, of Pericles, and of Alexander. Instructors of youth tell of the losses which have been made, and of how small a part of the literary work of Greek genius has escaped the great shipwreck of antiquity. Should they not also indicate where precious supplements of information may be found to fill the voids of written tradition? There are many variations of important myths, hardly mentioned in passing by obscure epitomizers of the lower centuries, which have furnished to ceramic artists subjects for pictures which make us acquainted with personages and with episodes of which writers have hardly left a trace. But even if we had the works of the cyclic poets, all of which have perished; if we had the lyric poets, of whom only Pindar has survived, and Bacchylides whose fragments are to-day the joy of Hellenists; if we had the whole of tragedy, of which we have but the remnants; if we had all of that comedy which is represented by [Pg 206]

Aristophanes alone; if we had all of the more ancient comedy, all of the middle period and all of the new, with Menander who since the Renaissance is the regret of all critics of fine apprehension—all this poetry could not exhaust the multiple fecundity and the prodigious richness of the imagination which created it. If malevolent Fortune had decreed the destruction of every bit of Greek plastic art we should have been condemned to perpetual ignorance of many aspects and methods of the Greek soul. Is there anything in literature worth the little clay figures of Tanagra in making clear how the Greeks apprehended and enjoyed female beauty: how they loved it not only in the noble and serious types of a Pallas or an Aphrodite, but even as presented by the humble inhabitants of little villages in the graceful *abandon* of their everyday life and in the liberty of their most ordinary attitudes? If we base an opinion of the religion of the Greeks only upon the epithets used by poets in defining the gods and upon actions they attributed to them, we run the risk of judging wrongly. In contemplating their images we obtain clearer notions of the ideas associated with each divine type. Alas! we do not possess the great works of Phidias which according to men of authority made men more religious—the Athene of the Parthenon and the Zeus of Olympia. But even in the reduced copies of these two masterpieces which have reached down to our time we can divine how the master expressed in the one the idea of calm and luminous intelligence and of supreme wisdom, and in the other the idea of that sovereign force in repose and of that omnipotence, tempered by goodness, which were conceived to exist in the sovereign of the universe, the father of gods and men.

In subsequent paragraphs Perrot imagines the Greek statues of the Louvre thus addressing a classical student:

"Young man, you who are studying Greece in Homer and Plato, in Sophocles and Herodotus, do not pass us by so quickly. We also belong to that Greece which you discern and which you seek in their writings, of which not without difficulty you decipher the prose and the verse. To understand and to love us, to read in our features the thoughts of which we are the expression, to seize in the modeling of our flesh and in the pure outline of our limbs the secret of the genius which created us, no grammar nor dictionary is needed; only apply yourself to the education of your eye. In this exercise, in this apprenticeship, you will find a pleasure which will become more and more keen as you become more capable of perceiving rapidly the finest gradations. If you aspire to become an authorized interpreter of Greek genius, do not fear that you may be losing [Pg 207] time. When, by long and affectionate intercourse, you shall have sufficiently entered into our intimacy to be able at any given hour to evoke in your spirit, as clearly as if we stood before you, a vision of the forms which shall have become dear to you, then the images which shall be awakened in your memories when you read the poets will be akin to those which the same recitals and the same epithets suggested to the Greeks who saw us born. To them you will be drawn by similarity of impression. You will be nearer to them, nearer to thinking and feeling after their fashion, at least by moments, than the most subtle grammarian or the most learned Hellenist who never has seen us."

Turning from Greece to Italy, Perrot derives a no less striking lesson from the statues of Roman emperors:

"Is there a lesson, though given by the most learned professor, that could cause to live before us all the life of the Rome of the Cæsars as do these effigies? In the long succession of portraits which embrace three centuries of history the differences of times and of men are contrasted more keenly and more vividly than in the recitals of ancient authors or in the dissertations of modern erudites. Augustus and Tiberius, Constantine and Theodosius, all bore the same title —'imperator'; all were called consuls, Cæsars, Augusti, *patres patriæ*, etc. Nevertheless, from the first to the fourth centuries the supreme power was greatly modified. Volumes have been written to explain the change, but there is nothing that makes it so clear as the comparison of the images of these princes. Augustus, in perhaps the most beautiful of all his statues, called *de Prima Porta*, has his head, arms, legs, and feet bare. Over the soldier's short tunic he wears a cuirass, and over it is thrown the military mantle of command. He is represented as supreme chief haranguing his troops. Another statue may represent him as a simple citizen, clothed with the toga and holding in his hand the manuscript of the discourse he proposes reading to the senate. The statues still show forth the Roman Republic, at least the customs and the style of it. Most vividly is the spirit and also the deception of the system perceived which, while investing a single individual with a power almost limitless, affects for two centuries a preservation of ancient liberties. Turn from these to an image of one of the successors of Diocletian, one who preferred to reside in Constantinople, the new capital of the empire. Do not seek his image in one of the ceremonial statues where, by force of routine, the sculptor may perchance have preserved classic rules; but in monuments of another order, where the artist kept closer to reality, in miniatures adorning manuscripts, in mosaics, in ivory diptychs, etc. There you will find figures which have nothing left of the simplicity and nobility which Rome borrowed from Greece, but figures which [Pg 208] in some particulars recall the old art of Asia, and in others already announce the art of the middle ages. The head is encircled with a diadem. The body and the limbs are entirely hidden by clinging draperies which are very long and very narrow. The materials which form this species of case are decorated from top to bottom with rich embroideries in the shape of medallions, flowers, animals, and even persons. There is no more deception; we are no longer in Rome; fictions so long preserved have finally disappeared; the empire has turned into an Oriental despotism.

"Between the two extremes of the series, how many degrees are there which furnish the very best commentaries of history? The heads of all the Cæsars, even those of Claudius, the accidental scholar, and of Caligula, the wicked and witty fool, are aristocratic. They show the nobility and

the pride of race. You recognize in them the descendants of those grand patrician families which at first seemed to hold exclusively the right to give masters to the Romans. With Vespasian, scion of a middle-class family pushing its way into second-class public positions, the advent of a new order is evident. Vespasian has the round and smooth, double-chinned face of the chief clerk of a commercial or banking establishment. Trajan has the features of a soldier who has probably pushed his way to the front from the ranks. Hadrian, who turns his head to hear the better, whose bright eyes gleam even in the marble, whose half-opened mouth seems in the act of speech, shows the features of a learned and intelligent scholar. Marcus Aurelius, with his bristling hair and beard, would be taken for a Greek philosopher. In Caracalla's looks there is derangement. His eye betrays that murderous and fantastic frenzy which seized more than one emperor, especially of those who from early youth had been exposed to the temptations of absolute power.[17]

"Not to personages alone do pictured monuments give life. The same character of sensible reality [Pg 209] is imparted to the frame and to the surroundings of the picture, to all the theater where these actors played their parts. Of this truth no one of our teachers, when I was a collegian, seemed to have a suspicion. There was not an illustration in the cold and dry compendiums which were placed in our hands. I can almost ask myself if, when I studied Greek and Roman history, I was really convinced that Sparta and Athens, Rome and Carthage had actually existed. I certainly did not know how or where to place them in space, what idea to have of their situation, or of the outlines made by the ridges of their walls, their houses, and their temples. All these cities were to me vague shadows, floating between heaven and earth. No one of them answered to a distinct and defined form.

"If this be the case with classical antiquity, in spite of the color and splendor of the narratives of its writers, how much more difficult is it to know and understand France of the middle ages when condemned to study it in its literary work alone! The literature of the period is partly in debased Latin, partly in early French. The French of the day was not the language of the thinkers. The deep thought of the age is not to be found in minstrelsy and ballads. It must be asked of the learned, of philosophers, of theologians, and of sacred writers. But to follow them in the subtle analyses and in the excessive complications of symbolism, in which they delight, requires mental efforts which are made all the more laborious by the artificial character of the church Latin, which no longer continued to renew itself at the source of popular speech. It is impossible to see how such works, in spite of their value to erudition, can be called to take part in the education of the young. It is for this reason that lately, by a judicious innovation, a discreet place has been made in the curriculum for histories and poems written in the common language, for the Chanson de Roland, and for the works of Villehardouin and Joinville. But the student can only read these in translations, or in those adaptations which so modernize the language as to leave but a little of its original flavor, and which therefore make but an imperfect contact between the original work and the mind of the reader. But supposing the scholar capable of mastering the original text: can its formless and superabundant prose, or the tiresome monotone of its flowing dissonances, give him emotions which have the vivacity of those which a page of Tacitus or a song of Virgil gives to those who know even a modicum of Latin? Can they have the power to excite the imagination in the same degree as any strong and concise sentence of the historian, any sonorous and glowing verse of the Roman poet?

"It is only exceptionally and as by flashes that the writings of the middle ages give the impression [Pg 210] of true beauty. The conceptions are often grand, but the expression is always weak and dragging. On the other hand, Roman or Gothic churches are not less beautiful after their manner than Greek temples. Their beauty is of another fashion, but many souls are touched more deeply. They manifest no less clearly the power of the religious faith which constructed them. The particular character of Christian faith is shown with singular clearness in their majesty, in the elevation of their vaults, in the half lights which flood them, and in the thousands of figures which populate and animate every surface. As in Greece, the sculptor co-operates intelligently and docilely with the architect and has occupied no less happily the allotted fields. As Phidias and Alcamenes represented on the pediments and friezes of Doric temples the great gods of Greece and the local myths of Athens and Olympia, so anonymous masters, called to decorate the cathedrals of the middle ages, have placed impressive statues on the sides and in the *voussoirs* of the portals, in the open galleries which run along the façades, on the top of the pinnacles which throng the roof —in fact, everywhere where space is offered. These statues, distributed in an order regulated by doctrine and tradition, show forth the Saviour, the Virgin, saints and angels, prophets and apostles, and hosts of personages and scenes suggested by Holy Writ or by local and popular legends. Among these images there are many at Bourges, Chartres, Rheims, Amiens, and Nôtre Dame de Paris, which are marvels of severe elegance, of chaste and haughty grace, and of lofty moral nobility. This wonderful statuary has but lately been investigated, exposed, and studied, but already it would be difficult to find a connoisseur unwilling to compare with the most boasted statues of antiquity that admirable image of the teaching Christ of the west portal of Amiens, to which the popular surname has been attached of *le Beau Dieu d'Amiens*.

"For evident reasons, French sculpture of the thirteenth century did not, as did Greek sculpture, devote itself to the study and reproduction of the nude. It denied itself this attraction. All figures are clad; but beneath the drapery, which is in fine masses with large folds, the outline and the movement of form are indicated with precision. The principal interest and the rare originality, however, of this sculpture is that it is perhaps the most expressive that has ever existed. This expressiveness appears in the general effect of the pose, in the disposition of the drapery, but especially in the character which the artist has succeeded in giving to the features of the face.

"The august mysteries of the Christian dogma, the poetry of the Old and of the New Testament, [Pg 211]
the triumphant deaths of martyrs, the miracles of saints and their infinite charity—these things which the middle ages failed to put into clear and intelligible words are fully rendered in sculpture. The work of the chisel is large and firm. Difficulties are not sought, nor are they feared. Whatever be the material, the form is sure. To understand how superior the plastic is to the literary work, and to measure the distance, compare the Amiens statue with the portraits the authors of the Mysteries endeavor to draw of the Son of God. 'What can be more flat than these poor verses, which are nevertheless of the sixteenth century? The authors had good intentions and an apprehension of what should be done, but they were betrayed by the language in which they wrote. The sculptors of the thirteenth century, on the contrary, who possessed fully the grammar of their art, expressed all they felt, and have left us the most divine images of Jesus Christ in existence.'[18]

"Italy of the Renaissance is quite unintelligible to any one who has not measured the place held by art in the preoccupations not only of artists who practice it, but of all men of all conditions—of princes, nobles, tradesmen, and of citizens of most humble occupations. No one in any rank is without a passionate love for plastic beauty. This love was Italy's life and Italy's death. She died of it, because all her sap was consumed in satisfying it. It made her indifferent to her dismemberment, to the hard yoke of her tyrants, to the loss of her political liberties, and of her independence. But, at the same time, it constituted the intensity of her life which was exhausted and renewed again in the ardor with which she pursued her ideal and in her endeavors to realize it under all its aspects. Let him who would wish to obtain an exact idea of this condition reside for a while in Mantua, in Parma, in Sienna, in Florence, or in any other less-known city which nevertheless had its local school of art, its architects, its sculptors, its painters, some of whom, though they only worked for their native city, were not far from manifesting genius.[19]

"The written history of the seventeenth century and its rich literature can not alone give an idea of the situation occupied by Louis XIV in Europe when he was admired, imitated, or rather servilely copied, as pre-eminently the type of the modern king even by those who hated him the most. After two centuries, have we not seen his wonderful prestige still potent in dominating the [Pg 212]
sickly mind of Louis II of Bavaria? In his desire to copy his chosen model Louis ruined himself in building palaces. In this folly he showed discrimination. Louis XIV, when dying, may have accused himself of having indulged too great a love for building; but his edifices, with their majestic grandeur and the opulence of their decoration, gave that royal life a frame which had much to do with the dazzling which all Europe experienced when in the presence of *le Roi Soleil*. In order to recognize and experience, though but for a moment, a little of the impression felt by all contemporaries, Versailles must be visited; the apartments of the palace, the terraces, and the alleys of the park must be traversed. Thus will be thrown upon this historic figure a light far more brilliant and true than could possibly be the result of learning by heart accounts of all the campaigns of Turenne or Condé, or all the clauses of the treaties of Nimègue and Ryswick.

"The same may be said of the eighteenth century, of which only an incomplete idea can be had without a knowledge of its art. This century, to which Voltaire gave the note, seems to have had no sentiment of poetry. Down to the time of André Chenier everything called poetry was no more than rhymed prose. The imagination, however, did not lose its rights. Like a stream which changes its bed, it withdrew from literature to flow into the arts of design. There it gives evidence of invention and of light and spontaneous grace. Architects adopt plans of happy arrangement. They employ forms of rare elegance both in the elements of construction and in the ornaments which decorate them. Such sculptors as Capperi and Houdon give to portraiture a marvelous intensity of life, while the terra cottas of Clodion, with their fantastic and voluptuous charm, recall the clay modelers of antiquity. Such painters as Greuze, Lancret, and Boucher spread before the eyes living idyls, while Watteau and Frangonard conjure dreams of ideal Cytheras, of a chimerical paradise where reign eternal youth and eternal desire. The politics of our kings and of our ministers of the period is but a succession of faults and weaknesses. The best concerted plans come to naught. The most brilliant victory produces no useful results. If France, in spite of so many reverses, still held her supremacy in Europe, she owed it to her writers and to her artists."

Perrot's arguments might be used with even greater force in reference to those notions which have had no Comines, no Joinville, no Froissart, no Villehardouin, but the history of whose civilization may be traced in monuments along the Rhine and the Danube, the Ems and the Elbe. In the last part of the article Perrot considers the best methods of giving the desired instruction. [Pg 213]
However interesting and valuable his suggestions may be in communities where the instruction has already been established, it is evident that there must first be a conviction of the value and necessity of such studies and the determination to have them started. Methods are not difficult to devise, and will vary with national and individual tastes. That American colleges of thirty, forty, or fifty years ago should have objected to the introduction of the history of the fine arts into their curricula is easily understood. Art in any form was regarded by the New England mind as an emanation of the devil, and the New England mind controlled American colleges. Why the repugnance continues to exist is harder to understand. It may subsist from ignorance, from prejudice, or from conservatism. Conservatism may still regard all information to be derived from art as objectionable. Prejudice may still be strongly fixed in the notion that written and spoken words are the only vehicles of instruction, and that the arts are useless and idle vanities, while ignorance may be awaiting demonstration which will have to be strong and conclusive to awake it from self-satisfied apathy. May the good words of Perrot help on the cause and accelerate the time when the best and the fullest education will be offered by the American university!

HOW STANDARD TIME IS OBTAINED.

By T. B. WILLSON, M. A.

Almost everybody knows that observatories are the places from which standard time is sent out and corrected daily or hourly. But comparatively few have more than the vaguest idea of the means used at the observatories for obtaining it.

Probably the majority of people suppose that the observatories obtain the correct time from the sun. When the average man wishes to give his watch the highest praise he says, "It regulates the sun," not being aware that a watch which would keep with the sun around the year would have to be nearly as bad as Sam Weller's. The farmer may safely decide when to go in to dinner by the sun, but if the mariner was as confident that the sun marked always the correct time as the farmer is he would be sure to be at times two or three hundred miles from where he thought he was. In other words, the sun—that is, a sundial—is only correct on a few days in each year, and during the intervening times gets as far as a whole quarter hour fast or slow.

These variations of the sun from uniform time caused no end of trouble between the astronomers and the fine clockmakers before it was discovered that sun time is subject to such irregularities. The better the clock, the worse it often seemed to go. [Pg 214]

But as the variations in sun time are now accurately known, correct time might be obtained from the sun by making proper allowance, were it not for the difficulty of observing its position, with sufficient exactness. The large disk of the sun can not be located so perfectly as can the single point which a star makes. For this reason astronomers depend almost wholly upon the stars for obtaining accurate time. It is the method of doing this which we propose to describe.

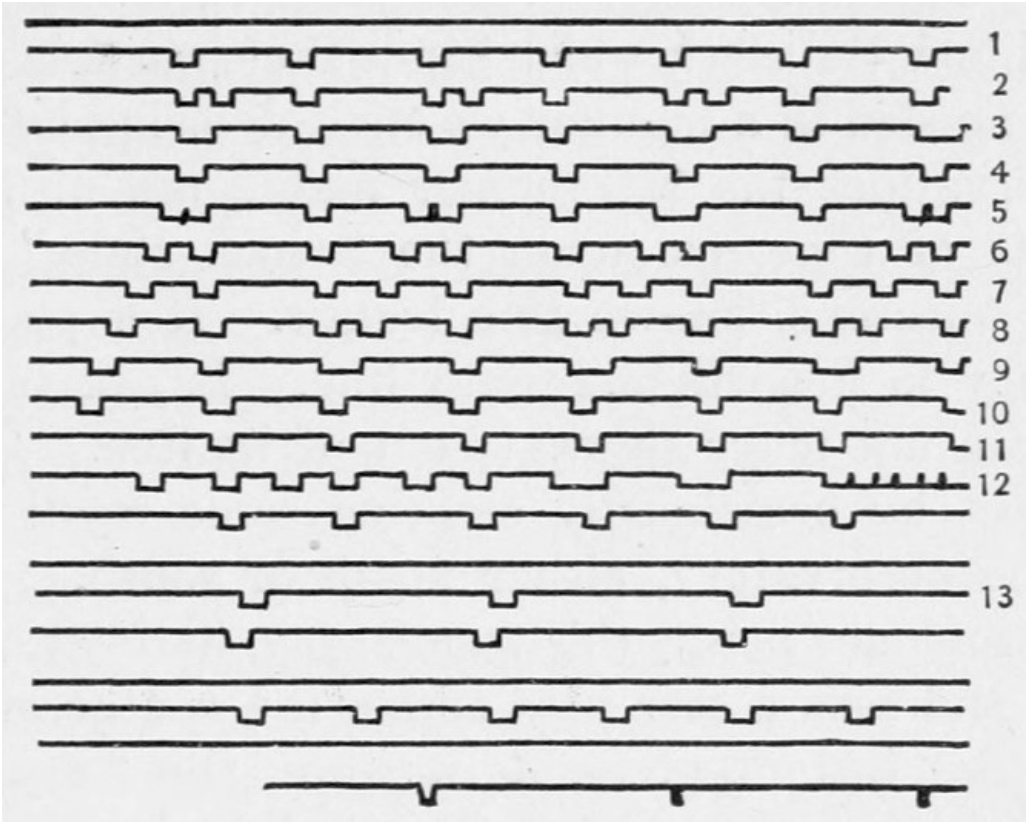
There are several hundred stars whose positions have been established with the greatest accuracy by the most careful observations at a number of the principal observatories of the world. If a star's exact position is known, it can readily be calculated when it will pass the meridian of any given place—that is, the instant it will cross a north-and-south line through the place. The data regarding these stars are all published in the nautical almanacs, which are got out by several different observatories for the use of navigators and all others who have uses for them. These stars are known as "clock stars."

Every observatory is provided with at least one, or, better, several clocks that are very accurate indeed. Every appliance and precaution which science can suggest is resorted to to make these clocks accurate. The workmanship is, of course, very fine. What is known as the "retaining click" prevents their losing a single beat while being wound. The small variations in the length of the pendulum which changes of temperature would cause are offset by compensation. The rise of the mercury in the pendulum bob, if the weather grows warmer, shortens the pendulum precisely as much as the expansion of its rod lengthens it, and conversely if it becomes colder. Such clocks, too, are set on stone piers built up from below the surface of the ground and wholly independent of the building itself. Often the clocks are made with air-tight cases, and sometimes are placed in tightly closed chambers, only to be entered when absolutely necessary. Some fine clocks even have appliances for offsetting barometric changes, but these affect such clocks less than other influences or imperfections which can not be accounted for, and thus they are seldom provided against.

The astronomer's principal clock—the one he uses in all his calculations—marks what is known as sidereal, not ordinary, time. The revolution of the earth in its orbit sets the sun back in its place in the heavens at the rate of about four minutes a day, or one whole day in a year, so that this clock, indicating star time, gains this amount and is only with ordinary clocks once a year. After it is once adjusted, no attempt is made to regulate it exactly, as the astronomer would better calculate its differences than disturb its regulation, always provided its rate is very uniform and accurately known. [Pg 215]

One or more of the other clocks, however, are made to show ordinary time, and corrected by observations taken every few days. It is from this clock that the standard time is sent out.

It is possible to connect any of these clocks telegraphically with an instrument in the observatory, known as a chronograph. It consists of a cylinder with a sheet of paper around it, on which rests a pen connected with the telegraphic instrument which follows the beats of the clock. The cylinder is turned slowly by clockwork, and the pen, carried slowly along by a screw, describes a spiral on the paper with jogs or teeth in it about a quarter of an inch apart, caused by the beats of the clock. In this way the astronomer secures a visible record of the beating of his clock, or rather of the movements of his telegraphic recorder. Thus, if he has another key on the same circuit with the clock, connected with his chronograph recorder, and should touch it between the beats of his clock, it would put in an extra jog or tooth on his record, and it will show, what he could not have told in any other way, in just what part of the second he touched this key, whether in the first or last part of the second, and precisely how far from either end—that is, he can determine fractions of a second with great nicety. [Pg 216]



A Short Section from the Paper Band of the Chronograph Cylinder, showing Tracings of Pen connected with Clocks: 1, seconds of sidereal clock; 2, both sidereal and common clocks; 3-10, the tracings of the mean-time clock fall steadily behind the other; 11, sidereal only; 12, connected with observer's key. The extra teeth show when a star passed each of the five spider lines. At the extreme right is a "rattle," put in to show where the observation is on the cylinder.

As a matter of fact, he has such a key at the telescope which he uses to make his observations in taking time, so that when he wishes to record the precise instant in which anything takes place which he is viewing through his telescope he has but to press the key in his hand and an extra tooth will be put into the record which the clock is making, somewhere among the regular teeth put in by the beating of the clock. Later, when he takes out the sheet he can see just where the tooth came, and so at what instant it was. If, now, he knows exactly what the instant was according to the true time as given in his almanacs—that is, what his clock ought to have shown at that instant—he can tell how nearly right his clock is. Once knowing how this clock is, it is a simple calculation to find how the clock which sends the signals is running, and to alter it if needed in a manner we shall describe later.

The observations the astronomer makes use of to determine these instants of time are upon the "clock stars." He uses a rather small telescope, known as a transit. It is placed with the nicest accuracy in a north-and-south line. It can turn over vertically, but can not move sideways out of its line. Its alignment is kept perfect by occasionally sighting some small mark a few rods from the observatory, either north or south.

If the astronomer points this transit, say, halfway up the southern heavens and sees a star pass across the center of its field he knows that that instant gives, as it were, the "noon mark" of that star. If it is one of the "clock stars," he knows by his tables what that instant of time is—should be—by his clock.

We have seen what his means are of comparing his clock and his observations. But observe, now, how much pains he takes to get the most exact observations.

To begin with, he must have calculated to a nicety his location. The director of an observatory always knows where he is located in a sense that few other men do. The accuracy of a large part of his observations of any kind depends on his first having determined the latitude and longitude of his observatory within a very few feet. Then the data given by his tables are all modified, and adapted to conform to his locality.

There are stretched across in the eyepiece of his transit five spider lines. The central one is on the central line of the field of his instrument. In observing a star for time the astronomer watches it as it is carried by the rotation of the earth past each of these spider lines, and presses his key—that is, makes a record—as it crosses each line. Taking the average of these five observations, he [Pg 217] makes the possible error very small. But, in addition to this, he also usually makes observations on at least four clock stars, which gives him twenty observations to average up and determine by. As he inspects the record of these observations which has gone upon the chronograph sheet along with the clock beats he is able to determine, after proper calculations, how his clock stands.

Such observations are made every three or four evenings, and thus the clocks are not given time to get far out of the way. It is not usual for a good clock to show a variation of more than half a second. If the astronomer finds that his clock which is sending the time is running a fraction of a second slow, he goes to it and lays on the top of the pendulum bob a minute clipping of metal, which is equivalent to shortening the pendulum an infinitesimal amount. When he takes his next observation he discovers how his clock has been affected, and again treats it accordingly. Thus the time that is sent out automatically by the clock is kept always correct within a small fraction of a second. Those who receive the time sometimes arrange electro-magnets near the pendulums of their clocks, which act with the beats of the observatory clock, and their attraction is enough to hold or accelerate the pendulums as needed to make them synchronize with the observatory clock.

It will be seen that the means of obtaining exact time involve a very considerable outlay, and that the services of highly trained men are needed. The public is thus greatly indebted to the railroads, telephone companies, and other corporations which usually bear the expense of securing standard time. It is probable, however, that from motives of scientific pride no observatory would undertake to charge for this anything like what would be exacted for such rare service in any department of the commercial world.

It is worth while to note that even with such perfect clocks and favorable conditions it is still impossible to secure perfect timekeeping. Add to this the fact that it is not usual for those who send out the time, after it has been received from the observatory, to pay much heed to variations, even of several seconds, in their master clocks, and we see why it is a disheartening task to keep the best watch as near the second as the owner would fain have it. In the first place, the watch could hardly be made to keep such time if kept still in an unchanging temperature; secondly, it is still less capable of it when subjected to the jolting and changes of temperature it encounters when carried; and, thirdly, the means of obtaining time with sufficient exactitude are rarely available to the general public.

AGRICULTURAL EDUCATION IN FOREIGN COUNTRIES.

[Pg 218]

By W. E. DE RIEMER, M. A.

The recent death, at the closing of the year 1898, of the lamented Senator Justin S. Morrill, who, as being the author of the Land-Grant College Act, is justly styled the father of agricultural education in the United States, seems to suggest the desirability of taking a survey of agricultural education as it at present exists in other countries than our own.

Since the pursuit of agriculture is one which concerns more of the people of our globe than any other pursuit, the necessity for scientific training for agriculturists becomes more and more evident to educated people. It is true that the cultivators of the soil do not generally admit the need of special schooling. At the beginning of this century very few educators, even, thought so. It was supposed that tilling the soil had nothing to do with schools, and that science had no connection with plowing and sowing. Agricultural lectureships were established early in the eighteenth century in several European universities, but they were regarded as curiosities of the age—superfluities of culture, rather than aids to the cultivator. Farmers themselves were supposed to be the only competent teachers of agriculture, and experience the only possible guide. But it has become apparent that no farmer's experience is broad enough to be adapted to all soils and climates. The successful farmer has come to regard the land which he owns as a wonderful machine which, if rightly managed, will turn out the most costly and perfect product; but which, if neglected or ignorantly handled, will disappoint his high hopes and possibly impoverish its owner. The development of commerce which so easily introduces the wheat and potatoes and other products of our country into competition with the grain produced in a distant land has taught the producers of this generation, and especially the citizen of European countries, that the farmer who can produce the largest crop of grain from the fewest acres, at the lowest price for the best cereal or vegetable, is the only successful cultivator. The nation which succeeds best in this direction with all its soil products is the one which is sure to have the "balance of trade" always in its favor.

The United States awoke to this idea when, in 1862, Congress passed the Land-Grant College Act, allotting Government lands in every State to aid in founding agricultural colleges. The country became more profoundly moved by this idea when, in 1887, Congress passed the Hatch Act, granting annually to each State the sum of fifteen thousand dollars to organize and perpetuate agricultural experiment stations, and still further when it organized a Department of Experiment Stations as an integral part of the Department of Agriculture.

[Pg 219]

But several of the countries of Europe have anticipated our action in behalf of agricultural education by a quarter of a century. Germany and France and little Switzerland realized fifty years ago that agriculture in its various departments must be pursued with the aid of the latest science combined with the broadest experience. These countries have not waited for the laborer to perfect himself in experience—an impossible attainment—but they have opened schools of every possible grade, arranged courses of lectures by the best educated scientists, made elementary agriculture a compulsory subject in the curricula of the common schools, sent out traveling instructors to confer with and advise and give courses of lectures to the older farmers,

made it possible—even compulsory—that young people should attend technical schools at odd hours of the day or evening, and even tempted them to pass a serious examination in their respective studies by the offer of a valuable prize as the reward of success. It is said that Charles Dickens once made a speech at an agricultural dinner in which he somewhat derisively said that "the field it paid the farmer best to cultivate was the one within the ring fence of his own skull." Dickens was correct. The farmer needs scientific education. The best civilized and progressive nations of to-day are admitting the utterance of Dickens to be a serious truth. Vast sums of money are appropriated by European governments to prevent their agricultural classes from continuing in or subsiding into ignorance of their art. Even the peasants of Russia, notably in the province of Ekaterinoslav, by the generous appliances for special agricultural education made by the Ministry of Agriculture and State Domains, united with the efforts of the Ministry of Public Instruction, are made to feel that without expert teaching a man can not succeed even in the raising of fowls or of bees, the culture of silkworms, the making of wine, or the manuring of his fields. Consul Heenan[20] says that in the province named above the Government annually rents thirty-two experiment fields, each eight acres in extent, distributed four in each district, and each one located in the midst of peasant fields. Each of these fields is placed in charge of some scientifically educated public-school teacher, who is paid twenty-five dollars per year for his direction, and receives, besides, all the harvest produced. The teacher uses the native tools and seeds, and hires neighbor peasants to assist in demonstrating that with care in plowing, cleaning of seed, cultivating, and reaping, his field will produce larger crops than his slovenly or ignorant neighbor. The object lesson has its certain result. The peasants are gradually adopting the four-field culture system—viz., fallow, winter crops, pastures, and summer crops. [Pg 220]

Besides these, Russia sustains 68 agricultural schools, containing 3,157 pupils, at a cost of $403,500, of which sum the Government pays $277,500, and the local *zemstovs* (societies) or the school founders pay $136,000.

In France the eminent scientist Lavoisier, at the close of the last century, advocated the founding of a national school for the teaching of agricultural science. His plan for government initiation was not realized, but in 1822 Matthieu de Dombasle founded, near Nancy, the first true agricultural school. In 1829 and 1830 the schools at Grignon and Grandjouan were founded by August Bella and Riefell respectively. Now France boasts of one of the most perfect systems of agricultural education of any country of the world. Under the joint direction of her Ministers of Agriculture and of Public Instruction, France plans to cover every phase of education from the simplest forms of object lessons taught by law in all her primary schools to the crowning National Institute of Agriculture at Paris. The facts of science, united with the soundest experience, are demonstrated to the farmer by lectures and experimentation; the future agriculturists of the country are educated in the certainties of scientific research at graded schools, ranging from elementary to university degrees, and every milkmaid is taught the necessity of promptness, cleanliness, and system in the care of milch cows and in the disposal of their milk.

The former able Director-General of French Agriculture, Monsieur Tisserand, says: "The aim and object of France has been not only to give to children and young people the means of acquiring knowledge, but also to establish means for *interesting old cultivators*. In this century of extreme competition we must admit that the agriculturist can only thrive if, in working the soil, he adopts scientific methods. Old routine is no longer sufficient in this branch, as it is proved to be insufficient in manufacture." In carrying out her enlightened policy, instruction was given in 1893[21] to 3,600 pupil teachers. Thirty agricultural laboratories throughout the country furnish analyses of soils and manures for the help of cultivators, and 3,362 trial fields are established where farmers can profit by experiments suitable to their own districts. The special farm schools number sixteen; practical schools of agriculture, thirty-nine; national schools of agriculture and horticulture, six; three veterinary schools; and one each, bearing the name of National Agronomic Institute, is a shepherd school, a cheese, and a silkworm school. In the universities are no less than 160 departments and chairs of agriculture for students of profoundest research. All this costs the departments alone over 4,504,050 francs per annum. [Pg 221]

In Prussian Germany no less activity is displayed or energy put forth to make the farmer's occupation one of financial profit and scientific status. Statistics for 1897 are at hand in the report of the Prussian Minister of Agriculture. The German system is based on the theory that schools and colleges are the only places where theoretical agriculture can be properly taught. Few of the higher agricultural schools first established were exclusively such. A liberal education could be obtained at most of them without touching the subject of agriculture. Later educators have developed a system which begins by fostering a love for Nature in the minds of the pupils in the kindergarten, and patiently develops that love through all the dozen or more grades of schools until it culminates in the polytechnic school or the degree granted by the university.

Germany is indebted to the learned Professor Thaer for the establishment of its first agricultural school at Möglin in 1807. But more than all is she, in common with all the world, indebted to the famous chemist Baron von Liebig, who, in 1840, announced the scientific truth which underlies all arguments for agricultural education—viz., that no matter how impoverished a soil is naturally, or has become by excessive cropping, its fertility may be restored, maintained, and even increased by providing it with the mineral and organic matter which it lacks.

Prussian agricultural affairs are under the supervision of the Ministry of Agriculture, Domains, and Forests. The state maintains three grades of schools—higher, middle, and lower—as in other European countries. The most celebrated are the Royal Agricultural High Schools at Berlin and

Popplesdorf, two royal academies of forestry, and the university courses in agriculture at Halle, Göttingen, Königsberg, Leipsic, Giessen, and Jena. The state expends something like two hundred thousand dollars annually on agricultural education. In Germany agricultural education has so broadened out as to include training in every technical part of a farmer's work—culture of forests, fruits, flowers, and vines; schools to teach wine, cider, and beer making, machine repairing, engine running, barn construction, and surveying; knowledge of poultry, bees, and silkworm raising; domestic economy, sewing, and accounts for farm women—all in addition to the long scientific courses of study and years of practical work on an established farm. Verily, the country that excels Germany in training agriculturists must be *par excellence* in its methods. [Pg 222]

A special feature of agricultural teaching is the traveling professor (*Wanderlehrer*). United States Consul Monaghan enthusiastically describes him: "These teachers, supported partly by the state and by agricultural unions, go from place to place ... and lecture on agricultural and horticultural subjects. Their purpose is to lift up and ennoble agricultural life; to afford the farmer the knowledge gleaned by science since he left the school; to impart to him the best methods of selecting soils, fertilizers, cattle, trees, etc.; to teach him how to use his lands to best advantage, to graft, to breed in; to get the best, quickest, and most profitable results. These teachers are skilled scientists, practical workers, not theorists, ... perfectly familiar with the wants and needs of their districts. Armed with this knowledge, the teacher's usefulness is certain and unlimited. When he speaks his voice is that of one in authority, it is heeded.... He is a walking encyclopædia of knowledge, especially of knowledge pertaining to the woods, hills, farms, and fields."

Austria has, like Germany, a system of agricultural and forestry schools in three grades—viz., superior, middle, and lower. Its oldest school of superior grade was established in 1799 at Krumman.[22] Similar schools existed later at Grätz, Trieste, Lemberg, Trutsch, and Altenburg. The latter is especially complete in every appliance for instruction, and well patronized. The middle schools provide two-year courses of study and practice, and are located at Grossan, Kreutz, Dublany, and other points, while the lower schools incline less to study and more to lectures and farm practice. They are located in the provinces of Bohemia, Styria, Galicia, and Carinthia.

Forestry schools of various grades exist at Mariabrunn, Wissewasser, Aussen, Pibram, Windschact, and Nagny; of these, Mariabrunn is especially deserving of mention for its thorough course and complete equipment.

Switzerland was the home of the philanthropist and educator Fellenburg. His school, established at Hopyl in 1806, was a philanthropy in aid of the peasantry, concerning whom he said that possessing nothing but bodies and minds, the cultivation of these was the only antidote for their poverty. At least three thousand pupils received their education in agriculture here. The Federal Polytechnic School at Zurich is the nation's pride. Out of six courses of superior training which it provides for its one thousand students, forestry and agriculture count as two. Five universities and numerous special schools furnish aid to agricultural education. [Pg 223]

The little kingdoms of Belgium and Holland are following hard upon the tracks of their powerful neighbors. In Belgium may be found superior institutions of agriculture, horticulture, veterinary science, and forestry at Gembloux, Vilvorde, Cureghem, and Bouillon respectively.

In Holland, whose people robbed the sea to obtain lands for farms and homes, about £71,500 were expended by the state on its agricultural department in 1897. Its first school, established by a communal society at Härен in 1842, was discontinued. The state in 1876 adopted the school of agriculture which has been established at Wageningen as its own, and this institution can fairly lay claim to equality with any in Europe. Government also supports the State Veterinary College at Utrecht, and subsidizes a school of forestry and several dairy schools. Agricultural teaching in primary schools has not yet proved a success.

Italy has not made such progress in agricultural education as her northern neighbors, yet she is not indifferent to the requirements of the times. She has a most unique scheme for Government superintendence of agricultural matters. All comes under the purview of a general Director of Agriculture, assisted by a Council for Agricultural Instruction, which latter was established by royal decree in 1885, and reorganized in 1887. Four divisions of the department exist—namely, (1) agriculture proper, (2) zoötechny, (3) forestry, and (4) agricultural hydraulics. Statistics are not easily procured, but recent catalogues show that the two Royal Superior Schools of Agriculture, located respectively at Milan and Portici, are institutions of which any country might be proud. Of the latter Mr. E. Neville Rolfe, British consul, wrote in 1897 that it was originally a provincial establishment, but in 1885 it had been established by royal charter and domiciled in the magnificent grounds and buildings of a disused royal palace. Its study course requires three years to complete, and graduates obtain the degree of Laureato Agronomo. Up to 1896, two hundred and twenty-eight students had obtained this degree, most of whom are instructors or Government employees of high rank. It is known also that thirty-three special and practical agricultural schools exist in different parts of the kingdom.

Much can not be said in praise of agricultural education in Spain. That country possesses the machinery for education of the higher grades, but through her seven distinctly agricultural colleges, located at Madrid, Saragossa, Barcelona, Corunna, Valencia, Caceres, and Jerez, she seems only to have obtained men for Government service at home or abroad. Spain expended in 1896 on agricultural education the sum of £58,460, but she evidently sends no *Wanderlehrer* instructors among her peasant farmers. [Pg 224]

It is said that Portugal possesses seven agricultural schools, attended in 1896 by one hundred and eighty-seven students, but of their location, save one, and courses of study the writer has no information. The Government conduct of education is committed to a Director-General of Agriculture. The leading school is named the General Institute of Agriculture, and is located at Lisbon. It provides four courses—viz., (1) rural engineering, (2) agronomy, (3) sylviculture, (4) veterinary medicine. It has a large tract of land for demonstration purposes located a few miles from the city.

Concerning Greece and the smaller kingdoms in southeastern Europe, together with the land of the Turk, not much to the encouragement of the scientific agriculturist can be said; but turning northward across Europe to the Scandinavian countries quite a different state of things becomes apparent. At once we find that the system of agricultural education is highly developed, and in some phases is not surpassed by other countries. Immediately we are in a network of dairy schools, experiment stations, chemical and seed-control stations, agricultural societies, colleges, and universities. Here we find five institutions all under royal patronage and state support. In Norway is the Higher Agricultural School at Aas, established in 1859. In Sweden stands the Agricultural Institute at Ultuna, established in 1849, and the Alnarp Agricultural and Dairy Institute, established in 1862. In Denmark is the Royal Veterinary and Agricultural College at Copenhagen, established in 1773 as a veterinary college. In Finland the Mustiala Agricultural and Dairy Institute, established in 1840. In these four small states there exist agricultural, horticultural, forestry, and dairy schools of all grades to the number of one hundred and fifty-nine. Education in agriculture is not attempted in the primary public schools of Norway or in any of these Scandinavian countries, but agricultural elementary instruction is begun in what other continental countries would call secondary schools, and is provided for persons intending to be farmers and who are eighteen years of age and older. Norway spent on elementary agricultural education in secondary schools, in 1895-'96, the sum of $31,182, and Finland more than doubled that sum.

Crossing the Channel to Great Britain, again we see a nation intent on solving the question of success for her agricultural population. Celebrated Englishmen, Scotchmen, and Irishmen early began to plan for an educated peasantry, but it was long before any national system was evolved. The sectional divisions and peculiarities belonging severally to Scot and Celt and Saxon have not [Pg 225] yet permitted a uniform legislation. Ireland and Scotland each has its own scheme of Government supervision, and both differ from England and Wales. It is estimated that but ten per cent of England's laboring population is concerned with agriculture for support, while in Ireland there is scarcely ten per cent of the people who are not dependent on agriculture for existence. In consequence, we find in Ireland, as in France, intense interest centers upon the plan to teach agriculture and horticulture in the elementary public schools, while in England, until very recently, agricultural education served principally to produce a class of educated scientific men fitted for the Government home and colonial service.

In Ireland compulsory attendance on primary schools is made by law. In 1876 Ireland claimed to be the pioneer country in providing compulsory elementary agricultural instruction in all her rural schools. She has desperately clung to the theory that in providing such education in her elementary schools she would eventually train a nation of agriculturists. To attain this end, elementary text-books were prepared, which all teachers must use. The Government grant for a pass at examination in agriculture was much larger than a pass in any other study; teachers who held certificates to teach it were given higher salaries than others, and to enable teachers to prepare for such certificates, scholarships were offered them at teachers' colleges (normal schools), and their railway fare was free in going and coming. Plots of ground at schoolhouse or teacher's house were provided, where flower and vegetable culture could be constantly practiced, and a special grant was allowed to the school for cultivating a successful garden, and another special for classes showing proficiency in practical work. Gardens were cultivated at convents and workhouses, and the subject was taught theoretically to "half-time" pupils and students at the "evening continuation schools."

In December, 1896, Ireland had 8,606 national schools, with an average attendance of 815,248 pupils. She also had 150 half-time schools, 155 workhouse schools, 267 convent schools, 30 model schools, five training colleges for teachers, and two training agricultural institutes (at Glassnevin and at Munster), and in all of these agricultural science or practice is either a compulsory or a voluntary subject. What country can surpass Ireland's enthusiasm for agricultural training?[23]

Scotland enjoys deservedly the distinction of having been first among the peoples of Europe to [Pg 226] introduce in the university course scientific education in agriculture. In 1790 a chair was established in the University of Edinburgh, and a course of agricultural lectures was given therefrom by Rev. D. Walker. Better than that, in 1743 a volume entitled Select Transactions was published by Maxwell, representing the agricultural society known as the "Society of Improvers," and numbering at one time three hundred members. Out of this society grew the "Highland and Agricultural Society," which organization has fostered every agricultural effort which private beneficence or royal grant has initiated in the land since 1834. Through its munificence both the departments of forestry and veterinary surgery have been placed upon a firm educational basis, and the educational lectureship of Edinburgh University has been permanently endowed. It has instituted its own syllabus of examinations for granting "Fellowships in Agriculture," and stimulated pupils of the secondary schools to make the effort by offering prizes and scholarships to the ambitious students.

The University of Aberdeen has lately entered the field as an agricultural educator by becoming what the Government styles a "collegiate center," receiving a straight subsidy of £100 per annum, and furnishing professional instructors to rural assemblies arranging lectures for them. In the public schools of Scotland agricultural science is arranged for as an optional study from the third to the sixth standards inclusive. In 1895-'96, 4,148 pupils passed examinations in the subject, and the cost of this to the state was £42,792. In 1896-'97 pupils in the "evening continuation schools" to the number of 1,089 passed in agriculture, and 115 others in horticulture.

England and Wales are under a joint administration of agricultural affairs. The Government policy, so far as it has one, has been continually opposed to paternalism and direct subsidy or ownership of schools. Rather has her Parliament waited to be solicited to make subventions by way of encouraging individual or local society initiative. The flourishing agricultural schools at Cirencester and Downton, for the instruction of the higher classes, have grown out of private establishments, then been perpetuated by obtaining royal charters, by which the Government became pledged to supply any lack of income. But since 1893 the state has so far relaxed her policy as to grant subsidies to certain colleges centrally located, which it styles "collegiate centers," through which colleges it offers superior instruction to the public. These colleges associate with themselves ample farm lands for experiment grounds and dairy machinery, and equip themselves with competent lecturers, who are also practical experts, and who, upon [Pg 227] invitation from agricultural societies or county councils, go forth as lecturers upon their special subjects. Each adjacent county makes an annual grant of £75 to the college funds, and is privileged to nominate students to attend the college agricultural course at a reduction of twenty-five per cent on the usual fee. In 1898-'99 the Board of Education granted to fifteen colleges and associations in England and Wales the sum of £7,200. The colleges were the Yorkshire College at Leeds, Durham College of Science at Newcastle-on-Tyne, University Extension College at Reading, University College at Nottingham, Southeastern Agricultural College at Wye, and in Wales the University Colleges at Bangor and Aberystwith.

Besides the direct Government subsidy to higher education, the state grants to the several counties part of the money raised from the excise ("drink money") for educational purposes, out of which at least £78,000 were spent by the committees in 1896-'97 in promoting agricultural education.

Still further, Parliament puts into the hands of the Science and Art Department large sums of money to be expended as grants-in-aid of "technical education." The state recognizes instruction in the principles of agriculture as instruction in elementary science, and through this Science and Art Department's grants to primary and secondary schools, and to teachers' colleges, it encourages agricultural education as a technical study. In 1896-'97, 1,023 pupils passed examination, and the respective school managements received as grant on their account a total sum of £140,150.[24]

In 1897 the Royal Commission on Agricultural Depression in England made its report. Among other declarations made by the commission were these: "We believe that it is essential for the welfare of agriculture that there should be placed within the reach of every young farmer a sound, general school education, including such a grounding in the elements of sciences bearing upon agriculture—e. g., chemistry, geology, botany, and animal physiology—as will give him an intelligent interest in them and familiarize him in their language."[25]

They further recommend that hereafter the control of all funds for technical agricultural education be placed with the Board of Agriculture, and that the entire income of the Customs and Excise Act of 1890 should be devoted to educational purposes, agriculture receiving its adequate share. Should the first recommendation carry for all divisions of the United Kingdom, agriculture would cease to be one of the subjects provided for examination by the Science and Art [Pg 228] Department. Should the second recommendation become a law, the sum expended by local county councils in agricultural education would be vastly increased.

Passing from England to her colonies, let us journey toward the sunrising. Stopping for a moment in Egypt, we note with pleasure the existence of the newly established School of Agriculture at Gizeh, which is under the direction of the Ministry of Public Instruction for Egypt. Its reconstructed course of study was open to students in 1898, and it provides for four years of study. Arabic and English are the teaching languages, especially the latter, and allotments of land for individual culture are made to all pupils.

Beyond the Indian Ocean lies Hindustan. Here all science study is awaiting its development. The best cultivation of India is not behind that of England as a matter of empiricism,[26] but the science of cultivation is yet to be developed. Agricultural chemistry and agricultural botany and horticulture, as related to India, have scarcely been investigated, and text-books in the native tongues have yet to be written. For this accomplishment all elementary instruction in public schools must patiently wait. For an agriculturally educated set of teachers, also, Indian youth studying in the vernacular must patiently wait. In 1889 the home Government (Parliament) laid upon the Indian Educational Department the duty of providing school "readers" which should contain elementary instruction in agricultural science, and it authorized a liberal grant-in-aid toward such schools as could furnish pupils for passes in this subject. For those students who have mastered the English language a few colleges exist. Saidapet, near Madras, with about forty students in a three-years' course, including veterinary, is a pure agricultural institution. Fourteen students received diplomas in agriculture in March, 1897.

Several colleges have agricultural departments, notably the Poona College of Science in the Bombay presidency; the Baroda College; the Maharajah's College and the Shimoga College, Mysore; the Central College, and the Sanskrit College of Bangalore. All of these are affiliated with the University of Bombay, and present pupils for examination in agriculture for the degree of B. Sc. A. [Pg 229]

In many of the English high schools of India are found agricultural classes which give both science teaching and field practice. These schools are at Nagpur, Nasik, Sholapur, Ahmednagar, Ahmedabad, Dhulia, Kolapur, Surat, Belgaum, and Nadiad. The stimulus to study in these schools is the hope of obtaining a diploma in agriculture, which would result in employment in the Government service.

In Lucknow is a celebrated veterinary school whose graduates have been greatly sought after. One at Bombay has become still more celebrated. In 1897 sixty-nine students were in attendance. Graduates easily found employment with native rajahs, and on the island of Ceylon, and at Mozambique. Another Government veterinary school recently established at Belgatchia, Calcutta presidency, has done good work.

The forestry school at Dehra Dun, in the Northwest Provinces, has attained a great reputation. About seventy students attend, and the Government charges the cost of the school, 33,000 rupees, to the districts which send up pupils for study. India, under the British rule, will soon come into line with educated agriculturists.

In Burmah and in Assam steps have been taken to introduce science lessons into Government, or grant-in-aid, elementary schools by the preparation of "readers," as in India, but no secondary or superior schools in agriculture exist in these countries. So far as we know, the same is true of Siam and the Malayan Archipelago and of the Philippines.

Australia, as a federation of states, is late in its development, but some of its states are surprisingly advanced. New Zealand has its superior university, combining the three colleges at Auckland, Lincoln, and Otago. Its syllabus provides for searching examinations in agriculture to obtain the degree of B. Sc., either of these colleges having previously granted the diploma of agriculture to successful students. Each of these colleges has ample grants of land, but only one —the Canterbury College at Lincoln—has yet presented agricultural candidates. Forty-four graduates have received diplomas previous to 1895. Instruction in elementary schools seems not yet to have included agriculture.

In Queensland the Queensland Agricultural College was opened at Gatton in 1897.

In South Australia is an agricultural college at Roseworthy and another at Adelaide which has graduated several recipients of the diploma.

In Victoria there exists a college at Dookia and another at Longerong. There is also a school of horticulture at Richmond. [Pg 230]

To New South Wales belongs the banner for furnishing the greatest opportunities for agricultural education. Its university at Sydney grants a degree of B. Sc. to students from the colleges of St. Paul, St. John, St. Andrew, the Woman's College, and the Sydney Grammar School. At Sydney also is the splendid Technical College, handsomely endowed, having an agricultural department. The superior of all other schools is the Hawksbury Agricultural College and Experimental Farm at Richmond, established in 1891, richly endowed with land (three thousand acres), and organized on the most approved modern models. Science teaching is not carried so high as the university standard, but all manner of practical work must be performed by each student.

Homeward bound, we reach Cape Colony, South Africa. Here, in 1887, the Government inaugurated a scheme for aiding farm schools in which elementary agriculture was taught. In 1894, out of 352 schools aided by the Government, 202 were classed as "farmhouse schools." In higher education there may be found (1898) the School of Agriculture and Viticulture at Stellenbosch, and a second one at Sunset East. As both of these schools are young, statistics concerning them are not yet available.

Last of England's colonies we notice the Dominion of Canada on our northern frontier. No evident progress has been made in introducing agricultural science teaching in the primary schools of the entire Dominion. The first step taken in the direction of agricultural education was for the enlightenment of farmers. In 1886 Parliament authorized the establishment of a system of experiment farms, one in each province in Canada, viz.: one at Ottawa (to serve both Quebec and Ontario), and one each at Nappan, in Nova Scotia; at Brandon, Manitoba; at Indian Head, Assiniboia; at Agassiz, British Columbia; and at Charlottetown, Prince Edward Island. To give these stations greater efficiency, the Government encouraged the formation of farmers' institutes in every electoral district for the hearing of lectures from experts which it provided, and for discussion or business. To each regularly organized institute of fifty members a grant of £10 is annually made.

In Nova Scotia five primary and secondary schools are reported as giving agricultural instruction to two hundred pupils. Some of these schools have farms or gardens. The Provincial School of Agriculture at Truro is making a good beginning. In its last class three students were granted teachers' diplomas, seven received farmers' diplomas, and eighteen took farmers' certificates. Three hundred and fifty students have pursued its course of studies. There is also a horticultural [Pg 231]

school at Annapolis Valley.

Another horticultural school exists at Wolfville, Nova Scotia, under the control of a committee of the Fruit-Growers' Association. Students take a thorough course of two years' duration. The Legislatures of New Brunswick and of Prince Edward Island grant bonuses of fifty dollars to each young man of their provinces who will take a course at this school.

Fine creamery plants are found at various points, and several provinces sustain each a "traveling dairy," which systematically visits accessible centers and gives demonstration lectures to farmers' families.

The crowning agricultural educational institution for the entire Dominion is the college at Guelph, Ontario. It combines instruction in veterinary science, horticulture, bee and poultry keeping, dairying, and the experimental farm. The course continues for three years. Two years confers the "associate diploma," and three years' study, with successful examination in the syllabus of the Toronto University, secures the degree of B. Sc. A. Success attends all these educational efforts and marks this colonial empire as among the ranks representing true progress.

Mexico and the countries of South America next claim our notice. In the first-named country, as early as the year 1850 provision was made at the old college of San Gregorio for instruction in agriculture in five different courses. But in 1854 the Government came into possession of the disused convent of San Jacinto, Agosta. Here a national school was organized, combining the two departments of agriculture and veterinary science. It was opened February 22, 1854, and designated the National School of Agriculture and Veterinary Science. Its courses of study are up to the best standards. Three years are necessary to complete the agricultural course and receive the title of Superintendent of Rural Estates, and four years' study must be given to secure that of Ingeniero Agronomo. The course was readjusted in 1893. During the five years past 169 graduates have received the former and 68 the latter degrees. The management consists of 48 persons, whose salaries annually cost the Government 96,424 Mexican dollars. Ample grounds and buildings are provided to make this institution a matter for national pride.

Besides this college, a farm school exists in one of the federal districts, costing annually $17,564, and another at the colony of Porfirio Diaz, costing the state $14,708. Mexico is also moving to introduce agriculture as a subject for primary instruction in public schools.

In Uruguay exist fine schools for teaching agriculture and viticulture which are of recent [Pg 232] organization. At Montevideo the Government has created a Department of Live Stock and Agriculture, subject to the Home Ministry. The budget of 1897 provides for organizing and sustaining agricultural schools and experiment farms to the extent of $28,222, with an additional allowance of $90,000 for experiments on farms, installation of plants, furniture, instruments, etc.

Chili is coming to the front in her educational efforts. In the city of Concepción exists a Practical School of Agriculture. Others are found at Santiago, at Talca, San Fernando, Elqui, and Salamanca. The school at Santiago receives an annual subvention of $40,000, and that at Concepción the sum of $23,000. Attached to the latter are agronomic stations for soil analysis and oversight of irrigation systems of the state. The Sociedad Nacional de Agricultur at Santiago receives an annual grant of $20,000, which it distributes at agricultural shows and for the support of the zoölogical garden. At Quintan Normal is also an Institute Agricola of high grade for agricultural engineers and agronomics, or for furnishing a simple certificate in agriculture.

Other countries of South America possess education facilities, but we are not supplied with details concerning them.

Our closing glance must be directed to the far Orient. Japan, the newest of kingdoms, has a model brace of institutions for superior education in agriculture. When Japan awoke to the new ideas, to which for ages she was oblivious, her keenest statesmen grasped the thought that her agricultural people needed new light and intellectual quickening along the lines which so vitally affected their daily subsistence. She took the United States into her confidence. She imported for a season our Commissioner of Agriculture (General Capron), in 1871-'72, as "Adviser to the Colonial Office at Hokaido," who, after visiting Japan, advised the Government to organize at once an agricultural college at Sapporo, and still another at Tokio. This advice was cordially received and speedily adopted. American scholars of the highest wisdom and experience were imported to inaugurate the work. The college was inaugurated by Colonel W. S. Clark, LL. D., President of Amherst Agricultural College, in August, 1876, with twenty-four students. Its new location was Sapporo, and its new name was the Sapporo Agricultural College. The Government dealt liberally in grants of land, but these ample acres have since been mostly confiscated, leaving only sufficient for educational purposes. Few can estimate the wonderful uplift which has come to Japan through this efficient school. In 1893 it had sent out from its agricultural course [Pg 233] 123 graduates; from the engineering, 4; military, 42; and from the practical department, 114.

In 1874 an agricultural department was added to the Imperial University at Tokio, the original location of the Sapporo College. An exhaustive syllabus in the Department of Agriculture provides examination for many profound students of this science, and admits them to the highest university degree. Four courses are open in the university—viz., agriculture, agricultural chemistry, forestry, and veterinary medicine. In 1895 there were 261 students of agriculture in the university.

From this extended though by no means exhaustive review of the status of scientific instruction

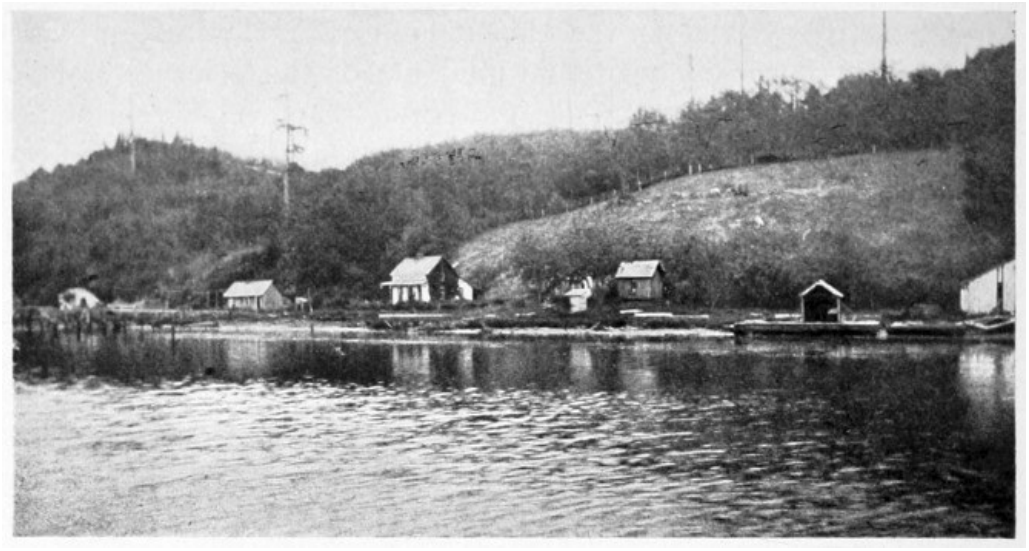
in agriculture throughout the world, it is evident that all the progressive nations have caught the inspiration which attaches to this branch of education, and are swinging into line in their efforts to adopt it. Old ideals are rapidly giving place to the new. Educators are forced to admit that mental culture is as possible under the study of science as by the protracted study of languages and literature; that such study aids vastly more than the latter in the training which prepares men for the active duties of life; and that if the development of husbandry as a pursuit does not keep pace on an intelligent basis with every other technical pursuit, national greatness and permanence will never be achieved.

EASTERN OYSTER CULTURE IN OREGON.

By F. L. WASHBURN, A. M.,

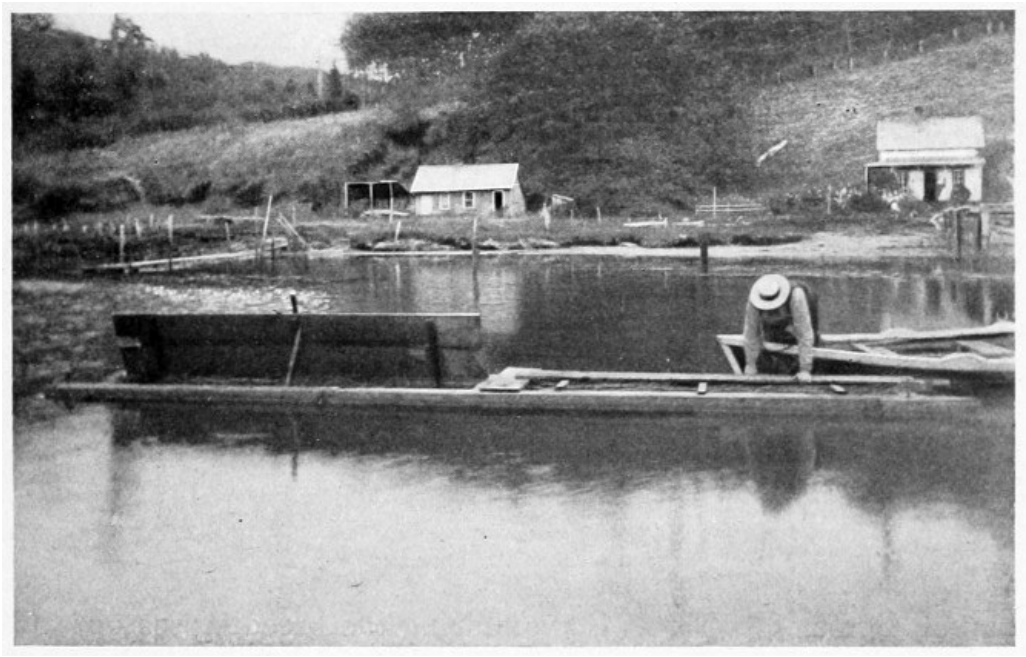
STATE BIOLOGIST AND PROFESSOR OF BIOLOGY IN THE UNIVERSITY OF OREGON.

During the past two years the United States Fish Commission, with characteristic enterprise, has been carrying on experiments in the propagation of Eastern oysters in the bays of the Oregon coast. Work of a similar nature is now being undertaken in the State of Washington.



"Oyster City," Yaquina Bay, Oregon.

As the result of an application through official sources, re-enforced possibly by the results of a biological survey made by this department during the preceding summer, twenty-two barrels of Eastern oysters were, on November 7, 1896, deposited on a portion of Oysterville Flat, so called, in Yaquina Bay, Oregon, seven miles and a half from the ocean. The oystermen of that section have agreed to abstain from tonging for native oysters upon the portion of the flat thus reserved until sufficient time has elapsed to justify an opinion as to the result of the experiment. These introduced oysters were of two varieties—the long, slender East Rivers and the more oval, fan- [Pg 234] shaped, and ribbed Princess Bays. Their journey of twelve days across the continent, in sugar barrels, from New York to San Francisco and thence to Oregon without water did not cause the mortality one might expect, for in strewing them over the bed from the scows of the oystermen very few dead individuals were observed—certainly not one half of one per cent.



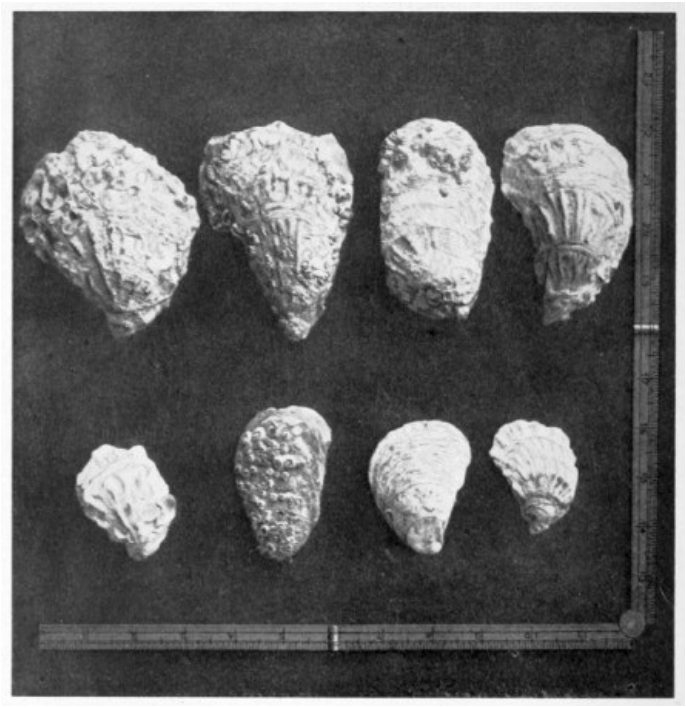
An Experimental Spawning Float.

This alien oyster has much to contend with here. It was realized that the cold and salt water rushing in from the Pacific—colder and salter by far than in their Atlantic home at the same time—if it did not entirely prevent spawning would at least make the survival of the young embryos a matter of doubt; yet it was hoped that perhaps, after a number of years, the oysters might become acclimated, as it were, and their spawn, inheriting their parents' acquired hardiness, we might present to the people of the State a new form of Oregon product in the shape of Eastern oysters hatched and grown in the waters of this bay. Notwithstanding the fecundity of this oyster, a female producing in the vicinity of sixty million eggs at a spawning, it must be remembered that even under the most favorable conditions in its own home, where the water has in summer a fairly constant temperature of over 70° F. and a salinity of 1.012 on an average, but a very small proportion of this multitude survive. How much more unlikely is its survival in the waters of Yaquina Bay, Oregon, where the writer has seen the water change from a temperature of 70° F. and a saltness of 1.012 to a temperature of 55° and a salinity of 1.022 within six hours! It was to save the young embryos from exposure to these and kindred dangers that I, as a volunteer employee of the United States Fish Commission during the summers of 1897 and 1898, among [Pg 235] other things resorted to the artificial fertilization of the eggs in a temporary laboratory, carrying the delicate embryos to the swimming stage and dumping them by thousands into the bay. Given some clean crocks, a microscope, dissecting instruments, tumblers, rubber tubing, thermometers, and instruments to test the saltness of the water, and innumerable embryos can be cared for without much trouble. The process, as practiced by Brooks, Ryder, Nelson, and others in America, is too well known to need repeating here. Its efficacy is well established, and, in spite of the incredulity of the oystermen, who wished to see the oysters spawn "spontaneous," as they expressed it, an incredulity amounting almost to opposition, the writer has persevered in this work for two seasons and intends to continue it the coming summer.

1, native oyster spat on clam shell; 2, same on inside of oyster shell; 3, 4, 5, native spat (*Ostrea lurida*) on Eastern oyster shells; 6, showing size and appearance of native spat one or two months old.

The native oyster of this Northwest coast (*Ostrea lurida*), smaller and by many preferred to its

Eastern congener, while it is far less fruitful in its spawning than the latter, retains its young within the parent shell until long after they have passed the tender stages, when they leave the mantle cavity of the parent to swim for themselves. This oyster could rightly be called viviparous, while the Eastern oyster is oviparous. On account of its nurse-acting proclivities this West-coast oyster has an immense advantage here over the introduced species. The latter's eggs have to run the following gantlet: (1) Not meeting with a fertilizing cell and perishing in consequence; (2) sinking, before or after fertilization, in the fatal mud; (3) being eaten by small fish and other minute animals; (4) being killed by sudden changes in the temperature and density of the water. [Pg 236] Artificial fertilization and the rearing of the embryos in the laboratory largely eliminate these dangers. We have adopted other methods to insure success. A few of the oysters were removed from the Government plant and deposited two miles farther up the bay, nine miles and a half from the ocean, where it was thought the water was warmer, less salt, and less variable than on Oysterville Flat. Some, during the breeding season, were placed on spawning floats and anchored near the shore, where the shallow water is thoroughly warmed by the sun. It was in one of these floats that the oystermen had an opportunity to see the oysters spawn "spontaneous," for the water therein, reaching 70° F., became milk-white with spawn or milt within an hour after the oysters had been taken from the plant. This was really our first proof that the introduced oyster would spawn here. Some were placed in sloughs adjoining the bay, with the hope that favorable [Pg 238] conditions would be met with there. Others were placed in artificially constructed salt ponds somewhat after the style used by the French.



Eastern Oysters in Oregon. The lower row shows size when planted in 1896; the upper row represents their appearance in 1898.

What has been the outcome? The oysters, particularly the Princess Bay variety, have grown enormously and are in excellent condition. Until this spring no Eastern spat or young Eastern oysters had been discovered; this, of course, is the crucial point in the experiment; we know they will spawn, but will the spawn develop? Recently, much to our encouragement, a few young oysters, apparently of last summer's spawning, have been found and forwarded to Washington, proof positive that the oyster will propagate here, but not certain evidence of the practical outcome of the experiment. It is too early to predict results as yet; two years more are really required to tell the story.

For thirty years Eastern oysters have been shipped to San Francisco by enterprising firms of that city, planted there in the bay until a large size is attained, and then sold at an immense profit. These firms have always claimed that the Eastern oyster did not reproduce there. As far as can be ascertained from a reliable source, the shipments in recent years have rather increased than diminished, this fact being used as an argument to support the above statement. It is nevertheless a known fact that much Eastern spat and many adult oysters undoubtedly hatched there have been found by members of the United States Fish Commission and others. Moreover, with increasing trade one would naturally expect more shipments, even though the introduced oyster did propagate to some extent.

Ostrea lurida, the toothsome little native oyster which years ago was so abundant at Yaquina Bay, affording support to many families, has decreased in numbers to such an alarming extent that unless some radical measures are soon taken to prevent, the native oyster industry of this locality will be a thing of the past. This decrease in the size and numbers appears to be due to several causes. In the first place, there has been a very persistent tonging on a somewhat limited area. This might have been counterbalanced by proper precautions to insure a future supply, but, with characteristic lack of foresight, such precautions have been neglected, and the beds have been culled year after year, until the comparatively few oysters now marketed from Yaquina Bay are of

very questionable size. Each oysterman has two acres of flats for private use. Three natural beds in the bay afford sources of supply for these private beds. The larger oysters tonged on the natural beds are marketed, and the smaller specimens spread on the private ground referred to. [Pg 239] Beyond strewing clean shells on these private beds, no provision is made to collect the swimming embryos during the spawning season, and multitudes must be carried away and lost. The writer has urged upon the oystermen the need of collectors of brush or tile, by the use of which the oysters which they have acquired may be largely increased in numbers, and will endeavor to demonstrate, by the use of tile collectors, that hundreds of young spat may be saved and raised to marketable age. Our native oyster structurally and physiologically resembles the European oyster (*Ostrea edulis*), and, like it, could be propagated in artificial oyster ponds. The practicability of such work on the West American coast depends, of course, on the market price of the resulting product as compared with the outlay required for labor.

MALAY FOLKLORE.

By R. CLYDE FORD.

The Malay is an Oriental, and, of course, possesses a goodly number of superstitions and old wives' fables, but he does not hug them to his soul like some of the other peoples of the East—the Chinaman, for instance, who lives only by favor of gods, ghosts, goblins, and devils. The Malay lives in spite of spirits, good or bad, and tries to be a model Mohammedan at the same time. With bold assurance and positiveness, he puts his trust in Allah; but, after all, this does not keep him from cherishing, on the sly, a knowledge of a few uncanny, hair-raising beliefs any more than to be a devout churchman with us removes one from the occult influences of stolen dishcloths, overturned saltcellars, and the phases of the moon.

The Malay man's *aberglaube*—his superstition—is undoubtedly of ancient origin. For five hundred years or more he has said his prayers five times a day in response to the muezzin's cry of *Allah ho akbar*, and his religion has penetrated the very life of his race and spread to the most distant confines of the archipelago, but it has never been able to remove entirely the heritage of that past when he was governed by Sanskrit gods or by deities of his own. Whatever he may have believed then and since changed, these fragments and relics of goblindom and superstition go back to that time, and so link on to all the weird love that prevailed in the ancient world. Another evidence of the primitiveness of Malay folklore may be seen in the fact that the inhabitants of the jungles and *padangs* and the aboriginal dwellers of mountains and dense forests cherish much [Pg 240] more heathen notions and greater elaborations of everyday superstitions than the more enlightened and modernized Malays of towns and *campongs*. In the East, as in the West, the man who lives close to Nature "holds communion with her visible forms," and likewise finds out, or thinks he does, a good deal about her invisible shapes.

The Malay has on his list of uncanny things the names of several spirits. Disease is everywhere a great dread of men, and often looked upon as an infliction of the supernatural powers. There are several spirits of sickness recognized among the Malays, but they reserve their greatest horror for the influences of the *Hantu Katumbohan*, or spirit of smallpox. But other spirits abound; there are some that inhabit the sources of streams, and many that dwell in forests. Mines, too, have their patron goblins, which are propitiated by the miners. The sea-going Malay, also, whose vision has been clarified by bitter salt spray, knows and frequently sees the spirits that inhabit certain parts of the ocean.

The *Hantu Pemburo*, or phantom hunter, is a spirit the Malays take special account of; in general, he seems to resemble the *wilde Jäger* of German folklore. Long ago, so the story has it, there lived a certain man and his wife in Katapang, in Sumatra. One day the wife fell sick, and, thinking the flesh of a mouse-deer might strengthen her, she asked her husband to kill one for her. He went forth on the hunt, but was unsuccessful and soon returned. His wife now became very angry, and told him to try again—in fact, not to return till he could come home with the coveted game. The man swore a mighty oath, called his dogs, took his weapons, and set out into the forest. He wandered and wandered, and always in vain. The days ran into months, the months became years, and still no mouse-deer. At last, despairing of finding the animal on earth, he ordered his dogs to bay the stars, and they sprang away through the sky, and he followed. As he walked with upturned gaze, a leaf fell into his mouth and took root there.

At home things were not going well. His son, born after his departure, when he became a lad, was often taunted by the other children of the *campong*, and twitted of the fact that his father was a wandering ghost. After hearing the truth from his mother, the boy went out into the forest to meet the huntsman. Far from the haunts of men, in the depths of the forest, they met and conversed. The boy told of his wrongs, and the father vowed to avenge them, and ever since that time, say the Malays, he has afflicted mankind. At night he courses through the wood and sky [Pg 241] with a noisy, yelping pack, and woe to the man who sees him! On the peninsula the people mutter this charm to ward off his evil influence:

> "I know thy history,
> O man of Katapang!
> Therefore return thou
> To thy jungle of Mohang,

And do not bring sickness upon me."

The Malay is a firm believer in the efficacy of charms. He wears amulets, places written words of magic in houses, and sports a tiger's claw as a preventive of disease. If he is specially primitive and backwoodsy, when he enters a forest he says: "Go to the right, all my enemies and assailants! May you not look upon me; let me walk alone!" To allay a storm he says: "The elephants collect, they wallow across the sea; go to the right, go to the left, I break the tempest." When about to begin an elephant hunt, according to Thompson, he uses this charm: "The elephant trumpets, he wallows across the lake. The pot boils, the pan boils across the point. Go to the left, go to the right, spirit of grandfather (the elephant); I loose the fingers upon the bowstring."

The Malay believes in witches and witchcraft. There is the bottle imp, the *Polong*, which feeds on its owner's blood till the time comes for it to take possession of an enemy. Then there is a horrid thing, the *Penangalan*, which possesses women. Frequently it leaves its rightful abode to fly away at night to feed on blood, taking the form of the head and intestines of the person it inhabited, in which shape it wanders around.

Such beliefs may perhaps have their origin in metempsychosis, which in other ways has some foothold among the common people. For instance, elephants and tigers are believed sometimes to be human souls in disguise, and so the Malay addresses them as "grandfather" to allay their wrath and avoid direct reference to them. Crocodiles also are often regarded as sacred, and special charms are used in fishing for them. One such, given by Maxwell, is as follows: "O Dangsari, lotus flower, receive what I send thee. If thou receivest it not, may thy eyes be torn out!"

The domestic animals also figure in Malay folklore. Dogs are unlucky and regarded with suspicion, for they would like to lick their master's bones. Cats, on the other hand, are lucky, and show a fondness for their owners.

Owls are regarded as birds of ill omen, and their hooting forebodes death.

Days are lucky and unlucky. Monday, Wednesday, and Friday are fortunate birthdays, and a dream on a Thursday night will come true. To dream of a dog or a flood is unlucky. To stumble when starting on a journey is a bad sign, and before setting out on a pilgrimage to Mecca certain formulas are muttered and signs followed. [Pg 242]

The Malay hates to tear down a house, and so the old one is left standing when a new one is built. The ladder of a house must be built just so, or disaster comes to the owner or builder; and to knock one's head on the lintel is regarded as unfavorable. One rises quickly from a meal; otherwise, if he is single, he may be regarded with disfavor by his prospective father-in-law.

As one travels over the archipelago he finds that superstitions vary, and what may be regarded by the Malays of the peninsula as particularly ominous may have no meaning at all with the Malays of the south or east. The Dyaks of Borneo are probably the most uncivilized of all the Malay tribes, for Mohammedanism has taken but little hold upon them, and their natural paganism remains as yet unshaken. Of their folklore we know but little. It awaits the conquest of the West, like the island itself.

ELECTRICITY FROM THALES TO FARADAY.

By ERNEST A. LESUEUR.

It is so common a notion nowadays that electricity had its birth and rise in the nineteenth century that it gives one a strange mental sensation to contemplate the fact that all the myriads of commercial applications that have of late years been developed in this field might have been made by the Chinese or the ancient Egyptians, so far as the potentiality of Nature for developing electrical phenomena is concerned. The writer used to know a delightful old gentleman in Vermont who once referred, as to a well-known fact, to Edison's having invented electricity. It is astonishing how closely his state of mind typifies that of a great many people.

In the form of the lightning, the aurora, and the shock of the electric eel or torpedo, electrical manifestations have been known ever since man commenced to observe those phenomena, but the fossil resin amber was the substance which eventually gave its name to the now tremendous agency. This material was observed, many centuries before our era, to possess the property of attracting light bodies to itself when rubbed with wool, and, being called ἤλεκτρον (electron) by the Greeks, transmitted its name to the property or force which it thus brought into evidence. The fact is mentioned as early as 600 B. C., by Thales of Miletus, although he does not transmit to us the name of the original observer of the phenomenon. Homely as was the experiment, it marked a beginning in electrical research. [Pg 243]

Not that scientific investigations in that or any line were pushed very assiduously in those days, for there is a great gap between the discovery of the property above alluded to and the acquisition of any more solid knowledge pertaining to electricity. The phenomenon was at that time set down in the list of natural facts, and no attempt appears to have been made to connect it with others. The inquiring spirit of the present age can hardly be brought into more striking relief

than by a comparison of the, at present, almost daily advances in scientific knowledge with the fact that twenty-two hundred years elapsed between the discovery of the above-mentioned power of amber by the ancients and the later one that a very large number of other substances, such as diamonds, vitrefactions of all kinds, sulphur, common resin, etc., possess the same property. A few other scattered facts were, however, also noted by the ancients: fire is said to have streamed from the head of Servius Tullius at the age of seven, and Virgil asserts that flame was emitted by the hair of Ascanius.

In examining, now, the history of the rise of electrical science we find, as just mentioned, the vast gap of over two millenniums between the discovery of the attracting power of rubbed amber and the mere extension of man's knowledge so as to include other substances. The philosophers Boyle and Otto von Guericke, who were active during the latter half of the seventeenth century, added a mass of new data in this line. Boyle, moreover, discovered the equivalence of action and reaction between the attracting and the attracted body, and that the rubbed amber or other "electric" retained its attractive powers for a certain period after excitation had ceased.

Otto von Guericke made a vast step forward by constructing the first electrical machine, in a crude form, truly, but which proved of the utmost service in adding to our knowledge of the properties of electricity. His machine was constructed very simply of a globe of sulphur mounted on a spindle, which could be rotated by means of a crank; the operator applied friction with the hand, his body receiving a positive charge, while the surface of the sulphur acquired a negative. The fact of the two electrifications being separated at the surface of the sulphur was not, however, known at the time; the only charge that Guericke observed being that appearing on the sulphur. The reason for this was that the latter, being a nonconductor, any electricity generated upon it was compelled to stay there, for a certain time at least, and consequently accumulated so [Pg 244] as to be observable; whereas the opposite electrification flowing into the operator's hand continuously escaped to earth without giving any sign of its presence. Had the operator stood upon an insulating support, the electrification would have accumulated on his body as well as upon the sulphur. Guericke made the discovery that a light body, having been once attracted to an electrified surface, was almost immediately repelled from it, and could not be again attracted without having its imparted electrification removed by contact with an uncharged surface.

Sir Isaac Newton, about 1675, made an interesting application of a principle allied to this. He used a hollow, drum-shaped contrivance with glass ends and a very short axis, into which he put a number of fragments of paper. On briskly rubbing the outside of the glass with a piece of silk the paper was caused to "leap from one part of the glass to another and twirl about in the air." This was repeated in 1676 before the Royal Society, to the great edification of that learned body.

Newton made a considerable improvement in the electrical machine of Guericke by the substitution of a hollow globe of glass for Guericke's sulphur one. What is chiefly interesting about the improvement is the fact that Guericke's sulphur globe, of comparative weight and cumbrousness, was made by casting melted sulphur into a glass globe and then breaking off the glass. Guericke observed in the dark a peculiar luminosity of conducting surfaces when well charged by means of his machine; he compared it to the phosphorescent light observed when lump sugar is broken in the dark. It was what is now known as the brush-discharge effect.

In 1705 Francis Hawksbee discovered the peculiar phenomenon which he termed the mercurial phosphorus. It was produced by causing a stream of well-dried mercury to fall through an exhausted glass receiver. The friction of the particles of mercury against the jet piece and the glass caused an electrification which evinced itself in a phosphorescent glow. The receiver, indeed, had not to be by any means thoroughly exhausted, the phenomenon occurring at an air pressure up to about fourteen inches of the barometer.

The crackling noise and the spark accompanying electrical discharge suggested about this time the analogy of those miniature disturbances to thunder and lightning, but the identity of the two was not fully established until later.

Up to this time the fact that certain substances were capable of conducting electricity was not known, but in 1729 Stephen Gray, F. R. S., an enthusiastic investigator, made the discovery, and at the same time the cognate one that a large class of materials are nonconductors. The only [Pg 245] source of electricity which was at the disposal of experimenters up to this time was the electrical machine, improved, as described, by Newton, which furnished intermittent currents (discharges) of infinitesimal quantity, as we should say now, but of extremely high pressure. This fact of the enormous pressure resulted in the electricity's forcing its way through very imperfect conductors, so as to cause our investigators to rank many of these latter with the metals. Thus Gray concluded that pack thread was a good conductor because it did not oppose sufficient resistance to prevent the flow of his high pressure (or, as we should now say, high voltage or tension) electricity. He tried wire as well, but did not realize it was a better conductor than the thread, although its conductivity was actually in the millions of times as great. In collaboration with his friend Wheeler he conveyed electrical discharges a distance of eight hundred and eighty-six feet, through presumably air-dry pack thread—an achievement which would almost be notable at the present time. He insulated the line by hanging it from loops of silk thread.

Gray hoped "that there may be found out a way to collect a greater quantity of electric fire, and consequently to increase the force of that power, which, *si licet magnis componere parva*, seems to be of the same nature with thunder and lightning."

About this time Desaguliers discovered that those materials which, upon being rubbed, develop

electrical charges, are all nonconductors, and that, conversely, nonelectrics are conductors. The terms electrics and nonelectrics were applied to bodies respectively capable and incapable of excitation; the words idioelectrics and anelectrics were also used in respectively equivalent senses.

In France, Dufay discovered that the conductivity of pack thread was greatly improved by the presence of moisture, and he succeeded in conveying a discharge a distance of almost thirteen hundred feet. He suspended himself by silken cords and had himself electrified, and then observed that he could give a shock accompanied by a spark to any person standing on the ground.

He also established the fact of the two opposite kinds of electrification, and gave them the names of vitreous and resinous, from the fact that the former was developed by the excitation of glass and vitreous substances generally, and the latter from that of amber and resins. He observed that the distinguishing characteristic of the two was the fact that opposite charges attracted each other, while similar ones exerted mutual repulsion. Dufay and Gray died within three years of each other, both at the age of forty, Gray having added to the results already mentioned the discovery of the conducting powers of certain liquids and of the human body.

Experimental research now began to spread into Germany and the Netherlands. The electrical [Pg 246] machine was greatly improved by Professor Boze, of Wittenberg, and Professor Winkler, of Leipsic, who respectively added the prime conductor and the silk rubber to that important piece of apparatus. A Scotch Benedictine monk of Erfurt—Professor Gordon—substituted a glass cylinder for the sphere, and thereby brought the instrument in its essentials practically to the form in which it exists to-day. The improvement enabled the production of very large sparks, which were caused to produce the inflammation of various combustibles. Gordon went so far as to ignite alcohol by means of a jet of electrified water.

We now come to an epoch-making discovery—that of the condenser, or, in its conventional laboratory form, the Leyden jar. Professor Muschenbroeck, of the University of Leyden, was struck with the idea that it would be a good plan to try to prevent the dissipation of the electric charge by inclosing the conductor containing it in an insulating envelope. He therefore took a glass jar, partly filled it with water, and electrified the latter. His assistant, who was holding the bottle, accidentally touched the wire which made connection with the water, and received on the instant a shock much more violent than any that the electrical machine was capable of giving. This led to the discovery that as the charge of vitreous electricity had accumulated in the water, a corresponding charge of the opposite kind had gathered upon the outside of the glass and been "bound" there, as it is called, by the attraction exercised upon it by the charge on the inside. It had been enabled to get upon the glass by the fact of the assistant's hand having covered part of the surface of the latter, and, since he stood upon the ground, the electricity had quietly flowed from the latter up through his body to the outside surface of the glass.

The apparatus was quickly perfected by coating both the inside and outside of a jar with tin foil, applying the charge by means of a wire or chain to the inside coating and allowing the outer one to stand upon the earth or upon a conducting substance in electrical contact with the latter. The exaltation of spirit with which the discovery was hailed by the *savants* appears to have been extraordinary—one student who took a discharge through his body being reported to state that he would not have missed the experience for a fabulous consideration, and that he would not repeat it if it were to save his life. In reality the advance was enormous; it gave a means for literally bottling up electricity in quantities previously unthought of. The prime conductor of an electrical machine could not retain any considerable quantity of electricity for the reason that, a certain small intensity of electrification having been reached, the addition operated to upset the [Pg 247] balance, so to speak, and the electricity escaped by a sudden (disruptive) discharge, or spark, or by the brush discharge already alluded to. With the Leyden jar, however, as fast as electricity was supplied to the inside coating it became "bound" there by the charge of opposite sign accumulating on the outside, and the limit of capacity of the jar was simply one of strength of the glass: if too much electricity was supplied, the stress of mutual attraction between the two charges relieved itself by destroying the jar.

Although Professor Muschenbroeck discovered the principle in the manner above referred to, it appears extremely probable that two other investigators, working independently, also did the same. One Cuneus and a monk named Kleist each claimed the honor of original invention of the condenser.

About 1747 the first gun was fired by electricity; this was accomplished by Sir William Watson, who also succeeded in kindling alcohol and gas by means of a drop of cold water and even with ice. The same experimenter reversed the ordinary procedure of causing the electric influence to pass from an electrified body to the one to be experimented upon, the latter being unelectrified, by electrifying the latter, and then producing the desired effect by approaching it to an unelectrified one.

A party of the Royal Society with Watson as chief operator instituted a series of researches on a grand scale to determine, if possible, the velocity of the electric discharge, and arrived at a number of conclusions which, however, were of a decidedly negative nature. The most important of these were as follows: That they could not observe any interval between the instant of applying the discharge to one end of the line and its reception at the other; that the destructive effects of discharge are greater through bad conductors than through good ones; that conduction is equally powerful whether occurring through earth or water.

Just previous to this there had been some brilliant experiments carried on in France, and the discharge had been conveyed through twelve thousand feet of circuit, including the acre basin of the Tuileries, but they had not been performed as systematically, or with the definite objects in view, as had the English experiments.

The following year the Royal Society continued its researches on a larger scale than previously, using 12,276 feet of wire, and found that even through that length the velocity was practically instantaneous.

Watson urged as a theory that electrical disturbances were caused by influx or efflux of a single electric fluid from the state of normal electrification, thus differing from Dufay in his opinion as to the existence of two fluids. He was led to this belief by observing that he obtained a larger [Pg 248] spark between two oppositely electrified bodies than from either to the earth.

From this time on there appears upon the scene a host of workers in this field, one of the most prominent being the distinguished American, Benjamin Franklin. Somewhat previous to his remarkable work, or about 1750, Boze made certain discoveries in the matter of the surface tension of conducting liquids being diminished by electrification, and Mowbray and Nollet ascertained that the vegetation of flowers and of vegetating seeds was hastened by electrifying them.

Franklin (born 1706, died 1790) made the important discovery of the active discharge of electricity from an electrified body by points as well as the converse of it—i. e., that electricity was rapidly abstracted from a charged atmosphere by points. This enabled him to increase the efficiency of the electrical machine by adding a comb-shaped series of points to the collector of the prime conductor.

Up to this time, although the identity of lightning with electricity had long been suspected, it had not been at all established, and to Franklin may be said to belong the honor of doing so, although in this, as in the case of the invention of the Leyden jar, there appears to have been successful contemporaneous research elsewhere. Before performing his great experiment Franklin published a book strongly supporting the belief in the identity of the two. Once having conceived the idea of drawing electricity from the upper atmosphere, he unfortunately lost some time through waiting for the completion of the spire of a certain church in Philadelphia, from the top of which he hoped to be able to collect electricity by means of a wire, but finally hit upon the device which now fills much the same place in connection with his memory that the classical cherry tree does with Washington's—the lightning-collecting kite. This apparatus was very simply constructed, and had a pointed wire projecting a short distance above the framework. It was controlled, and electrical connection made, by an ordinary string which terminated in a short length of silk ribbon to protect the person from possible injury, and to give electricity a chance to accumulate in the system, by insulating the "line." At the end of the string proper Franklin fastened a metallic key. In company with his son he flew the kite during a thunderstorm which occurred in June, 1752; for some time no electric disturbance approached the neighborhood, and he was on the point of abandoning the experiment when he observed what he had been waiting for—the outer fibers of the string standing out from the latter by repulsive force—and, applying his knuckle to the key, he drew a spark. Subsequently, when the rain soaked the string and caused it to conduct much better, there was a fine supply of electricity, and Franklin charged a [Pg 249] Leyden jar from the key, thus achieving the actual storage of "lightning."

He continued his investigations in atmospheric electricity, and discovered that the electrification of the clouds (or of the upper atmosphere) was sometimes positive and sometimes negative. The invention of the lightning rod is due to him.

Franklin sided with Watson in his belief in the single nature of the electric fluid.

As intimated above, atmospheric electricity appears to have been collected independently about the same time in Europe, and certain very daring and dangerous experiments were performed there. One sad occurrence, as a result, was the death of Professor Richman, in St. Petersburg, in 1753. Richman, in company with a friend, Sokolow, was taking observations on an electroscope connected with an iron rod which terminated in the apartment and extended in the other direction above the roof of the building. During the progress of their experiments a violent peal of thunder was heard in the neighborhood, and Richman bent to examine the instrument. In doing so he approached his head to within a foot of the end of the rod, and Sokolow saw a ball of fire "about the size of a man's fist" shoot from it to Richman's head with a terrific report. The stroke was, of course, immediately fatal, and what we now know as the return shock stupefied and benumbed Sokolow. The unfortunate event served as a warning to other daring experimenters.

Canton, another prominent worker in this field, discovered that the so-called vitreous electricity was not necessarily always developed by the friction of glass, as had hitherto been believed to be invariably the case. By applying different rubbers to glass he obtained either positive or negative at pleasure. This at once disposed of the idea that one kind of electricity resided in certain bodies and its opposite in others. Canton also made the interesting discovery that glass, amber, rock crystal, etc., when taken out of mercury, were all electrified positively. He was thus enabled to make the improvement in the electrical machine of coating its rubber with an amalgam rich in mercury, which greatly enhanced its powers.

Among the numerous names now coming into prominence must be mentioned those of Beccaria,

Symmer, Delaval, Wilson, Kinnersley, Wilcke, and Priestley.

The first named, Father Beccaria, was a celebrated Italian physicist who did most valuable work in connection with atmospheric electricity, and who published several classical works on that and allied subjects. Among these may be mentioned his *Lettre del Elettricità*, 1758, and *Experimenta*, 1772. He ascertained that water is not by any means a good conductor, as it had previously been [Pg 250] supposed to be, and, by using pure water, he caused the electric spark to become visible in it, a phenomenon capable of occurring only through media almost nonconducting. In these experiments he used thick glass tubes with wires led through the opposite ends, the latter being sealed, and the tubes filled with water. These were invariably shattered by the passage of the spark on account of the accompanying elevation of temperature, which caused expansion. He also established the facts that the atmosphere adjacent to an electrified body acquires electrification of the same sign by abstracting electricity from the body, and that the air then parts with its electricity very slowly. He advanced the theory that there is a mutual repulsion between the particles of the electric fluid and those of air, and that a temporary vacuum is formed at the moment of the passage of a disruptive discharge or spark.

Robert Symmer, in 1759, described some most entertaining experiments, making use of the opposite electrifications of superposed stockings of different materials or merely of different colors (the dye matters in the latter case causing differentiation). If, in a dry atmosphere, a silk stocking be drawn over the leg and a woolen one pulled over it, the two will be found, upon being removed, to be very powerfully electrified in opposite senses. If the four stockings of two such pairs be used and then suspended together, they will indulge in remarkable antics due to each of the silk stockings trying to attract both of the woolen ones, and *vice versa*, and, on the other hand, each of each kind repelling the other. The amount of electrical attraction and repulsion produced in this simple way in a dry atmosphere is remarkable. The experiment may also be performed with all silk stockings, one pair white and the other black.

Symmer advanced the theory of two fluids coexisting in all matter (not independently of each other, as had been previously supposed), which by mutual counteractions produced all electrical phenomena. His conception was that a body, positively electrified, did not exist in that condition because of the possession of a charge of a positive (as distinct from a negative) electric fluid which it had not held before, and did not hold in a normal state; nor that it possessed a greater share of a single electric fluid than it did in an unelectrified condition, as had been believed by Franklin and Watson, and by Dufay respectively; but that such a body contained both positive and negative electricities which, when the body behaved as "unelectrified," entirely counteracted each other, but which, on the other hand, caused a positive or negative charge to be evinced should either positive or negative electricity respectively preponderate.

Æpinus was the author of another notable theory, of which we must omit further mention for want of space.

Disjointed observations connected with animal electricity had been accumulating for many [Pg 251] centuries. The first chronicled note that refers to the subject dates back to 676 A. D. Whether or not entirely by chance, the Arabians named the electric eel, or torpedo, in a way that impresses us now as singularly felicitous, *raad* (the lightning). Toward the end of the last century Redi discovered that the shock was sometimes conveyed through the line and rod to the fisherman, and Kampfer compared the effects to those of electrical discharges. It does not appear, however, that the resemblance was actually believed to be more than accidental until Bancroft urged, in the last ten years of the eighteenth century, the view which was shortly proved. Investigation since has shown that several other aquatic animals possess this astonishing manifestation of vitality, notably the *Gymnotus electricus* (Surinam eel), the *Trichiurus electricus*, and the *Tetraodon electricus*. Humboldt gives an account of wonderful battles in South America between gymnoti and wild horses. In fact, the most expeditious method, if not the most humane one, of capturing these alarming creatures appears to be to drive horses into the pond inhabited by them, and to allow the eels to exhaust their strength by repeated electric discharges before endeavoring to bring them to land by other means.

Cavendish was one of the most noted experimental investigators in the electrical field during the latter third of the eighteenth century. His work was remarkably accurate, considering the lack of a proper equipment for taking observations incident to operations in those days. He computed the relative conductivities of iron and water as four hundred million to unity, and found that the addition of but one part of common salt to one hundred of water increased the conductivity of the latter a hundredfold. A twenty-six-per-cent solution of salt he found to possess only seven and one quarter times the conductivity of the extremely weak one mentioned. He also established the law that the capacity of condensers (of which the previously mentioned Leyden jar is an example) varies directly as the active area, and inversely as the distance separating the conducting surfaces. It was reserved for later investigators to make the grand discoveries which relate to electrochemical dissociation, but Cavendish succeeded in accurately determining the ratio of combination of the elements of water in a method which superficially suggests the inverse of electrolytic decomposition—i. e., by inducing the combination of hydrogen and oxygen by the electric spark in the instrument known as the eudiometer.

Hard on the heels of this work came news of Galvani's remarkable discovery (1790) of the fact that freshly amputated frogs' legs, on being touched along the lines of the muscles by dissimilar metals, were powerfully agitated. We can only speak of this discovery as the stumbling on to an [Pg 252] isolated fact, for it was reserved for Volta to establish the generalization that a current is

produced in the conductor joining dissimilar metals when the latter are both in contact with a suitable electrolyte (or liquid capable both of conducting electricity and of acting on one, and incidentally also sometimes both, of the metals). Meantime (Du Bois-Reymond observes), "wherever frogs were to be found, and where two different kinds of metal could be procured, everybody was anxious to see the mangled limbs of frogs brought to life in this wonderful way. Physiologists believed that at last they should realize their visions of a vital power, and physicians that no cure was impossible."

Volta first discovered merely the fact of electrification by contact. He wrote to Galvani: "I don't need your frog. Give me two metals and a moist rag, and I will produce your animal electricity. Your frog is nothing but a moist conductor, and in this respect it is inferior to my wet rag!" Nobili, nevertheless, in 1825 proved the existence of galvanic currents in muscles.

Later on Volta invented the "*couronne des tasses*" (crown of cups), thus at the same time adopting the general form of cell used, with modifications, to-day, and producing the higher electromotive force, or electrical pressure, consequent on the multiplication of the cells in a series battery.

Just before Volta's celebrated communication to the Royal Society, in 1800, Fabroni, of Florence, in discussing Galvani's phenomenon, went to the root of the matter by suggesting that the energy of chemical action was at the bottom of galvanic manifestations, and he was warmly upheld in this contention by Sir Humphry Davy, who, upon the publication of Volta's discoveries, constructed a most elaborate battery with which (apparently about 1806) he produced the arc light between carbon pencils.

In the year referred to, Davy published the results of a series of experiments of enormous significance, among other things of the isolation of the alkali metals, sodium and potassium, whose existence had hitherto not been dreamed of. The simple electrolytic decomposition of water had been accomplished by Nicolson and Carlisle in the last year of the eighteenth century. Sir W. S. Harris says: "A series of new substances was speedily discovered, the existence of which had never before been imagined. Oxygen, chlorine, and acids were all dragged, as it were, to the positive pole, while metals, inflammable bodies, alkalies, and earths became determined to the negative pole of the battery. When wires connected with each extremity of the new battery were tipped with prepared and well-pointed charcoal, and the points brought near each other, [Pg 253] then a most intense and pure evolution of light followed, which on separating the points extended to a gorgeous arc." It was at first supposed that the galvanic or voltaic electricity was distinct from the so-called "frictional" or "ordinary" electricity.

A distinguished contemporary of Cavendish was Coulomb, the value of whose work in developing certain exceedingly important mathematical laws with regard to action at a distance, surface densities, and rates of charge dissipation can hardly be overestimated. His name was given to the torsion balance which, since his day, has been the standard instrument for measuring electric and magnetic attractions and repulsions. The importance of his work has since been recognized by the perpetuation of his name in connection with the unit of quantity of electricity, as that of Volta has been honored by its use, abbreviated (volt), to designate the unit of electrical tension or pressure.

Certain highly instructive and interesting data were accumulated about this time by Volta, Laplace, Saussure, and the renowned chemist Lavoisier, in connection with the subject of electrification produced when evaporation, and the liberation of gases and vapors in general from any cause, occurs. The liquid, solid, or mixture liberating the gas was contained in a metallic dish and the resultant electrification of the latter examined qualitatively. Volta's observations led him to conclude that the electrification was always negative, but Saussure demonstrated finally that its sign was dependent on the material of the dish. These experimenters covered, between them all, a somewhat extensive field, examining, among other things, the electrification resulting from the ebullition of various liquids, from the ordinary combustion of fuel, and from the decomposition of acids by metals to liberate hydrogen.

About the end of the first decade of the century Poisson attacked the phenomena of electricity analytically, and succeeded in demonstrating the right of electrical investigation to rank among the exact sciences. Of his most important mathematical propositions is one in which, assuming as a working hypothesis the existence of two mutually attracting fluids, he deduced formulæ covering the distribution of these fluids on the surfaces of two conducting spheres, in or out of contact.

A great deal of work was done during the end of the last century and the beginning of the present one on what is now known as pyro-electrification. The Abbé Haüy discovered that fragments of tourmaline crystal exhibited opposite electrifications on opposite extremities of their lines of cleavage. It is this crystal also which has unusually remarkable powers of polarizing light, and which, under electro-magnetic stress, suffers modifications of the latter property. Haüy [Pg 254] investigated the field with much diligence, and succeeded in cataloguing a large number of natural crystals by the side of tourmaline. The subject was amplified later by Sir David Brewster, who added a series of artificial crystalline salts to the list of pyro-electrical materials, among them, notably, hydro-potassic (and sodic) tartrate. The property was found not always to reside on these substances, but to be developed by heating them. Brewster found that even powdered tourmaline exhibited opposite electrifications on the opposite extremities of each tiny particle, causing the latter to act, so far as attractions and repulsions went, as infinitesimal magnets.

Our rapid and imperfect survey has now brought us to the threshold of the great activity in electrical work elicited by the tremendous discovery, made by Professor Oersted, of Copenhagen, of the existence of the electro-magnetic field. It happens that two of the most amiable and estimable individuals that have ever devoted their lives to scientific research stand out in this connection head and shoulders above all other investigators—Ampère and Faraday, the latter sixteen years younger than the former and destined to long survive him.

WINGLESS BIRDS.

By PHILIPPE GLANGEAUD.

It is often said that there are no rules without exceptions. We purpose to test the truth of this maxim once more. Fishes are made to live in water, but some of them pass the greater part of their existence in mud. Some even perch upon trees, thus competing with birds, whose kingdom is the air, and which are able, with the aid of their wings, to plunge into space and travel rapidly over considerable distances. Yet there are birds, deprived by Nature, which do not possess the wing characteristic of the feathered tribe, and are consequently, like the majority of animals, pinned to the soil.

Birds do not all have equal power of flight, which is closely related to the extent of the development of their wings. There exist all grades in the spread of wings between that of the condor, which is four times the length of the body, whereby the bird is able to rise to the height of nearly twenty-five thousand feet, and the little winglets of the auk, which are of no use to it. The penguins have still smaller wings, which are nothing more than short, flattened stumps, without proper feathers and covered with a fine, hairlike down which might be taken for scales.

Another group of birds exists, called appropriately *Brevipennes*, the wings of which are so poorly developed as to be wholly unsuitable for flight. As an offset and just compensation for this, their long and robust legs permit them to run with extraordinary speed. For that reason they have been called running birds, in distinction from other kinds that constitute the group of flying birds. Among them are some gigantic birds, and also some that have no visible wings on the outside of their bodies, and may therefore be properly called wingless. [Pg 255]

The ostrich is a member of this group. With its bare, callous head and short bill, its long, featherless neck, and its massive body, supported by long, half-bare legs, ending in two large toes; its very short wings, formed of soft and flexible feathers; and its plume-shaped tail, it presents a very special appearance among the birds.

The nandous, the American representatives of the ostrich, have still shorter wings, which have no *remigia* at all, and terminate in a horny appendage, and they have no tail feathers.

The cassowary and the emu also resemble the ostrich in many points, but their wings are still more reduced than those of the nandou. They are only slightly distinct, and can not be seen when the bird holds them close up to its body. In the *Apteryx*, the name of which, from the Greek, means without wings, the organs of flight are hardly apparent, and consist simply of a very short stump bearing a thick and hooked nail. The *Apteryx*, which is also called *Kiwi*, a native of New Zealand, is the most singular of living birds. The neck and the body are continuous, and the moderately sized head is furnished with a long beak resembling that of the ibis. Having long hairs similar to the mustaches of cats at its base, it is different from the bills of all other existing birds in possessing nostrils that open at its upper point. Although the *Apteryx* can not fly, it runs very fast, despite the shortness of its legs, and can defend itself very effectively against assailants by the aid of its long-nailed and sharp-nailed feet. The tail is absent like the wings. The very pliant feathers are extremely curious, of the shape of a lance-head, pendent, loose, silky, with jagged barbs, and increase in length as they go back from the neck. The bird is of the size of a fowl, and when in its normal position stands with its body almost vertical, and carries the suggestion of a caricature—resembling, we might say, a feathered sack, with only a long-billed head and the claws projecting, and one beholding it feels that he is looking at some unfinished creature. It is a nocturnal bird, of fierce temper, and has become rare in consequence of the merciless war that is made upon it. Everything is strange about it, even the single egg it lays, which weighs about a quarter as much as its body.

Together with the *Apteryx*, there lived in New Zealand a bird that reached the height of nearly twelve feet—the *Dinornis*. It and the *Phororhaces* and the *Brontornis*, which have been recently exhumed in Patagonia, might be regarded as the giants of birds. This bird was known to the natives as the *Moa*, and lived in troops like the ostriches. Its organization was very much like that of the *Apteryx*, from which it was, however, distinguished by its great size, long neck, and short beak. It seems to have had the aspect of an ostrich, with a feathered neck and no wings or tail. The feet of the *Dinornis*, with their three large toes, were really enormous. Isolated fragments of its bones suggest very large mammals, rather than birds. The femur and tibia are larger than those of a bear, the tibia alone being about four feet long, and the thickness, in the narrowest part, of the width of a man's hand, while it was more than seven inches in the thickest part. The sternum, on the other hand, was small, convex, and longer than broad. The wing could not have been visible on the outside of the body, for the bones that constitute them are proportionally smaller than those of the *Apteryx*. There was, therefore, a maximum reduction of the wing in this [Pg 256]

bird.

The *Dinornis* was covered with a rich plumage, and this was doubtless what led to its destruction, women preferring its plumes to all other ornaments. The large number of bones which have been discovered in the alluviums, the caves, and the peat bogs of New Zealand authorize the thought that the island was once inhabited by a considerable number of these birds, which were able easily to repel the attacks of other animals by means of their big feet. But they could stand no chance against Nature's more terrible destroyer—man—who, when seeking the gratification of his taste and fancy, does not hesitate to exterminate whole species. The natives of New Zealand still recall the history of these singular birds; their extermination seems to have occurred about the time the island was visited by Captain Cook (1767-1778). Moreover, some of the bones collected in later years still had animal matter upon them. Even parts of the windpipe have been discovered, mixed with charcoal, and evidences of cooking have been found.

A near relative of the *Dinornis*, which the Maoris regard as extinct, is the *Notornis*, of which only four living specimens have been found since 1842, the last one having been captured in the latter part of 1898.

The eggs of the *Dinornis* were very large, having a capacity of about a gallon and being equivalent to eighty hen's eggs. Still larger eggs than these, however, are known. In 1851 Isidore Geoffroy Saint-Hilaire exhibited, in the French Academy of Sciences, eggs of a bird coming from [Pg 257] Madagascar that had a capacity of two gallons. Some specimens of these eggs may be seen in the galleries of the Paris Museum, and still larger eggs have been found. The museum in London has one with a capacity exceeding eleven quarts, or equivalent to two hundred and twenty hen's eggs, or more than seventy thousand humming birds' eggs. It was thought at first that the bird which laid these gigantic eggs was still living, for natives of Madagascar spoke of having seen a bird of colossal size that could throw down an ox and make a meal of it. Such, however, were not the ways of the bird called the *Epiornis*, which had no talons or wings, and fed on vegetable substances. The description by the celebrated traveler Marco Polo of a great flying bird of prey, called a roc, has no reference to the *Epiornis*. M. Grandidier has demonstrated that this bird no longer exists in Madagascar, and that if man ever knew it the stories with marvelous details which the savages hand down from generation to generation make no mention of it. We owe to M. Grandidier, M. Milne-Edwards, and Major Forsyth what is known of the history of this large wingless bird, which resembles the *Dinornis* in several points. If its size was proportioned to that of its eggs it should have been twice as large as the *Dinornis*. It was not, however, but constituted a family represented by very diverse forms and of variable size, though never much exceeding eleven feet. The head was similar in appearance to that of the *Dinornis*, but the surface of the forehead was furrowed with wrinkles and cavities, indicating the presence of a crest of large feathers. A curious peculiarity was the opening of the Eustachian tube directly on the exterior. The cervical vertebræ are very numerous, while the sternum is much reduced. It is a flat bone, broad but very short, especially in the median part. The wing also has suffered a great regression, for it comprises only a thin, short rod, the humerus, and a small osseous mass representing all the other bones of the wing stuck together. The *Epiornis* had no wings externally visible. The bones of the feet were, on the other hand, of considerable size, and indicate that the bird that possessed them was larger than the *Dinornis*.

The *Epiornis*, according to M. Milne-Edwards, frequented the borders of waters, keeping among the reeds along lakes and rivers, for its bones are found associated with those of turtles, crocodiles, and a small hippopotamus. It most probably nested in the low plains around lakes.

Just as the *Apteryx* among birds, and the bison and the beaver among mammals, so the *Dinornis* and the *Epiornis* have been destroyed as man has extended his abode and his domination.

When we regard the fauna of Madagascar and of New Zealand we are struck by the great [Pg 258] resemblance between them, from the points of view of their recent and ancient vertebrate fauna. These resemblances suggest the past existence of relations between these two lands now separated by a wide expanse of sea, and this agrees with geological observations.—*Translated for the Popular Science Monthly from La Nature.*

SKETCH OF FREDERICK C. SELOUS.

The description of Selous, in Men and Women of the Time, as "explorer, naturalist, and sportsman," is suggestive of the manner in which his career has been developed and his fame has grown. Beginning his active life as a mere hunter of big game in the wilds of South Africa, and known at first only as a sportsman, he has become recognized as one of the leading, most intelligent, and most efficient explorers of his time, and is accepted as the most eminent authority respecting what relates to the large and important region of Mashonaland.

Frederick Courtenay Selous was born in London, the son of a father of Huguenot extraction and of a mother who, descended from the Bruces of Clackmannan, could count Robert Bruce among her ancestors, and was also related to Bruce, the Abyssinian traveler. He was taught at Bruce Castle, Tottenham, and then went to school at Rugby, where he distinguished himself by his activity, which was displayed in his high spirits and love of violent mischief and by his personal courage to such an extent that his schoolfellows wittily nicknamed him "Zealous."

Leaving Rugby when sixteen or seventeen years old, he spent two years in Switzerland and Germany, studying at Neufchâtel and Wiesbaden. His hardy activity seems to have been as marked in Germany as at Rugby, for it is recorded of him that he attracted some notice in the papers by jumping into the Rhine in winter after a wild duck which he had shot. He was not dressed for a swim, and, his great coat and top boots becoming filled with water, he had much difficulty in getting to shore with his game. His determination to achieve a career in South Africa by hunting and collecting specimens was apparently reached while he was still a youth, and at nineteen years of age he sailed from England, to land at Algoa Bay in 1871. Hunting was his object, as is substantially confessed in the title of his first book, A Hunter's Wanderings in Africa. The book won instant recognition as a story of sport and a hunter's prowess, and was regarded in [Pg 259] that light by the critics and the general public. The Royal Geographical Society, however, perceived other qualities in the story he had to tell, and gave him successively honorable mention, the Cuthbert Peake grant, and, in 1883, the Founder's Gold Medal, the highest honor it had to bestow.

Among the earliest testimonials paid by this society to the value, as yet not generally appreciated, of Selous's work was that given by Lord Aberdare, president, in his anniversary address, delivered in May, 1881, to the services rendered to geography in the regions west of Lake Nyassa by Mr. Selous, who had "hitherto been known as a mighty hunter of large game.... This gentleman, we learn, in 1878 penetrated for one hundred and fifty miles the unknown country north of the Zambezi, in the direction of Lake Bangweolo. He has since crossed in various directions the Matabele country south of the Zambezi, discovering two new rivers and defining the course of others which had previously been laid down from vague information." Selous's Notes on the Chobi, it appears, had already been published by the Geographical Society.

Mr. Selous has spent most of his time since he began his African wanderings in 1871, except for occasional visits to England, in traveling and hunting over that part of the African continent with which his name as an explorer is associated. In 1877 he and some companions penetrated into Matabeleland to hunt elephants. Relating the story of his wanderings in an address to the Royal Geographical Society in 1893, he described his experiences with fever and ague, the attacks of which began in Griqualand in 1872, but came on only when he halted anywhere a few days. North of the Zambezi he made several journeys among the Balongas, and spent a wretched rainy season, almost without equipment, on the Manica table-land, of the luxuriant vegetation of which, with sweet-smelling flowers after the rains, he gave a glowing description in his address. Interesting observations were made on some of the northern rivers. The curious phenomena of the steady rise of the waters of the Chobi and Machabi—an outlet of the Okavango—was observed from the first week in June till the last week in September, when the flood began to recede.

From 1882 the journeys acquired additional geographical importance, and Mr. Selous proceeded to rectify the maps of Mashonaland made by earlier travelers, taking constant compass bearings, sketching the courses of rivers, and fixing the positions of tributaries. The value of this work was made manifest in a magnificent large scale map of the country.

This map, which was published in 1895, was intended, first and chiefly, to illustrate the work [Pg 260] done by Mr. Selous while in the service of the South African Company; and, secondly, to embody, as far as possible, the knowledge possessed of the entire region extending from Fort Salisbury to the northward as far as the Zambezi, and to the eastward as far as the lower Pungwe. Mr. Selous's manuscript originals, deposited in the map room of the Royal Geographical Society, comprise a compass survey, showing the routes during a year's employment in the service of the British South African Company, September 1, 1890, to September, 1891, on a scale of 1:255,000; a sketch map, showing the route of the Manika Mission from Fort Charter to Umtassa's and thence to the camp near Mount Wedza, and also the routes taken by Mr. Selous from the camp near Mount Wedza to Makoni's, Mangwendi's, Maranka's, and back to Makoni's, on a scale of 1:255,000; a sketch of routes from Umtali to Mapanda (Pungwe) and back, in 1891, on the same scale; a sketch of Mashonaland, showing tribal boundaries, on the same scale; a rough survey map of the countries ruled over by the Makorikori chiefs, for which a mineral concession had been granted to the Selous Exploration Syndicate, on a scale of 1:210,000; and about thirty sheets of manuscript maps and rounds of angles, utilized in the compilation of the first four maps of this list.

Although Mr. Selous did not determine latitudes or longitudes, his long-distance compass bearings enabled him to lay down a network of triangles connecting Fort Salisbury with Masikesi. These triangles included Fort Charter, Sengedza, and Mavanka's in the south, Mount Mtemwa in the north, and Mount Dombo in the east; and it turns out that the distance between Fort Salisbury and Masikesi, as resulting from this triangulation, differs to the extent of only about a mile from that obtained by careful astronomical observations made at the two terminal points. The greater part of Mr. Selous's compass bearings were taken during the rainy season, when the air was very clear and landmarks could be seen at great distances. Mr Selous's determinations of altitude were not so accurate, and those obtained with the aneroid were characterized by himself as "of little value."

During all of his twenty years' wanderings Mr. Selous represented in his address to the Royal Geographical Society, with the exception of a treacherous night attack made upon his camp by the Mashuku-Sumbwe, led by a few hostile Marotse, in 1888, he had never had any serious trouble with the natives. He had gone among many tribes who had never previously seen a white man, and was always in their power, as he seldom had more than from five to ten native servants,

none of whom were ever armed. Mr. Selous's pioneer work began in 1889, when he conducted a gold-prospecting company through eastern Mashonaland. The journey took the party to the Portuguese settlements on the Zambezi, where those people were found to have a full appreciation of the richness of the gold region. [Pg 261]

The British South Africa Company, or "Chartered Company," as it is sometimes called, was incorporated about the same time (October, 1889), with power to occupy and possess the large domains that constitute what is now called Rhodesia. The return of Mr. Selous to the Cape of Good Hope with the report of what he had observed had the effect of determining the company to speed its operations so as to anticipate the Portuguese. Mr. Selous entered the service of the company, and, although he was not yet an explorer in the scientific sense, the accurate memory of his early wanderings over the region enabled him to guide successfully the pioneer expedition that took possession of Mashonaland.

One of the sensational incidents of this campaign was the refusal of Lobengula to allow the pioneer force to use the road that led through Buluwayo, his capital, the only existing wagon road from the British frontier to the Mashonaland plateau. A new road was cut, under the guidance and superintendence of Mr. Selous, through four hundred and sixty miles of wilderness, the whole work being accomplished in two months and a half.

Among the chiefs who submitted to the British occupation after the seizure of Gonvola was Moloko, ruler of the country north of Manica, who made a treaty with Mr. Selous. After two years spent in various operations for opening up the country and securing treaties with the native chiefs, Mr. Selous returned to England in December, 1892, and put the narrative of his adventures to press, but was called back in August, 1893, returning at very short notice, on account of the threatening attitude of the Matabele chief Lobengula and the consequent risk of interruption in the development of the country. The tribes had risen against the assumption of the company to claim as a territorial cession what they had regarded as simply a grant of mining and exploiting privileges. Mr. Selous engaged actively in the campaign, in which he is credited with having fought with great gallantry by the side of the colonists, and was wounded while protecting some negroes who had been surprised by the enemy.

Returning again to Mashonaland, he reached there in time to witness a second outbreak of the natives, vexed by the triple plague of locusts, rinderpest, and the stringent regulations of the Chartered Company's government with respect to cattle. His own cattle were stolen, and he headed a company of volunteers that went out to check the insurgents and protect the people who were still on their farms. [Pg 262]

The fruits, in acquisition to geographical knowledge, of Mr. Selous's adventures and explorations are to be found, mingled with much about sporting and exciting incident, in his books: A Hunter's Wanderings in South Africa, already mentioned; Travel and Adventure in Southeast Africa (1893); Sunshine and Storm in Rhodesia (1896); and in lectures to the Geographical Society and periodical contributions concerning Mashonaland.

These books abound in observations on natural history, often constituting real contributions of new facts or new demonstrations to the science, usually occurring incidentally in the narrative of adventure, but sometimes given in more formal shape. The author avows that his conclusions respecting animals are drawn from personal experience of the beasts, and are not influenced in any way by the stories of old hunters, Dutch or native. Among these notices are original observations on the giraffe and its habits, notes on buffaloes and their disposition, and remarks on variations in the types of South African lions. Of this animal, while some authors would make three species, the author believes there is only one. "As out of fifty male lion skins," he says, "scarcely two will be found exactly alike in the color and length of the mane, I think it would be as reasonable to suppose there are twenty species as three." So in Notes upon South African Rhinoceroses, a paper read before the Zoölogical Society of London in June, 1881, and reprinted in this volume, Mr. Selous gives his reasons for affirming that there are only two species of rhinoceros in South or in all Africa—the square-mouthed or white *Rhinoceros simus* and the prehensile-lipped or black *Rhinoceros bicornis*—while the supposed *Rhinoceros keitloa*, or blue rhinoceros of the Boers, is merely a variety of the *bicornis*, the distinction between the two being based only on differences in the relative length of the horns. Another paper from the Proceedings of the Zoölogical Society, reprinted here, is Notes on the South Central African Antelopes, embodying again only the results of the author's own observations. In this paper twenty-two species are described by their scientific, native, Dutch, and English names, and their characteristics, habits, appearance, and distinctions are indicated.

In the preface to his Travel and Adventure in Southeast Africa Mr. Selous tells how he had determined, in 1881, upon visiting the ostrich farm of his friend Frank Mandy, to settle down in Africa for a quiet life. Then he went home and spent a few months in England. Visiting the Natural History Department of the British Museum, he was shown by Dr. Gunther and his associate how old and dilapidated some of the specimens were, and how many noble forms were not represented at all. He took note of what he ought to get should he visit the interior of Africa again. Next we find him in South Africa, not quiet on a farm as he had intended to be, but in the wilderness, where he spent six years (1882-'87) engaged principally in collecting specimens "of the magnificent fauna which once abounded throughout the land," but many forms of which were now becoming scarce and some were verging on extinction. He shot and preserved a great many fine specimens of the larger antelopes, some of which may be seen in the New Natural History Museum at South Kensington, while others are in the collection of the South African Museum at [Pg 263]

Cape Town. Besides the stories of specimen hunting and adventures with the lions that are always to be found where game is abundant, the volume contains much matter of more general interest, such as notes of personal experiences among the Boers; accounts of two expeditions sent against the Batauweni by Lobengula; the devastations committed by the Matabele in Mashonaland; valuable notes on the Bushmen or Masarwas; accounts of journeys beyond the Zambezi to the countries of the Machukulumbwi and Barotsi tribes; and a review of the past history and present condition of Mashonaland. We find here also a notice of the caves of Sinola, with a subterranean lake in the principal cave having water marked by a deep-blue color like that of the blue grotto of Capri, an account of which was published by Mr. Selous in the Proceedings of the Geographical Society of London for May, 1888. An account of Mr. Selous's Twenty Years in Zambezia was published in the Geographical Journal in 1893.

Mr. Selous has done more than any other man to bring Mashonaland into notice, and is credited, together with Cecil Rhodes, with having contributed most to the creation of Rhodesia. The first comprehensive account of Mashonaland was given by him in the Fortnightly Review for May, 1889, when he described the country as a land of perennial streams in which thirst is an unknown quantity; with its high plateau, standing at an elevation of from four thousand to forty-six hundred feet and forming a very important watershed, endowed with a network of important streams, the springs supplying which, welling out from the highest parts of the downs, were capable of being applied to the irrigation of an enormous area, and having a salubrious climate, the continuous southwest wind giving cool breezes in summer and cold ones in winter. The high plateaus were further of much ethnological interest, in that they gave shelter to the very few remnants of the peaceful Mashonas who had escaped extermination at the hands of the Matabele.

Editor's Table.

[Pg 264]

SCIENCE AND THE SCIENTIFIC MIND.

The address delivered by Prof. Michael Foster, as president this year of the British Association for the Advancement of Science, was not as long or elaborate as such addresses are wont to be, but it contained many thoughts of great value. After sketching the vast advances in scientific knowledge made within the present century, he observed, with great truth, that "the very story of the past which tells of the triumphs of science puts away all thoughts of vainglory." Why? In the first place, because no one can study the history of science without being made to feel how very near, in many cases, the men of the past came to anticipating some of the most famous discoveries and generalizations of later years. Translate the language of an earlier age into modern terms, and you often find that you have expressed the most advanced scientific doctrine of to-day. In the second place, if we find a certain lack of definiteness and truth to fact in the ideas of the past, how can we be at all sure how *our* ideas will look when confronted with the fuller knowledge which doubtless our successors will possess? Lastly, "there is written clearly on each page of the history of science the lesson that no scientific truth is born anew, coming by itself and of itself. Each new truth is always the offspring of something which has gone before, becoming in turn the parent of something coming after." However great the work of a man of science may be, "it is not wholly his own; it is in part the outcome of the work of men who have gone before." In this respect Professor Foster sees a striking difference between the man of science and the poet. We always know whence the former came, but the latter is almost as devoid of visible ancestry as Melchizedek. When the man of science dies the results which he achieved remain, and his work is taken up where he left it off; whereas the poet, strictly speaking, has no continuators. The Homeridæ do not represent Homer, nor do Dryden and Congreve take the place of Shakespeare.

The story of natural knowledge or science, we are reminded, is a story of continued progress. "There is in it not so much as a hint of falling back—not even of standing still." The enemies of science sometimes seek to turn against it the fact that each age revises the conclusions of the preceding one. They ask, What dependence can be placed upon opinions or theories that are thus subject to change? The answer is that the science of each age is the nearest approximation which that age can make to the truth, and upon some points represents the truth with a great approach to finality of interpretation. The law of gravitation, for example, as formulated by Newton, lies at the foundation of the physics of to-day. The circulation of the blood was discovered once for all by Harvey. The true theory of the solar system was given once for all by Kepler. It is the glory of science that whatever of imperfection may lurk in a scientific theory is sure to be brought to light and corrected by subsequent observation and analysis.

[Pg 265]

The learned professor dwelt briefly but forcibly upon the qualities of the scientific mind. In the first place, the scientific mind must "vibrate in unison with that of which it is in search." It is in search of truth, and it must therefore vibrate in unison with truth. The follower of science must have a truthfulness beyond that of the ordinary man, who does not set a great price upon exactness in his observations or conclusions, and readily confounds things which, superficially similar, are fundamentally different. Nature resents even the most trifling inexactness, and the careless student will find that the further he carries his inquiries the further he goes astray. The scientific mind must also be alert. The indications and hints which Nature gives are sometimes

very slight, and only one who is watchful in the extreme and attentive to the smallest things will catch them. Then the problems which Nature sets are often complicated, and call for a high degree of courage and perseverance. An inquiry which seemed easy at first will suddenly become overcast by what seems the most hopeless obscurity, and the scientific worker, unless he possesses the necessary moral as well as intellectual qualities, will fail in his quest. Considering the characteristics which the pursuit of science tends to develop in its votaries, and considering that scientific method is now and has been for many years past a wonderfully devised system for carrying on research, Professor Foster is surprised that the progress of science is not even more rapid than it is. He fears that perhaps Science does not get the best minds enrolled in her service, and rather hints that our institutions of education are responsible for turning aside many who might lend great aid in the advancement of real knowledge to less profitable pursuits. In words of almost precisely similar import to some that we used in these columns not very long ago, he observes that "that teaching is one-sided, and therefore misleading, which deals with the doings of man only and is silent about the works of Nature, in the sight of which he and his doings shrink almost to nothing." The whole address is stamped with the high thoughtfulness which so eminently distinguishes its author, and deserves to be carefully pondered by all who would understand the character and mission of science and the intellectual needs of the present age.

THE LATE WILLIAM H. APPLETON.

As many of our readers will have learned through the daily press, Mr. William H. Appleton, long the head of the well-known publishing house of D. Appleton and Company, passed away at his home in Riverdale on the Hudson, October 19, 1899, having reached the advanced age of eighty-five years. As one of the founders of this magazine, who from the start was in close sympathy with its aims, kept up an active interest in its management, and was ever ready to aid its conductors with advice and encouragement, it is fitting that a few memorial words should be spoken of him in these columns.

The career of Mr. Appleton was a marked one in many respects. Entering the book business of his father, Mr. Daniel Appleton, at an unusually early age, he soon developed such an aptitude for affairs that at twenty-one he went abroad for the purpose of making the acquaintance of the leading foreign publishers and paving the way for closer relations with them in the importation and sale of their books in this country. Three years later, or at the age of twenty-four, his father made him a partner in the business, which had previously been extended so as to include the publication as well as the sale of books, and had now so increased in volume as to compel [Pg 266] removal to more commodious quarters. Ten years of growth and uninterrupted prosperity followed, when Mr. Daniel Appleton, in 1848, retired from the now well-established firm, William H. Appleton, at the age of thirty-four, becoming its head, with his brothers John A. and Daniel Sidney as partners. In co-operation with these and other brothers who afterward entered the business, Mr. Appleton guided the operations of the firm for a period of nearly fifty years, successfully piloting it through several financial crises and carrying it to a foremost place among the publishing houses of America.

Besides the routine of an extensive publishing business, the history of the house during this time includes a number of large undertakings involving the expenditure of vast sums of money, and years of labor by many workers, and attended with risks that only the most far-seeing business sagacity could justify. We may presume that the several members of the firm shared a common faith in the success of these great enterprises, but it is fair to infer that as the head of the house William H. Appleton took a leading part in their origin and execution. One of these ventures was the publication of the American Cyclopædia, which in its present revised form represents an outlay of over a million dollars and some ten years of time. Another undertaking, and the one that we wish more particularly to speak of here, was the extension of the business in the line of popular scientific publications.

Scientific circles in this country have never realized the debt they owe to D. Appleton and Company, and especially to William H. Appleton, in this regard. It is no exaggeration to say that the advance of science in the United States was hastened by more than a quarter of a century by the enlightened and courageous policy which led the firm to add this class of books to their lists at the time they did. Everything apparently was against it—nothing in its favor. Our scientific literature consisted mainly of a few text-books having only a limited sale. Science itself was an affair of laboratories and bug collectors, the one to be shunned and the other commiserated. The few utterances of scientific men having a bearing on the great questions of the right interpretation of Nature, man's relations to his fellows and to the world at large, social betterment, etc., that here and there arrested public attention were received with contemptuous sneers or scouted as the rankest infidelity. Few who are not past middle life will find it possible now to realize that this was the general attitude toward science forty years ago, but we have only to refer the reader to the writings of the time for abundant confirmation of our statements.

It was such conditions as these that the firm was called upon to face when considering the question of entering this new field of publication. All ordinary business instincts were against it. Scarcely a publisher either here or abroad would even listen to the proposal to risk his capital in such an enterprise. Nevertheless, Mr. Appleton, lending an appreciative ear to the arguments of the former editor of this journal and displaying his usual foresight, finally decided in favor of the project, which afterward resulted in the introduction of the works of Spencer, Darwin, Huxley, Tyndall, Bain, Romanes, and other distinguished writers to American readers. A further step in

the same direction, taken later, was the publication of the International Scientific Series, now numbering some eighty volumes. The scheme as originated and shaped by Professor Youmans was heartily seconded by Mr. Appleton, as was also the plan of the Popular Science Monthly. [Pg 267]

A distinctive feature of the arrangements for the issue of all these foreign books, and one which redounds in no small degree to the credit of the firm, was the voluntary agreement, in the absence of an international copyright law, to pay their authors the usual royalties, making no distinction between them and authors at home. Mr. Appleton had been a lifelong advocate of international copyright, founding his contention on the simple justice of recognizing the property rights of the author, no matter where he lived. Although to adopt such a course was to expose themselves to the possibility of heavy loss through the issue of reprints by irresponsible parties, a thing which actually happened in the case of a good many of the volumes, the principle was faithfully adhered to, thus anticipating by many years the central provision of our present law.

The storm of denunciation raised abroad by the appearance of the earlier installments of these writings might well have deterred the boldest from repeating the experiment of giving them currency in America. But in spite of solemn warnings that dire consequences would be visited on the publisher who ventured to issue them here, the books continued to appear, while the predicted evils never came to pass.

It must not be inferred from the foregoing, however, that Mr. Appleton was either unmindful or wanting in respect for the opposition which his course aroused. Much of this had its origin in the religious convictions of the community, not a little of the criticism, be it said, emanating directly from the Church or its leading representatives. But, being a strong churchman himself, actively furthering the work of the Church with his private means and personal co-operation, in full sympathy with its purposes, and rejoicing in its beneficent influence, he was the last one who would wantonly outrage the sacred beliefs of his fellow-men. Yet, gifted with a large-mindedness that is at least unusual in the walks of business, he was enabled to see that the onward march of natural knowledge which had so often before excited alarm among men of narrow views could have nothing in it that was inconsistent with a truly religious life; while, on the other hand, to promote its advance and diffusion was to contribute by so much to the highest human welfare.

The wisdom of Mr. Appleton's course has been fully justified by the event. As we look over the last half of the century, which has been so fruitful in discovery and has witnessed the development of so many agencies for the amelioration of human ills and so manifold an increase in man's power for right living, we can see at the various stages of this evolution how large a part the broadening of thought fostered by these authors and the new aims and methods in inquiry suggested by them have contributed to the advance. It could not, in short, have been made so rapidly or effectively without the stimulus they gave. For what has been done in this line in this country we think—when we reflect that it was he who had the courage to bring the works of those thinkers here, and who made them accessible to students and the reading public, who constituted the agency through which the new thoughts and aims were spread—a very important part in the achievement may fairly be ascribed to Mr. William H. Appleton.

Scientific Literature. [Pg 268]

Owing to the increasing demands upon our space, authors and publishers are notified that hereafter the department of Scientific Literature, with the exception of Publications Received, will be discontinued.

SPECIAL BOOKS.

The busy pen of Mr. *John Fiske* has produced another book marked by the qualities which the public has learned to associate with all his work—lucidity of expression, felicity of illustration, a large command of the conventional elements of literary composition, and a philosophy which, while very free and lightsome in its steps and paces, always has the luck to fetch up within easy hailing distance of a moderate orthodoxy. Mr. Fiske undertakes to conduct us on an excursion *Through Nature to God*,[27] somewhat as Cook, of international fame, might undertake to see us safe from New York to the Holy Land. Of the two, we think Cook makes the surer thing of it; yet no one can deny that Mr. Fiske has done his best to trace the itinerary and encourage his excursionists to believe that they will "get there."

We may as well candidly confess that we have not much faith in the method followed in the work before us. The intention is to show that an analysis of Nature and of Nature's ways yields God; in other words, that we have only to carry out the processes of thought which an examination of the external world and of human history sets in motion in order to find God at the end of the argument. Thus, by searching, contrary to what Scripture has generally been held to imply, we find out both that God is and to some extent what he is. We prefer the older view. The world's greatest Teacher said simply, "God is a spirit." He did not say that this was a conclusion to which many lines of argument led. He did not hint at any kind of argument, but assumed the affirmation of God by the human consciousness. We venture to say that if Mr. Fiske's method were successful and we could argue ourselves into a belief in God, the result would be disastrous; for the God of argument, or even of analogy, is not the God of the human soul or conscience. We should have

one conclusion more of science, but we should lose that for which no conclusion of science could make amends—our sense of the infinite and the possibility of faith.

Mr. Fiske discusses, in the early chapters of his book, The Mystery of Evil. He takes the familiar ground that evil is the necessary correlative, and in a manner the necessary condition, of good. We are placed in a universe that abounds in evil in order that by conquering it we may raise ourselves to a moral level otherwise impossible. On one page the author goes so far as to say that God, and not the devil, "is the creator of evil," but elsewhere he relaxes his boldness and speaks of evil being "permitted." One feels like asking, If good and evil are equally made by God, then which is which? When we speak of electricity as positive and negative we do not ascribe any superiority to one over the other. Nor do we say that centrifugal is a more commendable form of force than centripetal, or *vice versa*. "For strong and resolute men and women," we are told, "an [Pg 269] Eden would be but a fool's paradise." This is not complimentary to our first parents in their primitive condition of innocence, and it puts the curse pronounced upon them in a somewhat equivocal light. There is also quite a rehabilitation of the "serpent," who, it seems, knew quite well what he was talking about and gave excellent advice. We wonder whether Mr. Fiske is really of opinion that it helps us to solve any of the practical problems of life to be told that without evil there could not be good. Men have known for centuries that it is good to fight evil, though what evil is essentially they have often been in doubt. Upon the latter point Mr. Fiske does not in the least attempt to enlighten us; and yet it should be rather a more hopeful enterprise to attempt to show us what is specifically evil and ought therefore to be resisted, than to vindicate evil in general as the indispensable condition of good, and something, therefore, which God was justified in making.

The second division of the book deals with The Cosmic Roots of Love and Self-Sacrifice. We can not see that these roots are traced further back than the mother's affection for her offspring. Mother's love is doubtless an old story in the world by now, and perhaps as good a story as earth has to tell; but it seems to us that the "cosmic" character of it is not very apparent. We may believe that it was destined to come in the fullness of time, but this can be said equally of all that exists. "I think it can be shown," says Mr. Fiske, "that the principles of morality have their roots in the deepest foundations of the universe; that the cosmic process is ethical in the profoundest sense; that, in that far-off morning of the world when the stars sang together and the sons of God shouted for joy, the beauty of self-sacrifice and disinterested love formed the chief burden of the mighty theme." All we can say in regard to this is that Mr. Fiske has *not* shown it. He has shown just what we all knew before—that love exists in the world, that it antagonizes selfishness, and that human beings are endowed with a moral and religious sense—but he has not made it plain that the meaning of the universe is to be found in these (as we regard them) higher developments. He has himself acknowledged that, on a broad view of the world-wide struggle for life, there are no moral elements to be seen.

Religion, as we hold, is its own justification. There is more of religion in one verse of the Psalms than in all the Theodicies that ever were written. "As the hart panteth after the water brooks, so panteth my soul after thee, O God. My soul thirsteth for God, for the living God." Here is the whole essence of the matter—the affirmation of the human heart that there is something or some one beyond and above the mesh of circumstance and fact in which our lives are involved; something or some one who authenticates all that is good, and everlastingly condemns what is evil; something or some one to which or to whom the soul gravitates as to nothing else in the universe. When this affirmation is strong, religious life is strong; when it is weak, religious life is weak; should it cease entirely, then religion is dead. The book Mr. Fiske has given us is interesting from first to last—all his books are interesting—but it does not increase our knowledge, nor does it add to our knowledge faith.

GENERAL NOTICES. [Pg 270]

The author of *Extemporaneous Oratory for Professional and Amateur Speakers*[28] is himself one of the most effective orators, especially in debate, of the time. He has embodied in this book the results of ripened thought and successful experience gained in a field in which he is a master, for the instruction and help of those who would follow what he regards as the greatest of all arts, including the elements of all—music in the intonations of the voice, and painting and sculpture in the life, attitudes, and expression of the speaker. It is an art, too, which has wielded a more general and important influence than any other, which is almost universal in its appeals, and which any one may at any time find useful, when it will be of great advantage to him to possess the ability "to speak distinctly to the purpose, gracefully, with genuine fire." Extemporaneous oratory concerns the delivery, in form and language suggested by the occasion, "of ideas previously conceived and adopted with more or less fullness and precision, together with such thoughts and feelings as may arise and obtain utterance." It has many advantages over other methods of oratory, all tending to give the speaker greater power over his audience, and particularly in the fact that the extemporizer is at all times ready to expound, defend, illustrate, and enforce his opinions. The extemporaneous speaker must have a full and fluent command of language, and a full store of facts which he may at any time have to bring to bear upon the subject of his address and in the vindication of his opinions. The first place of importance is given to facts of natural science, which are of increasing utility. "To the educated and uneducated alike,

natural science is now the most interesting of themes." Next come the facts of history and biography, those of the special branches bearing on the speaker's theme and purpose, and the great general conceptions included in the thoughts of the learned; and he must have settled opinions. At the basis of Dr. Buckley's treatment of this art and of his advice to those who would perfect themselves in it is the principle that extemporization is evolution after involution. This advice, in which the various phases of the subject are commented upon under a great variety of aspects, concerns the general preparation for the address, the acquisition of effective command of language, the exercise and training of the voice, the intellectual and physical elements that enter into oratory, its accessories, and the factor of the audience—all plainly and practically presented, with a facility of style that makes the reading of the book a pleasure.

Readers of the Popular Science Monthly have already had an opportunity of perusing some of the narrative and observations which Professor *Heilprin* has embodied in his *Alaska and the Klondike*.[29] In it he has attempted to portray that remarkable region in its true aspects. Professor Heilprin is well able to do so, for he is a keen observer and looks with a scientific eye, and his literary style is free and graphic. He made a summer journey to the region last year (1898), between the end of July and the middle of October, with the object of being "able to determine between fact and fancy, and to obtain a personal knowledge of the region and its varied conditions." What he saw and heard is here presented. While by no means pretending to that degree of accuracy and of proper insight which can only come with more protracted and intimate knowledge, the author believes that he has given a careful and unprejudiced account. Persons whose ideas of the regions about Dawson are associated with visions of arctic severity and sterility may be a little surprised at reading of one's looking from the heights about the town [Pg 271] northwestward "over a most lovely stretch of river, with hillsides closely besetting it, and with a vegetation of most striking brilliancy and vigor," and of the eye turned southward, losing, in consequence of the different configuration of the ground, "all but the beautiful verdant slopes which still mark out the valley"; of the beholder being able for hours at a time to sit watching the beauty of the landscape; and of the difficulty of recommending to one endowed with a proper appreciation for the works of quiet Nature "a more enjoyable exercise than to take in a bit of this wonderful land of the North, and with it a mellow sunshine that is not to be found elsewhere." These pretty landscape pictures of the arctic summer are followed by accounts of society at the Klondike as the author found it, of the trail, steamboat travel, and the routes to the region; a description of the placers, their occurrence, and the methods of mining; observations on the physical history and geology of the gold fields; and a summary of the laws regulating mining. In the summary of his geological discussion the author expresses the opinion that it seems probable that "the Klondike gold region is merely a fractional part of a discontinuously continuous auriferous tract that extends in a westerly course into the heart of Alaska, and southward into British Columbia."

Mr. Bullen's Idylls of the Sea[30] comprises three groups of essays, each group being marked by distinct characteristics. The sketches in the first group, the designation of which gives the name to the book, answer approximately well to Mr. Strachey's estimation of the whole as "some of the most vivid things ever written about the sea," such as only a man who really knows the sea in all its humors, and "has heard all those multitudinous voices that echo along the waste spaces of the deep," could write. There is something weird about them, and they have the air of mystery and superstitious awe with which, according to tradition, the sailor regards the imperfectly understood features of the sea. They are short stories of curious or striking incidents of sea life. The essays of the second group are real natural-history sketches—accounts of some oceanic birds, the kraken, sharks, the devilfish, etc., by a man who is well and scientifically acquainted with them. The third group includes longer sketches of sea-farers' life, rather more actual ones than those of the first group, and papers having a critical bearing on the present conditions of British seamanship.

The constant advance in the knowledge of dietetics makes it desirable that its results should be put in an accessible form, and this is particularly the case in regard to food for those in ill health, to whom it may be the means of restoring the normal condition. In her book on *Diet in Illness and Convalescence*[31] the author has endeavored to present the substance of Diet for the Sick, now out of print, together with recent thought on the subject, especially in the treatment of typhoid and malarial fevers, which we owe in such variety to the present war. An outline is given for suitable food in the more common forms of disease, suggestions for serving meals tastefully to an invalid, and numerous recipes for beverages, soups, dishes of meats, vegetables, and desserts. Some of these are taken from English and French treatises; others are contributions of American cooks, and include many novel and excellent ideas. From the preparation of koumiss and May wine to the manipulation of Dixie biscuit there is no want of explicitness, and one is tempted to covet the state of convalescence in which he could fare upon such attractive compounds as rose, violet, or amethyst jelly. A word of caution is inserted now and then. We are told "a fritter of any kind should never be mentioned in an invalid's book." Macaroni croquettes and soufflé of shad roe are, however, admissible. The beginning of the volume is devoted by the author to a brief consideration of the constituents of food and processes of digestion, with directions for the use of the pancreatic ferments. There are unfortunately many disputed points concerning a fit dietary in [Pg 272] illness; not only idiosyncrasies of constitution but incomplete knowledge of physiological chemistry still render the problem difficult. New foods are constantly introduced which subsequent experiment proves to be harmful. The last dictum, we believe, in regard to saccharin is that it is not wholly innocuous, so that it might be as well for the diabetic patient to learn to do without sweets in the beginning, while as for the digestive ferments, they are at the least

hazardous concoctions. We can not be too wary of artificial substitutes and laboratory products which claim the virtues of organic material or living protoplasm.

The reason for the being of *John Munro's The Story of the British Race*[32] is briefly indicated in the preface as to be found in the fact that the current ideas on the subject are derived from the views of historians representing the doctrines of an earlier and less critical generation, while the fact is overlooked that the new science of anthropology, using careful observations and exact methods, has put the real nature of the British people in a light in which it was never seen so clearly before. The result is that the old ideas on the subject have been greatly modified. Mr. Munro believes that his little book is the first attempt to bring these important results and views of modern anthropologists before the general public in familiar language, whereby the oversights of historians and teachers may be redeemed. An important error to be controverted, in the author's view, lies in the fine-drawn distinctions and sharply defined demarcations that have been made between Celts and Saxons. It is inferred from anthropology that the population of the British Isles is a mixture of all the races of western Europe, in which the Teutonic and Mediterranean elements—"the aborigines of Europe"—predominate, while "the intrusive Celtic race from Asia," still represented by the Bretons, passed into the British Isles in comparatively small numbers. Scotland is perhaps more Teutonic and less Mediterranean than England, Wales, or Ireland. Wales is the least Teutonic and the most Mediterranean, if not Celtic, of the three. England has more of the Dutch and Low Country elements than of the Scandinavian, with apparently not far short of an equal share of the Mediterranean and Teutonic elements. Ireland is perhaps as Teutonic as England, though the better fusion of the elements may disguise the fact. The author thinks that the first chapters of English history will have to be written over again by the light of anthropology.

The *Eighteenth Annual Report of the United States Geological Survey*[33] mentions, as an important change in the field work that made necessary by the legislation providing for the establishment of levels and permanent monuments and bench marks, of which 10,840 miles of levels were run and 1,820 bench marks were established. The topographic surveys to date covered an aggregate area of 759,525 square miles, of which 240,000 square miles were on a scale of four miles to the inch. The topographic work has progressed very satisfactorily under the present organization of the survey, including, in the year covered by the report, surveys in the Indian Territory and of the northern part of the boundary line between Idaho and Montana—the first work of the kind assigned to the Geological Survey—and the beginning of the survey of the forest reserves. The work on the educational series of rocks has been completed. It includes two hundred and fifty larger and smaller sets, which will be distributed to institutions where geology is taught. In his general report the director mentions the work of more than thirty geological parties in all parts of the United States, of six paleontological parties, hydrographic and topographic surveys by States, and the work of the division of mineral resources, the full account of which will constitute Part V of the report. The theoretic and other papers in Part II relate to the Triassic Formation of Connecticut (W. M. Davis), Geology of the Edwards Plateau, etc., Texas [Pg 273] (R. T. Hill and J. W. Vaughan), North American Tertiary Horizons (W. H. Dall), Glaciers of Mount Rainier (I. C. Russell) and Rocks of Mount Rainier (G. O. Smith), The Franklin White Limestone of New Jersey (J. E. Wolfe and A. H. Brooks), the Geology of San Clemente Island (W. S. T. Smith), Geology of the Cape Cod District (N. H. Shaler), and Recent Earth Movement in the Great Lakes Region (G. K. Gilbert). Part III contains papers on the gold districts of Alaska, by G. F. Becker, J. E. Spurr, and H. B. Goodrich; Coal Fields of Puget Sound (B. Willis), the Judith Mountains of Montana (W. H. Weed and L. V. Pirsson), Certain Mining Districts in Idaho (W. Lindgren and F. H. Knowlton), and the Mining Districts of the Telluride Quadrangle, Colorado (C. W. Purington). The four papers in Part IV are a Report of Progress of Stream Measurements during 1896, by A. P. Davis; the Water Resources of Indiana and Ohio, by Frank Leverett; New Developments in Well-boring in South Dakota, by N. H. Darton; and Water Storage and the Construction of Dams, by J. D. Schuyler.

The purpose of *Belle S. Cragin's Our Insect Friends and Foes*[34] is illustrated from a passage in the author's own life, cited in the preface: "In my younger days, when Nature study was unknown in schools and my problems had to be solved by my own investigations or remain unsolved, I used to long for somebody to write a book that would tell me the things I wished to know, or show me how to find them out for myself; and that is what I have tried to do for you." The beginning of the book is a chapter on the collection, preservation, and care of insects for specimens, giving explicit directions for collecting them perfect, for putting them to death, for mounting and placing them in the cabinet, and for protecting them against vermin, dust, and mold, with descriptions of the instruments, cases, etc., that are used. In the descriptions of insects no attempt is made to mention any except the commonest species, and not all of those. The habitat, in most cases, is included in the description. As a rule, most of the species are those found in the States east of the Rocky Mountains and north of the Gulf States. Scientific names are attached to the illustrations and a list of popular names, with their scientific equivalents. The descriptions are brief and well adapted to the purpose indicated in the quotation with which our notice begins.

In presenting a revision of their *Plane and Solid Geometry*[35] Messrs. *Beman* and *Smith* express their belief as being, that amid all the schemes for breaking away from the formal proofs of Euclid and Legendre and leading the student to independent discovery, the best results are secured by setting forth a minimum of formal proofs as models, and a maximum of unsolved or unproved propositions as exercises. They likewise share in the belief that such of the notions of modern geometry as materially simplify the ancient should find place in our elementary text-

books. Accordingly, they have introduced various ideas, such as those of one-to-one correspondence, anti-parallels, negative magnitudes, general figures, prismatic space, similarity of point systems, etc., which are of real use in the early study of the science. In general, whatever is found to be usable in elementary work has been inserted where it will prove of most value.

The plan of the investigation undertaken by Mr. *Walter Smith* in his *Methods of Knowledge*[36] is, first, to give a definition of knowledge. The methods are then considered by which men have thought it possible to attain knowledge of the self on the one hand, and the not-self on the other. The common view of philosophers and men of science that truth is given in general concepts, or universals, or categories, is taken up, and the special form of the doctrine given in empiricism is considered and found to be a doctrine wanting in all its forms. Yet it is pointed out that the [Pg 274] concept has its uses in the mental economy. The method is then expounded of knowing the not-self as being gained by sympathetic imitation. It is then determined wherein self-knowledge consists, and the bearing of this theory on the philosophical problem and on certain practical questions is indicated.

In *The Philosophy of Memory and Other Essays*[37] Dr. *D. T. Smith* develops a theory of mental action, the basis of which is the setting up in the cells of the gray matter of the brain, and possibly of the spinal cord, of orderly grouping of waves or vibrations among certain atoms or molecules by whatever may affect any of the senses; that these undulations are realized first as sensations, and then group themselves so as to form perceptions, ideas, emotions, etc. They rise in succession into the scope of consciousness. After a time the effect of these vibrations in consciousness is weakened, without perhaps utterly passing away, and retains the possibility of being re-enforced by kindred vibrations in harmony with it. This is memory.

In *The Psychology of Reasoning*[38] M. *Alfred Binet* makes reasoning a process of the formation of mental images. He finds no decided difference between perception—the cognizance of sensations and assignment of them to their source—and logical reasoning. "The two operations are both reasonings, transitions from the known to the unknown"; "the two extremes of a long series of phenomena." A premise is "a judgment, an association of images," and a conclusion that follows from the premises is "an association of images produced by other associations." The theory of three images—the two premises and the conclusion—"is applicable to reasonings of every kind, and therefore constitutes a general theory of reasoning.... If it be recollected that images are fragments, residues of former sensations; that they spring from the place where former sensations have been received, in the sensory centers of the cerebral surface layers, it will be understood that the purpose of these images in grouping themselves in reasonings, according to the laws of their affinity, is to replace the absent sensations. Such is therefore the function of reasoning; it enlarges the sphere of our sensibility, and extends it to all objects which our senses can not know directly. Thus understood, reasoning is a *supplementary sense*, which has the advantage of being free from those strict conditions of time and space—the two enemies of human knowledge." In memory, "the suggested image is projected and localized in the panorama of the past, of which it appears to be a fragment." Imagination is "a faculty of creating assemblages of images which do not correspond to any external reality."

The idea of preparing *Who's Who in America*[39] was suggested by the success of the English book, Who's Who? now in its fifty-second year, and the work has been prepared on similar lines. Its purpose is to supply information concerning living American men and women who have achieved distinction, who hold recognized public positions, and who have contributed so as to have it talked about to the growth, development, knowledge, and civilization of the country. Eight thousand six hundred and two such persons are represented in this book, including, *ex-officio*, all members of the Fifty-sixth Congress, Governors of States and Territories now in office, United States, State, and territorial judges of courts of high jurisdiction, persons of other prominent official classification, national academicians, members of the National Academy of Sciences, heads of the larger universities and colleges, and a few others chosen on similar arbitrary lines. Special effort has been made to include all living American authors of books of more than ephemeral value. The data for the book have been obtained from first hands, except in a very few cases, where the modesty of the subjects made it necessary to supply the material from other [Pg 275] sources, when the articles were submitted to the subjects for revision.

In *The Dawn of Reason*[40] Dr. *Weir* has provided a most interesting book for the unscientific reader as well as for the comparative psychologist. He traces the gradual unfolding of conscious mind in animal life from the actinophryans which discriminates between the grains of starch and sand, and the Stentor which changes its position to catch a ripened spore, to the higher forms that decorate their homes, exhibit parental affection, exercise mathematical faculty, and extricate themselves from unforeseen dangers. As the field of observation of the senses of touch, taste, and smell has been so thoroughly worked by Lubbock and other naturalists, special attention is paid by the author to the senses of sight and hearing, in regard to which he furnishes new and valuable data. In addition to these he claims to establish the fact that tinctumutations and "homing" are auxiliary senses—not instincts. He located the center of color changing in the frog exactly below the optic, and by artificial stimulation produced the alteration in tint, and by excision, or treatment with atropine, destroyed the chromatophoric function. By experimentation upon snails he found the center of the sense of locality at the base of the cephalic ganglion, and, removing it, rendered them unable to return to their homes. Many anecdotes are given showing that the lower orders of animal life exercise conscious determination, and that among those with more complex nervous systems there is a mind akin to that of man. Not only do animals

remember friends, strangers, and events, but they love, hate, and fear. They evince æsthetic feeling also when the spider ornaments its web with logwood flakes, the dog howls in harmonic accord with the church bell, and salamanders assemble at the sound of a piccolo. Still higher psychical attributes are those of animals that show parental affection or ability to count, like the mason wasp, which provides invariably five spiders for the male larva and eight for the female; or the harvester ants that plant their grain, weed and winnow it. Examples are cited of the capacity of the elephant to form abstract ideas and of the dog to indulge in brown studies. The author scouts at the theory that "specialized instinct," or "intelligent accident," prompts actions in animals which in man would be ascribed to reason. "Instinct," he writes, "is the bugbear of psychologists," and thereupon he differentiates sharply the two sadly confused functions.

In the thesis entitled *A Step Forward*, *F. Theodor Kruger* proposes, as a measure of possible social reform, placing the medical and legal professions wholly under the direct control of the civil authorities, to be exercised through duly constituted boards or departments of the several communities.

In his study of *Centralized Administration of Liquor Laws in the American Commonwealths* (Columbia University Studies in History, Economics, and Public Law) *Clement M. L. Sites* finds that widely variant policies are followed by the several States in the regulation of the liquor traffic, all based upon the broad powers of taxation and police. While we hear much of characteristic plans of regulation, little is said about characteristic systems of administration. This is because the liquor laws are administered incoherently. There is no consensus, even within the Commonwealth, in standards of administration. Each community practically determines for itself how the law shall be enforced, and we have all degrees of enforcement, from rigid severity to none. The various plans of regulation are classified by the author according to the dominant aspect in which they regard the liquor traffic. It has been treated as an open traffic, subject simply to taxation and reasonable safeguards; as a necessary but dangerous business, to be limited to approved persons and places and surrounded by special safeguards; as a criminal enterprise, to be suppressed, like highway robbery; and as a subject of legal monopoly. It is the purpose of Mr. Sites's essay to follow the developments of centralized administration that have taken place in recent years in each of these spheres, and in that of the institution and maintenance of judicial proceedings. The phases of current development that seem to merit special note are the substitution of the liquor-tax system for the license system, the extension and elaboration of local option, the contingent central control of city police administration, and the recognition of the general province of administration. The author's study shows that these developments accord in general with the laws of evolution, each representing some special aspect of the differentiation. In considering the "dispensary" plan, illustrated in South Carolina, a significant contribution to current thought is remarked in the approval it gives to the use of liquors as a beverage, while their abuse is disapproved in an equally marked degree, a distinction being attempted here, with correspondingly different methods of treatment between those who can be trusted with liquors and those who can not.

[Pg 276]

The Report of the United States Commissioner of Fish and Fisheries for the year ending June 30, 1898, represents that the operations of the division of fish culture were in some respects more important during that than in any preceding year. This was owing in part to the natural growth of the work, and in part to greater efficiency in dealing with the various questions and problems that came up for consideration. The propagation and distribution of food fishes exceeded by about forty per cent the work accomplished in any other twelve months. The steady increase in the catch of shad is cited as being conclusive evidence of the value of artificial propagation. The constant decline in the lobster fishery accentuates the necessity for increased work in that line. The efforts to acclimatize food fishes in waters to which they are not indigenous have been continued. The special papers published in connection with the report relate to mackerel investigations, the alewife fisheries, the oyster beds of Louisiana, the shad fisheries of the Atlantic coast, reports of fishes obtained in sea explorations, a list of publications, and a report of the exhibit at the Tennessee Centennial.

The Tenth Annual Report of the Interstate Commerce Commission on the Statistics of Railways in the United States covers the year ending June 30, 1897. The year is characterized as having been for the transportation industry one "of deferred expectations." While the years from 1890 to 1893 each closed with increased gross earnings as compared with the preceding year, 1893-'94 was disastrous, showing a large decrease; no recovery took place in 1894-'95, but an increase took place in 1895-'96. A downward turn came again in the year of the present report, with no revival till the last month of the twelve. The total increase in mileage for the year of the report was only 1,651.84 miles, the smallest increase and the smallest percentage of increase noted in any year since 1890. "In many States," says the report, "railway construction seems to have been practically abandoned. Especially is this noticeable in the more populous districts of the country —a result which is not entirely due to the general commercial depression, but to the marvelous increase in electric railways for suburban and short-distance traffic. The influence of electric construction upon steam transportation is noted in certain of the reports of State railway commissions for the current year." These are only two of the numerous interesting facts presented in the report.

Small Accumulators, how Made and Used, is the first of a series of popular scientific handbooks for students and engineers. The particular subject has been selected for beginning the series under the suggestion of a large number of requests for advice which the author, *Percival Marshall*, had received in his capacity as editor of the Model Engineer and Amateur Electrician.

The work is intended to be an elementary handbook—"a practical and trustworthy guide"—for amateurs and students. The theory of the accumulator is explained, directions are given for making them, types of small accumulators are illustrated, the charging and use of accumulators are explained, and the applications are shown. Useful receipts and a glossary of technical terms are given. (The book is published by Spon & Chamberlain, New York. Price, 50 cents.)

In his *Better World Philosophy—a Sociological Synthesis* (Chicago: the Ward Waugh Company), *J. Howard Moore* utters a protest against the egoism or selfishness of our day, and suggests an [Pg 277] ideal scheme. The problem of life is defined as being the relation of each individual to the rest of the universe, and is peculiarized by the existence of the social problem involving relations of individuals to each other different from those sustained to the impersonal universe. There are in the nature of living beings the egoistic element, which impels action in behalf of self, and the altruistic element, which prompts or prevents movement out of consideration to others. At present the egoistic element predominates, with results that make a picture far from bright. In the social ideal the strong should supplement the weak as they would like to be supplemented if they were weak; individuals not unequal but diverse may mutualize their efforts to the advantage of all; and each individual should perform in the social economy that function for which he is best fitted, and should receive in return "a graceful equity in the means for satisfying his desires."

Among the books announced for issue soon by Henry Holt & Co. are *The Book of Vertebrate Zoölogy*, by Prof. *J. S. Kingsley*, author of The Elements of Comparative Zoölogy, published by the same house, which can be used as a companion to McMurrich's Invertebrate Zoölogy; *Elementary Studies in Chemistry*, by Prof. *Joseph Torrey*, of Harvard, which, while it is characterized by the emphasis laid upon quantitative laboratory work in general chemistry, will be a comprehensive text-book on the whole subject; and *Moulds, Mildews, and Mushrooms*, a guide to the systematic study of the fungi and *Mycetozoa* and their literature, by Prof. *Lucien Underwood*, of Columbia University.

Miss Cornelia E. Horsford, being interested in the question of the origin of certain ancient ruins situated on the Charles River, Mass., and elsewhere in America, which were discovered by the late Prof. E. N. Horsford and were believed by him to be relics of the settlements formed by the Norsemen in the tenth century, commissioned Mr. Thorstein Erlingsson to examine for comparison certain ancient dwellings in Iceland, in the summer of 1895. The inquiries assigned to him related to the method of construction of the long houses, square buildings, hillside cots with pavements, mounds, things and doom rings, irrigation and drainage, ditches, river dams, hithes and ship docks, or *nauts*, grave-hills, and forts. The results of the study are given, with illustrations, in a small book, *Ruins of the Saga Times*, by *Thorstein Erlingsson*. (Published by David Nutt, London.) Mr. Erlingsson's report is supplemented by an outline of already ascertained knowledge regarding early Scandinavian home building, derived from previous excavations and investigations furnished by F. T. Norris and Jön Stefánsson, and a summary in French by M. E. D. Grand.

The Quarterly Journal of the Anthropological Institute of Great Britain and Ireland was issued during the thirty-seven years from the beginning of 1871 in the form styled demi-octavo. The small pages of this size entailed some inconveniences, especially when ample plates and tables were needed for illustration. With the double number (August and November, 1898) a new series was begun, in the form styled imperial octavo, with a page considerably larger than in the old form and corresponding in size with the important publications of some of the continental societies of Europe. This number contains the proceedings of seven meetings of the society and important anthropological articles, some of them on American subjects. Among them is a criticism, by Prof. W. Z. Ripley, on Deniker's Classification of the Races of Europe.

In *How to Swim* (Putnams, $1) Captain *Davis Dalton*, Chief Inspector of the United States Volunteer Life-Saving Corps, gives a practical treatise upon the art of natation, together with instruction as to the best methods of saving persons imperiled in the water and of resuscitating persons apparently drowned. The treatise covers every branch of the art, and abounds in cautions in connection with nearly every topic, against the mistakes that may arise from timidity or the carelessness of over-confidence. The author holds that swimming is an art to be acquired and learned like other athletic arts, although it depends upon natural principles. The best [Pg 278] movements for taking advantages of the physical laws involved in it have been studied by competent men, and a brief and clear presentation of them is attempted here. First, we have the lessons for the beginner, who must, before all things, "have confidence." The different strokes are described in detail and illustrated; the different modes of swimming and the postures, swimming in clothes, taking off clothes in the water, diving and swimming under water, swimming in waves, and other features are explained; and, finally, the life-saving directions are given, and public education in swimming is insisted upon.

The Southern Magazine is a new monthly, published at Manassas, Va., by the Southern Publishing Company, of which we have the third number, that for August. It has a definite flavor of the old South, for which we find no fault with, for there was much about the old South which ought to be preserved, and no little that was too precious to be lost. Among the matters of special interest in this number are the Sketch of Sidney Lanier, by Ellen Manderson, with selections from his writings; The Last Meeting of the Confederate Cabinet (held, by a curious coincidence, at Abbeville, S. C., where secession was started), by Walter L. Miller; an account of the University of Virginia, by John S. Patten, which appears to be the first of a series on Southern Educational Institutions; and an article on South Carolina in Letters, by Colonel J. P. Thomas.

The fifth yearly number of *L'Année Psychologique* of MM. *Alfred Binet*, *H. Beaunis*, and *Th. Ribot* is a volume of 902 pages, of which 591 pages are included in the first part, devoted to Original Memoirs and General Reviews. The papers are nineteen in number, on such subjects as muscular fatigue, the foreshortening of objects rising from the horizon, stereognostic perception and stereoagnosy, suggestibility, applications of the calculation of probabilities to psychology, colored audition, mental labor and nutritive changes, measure of mental fatigue, sensations of smell, phonographs and the study of the vowels, cephalometry, pedology, volume of the arm and muscular force, chronophotographic and other apparatus, and muscular sense; and the authors are MM. Van Biervliet, of Ghent; Blum, of Nîmes; Bourdon, of Rennes; Claparède, of Geneva; Clavière, Delage, Demeny, Druault, Mlle. Joteyko, MM. Larguier, Manouvrier, Marage; Marbe, of Würzburg; Obersteiner, of Vienna; Tscherning and Zwaardemaker, of Utrecht. M. V. Henri's paper on Muscular Sense would make a volume by itself. The second part—Analyses—consists of reviews of psychological publications entered under ten headings. The Bibliography contains 2,558 titles, and the index of authors fills upward of seventeen double-columned pages. (Paris: Scheicher Frères.)

Valuable papers on Comparative Tests of Bituminous Steam Coals, by John W. Hill; the Artificial Preservation of Railroad Ties by the Use of Zinc Chloride, by W. W. Curtis; and the Theory of Concrete, by G. W. Rafter, are given in the *Proceedings of the American Society of Civil Engineers* (vol. xxv, No. 4, April, 1899), together with discussions respecting street grades and cross-sections in asphalt and cement and to loads and maximum stress on members of a bridge truss; also biographical sketches of D. L. Barnes and W. R. Michie.

A valuable addition to D. Appleton and Company's International Education Series, and a sprightly book in itself withal, is *Montaigne on the Education of Children*, a volume of selections bearing on the subject from the writings of the quaint old Frenchman, translated and annotated by L. E. Rector. The significance of Montaigne, as the editor of the series observes in his preface to the volume, lies chiefly in his protest against pedantry, and the translator finds Montaigne's modernity shown in his attempt to degrade men learning from the first place, and to lay the emphasis on fitness for practical life, ability to use one's judgment, and morality and virtue. While Montaigne had limitations and defects in his educational views, such as are pointed out by Dr. Harris, he still appears to have been far in advance of his own time, and in some respects of the present time as well. The solution of the human problem, success in dealing with one's self and his fellows, was his ideal. The translator shows how Locke and Rousseau, and, of course, all educational writers who have built upon these, drew from him. The subjects of the selections given here are the Education of Children, Pedantry, the Affection of Fathers, Liars, Physiognomy, Anger, the Art of Conversation, Idleness, Experience, and History. [Pg 279]

An essay on *The Object of the Labor Movement*, by *Johann Jacoby*, translated by Florence Kelley, and published by the International Publishing Company, advocates co-operation, demands that the employer recognize the laborer whom he employs as a being fully his own equal and treat him accordingly, and claims of the State an especial consideration of the working class as an act of reparative justice.

The *Transactions of the First and Second Regular Meetings of the Wyoming State Medical Society*, May 13 and November 1, 1898, shows that that body is vigorous and active, and that the doctors of Wyoming are interested in maintaining the dignity and reputation of their profession. It is represented that fully fifty per cent of the regular physicians of the State have already been enrolled as members of the society.

Mr. *Frederick H. Gelman's Elements of Blowpipe Analysis* (New York: The Macmillan Company; 60 cents) is intended to serve the twofold purpose of giving the student a general outline of the analysis and of introducing him to the methods of determinative mineralogy. Every effort has been made to simplify the account. The first chapter is devoted to Apparatus and Details, and the second to the General Outline of Blowpipe Analysis. Then the general reactions for the detection of the metallic elements in simple compounds are described, the behavior of some of the principal ores before the blowpipe, and comparative tables.

PUBLICATIONS RECEIVED.

Abbot, A. C., M. D. The Hygiene of Transmissible Diseases, their Causation, Modes of Dissemination, and Methods of Prevention. Philadelphia: W. B. Saunders. Pp. 311. $2 net.

Allin, Arthur. Extra-Organic Evolution and Education. Pp. 8.

Baker, Charles Whiting. Monopolies and the People. Third edition, revised and enlarged. New York: G. P. Putnam's Sons. Pp. 368.

Baker, M. N. Potable Water and Methods of Detecting Impurities. New York: D. Van Nostrand Company. Pp. 97. 50 cents.

Baskett, James Newton. The Story of the Fishes. New York: D. Appleton and Company. (Appletons' Home-Reading Books.) Pp. 297.

Borodine, N., Editor. Revue Internationale de Pêche et de Pisciculture. (International Review of

Fisheries and Fish-Culture.) No. 1. August, 1899. (Three times a year.) St. Petersburg, Russia. Published by the Russian Imperial Society of Fisheries and Fish-Culture. (In English, German, and French.) Pp. 37, with supplement of one folded page. Annual subscription, four francs.

Bulletin, Le, Médical de Quebec. Volume I, No. 1. September, 1899. Published under the direction of the Medical Society of Quebec. Monthly. Pp. 56. $2 a year.

Burgess, O. O., M. D. Consciousness, Being, Immortality; Divine Healing and Christian Science. San Francisco. Pp. 20.

Christian Science Publishing Society, Boston. Legal Aspects of Christian Science. Decisions of Courts, Opinions of Lawyers, etc. Pp. 83.

Conn, H. W. The Story of the Living Machine. New York: D. Appleton and Company. (Library of Useful Stories.) Pp. 191. 40 cents.

De Morgan, Augustus. Elementary Illustrations of the Differential and Integral Calculus. Chicago: The Open Court Publishing Company. Pp. 144. $1.

Descartes, René. Discourse on Method; or the Method of Rightly Conducting the Reason and Seeking Truth in the Sciences. Translated, etc., by John Veitch. Chicago: The Open Court Publishing Company. (Religion of Science Library.) Pp. 87. 25 cents.

Flynt, Josiah. Tramping with Tramps. Studies and Sketches of Vagabond Life. With Prefatory Note by Hon. Andrew D. White. New York: The Century Company. Pp. 396. $1.50.

Giles, William A., Chairman of the Legislative Committee of the Civic Federation (Chicago). Papers on Reform Legislation, Corrupt Practices Acts, and Pawnbroking in Different Countries. Chicago: R. R. Donnelley & Sons Company. Pp. 35.

Griffith, G. W. The Influence of the Earth upon the Field of a Bar Magnet. Pp. 4.

Harrington, Mark W. About the Weather. New York: D. Appleton and Company. (Appletons' Home-Reading Books.) Pp. 246.

Higginson, Thomas Wentworth. Contemporaries. Boston and New York: Houghton, Mifflin & Co. Pp. 379. $2.

Holland, Frederick May. Liberty in the Nineteenth Century. New York: G. P. Putnam's Sons. Pp. 257.

Korscheldt, Dr. E., and Helder, Dr. K. Text-Book of the Embryology of the Invertebrates. Translated by Matilda Bernard, and edited, with Additional Notes, by Martin F. Woodward. Vol. II. Pp. 369. Vol. III. Pp. 441. $3.25. [Pg 280]

Lake Mohonk Conference on International Arbitration. Report of the Fifth Annual Meeting, 1889. Pp. 142.

Lo Blanco, Dr. Salvatore. The Methods employed at the Naples Zoölogical Station for the Preservation of Marine Animals. Translated by E. O. Hovey. United States National Museum. Pp. 42.

Newman, George. Bacteria, especially as they are related to the Economy of Nature, to Industrial Processes, and to the Public Health. New York: G. P. Putnam's Sons. Pp. 348.

Newton, Alfred, Gadow, Hans, and others. A Dictionary of Birds. New York: The Macmillan Company. Pp. 1088. $5.

Ohio Agricultural Experiment Station. Press Bulletin No. 199. Plums. A Comparison of Varieties. Pp. 2.

Oliver, Charles A. Description of an Adjustable Bracket for the Reid Ophthalmometer. Pp. 3; A Case of Foreign Body in the Optic Nerve. Pp. 3; A Case of Reflex Irritation. Pp. 5; A Case of Fibroma of the Eyelid. P. 1, with plate; A New Method for the Plantation of Glass Balls into the Optical Cavity. Pp. 30.

Putnam, F. W. Address as Retiring President of the American Association for the Advancement of Science, Columbus Meeting, 1899. Pp. 17.

Ribot, Th. The Evolution of General Ideas. Chicago: The Open Court Publishing Company. Pp. 231. $1.25.

Russell, Charles T. The At-one-ment between God and Man. ("Millennial Dawn." Vol. V.) Allegheny, Pa.: Watch-Tower Bible and Tract Society. Pp. 507.

Stuver, E., M. D. The Importance of a Knowledge of the Phylogenetic Development of the Child in the Prevention of Children's Diseases. Pp. 11.

Thompson, Ernest Seton. The Trail of the Sandhill Stag. New York: Charles Scribner's Sons. Pp. 93. $1.50.

United States Department of Agriculture. Farmers' Bulletins. No. 70. The Principal Insect Enemies of the Grape. By C. L. Marlatt. Pp. 23; No. 80. The Peach-Twig Borer. By. C. L. Marlatt. Pp. 15: No. 99. Three Insect Enemies of Shade Trees. By L. O. Howard. Pp. 30;—Division of

Entomology. No. 37. The Use of Hydrocyanic-Acid Gas for Fumigating Greenhouses and Small Frames. Pp. 10; No. 38. The Squash-Vine Borer. Pp. 6; No. 39. The Common Squash Bug. Pp. 5.

United States Fish Commission. Check-List of the Fishes of Florida. By B. W. Evermann and W. C. Kendall. Pp. 68.

Upsala, University of (Sweden). Bulletin of the Geological Institution. Hj. Sjögren, Editor. Vol. IV, Part I, No. 7. 1898. Pp. 131, with four plates.

Weed, Clarence Moores, Editor. The Insect World. A Reading Book of Entomology. New York: D. Appleton and Company. (Appletons' Home-Reading Books.) Pp. 207. 60 cents.

Wisconsin Geological and Natural History Survey. Bulletin No. 4. On the Building and Ornamental Stones of Wisconsin. By Ernest R. Buckley. Pp. 544.

Wisla. A Geographical and Ethnographical Publication (in Polish). Vol. XIII, Nos. 1 to 5. Warsaw, Poland. Pp. 320.

Wright, Mabel Osgood. Wabenor the Magician. New York: The Macmillan Company. Pp. 346.

Fragments of Science.

The Dread of the Jew.[41]—The Dreyfus affair and the furious passions that it has awakened have their ultimate foundation in dread and hatred of the Jews. There is a Jewish question, more or less acute, in every continental country, and we are told by pessimists that before long we shall have an anti-Jewish movement in the East End of London. These facts naturally suggest an inquiry into the causes of the dread and hate which the Jews inspire, and the asking once again whether there are any good grounds for regarding the Hebrew race as a menace to the Christian world. The main fact about the Jews on the Continent which emerges from a study of the present situation is that for some reason or other they inspire terror. That this terror is as absurd and as unreasonable as is the terror caused respectively by Jesuits and Freemasons, we ourselves do not doubt for a moment, but that does not alter the fact that the sense of terror exists. It is hardly too much to say that the majority of people on the Continent honestly believe that unless the Jews are in some way or other curbed, controlled, and kept down, something very dreadful will happen. In Russia the vast Slavonic population and its leaders believe that unless the Jews are impounded in the Polish Pale they will swamp the true Russian, and utterly ruin and destroy the Russian nationality and the Russian ideal. In Austria it is believed that if the Jews are allowed to go on as [Pg 281] they are going on they will get everything into their hands—the land of the peasants, the sources of public information and the press, and the nerves by which trade and commerce are moved. In Germany it is much the same story, and there the Jews are believed, unless stopped in time, to be about to monopolize the universities. In France it is thought that the Jews, if not put down with the strong hand, will capture the whole administration, as well as "strangle commerce by their octopus grip." The Jews are called a "parasitic race," whatever that may mean. It is said that the Jew never becomes an agriculturist, that he is a usurer and a bloodsucker, that he is a gross materialist, and that he has no ideals beyond the precious metals; and that they habitually act together to further their own racial interests and to injure those communities which have been foolish enough to trust them. To take the charge of want of patriotism first. How is it substantiated? We can not say that we have ever seen any real evidence of want of patriotism in the Jews. Look at the case of France at present. There is something extremely pathetic in the way in which the French Jews cling to their nationality in spite of all the hatred they inspire. The truth is, the Jew is a sort of expert in patriotism. Did not the Maccabees teach the world one of its first lessons in patriotism? Depend upon it, if the Jew is only allowed to be a patriot he will not fail here. The charge, indeed, is like that so often made in Russia against the Jews. They are accused of not tilling the soil, their accusers ignoring the fact that no Jew is allowed to buy, or to lease, or to occupy land, and is, in fact, excluded by law from acting as a farmer. Take next the charge of "aloofness." Probably this charge is well founded, but what can be expected of a people so newly freed from the Ghetto? If you treat a race for centuries as lepers, and visit its members with dire penalties, if they do not keep "aloof" they are likely to remain for some time disinclined to free intercourse. The third charge is, in reality, that the Jews of the world, having obtained control of cosmopolitan finance, act together in the interests of their race, and inflict grievous injuries upon the nations. But what proof is there of this? Curiously enough, Mr. Arnold White—though in other ways he seems to encourage this charge—accuses the great Jewish financiers of not doing this very thing. He tells us that after the Russians had driven the Jews into the Pale they wanted to raise a loan. One would have expected the great Jewish loanmongers to have absolutely refused to help the enemy of the race. Instead they basely, as we think, found Russia the money she wanted. But though this was a base act, it certainly is not consistent with the charge that the Jews control the international money market for tribal ends. We believe, in fact, that this whole charge is a pure delusion. The great financiers, whether Jew or Gentile, look for a profit, and not to deep and mysterious racial aspirations. The charge that the Jews are steeped in materialism, and so are a demoralizing element in the community, is equally unfair and absurd. Many Jews may be fond of pomp of a vulgar kind, and may affect what we confess personally to finding very disagreeable forms of Asiatic luxury; but these are externals. In essentials and as a race the Jews are no more materialistic than their neighbors. And can we say that they are a demoralizing element when it is universally confessed that the Jews are among the best fathers, sons, and

husbands in the world?

Death of Professor Bunsen.—With the death of Robert Wilhelm Bunsen, at Heidelberg, August 16th, the world loses a student whose name is inseparably connected with nearly all the chemical work that has been done in the last fifty years, for it is safe to say that hardly a discovery has been made or experiment performed to the success of which some process, property, or instrument discovered, invented, or suggested by Bunsen, and usually named after him, has not contributed. A sketch of this illustrious chemist, with a portrait, and an enumeration of his principal works, each of which might be characterized as a milestone in the advance of the science, was published in the Popular Science Monthly for August, 1881 (vol. xix, page 550). One of the principal events in his life since that sketch was published was his election, in 1883, as one [Pg 282] of the eight foreign associates of the French Academy of Sciences—the highest honor that that institution is competent to confer. Besides Bunsen's personal interest in the work and success of his students, one of his most salient traits, as described by a careful and appreciative biographer in the New York Evening Post, was his absentmindedness concerning what he had himself accomplished. He was afflicted with an "incipient aphasia," which made it impossible for him to talk about them. "He could not answer verbal questions, whether oral or written. He could not have passed a decent examination in his own discoveries. Let the question come in the shape of an emergency in a chemical operation, and a wealth of knowledge would be poured out, but let it be put in words and he could not answer it." He is said to have answered a student once, who asked him about some substance, that he knew nothing about it—"You will have to look up the literature." The student looked up the literature, and found that it consisted of a single article, and that by Bunsen! Professor Bunsen prized what would stimulate him to effort, enjoyed life, was fond of travel and interested in everything human, and was a good novel reader.

The Unprofitableness of Strikes.—The cost of a large strike is impressively illustrated in some of the results of the great colliery dispute of 1898 in South Wales, as they are set forth in the British Board of Trade returns and the reports of the consular service. In direct financial loss, the company suffered to the extent of $100,000, and the men of $300,000 in wages, besides the demoralization from being so long out of work. To a certain extent, other districts gained what the South Wales mines lost by the diversion of trade to them, but that simply aggravated the evil in the mines, for some of this diverted trade will stay where it went. It is sometimes said, indeed, that strikes have only a temporary effect on business, from which it will recover in time. This is true, however, as is suggested in Industries and Iron, only when the locality affected has a virtual monopoly of the trade, while in the competition of the nations instances of that kind are growing rarer. England especially has many rivals in these days, eager to take advantage of every opportunity to profit by its mistakes or misfortunes, and which, when they get their hands on a good thing, are not apt to let go. Notwithstanding some strikes at home, the coal trade in the United States derived benefits from the British strike by sending to markets which the Welsh mines should have supplied; Germany sent coal to Sweden, and Belgium increased its shipments to the Canary Islands. Other countries are induced, by conditions making the usual sources of supply inconvenient to them, to a more active development of their own resources, as Austria-Hungary, Spain, and France were in the present case. So it is more than doubtful whether the present strike paid.

The Scientific Spirit.—The study of science, especially of an experimental science, said Prof. R. H. Chittenden in an informal talk to students of the Sheffield Scientific School, is peculiarly adapted for developing the power of independent thought, and of training one in drawing logical conclusions from experimental data. In the laboratory is afforded an opportunity for making observations, but if real benefit is to be derived from the experimental work there must be a full realization of the necessity of careful thought in drawing deductions from the results observed. Broad generalizations built on a slender foundation of fact frequently topple to the ground, and sometimes carry destruction with them, all because of a lack of that critical spirit which prompts a careful and thorough consideration of all the premises. The man who has acquired the habit of careful thought, of reasoning out each step in a process, of weighing carefully each reaction involved, of seeking in his own mind the reason for this or that phenomenon, who looks at both sides of a question, and carefully considers all the facts available, will build much more surely and firmly than he who by specious arguments constructs a glittering hypothesis, only to see it fade away. Hasty reasoning, insufficient data, obscure facts, are the bane of modern science. The [Pg 283] true scientific spirit prompts to thorough inquiry; it will have nothing to do with hasty generalizations that may glitter but do not convince; it puts a restraining hand on all immature conclusions, and demands, above all else, careful, thorough observation. It shuns all shams. Good, honest work is the only passport to the domain of science.

Constitution of the Funafuti Atoll.—In the boring of the coral atoll of Funafuti, Professor David, of the University of Sydney, reached a depth of 697 feet, and a subsequent boring was made down to about 1,000 feet. The core obtained by the David party was sent to England and placed in the hands of Professor Judd for investigation. The general statement is made respecting it that the material brought up presents much the same character throughout, and so far is regarded as supporting Darwin's theory. There are no layers of chalky ooze, such as Murray's hypothesis might have made possible, and no trace of volcanic material has been found. The later boring beyond 700 feet passed through a hard limestone containing many well-preserved corals. In a boring of the bed of the lagoon down to 144 feet, after passing through 101 feet of water, the first 80 feet below were found to consist of the calcareous alga Halimeda mixed with shells, and the remaining 64 feet of the same material mixed with gravel.

Metallic Calcium.—Metallic calcium, as prepared by Professor Moissan from solution in liquid sodium, separates in hexagonal crystals which have a specific gravity of 1.85 and melt at 760° *in vacuo*. On solidifying, the metal is somewhat brittle, is less malleable than potassium and sodium, and shows a crystalline fracture. When free from nitride it is silver-white in color, and has a brilliant surface. Heated to redness in a current of hydrogen, a crystalline hydride, CaH_2, is formed. When pure, calcium is not acted upon at ordinary temperatures by chlorine, though at 100° C. the action is decided. But if the metal contains nitride, chlorine attacks it at the ordinary temperature. At 300° C. calcium ignites and burns brilliantly in oxygen. Gently warmed in air, it burns with brilliant scintillations. It combines with sulphur, with incandescence, at 400° C. At a red heat it unites actively with lampblack, giving a carbide, CaC_2. It gives some brittle alloys with magnesium, zinc, and nickel. The alloy with tin slowly decomposes water. A crystalline amalgam is formed with mercury, which may be distilled in hydrogen at 400° C., but which forms nitride when heated in nitrogen. Heated to redness with potassium or sodium chloride, calcium sets the metal free. Water acts on calcium only very slowly, with the evolution of hydrogen. In liquefied ammonia at -40° C. calcium ammonia is formed—a reddish-brown solid.

Prosperity and Enterprise in Mexico.—The increasing prosperity of Mexico is one of the striking features of current history. In four years the imports of the country increased from $30,000,000 in 1894 to upward of $45,000,000 in 1898, the average for five years having been $40,000,000. The chief sellers to Mexicans are the United States, Great Britain, France, and Germany, and the keenness of the competition for trade is shown in the fluctuations in the relative shares of it of the several countries. Spain has a small share of trade, which is growing. Industrial enterprises are being developed throughout the country with energy, enterprise, and success. Cotton and linen factories have been established, attention is given to the erection of woolen mills, and a noticeable activity prevails in mining industries. Under all these influences the railroads are prospering too.

A Question of Economy.—A paper, "Shall we grow the Sugar that we consume?" by Freeman Stewart, called out by an article by ex-Secretary Wilson, besides matter bearing directly on the question, embodies observations on general political principles. Thus, it seems necessary to observe "that the idea that republicanism requires our public officials to act as mere weathercocks for the transient waves of popular clamor and excitement is also a deplorable delusion, which, if persistently carried into effect, will soon utterly destroy republicanism. As free institutions depend on the recognition of correct principles by the people, it is primarily necessary that correct principles should be constantly impressed upon the attention of the people. The great need of the nation to-day is wise leadership—unselfish men, who appreciate the necessity of being governed by immutable divinely appointed principles, to act as leaders, to keep the minds of the people centered in the right direction." Coming to the main subject of the essay, we have, as to the expediency of taxing ourselves to have sugar made here: "If the farmer's profits must come from the consumers of sugar as a bounty or tax, and not from the inherent profitableness of the business, then the farmer's profits are the consumer's loss. The business is inherently unprofitable, and no farmer, or any one else, has a right, 'inherent' or otherwise, to carry on an unprofitable business, except at his own expense.... It may be assumed that the farmers who are growing the sugar are now growing crops which, if not as profitable as they desire, are at least sufficiently so to keep them from being burdensome to the rest of the nation. And how can the prosperity of the nation be increased by having these same farmers engage in a new business which will require them to draw on the productive capacity of the rest of the people to the extent of many millions of dollars annually, in order to keep their heads above water?"

[Pg 284]

Bacteria of the Dairy.—An investigation of the relation of acid fermentation to the flavor and aroma of butter, made by C. H. Eckles at the Iowa College Experiment Station, has given the results that the flavor is produced by the bacterial fermentations which have taken place in the milk and cream. The kind of flavor depends upon the class of bacteria causing the fermentation. The ripening of a good quality of acid cream is mostly a development of acid bacteria. Four species of acid-producing bacteria, tested in ripening pasteurized cream, were found to give the butter the typical flavor and aroma. Of the species tried, the most common milk-souring organism (*Bacterium lactarii*) was found to give the most satisfactory results in ripening cream. Cream ripened with common bacteria found in hay dust (*Bacillus subtilis*) gives a very undesirable flavor to butter. The superior flavor of summer butter is due to the greater number of bacteria of the acid class found in milk during that season.

For Outdoor Improvement.—The American Park and Outdoor Association has taken up and aims to nationalize the important work of the improvement of outdoors. Not that it expects to improve upon Nature, but it hopes to be able to neutralize or remedy the devastation and disfigurement which man has wrought upon her face. At the third annual meeting of the association, held in Detroit in July, 1899, preliminary steps were taken toward offering prizes for the improvement of grounds about manufactories and homes—both front and back lots—and especially about the homes of artisans. A standing committee was instituted to consider the best way of checking abuses of public advertising. A paper read by Mr. F. Law Olmstead, on the Relation of Reservoirs to Public Parks, concerned such construction of reservoirs and the surrounding them with suitable settings as would bring them into closer harmony with the park landscape and make them more a part of it. Another paper, by Mr. R. J. Coryell, of the Detroit parks, might be described as an effort to show how a similar service may be performed for the parks and the people—in other words, how to make the people at home in the parks. Its points were illustrated by citing what had been done in Detroit. Respecting means of preventing depredations, Mr. C. C. Lancey told of good results accomplished in Rochester, N. Y., by the

distribution of circulars of information on the subject; and Mr. F. L. Olmstead, Jr., of the interest taken by the children in the school gardens in Cambridge, Mass.

Where Physical Investigation Fails.—From the discussion of the physical method, with its descriptive laws and applications and hypotheses, Prof. J. H. Poynting was led, in his address at the British Association, to the consideration of the limitation of its range. It was developed in the study of matter which we describe as non-living, and with non-living matter it has sufficed for the [Pg 285] particular purposes of the physicist. Of course, only a little corner of the universe has been explored, but in the study of non-living matter we have come to no impassable gulfs, no chasms across which we can not throw bridges of hypothesis. Does the method equally suffice when it is applied to living matter? Can we give a purely physical account of such matter? Do we make any attempt to apply the physical method to describe and explain those motions of matter which on the psychical view we term voluntary? In practice the strictest physicist abandons the physical view, and replaces it by the psychical. He admits the study of purpose as well as the study of motion, and has to confess that here the physical method of prediction fails.

Honors to Sullivant and Lesquereux.—"Sullivant day," August 22d, was devoted in the American Association to the commemoration of the lives and works of William S. Sullivant and C. Leo Lesquereux, botanists, the former distinguished for his studies in the mosses and the latter for his researches in paleobotany, both of whom lived and did the work by which they became famous in Columbus, Ohio. Sullivant was born and passed the whole of his life in Columbus. Lesquereux, a Swiss by birth, lived in Columbus during many of his most fruitful years, and worked alongside of Sullivant. A considerable number of objects associated with the two botanists were on exhibition—rare botanical specimens, charts and pictures connected with their labors, and complete sets of their published works—and excellent and highly prized portraits of them were shown. The families of both were represented by the presence of daughters and granddaughters, among whom was Miss Arhart, a granddaughter of Lesquereux, who was associated with him in part of his work, and made most of the drawings for his later books. Prof. C. R. Barnes presided over the exercises. Prof. W. A. Kellerman read a tribute to Sullivant from Dr. Gray's supplement to the Icones. Mrs. Britton gave a short review of the species named from Sullivant (including twelve North American mosses). Professor Barnes read a tribute to Lesquereux, taken from the Botanical Gazette. Remarks were made and papers read on the Progress in the study of the Hepatica, by Prof. L. M. Underwood; the Moss Flora of Alabama, by Dr. Charles Mohr (read by Professor Earle); the History of the Study of the Mosses, by Mrs. Britton; the Classification of Certain Mosses, by A. J. Grout; the Study of Lichen Distribution in the Mississippi Valley, by Bruce Fink; and Botanical Teaching in the Secondary Schools, by W. C. Stevens and Ida Clendenin. Among the exhibits, those of twelve species of hepaticæ from California, by Prof. F. E. Lloyd; forty-five photographs of American students and collectors made famous by their work in mosses, by Mrs. Britton and Professor Underwood; and six species of mosses discovered and collected originally by Sullivant and Lesquereux near Columbus, deserve special mention.

Rate of Evolutionary Variation in the Past.—Mr. Adam Sedgwick, speaking, in his address at the British Association, of variation, selection, and heredity, having raised the question whether the variability of organisms has ever been different from what it is now, answered it in the affirmative, because it would be absurd to suppose that organisms would remain constant in this respect while they have undergone alteration in all their other properties. According to the Darwinian theory of evolution, one of the most important factors in determining the modification of organisms has been natural selection. It acts by preserving certain favorable variations, and allowing others less favorable to be killed off in the struggle for existence. It will thus come about that certain variations will be gradually eliminated, while the variations of the selected organisms will themselves be submitted to selection, and certain of these will in their turn be eliminated. In this way a group of organisms becomes more and more closely adapted to the surroundings. It would thus appear that the result of continued selection is to diminish the variability of a species. Hence, as selection has been going on all the while, variation must have been much greater in past times than it is now. Following out this train of reasoning, we are driven to the conclusion [Pg 286] that one of the most important results of the evolutionary change has been the gradual increase and perfection of heredity as a function of organisms and a gradual elimination of variability. This view, if it can be established, is of the utmost importance to our theoretical conception of evolution, because it enables us to bring our requirements as to time within the limits granted by the physicists.

MINOR PARAGRAPHS.

Of the archæology of Block Island, Arthur Hollick found in his explorations that around the shores of Great Salt Pond and on the sand dunes that border the western shores of the island evidences of former occupation by the Indians are numerous. Kitchen middens are exposed in several street cuttings, implements are often found scattered over the surface of the ground in certain localities, and skeletons have been unearthed from time to time. In many places the kitchen midden accumulations were so obvious that it was impossible to ignore them entirely. They were found to consist of the customary collection of oyster and other shells, bones, pottery fragments, fire-cracked stones, charcoal, finished implements, rejects, flakes, chips, etc. The finished implements found were two axes, of a plagioclase igneous rock, and three arrow points, all of quartzite. In the sand dunes were many old fireplaces, mostly buried by the sand which has drifted over them. They could generally be located by the richness of the turf on the surface

immediately above. Mixed with the accumulations in these places were the bones and teeth of animals. The island promises a good reward for archæological investigation.

In a form of disease known as peckiness in the cypress and pin-rot in the *librocedrus*, described by Hermann von Schrenk in a thesis presented to Washington University, the wood is destroyed in localized areas, which are surrounded by apparently sound wood. The cell walls are changed into compounds, which diffuse through the walls and fill the cells surrounding the decayed center, and these have been called humus compounds. In both trees a fungus mycelium occurs, with strongly marked characteristics, which flourishes within the diseased centers, and grows between them without affecting the intervening wood. This wood can be utilized for many purposes even when much rotted, and in neither case does the mycelium grow after the tree has once been cut down. The two trees thus diseased, both representatives of a race of trees the majority of which are extinct, are closely related genetically, although growing in different parts of the country. The two forms of decay differ but slightly, and not more than might be expected in two woods of different character.

Mr. J. C. Arthur, of the Purdue University Agricultural Experiment Station, a few years ago picked up a small white flower (*Cerastium arvense oblongifolium*) growing unobtrusively among the grass and low weeds of the roadside. It was a little more attractive than its relative which is called the field chickweed, and the author suggests the name of starry grasswort for it. Under cultivation it spread out over the ground in a close mat of foliage in a manner characteristic of many members of the pink family, to which it belongs; and now for six weeks in April and May it is a mass of "dazzling whiteness, softened with the pale green of stems and leaves," while "all winter long the prostrate stems remain alive to their very tips, and the leaves maintain a summerlike appearance," without the indurated, polished look so usually associated with evergreen foliage. This is one roadside flower taken up, perhaps casually, for cultivation and improvement. There are others—no one knows how many—that will doubtless likewise reward the pains taken with them; and this inspires Mr. Arthur to suggest to others that they keep a lookout for plants that may become desirable garden varieties and try them. "It is evident that showiness in the wild state is not the most important criterion by which to gauge the future culture value of a plant. One needs to have many factors in mind to meet with success, and it is hoped that the study of the starry grasswort will be suggestive in this line. The byways and fields [Pg 287] undoubtedly hold many incipiently valuable decorative plants which await the discoverer, as truly as do those of the unexplored regions of Asia and Africa."

An experiment has been tried in New York during the past summer in the way of "vacation schools" for teaching housekeeping and domestic economy. Instruction was given daily in these arts in the public schoolrooms in Front and Oliver Streets and in Hester Street. At Front and Oliver Streets girls were taught to air, clean, and take care of a bedroom; to set table, clean, and take care of a living room; kitchen cleanliness; laundry work—one week being devoted to each course, and talks were given on furnishing a flat, the care of a cellar, and the importance of air and sunlight to health. The children were also taught daily to cook appetizing dishes and serve them. At Hester Street more time was given to the cooking lessons, instruction was given on the feeding of babies, and a class in nursing was taught; among other things, emergency bandaging, caring for helpless patients, and the hygiene of the sick-room.

Mr. A. P. Coleman, during some geological work last summer on the north shore of Lake Superior, about Heron Bay, discovered a new mineral, which he has named *Heronite*, and which he describes at length in the Journal of Geology for July-August. It is a dike rock, consisting essentially of analcite, orthoclase, plagioclase, and ægyrite, the analcite having the character of a base, in which the other minerals form radiating groups of crystals. The analcite clearly represents the magma left after the crystallization of the imbedded minerals, and it is evident that it can be formed only from a magma highly charged with water, and therefore under pressure.

From the examination of a number of nearly pure hydrocarbons obtained from American petroleum by Young, it appears that the same classes of hydrocarbons, paraffins, polymethylene compounds of naphthenes and aromatic hydrocarbons are present in these and in Russian and Galician petroleums; but that Russian petroleum contains a relatively larger amount of naphthalenes and, in all probability, of aromatic hydrocarbons, than Galician, and Galician a larger amount of the same hydrocarbons than American petroleum.

NOTES.

An old contributor, Dr. A. F. A. King, of Washington, D. C., writes us calling attention to the interesting fact that we printed an article of his as far back as September, 1883, suggesting the mosquito theory of malaria, and giving a number of observations which seemed strongly to support this view.

Experiments made by F. H. Hall and W. P. Wheeler, at the New York Agricultural Experiment Station, regarding the best food for "chicks, pullets, cockerels, and ducklings," seem to indicate conclusively that part of the protein must be drawn from animal sources if we are to get the best results. Rations in which from forty to fifty per cent of the protein was supplied by animal food produced more rapid growth and at less cost of production.

Messrs. A. Stutzer and Hartlieb, of Breslau, have detected bacteria in Portland cements, which provoke the liberation of the nitrogen from nitrogenous compounds in water, and the formation

of nitrous and nitric acids that act upon the lime in the cement and promote its disintegration.

According to Industries and Iron, the tides are now utilized for generating power at Pont-l'Abbé, Finisterre, France, during fourteen hours per day. At flood tide the water flows through a canal two miles and a half inland into a pond in the rear of the power house, and returns to the sea at ebb tide. The total fall is seven feet and a half, and eighty-horse power is generated by means of turbines. Means have been considered for applying this method of generating power to various industries.

A proposal for an International Physical Congress has been accepted by the authorities of the Paris Exposition of 1900, and the congress will be held from the 6th to the 12th of August, under the auspices of the French Government. It immediately precedes the International Electrical Congress. So far as has yet been determined, the subjects of the addresses and reports will be classified under the headings of the definition and fixing certain units (of pressure, scale of hardness, quantity of heat, etc.), the Bibliography of Physics, and National Laboratories. The final [Pg 288] programme is, however, still to be settled. The subscription for membership is twenty francs, or four dollars. The foreign secretary of the congress is M. Charles Edouard Guillaume, Pavillon de Breteuil, Sevres (Seine et Oise), Paris.

In a book called Literary Munich Portraits, with brief biographical sketches by Paul Heyse, are given of twenty-five of the most prominent literary men of that brilliant capital. Only two authors not Germans are included. One of them is our contributor, E. P. Evans. The other is the Norwegian novelist Björnson. Heyse leaves himself out, although he is the greatest literary character of them all.

Some recent experiments, conducted jointly by the Kew Observatory Committee and the International Bureau of Weights and Measures at Sèvres, were made to compare the platinum thermometer of Professor Callendar, which measures temperature by the varying resistance of a platinum wire, and the older mercury and gas thermometers. It was found that below 100° C. the differences between the observed values on the nitrogen scale and those deduced from the platinum thermometer are exceedingly small, and that even at the highest temperature (590°) the differences only amount to a few tenths of a degree.

The American Chemical Society has gained 232 members during the past year, making the present number 1,540. The report of the committee on the analysis of coal, submitted to the recent meeting of the society at Columbus, Ohio, embodied detailed instructions in regard to the best methods of analyzing coke, and outlined a plan for securing uniformity in such analysis by chemists throughout the land. This report was adopted.

At the recent annual meeting of the American Society for the Promotion of Agricultural Science Prof. W. J. Beal reported concerning the germination of seeds, after long keeping, that experiments had been tried with various seeds five, ten, fifteen, and twenty years old, from which it appeared that seeds of a large number of important plants would germinate after fifteen years, but the number sprouting after twenty years was small.

A paper was read by Dr. L. O. Howard, at the recent meeting of the American Society of Entomologists, recording the success which has been obtained by the fig-raisers of California in fertilizing the Smyrna variety of figs by the aid of the blastophaga which issues from the Capri figs covered with their pollen. A generation of the blastophaga has been developed at Fresno by which many Smyrna figs have been satisfactorily fertilized, and there is considerable probability that the insect has at last established itself on California soil.

The five hundredth anniversary of the birth of Gutenberg, associated with the invention of printing, is to be celebrated at Mayence, June 24, 1900. It is hoped that the foundation of a Gutenberg Museum may be a result of this movement. An exhibition illustrating the art and progress of printing is also expected to be held.

The conclusion is drawn by the Italian, Signor Albini, from investigations on the nutritive value of whole-meal bread, that it is inferior to that of ordinary white bread, and that a further disadvantage comes from the excessive quantity of indigestible matter, formed of the harder parts of the pericarp of the grain, which it contains.

We have to add to our obituary list of men known in science the names of Edward Orton, LL. D., Professor of Geology in Ohio State University, late State Geologist of Ohio, and late President of the American Association for the Advancement of Science, at Columbus, Ohio, October 16th, in his seventy-first year, of whom we shall shortly give a more extended sketch, with portrait; Grant Allen, writer of several scientific books and articles, and a contributor to the Popular Science Monthly; Prof. Theodore Elbert, German geologist, aged forty-two years; Dr. Max Barth, Director of the Agricultural Station of Rufach, Alsace, aged forty-four years; M. Paul Janet, member of the Paris Academy of Moral Science, and formerly professor at the Sorbonne; Edward Case, English engineer, well known for his method of groining to prevent the sea from encroaching on the coast, September 22d; Hamilton Y. Castner, whose name is associated with the establishment of processes for the electrolytic production of alkali and bleaching powder from common salt, and for the extraction of aluminum; Dr. Oscar Baumann, of Vienna, African explorer, author of a map of the Congo, geographical articles, and books relating to his explorations; and Dr. J. W. Hicks, Bishop of Bloemfontein, formerly demonstrator in chemistry in the University of Cambridge, and author of a text-book on inorganic chemistry.

FOOTNOTES:

[1] A paper read before the Viking Club of London on December 16, 1898; also before the Section of Anthropology of the American Association for the Advancement of Science at the Boston meeting, August, 1898.

[2] The translations are from the Icelandic texts in The Finding of Wineland the Good by Arthur Middleton Reeves. Henry Frowde, London.

[3] Chart of North Atlantic, No. 98. Norie & Wilson, London.

[4] Belle Isle to Boston, No. 102. Norie & Wilson, London.

[5] United States Hydrographic Office Report, No. 99, 1897, p. 315.

[6] Ibid., p. 314.

[7] United States Hydrographic Office Report, No. 100, 1897, p. 70.

[8] Ibid., pp. 130, 152.

[9] Ibid., p. 157.

[10] Ibid., p. 173.

[11] United States Coast and Geodetic Survey, General Chart of the Coast, No. VII.

[12] Chart of North Atlantic, No. 98. Norie & Wilson, London.

[13] United States Coast and Geodetic Survey Chart, No. 13. Cuttyhunk to Block Island.

[14] Icelandic-English Dictionary. R. Cleasby. Enlarged and completed by Gudbrand Vigfusson.

[15] In this document it is asserted that Neministic Science and Astral Health with a Key to the Stars "and all of the inspired writings shall be free—i. e., free from the love of the lust of gain and that the charging of three dollars for Science and Health, etc., when it can be printed and sold for less than fifty cents per copy, is wrong in principle, and, in effect, shuts the doors of this beautiful truth upon the poor by thus putting a prohibitive price upon it....

"We hold that in the giving of class instruction the teacher is entitled to a reasonable compensation, and give our opinion that such compensation should be ten dollars, and we do condemn the present practice when they charge one hundred dollars for a series of twelve lessons. Take a class of thirty—which is not unusual—the teacher receives about $258 per day for two hours' work. This is unjust, and especially so, because many of these teachers are unable and unfit for teaching.

"In the matter of healing, when the healer gives the proper time to the work, one dollar per treatment ought not to be excessive, but the practice of some of charging before the patient is received into the room and then heavily charged for the treatment, is an outrage, ... and should be prohibited."—*See full text, Washington News Letter, September 6, 1899; Editor.*

[16] The highest education consists in the presentation and in the acceptance of the purest ideas and the highest ideals of all ages, whether they be presented in written or spoken words, in songs of voices or sounds of instruments, in plastic forms or glowing pictures, in humble lives or glorious actions. The well-educated man should be the product and the epitome of the best thoughts and sentiments the world has produced, for he carries the responsibility of past centuries.

[17] There is a bust of Julius Cæsar in England of which a cast or a copy should be by the side of every expounder of the Commentaries. The presence of the bust would give new life to the narrative, for there is more life in the marble than in the writing. There are in the Louvre, placed side by side, three representations of Nero which tell the story of the man more graphically than the pages of Suetonius. The first represents the youth, whose thoughts are pure, hopes bright, and resolves noble. The second shows the conflict with evil and the beginning of the triumph of sin. The third is so monstrous in its brutality and lust that it must have been taken but a short time before the catastrophe which terminated the matricide's career. Historians may detail the circumstances of the fall of Rome, philosophers may investigate the causes which led to it, but that hideous face in the Louvre tells the whole story with a force so startling, so instantaneous, that history and philosophy seem weak and wanting.

[18] E. Mâle. Revue Universitaire, Third Année, l. i, p. 15.

[19] Raphael's Madonnas save the reputation of the papal see of the sixteenth century, for pontiffs who cherished such pure and gentle representations could not have been so corrupt as Luther's partisans assert.

[20] See United States Consular Reports, vol. lvii, No. 215, August, 1898, article on Gardener's Schools in Russia, by Consul Heenan.

[21] Statistics of 1893. The French Government only occasionally issues its official report of agricultural schools.

[22] See Barnard's Journal of Education, vol. xx, 1870, p. 673.

[23] A bill for the development of Irish agricultural industry and Irish technical education, providing for Government aid to private enterprise in agriculture, and in manufacturing industries also, has just passed (August, 1899) the House of Commons, and is assured its passage by the House of Lords also.

[24] Appendix to Report of Science and Art Department, 1896-'97.

[25] Page 152 of Report.

[26] Dr. Voelker, in his Report on Improvement of Indian Agriculture, made to the English Board of Agriculture in 1893, said: "At the best, the Indian *raiyat*, or cultivator, is quite as good as, and in some respects the superior of, the average British farmer. It is wonderful, too, how much is known of rotation, the system of mixed crops, and of fallowing. Certain it is that I, at least, have never seen a more perfect picture of careful cultivation, combined with hard labor, perseverance, and fertility of resource, than I have seen at many of the halting places. Such are the gardens of Máhim, the fields of Nadiad, the center of the garden of Gujarat, in Bombay."

[27] Through Nature to God. By John Fiske. Boston and New York: Houghton, Mifflin & Co.

[28] Extemporaneous Oratory for Professional and Amateur Speakers. By James M. Buckley. New York: Eaton & Mains. Pp. 480. Price, $1.50.

[29] Alaska and the Klondike. A Journey to the New Eldorado. With Hints to the Traveler and Observations on the Physical History and Geology of the Gold Regions, the Conditions and Methods of working the Klondike Placers, and the Laws governing and regulating Mining in the Northwest Territory of Canada. By Angelo Heilprin. New York: D. Appleton and Company. Pp. 315. Price, $1.75.

[30] Idylls of the Sea. By Frank T. Bullen. With an Introduction by J. St. Loe Strachey. New York: D. Appleton and Company. Price, $1.25.

[31] Diet in Illness and Convalescence. By Alice Worthington Winthrop. New York: Harper & Brothers. Pp. 286.

[32] The Story of the British Race. (Library of Useful Stories.) By John Munro. New York: D. Appleton and Company. Pp. 228. Price, 40 cents.

[33] Eighteenth Annual Report of the United States Geological Survey to the Secretary of the Interior, 1896-'97. Charles D. Walcott, Director. In Five Parts. Director's Report, including Triangulation and Spirit Leveling. Pp. 450, with 4 plates. Part II; Papers chiefly of a Theoretic Nature. Pp. 653, with 105 plates. Part III; Economic Geology. Pp. 861, with 118 plates. Part IV; Hydrography. Pp. 756, with 102 plates.

[34] Our Insect Friends and Foes. How to Collect, Preserve, and Study them. By Belle S. Cragin. New York: G. P. Putnam's Sons. Pp. 377. Price, $1.75.

[35] New Plane and Solid Geometry. By W. W. Beman and D. E. Smith. Boston: Ginn & Co. Pp. 382.

[36] Methods of Knowledge. An Essay in Epistemology. New York: The Macmillan Company. Pp. 340. Price, $1.25.

[37] The Philosophy of Memory and Other Essays. By D. T. Smith. Louisville, Ky.: John P. Morton & Co. Pp. 203.

[38] The Psychology of Reasoning. Based on Experimental Researches in Hypnotism. By Alfred Binet. Chicago: The Open Court Publishing Company. Pp. 191.

[39] Who's Who in America. A Biographical Dictionary of Living Men and Women in the United States, 1899-1900. Edited by John W. Leonard. Chicago: A. N. Marquis & Co. Pp. 822.

[40] The Dawn of Reason. By James Weir, Jr., M. D. New York: The Macmillan Company. Pp. 234. Price, $1.25.

[41] From an article in the London Spectator.

Transcriber's Notes:

Obvious printer's errors have been repaired, other inconsistent spellings have been kept.

Captions added to captionless illustrations and some illustrations were relocated to correspond to their references in the text.

included with this eBook or online at www.gutenberg.org. If you are not located in the United States, you will have to check the laws of the country where you are located before using this eBook.

1.E.2. If an individual Project Gutenberg™ electronic work is derived from texts not protected by U.S. copyright law (does not contain a notice indicating that it is posted with permission of the copyright holder), the work can be copied and distributed to anyone in the United States without paying any fees or charges. If you are redistributing or providing access to a work with the phrase “Project Gutenberg” associated with or appearing on the work, you must comply either with the requirements of paragraphs 1.E.1 through 1.E.7 or obtain permission for the use of the work and the Project Gutenberg™ trademark as set forth in paragraphs 1.E.8 or 1.E.9.

1.E.3. If an individual Project Gutenberg™ electronic work is posted with the permission of the copyright holder, your use and distribution must comply with both paragraphs 1.E.1 through 1.E.7 and any additional terms imposed by the copyright holder. Additional terms will be linked to the Project Gutenberg™ License for all works posted with the permission of the copyright holder found at the beginning of this work.

1.E.4. Do not unlink or detach or remove the full Project Gutenberg™ License terms from this work, or any files containing a part of this work or any other work associated with Project Gutenberg™.

1.E.5. Do not copy, display, perform, distribute or redistribute this electronic work, or any part of this electronic work, without prominently displaying the sentence set forth in paragraph 1.E.1 with active links or immediate access to the full terms of the Project Gutenberg™ License.

1.E.6. You may convert to and distribute this work in any binary, compressed, marked up, nonproprietary or proprietary form, including any word processing or hypertext form. However, if you provide access to or distribute copies of a Project Gutenberg™ work in a format other than “Plain Vanilla ASCII” or other format used in the official version posted on the official Project Gutenberg™ website (www.gutenberg.org), you must, at no additional cost, fee or expense to the user, provide a copy, a means of exporting a copy, or a means of obtaining a copy upon request, of the work in its original “Plain Vanilla ASCII” or other form. Any alternate format must include the full Project Gutenberg™ License as specified in paragraph 1.E.1.

1.E.7. Do not charge a fee for access to, viewing, displaying, performing, copying or distributing any Project Gutenberg™ works unless you comply with paragraph 1.E.8 or 1.E.9.

1.E.8. You may charge a reasonable fee for copies of or providing access to or distributing Project Gutenberg™ electronic works provided that:

- You pay a royalty fee of 20% of the gross profits you derive from the use of Project Gutenberg™ works calculated using the method you already use to calculate your applicable taxes. The fee is owed to the owner of the Project Gutenberg™ trademark, but he has agreed to donate royalties under this paragraph to the Project Gutenberg Literary Archive Foundation. Royalty payments must be paid within 60 days following each date on which you prepare (or are legally required to prepare) your periodic tax returns. Royalty payments should be clearly marked as such and sent to the Project Gutenberg Literary Archive Foundation at the address specified in Section 4, “Information about donations to the Project Gutenberg Literary Archive Foundation.”

- You provide a full refund of any money paid by a user who notifies you in writing (or by e-mail) within 30 days of receipt that s/he does not agree to the terms of the full Project Gutenberg™ License. You must require such a user to return or destroy all copies of the works possessed in a physical medium and discontinue all use of and all access to other copies of Project Gutenberg™ works.

- You provide, in accordance with paragraph 1.F.3, a full refund of any money paid for a work or a replacement copy, if a defect in the electronic work is discovered and reported to you within 90 days of receipt of the work.

- You comply with all other terms of this agreement for free distribution of Project Gutenberg™ works.

1.E.9. If you wish to charge a fee or distribute a Project Gutenberg™ electronic work or group of works on different terms than are set forth in this agreement, you must obtain permission in writing from the Project Gutenberg Literary Archive Foundation, the manager of the Project Gutenberg™ trademark. Contact the Foundation as set forth in Section 3 below.

1.F.

1.F.1. Project Gutenberg volunteers and employees expend considerable effort to identify, do copyright research on, transcribe and proofread works not protected by U.S. copyright law in

creating the Project Gutenberg™ collection. Despite these efforts, Project Gutenberg™ electronic works, and the medium on which they may be stored, may contain “Defects,” such as, but not limited to, incomplete, inaccurate or corrupt data, transcription errors, a copyright or other intellectual property infringement, a defective or damaged disk or other medium, a computer virus, or computer codes that damage or cannot be read by your equipment.

1.F.2. LIMITED WARRANTY, DISCLAIMER OF DAMAGES - Except for the “Right of Replacement or Refund” described in paragraph 1.F.3, the Project Gutenberg Literary Archive Foundation, the owner of the Project Gutenberg™ trademark, and any other party distributing a Project Gutenberg™ electronic work under this agreement, disclaim all liability to you for damages, costs and expenses, including legal fees. YOU AGREE THAT YOU HAVE NO REMEDIES FOR NEGLIGENCE, STRICT LIABILITY, BREACH OF WARRANTY OR BREACH OF CONTRACT EXCEPT THOSE PROVIDED IN PARAGRAPH 1.F.3. YOU AGREE THAT THE FOUNDATION, THE TRADEMARK OWNER, AND ANY DISTRIBUTOR UNDER THIS AGREEMENT WILL NOT BE LIABLE TO YOU FOR ACTUAL, DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE OR INCIDENTAL DAMAGES EVEN IF YOU GIVE NOTICE OF THE POSSIBILITY OF SUCH DAMAGE.

1.F.3. LIMITED RIGHT OF REPLACEMENT OR REFUND - If you discover a defect in this electronic work within 90 days of receiving it, you can receive a refund of the money (if any) you paid for it by sending a written explanation to the person you received the work from. If you received the work on a physical medium, you must return the medium with your written explanation. The person or entity that provided you with the defective work may elect to provide a replacement copy in lieu of a refund. If you received the work electronically, the person or entity providing it to you may choose to give you a second opportunity to receive the work electronically in lieu of a refund. If the second copy is also defective, you may demand a refund in writing without further opportunities to fix the problem.

1.F.4. Except for the limited right of replacement or refund set forth in paragraph 1.F.3, this work is provided to you ‘AS-IS’, WITH NO OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE.

1.F.5. Some states do not allow disclaimers of certain implied warranties or the exclusion or limitation of certain types of damages. If any disclaimer or limitation set forth in this agreement violates the law of the state applicable to this agreement, the agreement shall be interpreted to make the maximum disclaimer or limitation permitted by the applicable state law. The invalidity or unenforceability of any provision of this agreement shall not void the remaining provisions.

1.F.6. INDEMNITY - You agree to indemnify and hold the Foundation, the trademark owner, any agent or employee of the Foundation, anyone providing copies of Project Gutenberg™ electronic works in accordance with this agreement, and any volunteers associated with the production, promotion and distribution of Project Gutenberg™ electronic works, harmless from all liability, costs and expenses, including legal fees, that arise directly or indirectly from any of the following which you do or cause to occur: (a) distribution of this or any Project Gutenberg™ work, (b) alteration, modification, or additions or deletions to any Project Gutenberg™ work, and (c) any Defect you cause.

Section 2. Information about the Mission of Project Gutenberg™

Project Gutenberg™ is synonymous with the free distribution of electronic works in formats readable by the widest variety of computers including obsolete, old, middle-aged and new computers. It exists because of the efforts of hundreds of volunteers and donations from people in all walks of life.

Volunteers and financial support to provide volunteers with the assistance they need are critical to reaching Project Gutenberg™’s goals and ensuring that the Project Gutenberg™ collection will remain freely available for generations to come. In 2001, the Project Gutenberg Literary Archive Foundation was created to provide a secure and permanent future for Project Gutenberg™ and future generations. To learn more about the Project Gutenberg Literary Archive Foundation and how your efforts and donations can help, see Sections 3 and 4 and the Foundation information page at www.gutenberg.org.

Section 3. Information about the Project Gutenberg Literary Archive Foundation

The Project Gutenberg Literary Archive Foundation is a non-profit 501(c)(3) educational corporation organized under the laws of the state of Mississippi and granted tax exempt status by the Internal Revenue Service. The Foundation’s EIN or federal tax identification number is 64-6221541. Contributions to the Project Gutenberg Literary Archive Foundation are tax deductible to the full extent permitted by U.S. federal laws and your state’s laws.

The Foundation’s business office is located at 809 North 1500 West, Salt Lake City, UT

84116, (801) 596-1887. Email contact links and up to date contact information can be found at the Foundation's website and official page at www.gutenberg.org/contact

Section 4. Information about Donations to the Project Gutenberg Literary Archive Foundation

Project Gutenberg™ depends upon and cannot survive without widespread public support and donations to carry out its mission of increasing the number of public domain and licensed works that can be freely distributed in machine-readable form accessible by the widest array of equipment including outdated equipment. Many small donations ($1 to $5,000) are particularly important to maintaining tax exempt status with the IRS.

The Foundation is committed to complying with the laws regulating charities and charitable donations in all 50 states of the United States. Compliance requirements are not uniform and it takes a considerable effort, much paperwork and many fees to meet and keep up with these requirements. We do not solicit donations in locations where we have not received written confirmation of compliance. To SEND DONATIONS or determine the status of compliance for any particular state visit www.gutenberg.org/donate.

While we cannot and do not solicit contributions from states where we have not met the solicitation requirements, we know of no prohibition against accepting unsolicited donations from donors in such states who approach us with offers to donate.

International donations are gratefully accepted, but we cannot make any statements concerning tax treatment of donations received from outside the United States. U.S. laws alone swamp our small staff.

Please check the Project Gutenberg web pages for current donation methods and addresses. Donations are accepted in a number of other ways including checks, online payments and credit card donations. To donate, please visit: www.gutenberg.org/donate

Section 5. General Information About Project Gutenberg™ electronic works

Professor Michael S. Hart was the originator of the Project Gutenberg™ concept of a library of electronic works that could be freely shared with anyone. For forty years, he produced and distributed Project Gutenberg™ eBooks with only a loose network of volunteer support.

Project Gutenberg™ eBooks are often created from several printed editions, all of which are confirmed as not protected by copyright in the U.S. unless a copyright notice is included. Thus, we do not necessarily keep eBooks in compliance with any particular paper edition.

Most people start at our website which has the main PG search facility: www.gutenberg.org.

This website includes information about Project Gutenberg™, including how to make donations to the Project Gutenberg Literary Archive Foundation, how to help produce our new eBooks, and how to subscribe to our email newsletter to hear about new eBooks.