

SCIENCE

NEW YORK, JUNE 3, 1892.

AN ARCHITECTURAL SCHOLARSHIP FOR PHILADELPHIA.

THE attempt now being made in Philadelphia to found an Architectural Travelling Scholarship in connection with the University of Pennsylvania is a most interesting incident in architectural education. The value of travelling scholarships for study abroad has long been recognized in the older architectural schools of the country. Boston has two, and so has New York, in both of which cities they form not only the richest prizes for the student, but are the climax to the scheme of education. In Philadelphia rather a different tack has been taken. Though the Architectural School of the University of Pennsylvania is one of the youngest in the country, it has, within a few years, become so firmly established as to be able to make an appeal to the people of Philadelphia for the endowment of this most important enterprise.

The success of this movement will mean much more than the addition of one more attraction to the already rich list brought to the University through the energy and tact of the provost, Dr. William Pepper. Important as it is for the future of the architectural school, it is much more important in indicating a new and healthy growth of architectural appreciation in a city which has long been a by-word among architectural critics. However great may be the merits of some Philadelphia buildings, its architecture, as a whole, is much below the standard of other American cities. That the large amount necessary to found a Travelling Scholarship should be raised there, shows an increased appreciation of the æsthetic side of architecture, which the buildings of the city scarcely indicate. This movement, however, shows that at foundation the status of Philadelphia architecture has been greatly underestimated. It shows that, though Philadelphia architecture may not always be what it should be, the architectural ideas prevalent in that city are just what might be expected in any cultured community. It shows an interest in the art that will work wonders in determining the future architectural standing of the city.

And this is what the scholarship is hoped to accomplish, though in another way. Limited to draughtsmen of Philadelphia and Pennsylvania, the year devoted to foreign study cannot but be highly beneficial to the city and State. The training in the architectural schools is wholly preliminary to professional work. Unlike the medical schools, they do not undertake to turn out finished graduates, ready for business, and prepared to design great monuments of art and genius. The architectural graduate, on leaving his school, is only prepared to begin his professional studies. Not only has his preliminary work been directed towards this point, but it has afforded him perhaps the only opportunity in his life to become acquainted with the relative merits and forms of every style of architecture. Every day architects are specializing their work more and more, and limiting their activity to some one particular style, or perhaps to some one phase of a style. The draughtsman in the office has, there-

fore, no opportunity to become acquainted with any style save that upon which his employer is engaged. His ideas centre in one direction; like the partly-educated man, his horizon is limited, and possibly in the most unfortunate manner.

It is here the value of the school training in the history of architecture comes in, for by this means the student is enabled to review the entire history of architecture under an intelligent and unprejudiced guide. He does not learn to design in every style,—at least he should not,—he does not learn the minutiae of every school, nor practise eclecticism, the most barbarous of all architectural sins. He is simply storing his mind with images of great and beautiful buildings, just as the student of literature—to make a somewhat unnecessary comparison—stores his mind with the beautiful thoughts and styles of the master poets. Now if to this is added a year of foreign study, in which the best architectural products of man can be studied in the monuments themselves, in which practical problems of great magnitude can be seen in their actual solution, in which the realities of architecture can be appreciated in a more real manner than is possible from photographs and descriptions, and the students see and study architecture in its monumental aspect, the benefits from such a course may be readily seen. There results a broadening of mind, and a keener appreciation of architectural art than can be had by other means. This is the value of architectural travelling scholarships, and this is why the movement by the University of Pennsylvania means so much for that city and the State.

It must not be inferred that study abroad will make dreamers of our architects, or instil foreign ideas in place of native conceptions. We may not build cathedrals or palaces or great monumental structures, but these edifices show how very great architecture can be, and illustrate methods and forms which can be studied in no other way. Refreshed from a study of foreign architecture, the American student is better able to grasp the conditions which surround the art at home. He has seen what architects in ages less rich in knowledge and mechanical appliances have accomplished, and though his own problems may be different, the example of former work spurs him on to better attempts. We hear a good deal about American art for Americans, and the futility of sending American artists to Paris to study. Fortunately, we hear less of this than formerly, and we shall hear less as the value of foreign study is appreciated. There is no cry for American architecture for America, but the value of foreign study to the architect is quite as valuable, quite as useful, quite as necessary, as it is to the painter or the sculptor. A year abroad is not for the purpose of learning how to copy foreign buildings, but to see and study architectural masterpieces. To borrow a previous illustration, the student of literature does not study Shakespeare with the hope or thought of imitating him, but of gaining some helpful insights into the masterpieces of literature. It is on this principle the architectural scholarships are founded. And it is on this the University of Pennsylvania makes its appeal for a Travelling Scholarship.

BARR FERRÉE.

New York.

ARTESIAN WELLS IN IOWA.

THE demand for artesian waters in the State of Iowa is not to be connected with unfavorable climatal conditions. The State is well watered; a considerable number of rather large streams and innumerable smaller ones combine to make it, from a hydrographic standpoint, unique among prairie States. The annual rainfall is a little more than thirty-five inches, and chiefly comes at a time of year when every crop-necessity is fully supplied. The main grounds upon which artesian waters are sought, therefore, are, first, the convenience of such flows for farm and urban use, and, second, the supposed purity of such waters. These are the prime reasons which have induced exploratory drilling, the chief results of which it is the purpose of this notice to record.

About four-fifths of the area of Iowa has now been demonstrated to possess artesian conditions. Most of this area lies northward of a line which may be drawn across the State, in a north-westerly direction, from near Keokuk to Sioux City, except in the igneous area indicated below. South of this somewhat arbitrary line but one or two artesian flows are known; these appear to be connected with the Nebraska artesian area, and are in the immediate neighborhood of the cities of Omaha and Council Bluffs. By reference to the sketch-map accompanying, it will be seen that the greater number of the wells lie along the Des Moines River or its tributaries; this distribution, which is well marked, is to be correlated with the distribution of the great terminal moraine, within which most of these wells are situated. This peculiarly interesting feature is further discussed beyond. The very deep and permanent artesian wells lie mainly east and north of the line above mentioned; or, better still, east of a line drawn north and south through the city of Ottumwa, No. 169 on the map. With but a single exception, that at Washington, No. 54 of the map, these deeper borings furnish abundant flows of water. But there are also, east of this north and south line, two smaller areas of shallow wells whose characters are essentially identical with those exhibited by the wells within the terminal moraine. One of these lies along the Iowa River (see map, Nos. 60-66, etc.); the other, and by far the smallest single artesian area in the State, is in the valley of the Wapsipinnicon River, in Bremer County (see map, Nos. 11, 12, and 42). The shallow wells, therefore, constitute well-defined groups; the deep wells are widely scattered.

It has been found convenient to classify the Iowa artesian wells in terms of the geological structure which they exhibit. To the shallow wells, those that form groups and which present similar geological sections, the term "glacial wells," or wells of the first class, has been applied. To all others, no matter what may be the geological age of the strata into which they may pass or in which they end, the term "deep wells," or wells of the second class, may be appropriated. There is no distinguishing mnemonic on the map, by which these wells may be differentiated.

A few important deep borings have been made, in various parts of the State, but more particularly in the north-western and south-western portions, in which artesian waters were not found. But, in the greater number of these borings, the water rose to constant heights, always, however, some distance below the top of the boring. These are called on the map "deep wells not artesian," and are indicated by a specific mnemonic, as in the Glenwood well, in south-western Iowa (see map, No. 120).

In depth the glacial wells range from forty feet to two hundred and fifty feet in a few cases; this feature is dependent on the relations of the borings to pre-glacial drainage, on the one hand, and to the thickness of the morainic materials, which is a variable, on the other. A generalized section may be given as follows from the sequence disclosed in Hancock and Wright Counties:—

Soil.....	1-5 feet.
Bowlery clay, with water.....	10-50 feet.
Bluish, bowlery glacial clays.....	30-12 feet.
Sand and gravel.....	8-20 feet.
Sand and gravel, with water.....	15-25 feet.

These materials are irregularly distributed over the surface of the State, and exhibit a variable relation. However, whenever the gravels and sands of the lower series are reached, especially in the valleys of the larger streams within the terminal moraine, flowing wells are likely to be obtained.

The deeper artesian wells, or those which present the characteristic feature of penetrating the country rock, are typified by the following section, which is that of the deep artesian well at Cedar Rapids:—

No.	Feet.
1. Dark-gray limestone.....	50
2. Light-gray limestone.....	85
3. Gray limestone.....	40
4. Coarse-grained, reddish-brown limestone.....	65
5. Coarse, brown, and very porous limestone.....	60
6. Coarse, light-brown limestone, mixed with shale.....	30
7. Shale.....	20
8. Coarse, dark-gray limestone.....	25
9. Coarse, light-gray limestone.....	45
10. Tough, blue clay.....	200
11. Reddish-brown sandstone.....	205
12. Shale.....	5
13. Dark, bluish-gray sandstone.....	65
14. Shale.....	1
15. St. Peter's sandstone.....	50
16. Gray sandstone.....	74
17. Brownish sandstone.....	40
18. Coarse-grained, porous, brown sandstone.....	270
19. Light sandstone.....	88
20. Dark-colored and hard sandstone.....	42
21. Brown, very close-grained and hard sandstone.....	140
22. Blue clay.....	100
23. Soft, reddish-brown sandstone.....	160
24. Potsdam sandstone.....	200
25. Red sandstone.....	75

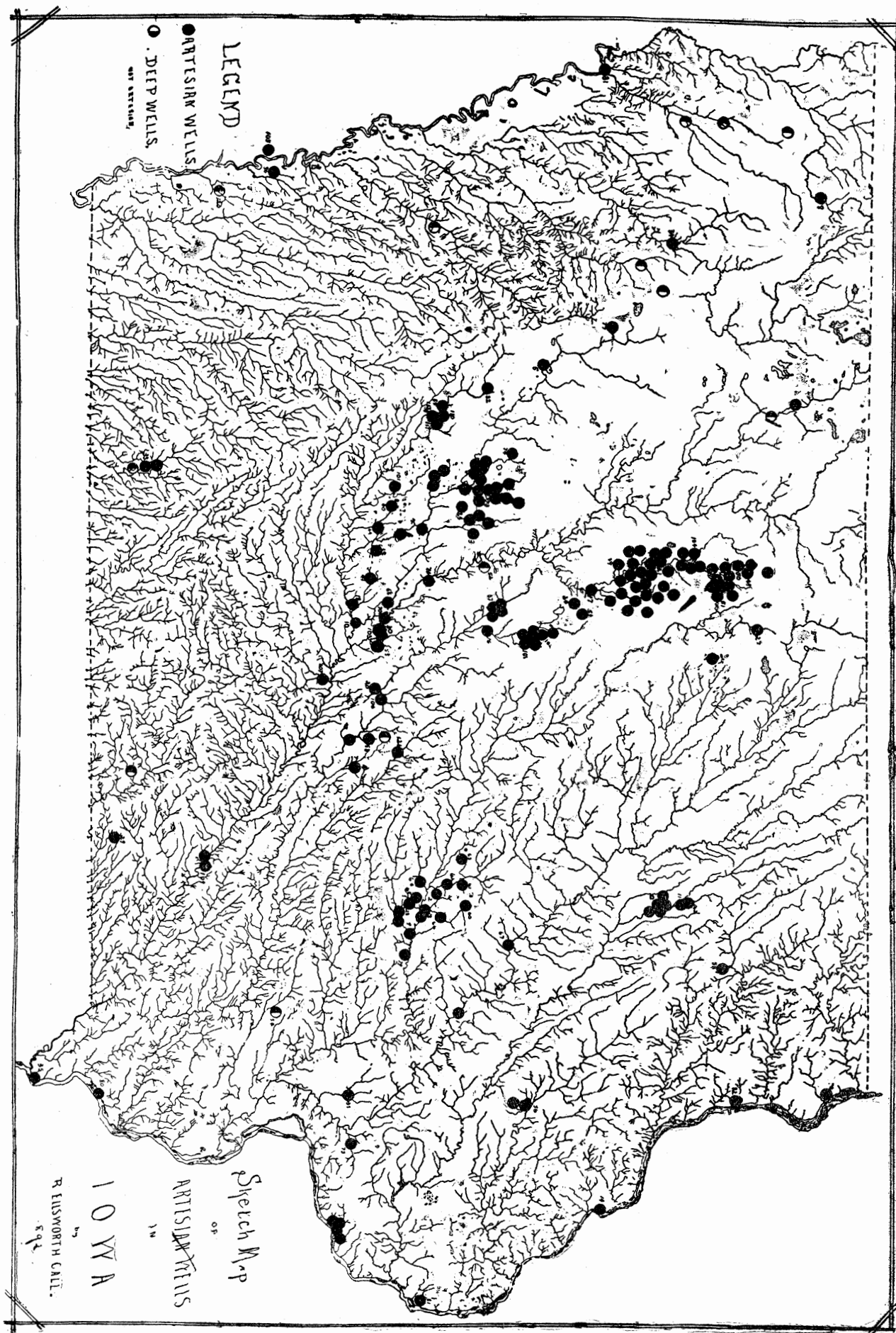
¹ Contains water.

Over the eastern third or more of Iowa, east and north of the line drawn from Keokuk to the vicinity of Sioux City, as above mentioned, thence north-easterly to Worth or Mitchell Counties, the St. Peter's Sandstone may be reached in deep wells, and flowing water found. North of that part of the line which extends north-easterly from Sioux City flowing water will not be found, if the indications of the strata penetrated in the Hull, Sioux County, wells are reliable. From that place igneous rocks, presenting a volcanic facies, have been submitted to us.

The south-western part of the State, that is, all that part of Iowa which lies south of the first arbitrary line above indicated, will not furnish artesian waters. The section, which is given elsewhere, of the Glenwood deep-boring furnishes the most complete vertical section of the carboniferous rocks, which is exhibited in Iowa. It further affords no hope that artesian waters will be reached at reasonably profitable depths in that portion of the State.

Readers of *Science* who may be interested in the details of an investigation, of which this notice is a brief abstract, may receive the full paper on addressing the Iowa Weather and Crop Bureau, Des Moines, Iowa, under whose auspices the work has been done.

E. ELLSWORTH CALL.



REVIEW OF THE ORIGIN OF THE BASINS OF THE GREAT LAKES.¹

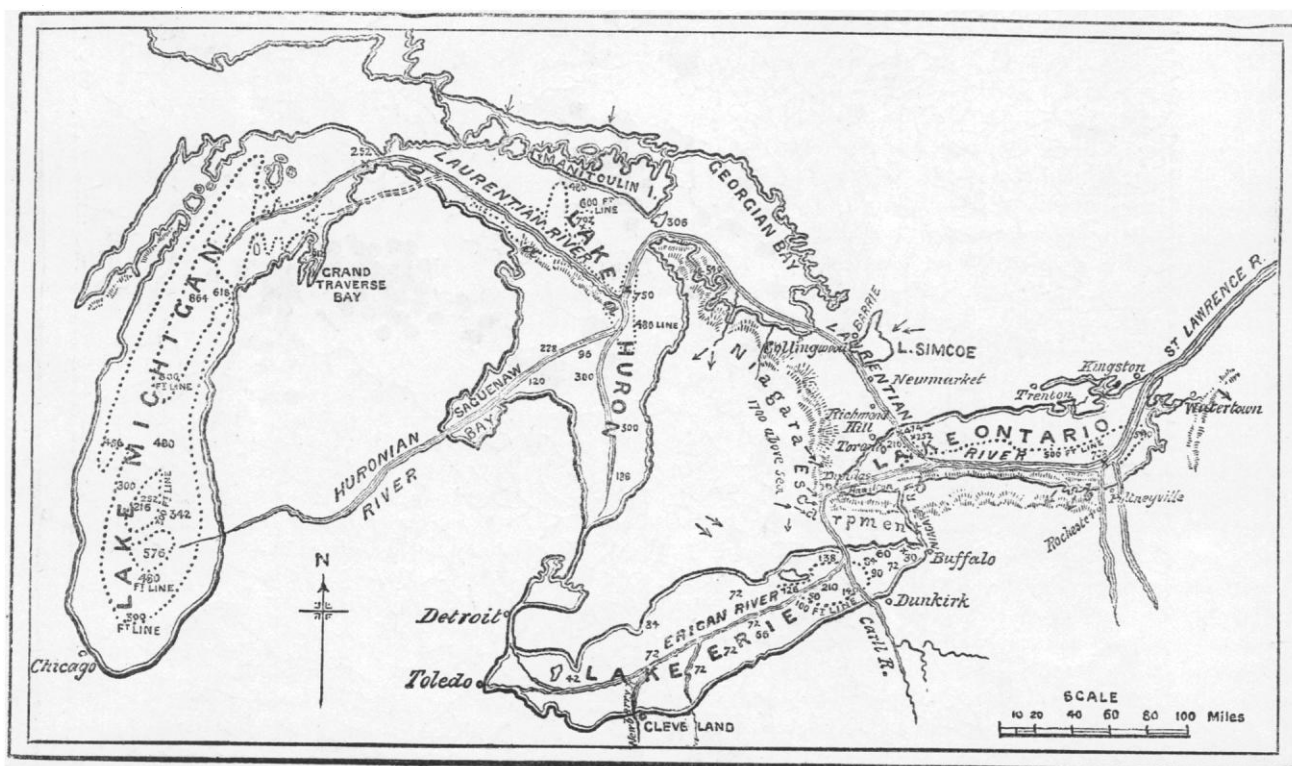
THE origin of such prominent features as the Great Lakes has a general interest to others as well as to geologists; but even phenomena so commonplace are not always readily explained. The delay in this case has been largely due to the want of information that could only be obtained by numerous borings, accurate levelling, and other data obtainable in regions where few active workers in surface geology have been carrying on their investigations. To these causes may be added a *quasi* satisfaction with favorite theories, to which facts are often moulded.

A score of years ago the mysterious agent which formed the lake basins assumed the guise of glaciers digging out new troughs or fashioning older ones. This plausible hypothesis received consideration, as it was championed by Dr. J. S. Newberry and other eminent men. At that time, and

merged in them These phenomena were first emphasized in America by Dr. J. W. Spencer, and were sufficient to disprove the hypothesis, even if no other had been available.

The amount of glacial erosion demanded was more than could be accepted by many glacialists. Accordingly Dr. T. C. Chamberlin accounted in part for the lake basins as due to depressions produced by glaciers accumulating to a greater thickness over preglacial valleys, but that with the retreat of the glacier the waters left in the basins still depressed the earth's crust. The demonstration of such a theory could scarcely be hoped for. It not only begged the question, but in doing so it did not consider that the previous removal of the hundreds of feet of rock, in forming the accepted valleys, ought to have permanently produced the opposite effects upon the earth's crust to that of the small quantity of water left in the basins, especially as the basins were sometimes shallow and sometimes channel-like.

These theoretical explanations showed the necessity for



for years after, the extraordinary erosive power of glaciers, in scooping out basins, was an article of faith; but to-day few observers of existing glaciers, or of real extinct ones, have not modified this old creed, as observations do not support it. Apart from the question of the ability of ice to plough out great basins, the direction of the ice scratches about the Great Lakes is oblique, or often at right angles, to the escarpments or rock walls which bound the lakes, or are sub-

further research, which has been made by Dr. Spencer with results announced from time to time for more than a decade, and may be summarized as follows: The lake basins are simply valleys of erosion, formed during periods of high continental elevation lasting long enough for the excavation of broad, deep valleys. This elevation amounted to 3,000 feet above the present altitude, as shown by the submerged channels upon the coast; and temporarily the continent appears to have reached even 6,000 feet. Some of the lakes now descend to nearly 500 feet below sea-level. The basins of the lakes were just such broad valleys as that of the modern St. Lawrence River north of the Adirondacks or farther seaward. During the later geological times, and reaching down to the modern days, the physical revolutions of the Ice Age converted the old valleys of the St. Lawrence (Lawrentian) River and its tributaries into basins, in which the modern lake waters are held. The phases of the physical revolutions which fashioned the basins were partial obstruction of the old waterways by drift accumulations, a general

¹ "High Continental Elevations Preceding the Pleistocene Period (in America)," with map. Read before Geol. Soc. Am., Aug., 1889. Bull. of Soc., vol. 1. Geological Magazine (London), dec. III, vol. VII, 1890.

"Origin of the Basins of the Great Lakes," with map of the Ancient St. Lawrence River and Tributaries. Quar. Jour. Geol. Soc. (London), vol. XLVI., 1890. Reprinted in American Geologist, vol. IV., 1891.

"Deformation of the Iroquois Beach and Birth of Lake Ontario," with map and illustrations. Am. Jour. Sci., vol. XI., 1890.

"Deformation of the Algonquin Beach and Birth of Lake Huron," with map and illustrations. Am. Jour. Sci., vol. XII., 1891.

"High-Level Shores in the Region of the Great Lakes, and their Deformation," with map. Am. Jour. Sci., vol. XII., 1891.

"Post-Pliocene Continental Subsidence," with map of deserted Short-Lines in the region of the Great Lakes. Read before Geol. Soc. Am., Dec., 1890. Bull. of Soc., vol. II.

subsidence of the region, and a re-elevation of the land, rising most rapidly towards the north-east, whereby rock barriers, in fact, were formed across the old valleys.

The drainage by the ancient Laurentian River from Lake Michigan is shown by the remains of channels 600 feet deep, in the otherwise shallower north-eastern end of the lake. It crossed the Huron Basin at the foot of a high but now submerged escarpment. It passed into Georgian Bay by a submerged channel between the islands, also now partly buried by drift. The waterway through the shallow Georgian Bay is still left open to a depth of nearly 600 feet below the surface of the water along the edge of the Indian Peninsula. Thence to a point about twenty miles east of Toronto, where the deep river channel is seen near the shore in the shallower portions of Lake Ontario; this ancient valley is deeply buried by drift accumulations. The chain of borings reveal it to a depth of hundreds of feet beneath the rocky floor of the country through which it passes. Through Lake Ontario it is seen at the foot of a submerged escarpment, extending eastward to the point where the recent warpings, recorded in the shore lines, bring up the old channel to near the surface. This warping, recorded in the beaches north of the Adirondacks, is sufficient to account for the rocky barrier between Lake Ontario and the sea, the rise being five or six feet per mile towards the north-east. The warping east of Georgian Bay is 4 feet per mile; at the outlet of Lake Huron, 2 feet; at the eastern end of Lake Erie, 2 feet; and at the head of the lake it diminishes to zero. Across the Peninsula of Michigan an ancient tributary (Huronian River) flowed through a valley now buried by 500 feet of drift, or 350 feet beneath the lake, and through Saginaw Bay to join the Laurentian River. Through Lake Erie, and buried beneath the mud upon its floor, the ancient Erigan River drained the valley, and passed through the buried channel at the head of Lake Ontario. Such was the ancient drainage of the youthful lake basins, which date back only as far as the later Pleistocene period, since changed, owing to drift accumulations obstructing the valleys and to warpings of the earth's crust.

No phenomena of the Pleistocene period rests upon more substantial evidence, which very slowly appeared. The history of every great natural problem presents the same story. The literature of the older writers was not useless, but awakened an interest and gave suggestion, as the data had not been collected. Such, however, is the record of progress that much of every observer's work is only a means, which must be modified before reaching the end.

NOTES AND NEWS.

THE Italian Geographical Society has been authorized by the Municipality of Genoa to convoke a geographical congress to be held in that city, in commemoration of the fourth centenary of the discovery of America. No historical event is more deserving of celebration by geographers throughout the world. It was this idea that inspired the International Geographical Congress, held at Bern in 1891, when it decreed that to the commemoration in Genoa and in Spain, all geographical societies should be invited to send delegates. The congress will take place about the middle of next September. The precise date of its inauguration will be made known as early as possible.

—The Jury of Awards of the International Exposition at Paris, 1889, has awarded the Grand Prize to the United States Department of Agriculture for "Organization Methods and Material for Agricultural Instruction." In the award, Professors Atwater and Taylor are particularly distinguished, Professor Atwater, for his exhibit of maps and photographs on agricultural colleges, and Dr. Taylor, microscopist, for his collection of photographs and drawings of the microscopic analysis of food adulterations,

especially butter. Each of these gentlemen is awarded a silver medal.

—Australians have had bitter experience of the mischief which rabbits are capable of doing, and now they seem likely to have trouble of a similar kind from the introduction of foxes. An Australian journal, quoted in the May number of the *Zoologist*, says that foxes have already spread over a wide area, and are most destructive both to lambs and poultry. They attain greater size and strength in Australia than in England, and the mild climate is highly favorable to the increase of their numbers. "It must be very disheartening," says the writer, "to all who have stock of any kind to lose, to find themselves confronted by some new enemy introduced by thoughtless or selfish persons. If some energetic steps are not soon taken, nothing can prevent the spread of foxes over the whole continent."

—The Civil Service Commission will hold examinations on the 28th of June, continuing through the 29th, to fill two vacancies in the position of computer in the Coast and Geodetic Survey at \$1,000 a year, and one in the position of draftsman at \$900. Arrangements may be made to hold the examinations in some of the large cities outside of Washington if there should be applicants. The subjects of the computer's examination will be orthography, penmanship, letter-writing, algebra, trigonometry, geometry, geodesy, practical astronomy, and differential and integral calculus. The subjects of the drafting examination will be letter-writing, geography, arithmetic, algebra, geometry, descriptive geometry, plane and spherical trigonometry, shades and shadows, and drawing. Application blanks may be had of the Civil Service Commission. Residents of the District of Columbia are ineligible. Applicants will be required to furnish the necessary implements for drawing.

—The new professor in physiological psychology at Yale is announced to be E. C. Scripture of Clark University. He has been chosen by the faculty, but his choice will not be confirmed until the meeting of the corporation. Mr. Scripture is one of the most brilliant disciples of the noted German philosopher, Professor Wundt. He is at present a valued assistant of President Hall of Clark University. Professor Scripture will enter upon his duties at Yale at the opening of the next college year. His selection involves the opening of an entirely new department at Yale, that of scientific physiological investigation in mental philosophy and psychology. This line of work is entirely new in American universities, the department at Yale being the third or fourth to be put into practical operation in this country. A new psychological laboratory will be built for the use of Professor Scripture and his assistants. It will contain all the latest appliances for scientific work. Work upon it will be commenced at once, and it will be ready for occupancy by the first of October.

—At the eighth annual meeting of the Kansas University Science Club held in Snow Hall, on Friday, May 27, 1892, the following papers representing original research were presented: Notes on Magnetic Declination, F. O. Marvin; Constants for the Fauth Alt-azimuth, No. 296, A. O. Ridgeway; Examination of Stramonium Seed, L. E. Sayre; On the influence of Parapeptones on Digestion, L. E. Sayre and H. Day; The Coffee Bean, L. E. Sayre and F. C. Combs; On Parachlormetanitrotoluene, E. C. Franklin; Analysis of a Mineral Water from Nemaha County, Kansas, E. H. S. Bailey and J. F. Noble; Analysis of the Alkaloid of *Solanum rostratum*, C. E. McClung; On the Affinities of the Phryganidæ and the Lepidoptera, V. L. Kellogg; On the Taxonomic Value of the Scales in Lepidoptera, V. L. Kellogg; A Graphic Method for Angle Blocks in the Howe Truss, A. S. Riffle, Portland, Oregon; Viaduct on the T. A. A. and N. M. R. R. at Ann Arbor, Mich., H. E. Riggs, Chief Engineer; A New Method for Extinguishing Fires in Dwellings, L. I. Blake; On MacCullagh's and Salmon's Methods of Generating Quadratic Surfaces, H. B. Newson; Maximum Moment in an Arch-rib, E. C. Murphy; Kansas Pterodactyls, Part I, S. W. Williston and E. C. Case; Kansas Mosasaurs, Part II, S. W. Williston; The Analysis of some Kansas Building Stones, E. C. Case; The Diseases of Grasses, W. C. Stevens; A Method of Trisecting an Angle, A. L. Candy; Brazilian Diptera, Part II, S. W. Williston.

SCIENCE:

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

PUBLISHED BY

N. D. C. HODGES,

874 BROADWAY, NEW YORK.

SUBSCRIPTIONS.—United States and Canada.....\$3.50 a year.

Great Britain and Europe..... 4.50 a year.

Communications will be welcomed from any quarter. Abstracts of scientific papers are solicited, and one hundred copies of the issue containing such will be mailed the author on request in advance. Rejected manuscripts will be returned to the authors only when the requisite amount of postage accompanies the manuscript. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guaranty of good faith. We do not hold ourselves responsible for any view or opinions expressed in the communications of our correspondents.

Attention is called to the "Wants" column. It is invaluable to those who use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

For Advertising Rates apply to HENRY F. TAYLOR, 47 Lafayette Place, New York.

AUGUST WILHELM VON HOFMANN.

ON May 6, 1892, the New York papers announced the death of this great chemist, in a brief despatch from Berlin; and the comments upon his life and works took an equally brief form. Yet there was probably no German professor whose name was dear to so many American pupils, no foreigner who viewed American science so sympathetically, no contemporary who had left so deep an impress upon one of the cardinal branches of human knowledge and industry. Chemical journals will bring to every laboratory eloquent tributes to the memory of the deceased master; but I am glad that this paper, which appeals to the general scientific public of the United States, opens its columns to a testimonial, however trifling and inadequate, from one of the departed master's pupils.

August Wilhelm Hofmann was born April 8, 1818, in the Hessian town of Giessen, in which his father lived as an architect. Giessen was an obscure town, harboring the equally insignificant University of the Grand Duchy of Hesse-Darmstadt. But six years after the birth of Hofmann an event occurred which was to have a curiously analogous effect upon his own career and that of his native town, the installation of Justus Liebig in the chair of chemistry. From a torpid mediæval village, Giessen became a centre of intellectual activity; its university achieved imperishable renown as the first to establish a laboratory devoted primarily to instruction. Equally beneficent was Liebig's influence upon young Hofmann: after devoting his attention successively to philology and to law, the example of Liebig drew him irresistibly toward chemistry, and he became one of his most enthusiastic and successful pupils. His first connection with Liebig was of a personal nature, since the erection of the University Laboratory, which was entrusted to the elder Hofmann, brought the two families into intimate relations. Later he married a niece of Liebig's wife.

His first apprenticeship as teacher, after the formal comple-

tion of his studies, was likewise passed under Liebig's eye; but in 1845 he established himself as *privat docent* in Bonn, although he was not destined to remain there long. Late in the same year he accepted an invitation to become the head of the Royal College of Chemistry, then newly established in London by Prince Albert, the Consort of the Queen. This institution was avowedly intended to be a reproduction, on British soil, of the Giessen Laboratory, and the choice of its director could not have been a happier one. The English pupils found in their teacher not the traditional German pedagogue, narrow, pedantic and awkward, visionary and incapable of adapting himself to his surroundings; but a brilliant lecturer, an energetic executive officer, a polite gentleman, a kind and encouraging teacher, and a sympathetic friend. During the seventeen years of his life in London he seemed to have completely assimilated himself to his surroundings, and the English world of science, ordinarily so nativistic, seems to have admitted him unreservedly within its fold. In fact, there was nothing upon which his energy and sagacity might be brought to bear, with which he was not entrusted. If there was a question to be solved in the manufactures, if the Treasury wanted advice in excise matters, if a competent judge were needed in international exhibitions of science and arts, if learned societies were in search of a representative head, recourse was always had to Hofmann. In fact, he received what was for many years the highest scientific reward in the bestowal of the Crown, the Mastership of the Mint. In England his greatest and most lasting work was doubtless accomplished. It was there that he and his pupils first investigated the organic compounds of phosphorus, the complicated ammonia bases, the cyanides, the isonitrils, and the mustard oils. In his laboratory the aniline dyes and the azo-dyes were discovered by himself and his pupils Perkin and Peter Griess. From all parts of the world pupils came to work under him, and I have heard him relate with pardonable pride how he was always sure in his extensive travels to find old pupils, be it in the extreme west and south of the United States or on the outskirts of European civilization in Egypt and Asia Minor. The Royal College of Chemistry became a place of pilgrimage for the young chemist, similar to Liebig's laboratory in Giessen, or to Berzelius's house in Stockholm, or Gay-Lussac's in Paris, in earlier times.

Nevertheless, he accepted a call in 1862 to found a University Laboratory at Bonn, and actually planned and superintended the erection of the building. Before he could enter upon his duties as director, however, he received an invitation to a still larger field. He was to become the successor in Berlin of two recently deceased chemists of great renown, Mitscherlich and Heinrich Rose. A new University Laboratory was to be built in what was rapidly becoming the metropolis of Germany; the Royal Academy was anxious to provide additional facilities for private research. So it happened that Hofmann really went straight from London to Berlin, in 1865; Kekulé filled the vacancy in Bonn, while Williamson assumed charge of the Royal College of Chemistry.

Until his death, Hofmann remained at the head of chemical affairs in Berlin. The laboratory was built in 1867, and at once was completely filled with students; in a short while it became rather uncomfortably crowded, and has remained so until now. It has always harbored numerous foreigners, especially Americans. As member of the Prussian Academy, he was entitled to a research laboratory and a dwelling, which were so connected with the Students' Laboratory that no time

was lost in passing from one to the other; even at times when he was not passing through the laboratory, a student requiring an answer to a serious question was always at liberty to seek him in his private laboratory or his library. He restricted his personal instruction, however, to a fourth of the students who were at work in the laboratory building, turning over the rest completely to his assistants. He lectured three to five times a week for two consecutive hours, always on elementary subjects. In winter the course was upon general inorganic chemistry; in summer upon organic chemistry. These lectures were profusely illustrated, very entertaining, and remarkably lucid. But their purpose was evidently much more to interest the beginner and to show him the beauties of the treasures within reach, than to present an actual key to these treasures, or, in other words, to deeply impress facts upon his mind. For eloquence and noble enthusiasm no speaker could surpass him.

As a teacher in the laboratory he was painstaking to the last degree. Restricting himself to a favored few and practically limiting the range of their instruction to organic synthesis, he endeavored to visit each at his desk once or twice a day, and would give him all the time he needed. Each new comer was put, for a longer or shorter period, at the preparation of well-known compounds, merely for the sake of practice. It was delightful to see the interest which he took in this routine work, the manner in which he made each tyro feel as if something depended upon the careful completion of these tasks. He would hail each carefully prepared specimen as if it were the most novel thing in the world to himself, and if it happened to be a substance upon which he had worked in former years, he would take especial pleasure in exhibiting all its properties. After a certain time, the student would be put upon an "original" investigation. As a general thing, it must be confessed, the results of these investigations did not show too much originality. He generally assigned subjects closely allied to work that was being done or had been done in his own private laboratory, the work of his students generally presenting corroborative evidence to results already obtained. But he always encouraged original thought, and was very ready to give credit for it. Whether the student was dull or bright, whether his investigation proved interesting or not, Hofmann was always helpful and encouraging; the only thing he could not stand was laziness. As a matter of fact, in spite of the freedom from disciplinary control in German universities, few American college laboratories could show so constant an attendance at all hours. He always took the greatest interest in the personal welfare of his students, and, especially if they were foreigners, would treat them as if they were intrusted to his personal care.

In his own work, he was indefatigable, and his private assistants, of whom there were four or more, certainly had arduous duties to perform; he would frequently work with them from 8 A.M. until 11 P.M. When he was a younger man, there were times when work was continued in relays, without any intermission, until it was completed. But there was never a lack of volunteers to fill any vacancy on his staff of assistants, even though the pay was very moderate. In return, he was kindness itself in looking out for their future and in providing for their relaxation in vacation time, so that they were always his enthusiastic followers.

As to his scientific achievements, the present writer is not sufficiently presumptuous to even hint a personal opinion; he believes, however, that it is the general judgment among those best qualified to speak, that Hofmann's great success

was due to his great energy, his marvelous dexterity of manipulation and observation, and careful deductive reasoning, rather than to any startling brilliancy of invention, such as that of his master, Liebig. Hofmann's contributions both to pure and to industrial chemistry are those of the investigator, not of the inventor. He neither invented the "type" theory of Laurent and Gerhardt; nor did he first discover the production of coloring matter from aniline; in the various discussions of the fundamental structural formulæ, he rarely took part. But, the type theory once given, it was he who did the most to elucidate the "ammonia-type;" when rosaniline had been produced, it was his privilege to clearly explain the reasons that had brought about this happy accident and to show how the whole gamut of colors could be produced in a similar manner. The complicated ureides, the innumerable benzol derivatives, the natural and artificial alkaloids were all manipulated by him in a manner to make them more accessible to further study and more useful to mankind. Generalizations and metaphysical speculations were entirely foreign to his nature.

A peculiarly apt illustration of this bent of his mind may be found in the manifold apparatus he invented for the purposes of demonstration or investigation. While it never involved the application of new principles, as did those of Lavoisier, Gay-Lussac, Davy, Faraday, or Victor Mayer, it always showed the most thorough knowledge and most ingenious applications of all established methods of physics and of chemistry. For elegance and for the unfailing certainty of success in working, the apparatus invented by him will always stand pre-eminent.

To illustrate his energy and power of self-sacrifice, I would instance the occurrences after a serious illness which befell him at the age of 68, in the spring of 1886. He had been confined to his room for several weeks, and was not allowed to see anyone; barely recovered, he sent for his assistants, to hear their reports and sketch out new work; before he was allowed to leave his own house he sent for his students, day by day, to talk over their progress. As soon as the physician grudgingly assented, he resumed his lectures, not only speaking for two hours a day, at the regular hours, but actually striving to make up for lost time by giving an additional lecture three times a week from 6 to 8 A.M.! Such a tax upon the strength of an old man, weakened by sickness, seems tremendous. But he seemed not to mind it in the least.

As a traveller, too, he was untiring: fatigue which completely overcame younger men, did not seem to exist for him; as a matter of fact, the extreme Orient and Australia were the only civilized regions which he did not visit, and these he would surely have sought to reach, if his conscientiousness had not prevented his seeking a sufficiently protracted leave of absence.

He always spoke with special pleasure of his visit to the United States in 1883, and seemed greatly to appreciate the cordiality of his reception here. Probably he had a better understanding of the limitation imposed upon scientific research in America than do most foreigners; for he has always praised what has been done, without churlishly demanding the perfection reached at older and more firmly established centres of knowledge.

In his private life, he was greatly beloved by all who knew him, and he certainly was able to make and maintain the warmest friendships. In his later years, he devoted much of his time and ability to the bitter-sweet task of sealing this intimacy with an eloquent testimonial to the worth

and renown of the "Friends who had gone before." For such memorial biographies the world owes him additional gratitude; for the lives of Liebig, Wöhler, Dumas, and Graham, as described by him, will surely arouse the latent enthusiasm in many a youthful mind, and thus serve to pass on the torch of learning to new bearers.

His personal magnetism had much to do with the unprecedented success of the German Chemical Society, which was founded by him in 1868, and which is now in point of membership and influence the most important scientific body of the world. A society embracing men of every nation could only have been founded by a man who had no petty narrowness himself, who could impartially recognize and assimilate what was good wherever he found it. As a cosmopolitan, Hofmann could bring to London the thoroughness of the German schools of learning and imbue his surroundings with it, bringing back in return to Berlin the breadth of political views, the openness of social intercourse, the tolerance for opposing views, which existed in the English capital. While Hofmann shunned every form of altercation and was rarely drawn into political or social discussions, it was well known that his views were always democratic and for toleration of every sort. The only time he ever incurred the enmity of a class was during his rectorate at the Berlin University, when he took stern measures to prevent the introduction of political and religious intolerance in the student circles. I do not doubt that he was a patriotic German in every respect, but no other German has ever written words so appreciative of the French character, as it showed itself during the terrible siege of Paris, so hearty in deprecation of the fact that political jealousies have strained scientific relations—as are to be found in Hofmann's eulogies on Dumas and Wurtz.

In Hofmann the world has lost the model of a scientific man: a lover of science, both for its own beauties and for the benefits it confers upon mankind, a devoted teacher, a shining example of the rewards to be obtained by industry, integrity, and singleness of purpose. Those who have enjoyed the privilege of his personal contact will always be grateful for the view he opened to them of the beautiful and the true.

MORRIS LOEB.

University of the City of New York.

CURRENT NOTES ON ANTHROPOLOGY. — VII.

[Edited by D. G. Brinton, M.D., LL.D.]

Laws of Variation and Fixity in Species.

It is well observed by Dr. C. Dareste, in a recent lecture, that the fundamental question in anthropology is the origin of the differences in the human species. These differences begin with those visible in every individual, and extend up to those broad and permanent traits which distinguish the subspecies of man from each other. Beyond this they nowhere go; that is to say, no "missing link" exists which connects in an uninterrupted chain the human with any other vertebrate.

In explanation of this phenomenon of indefinite variation within fixed limits, M. Ch. du Pasquier has published an ingenious theory in the *Bulletin de la Société d'Anthropologie de Paris* (1891). He suggests that the fixity of the species, instead of being an argument against the theory of evolution, is the natural corollary of its two great factors, 1. The law of constant variation, and 2. The law of fixed

heredity. These act with like mechanical inflexibility as the motions of a pendulum, always moving but unfailingly self-limiting, and thus determining the invariability of the specific type, while leaving a wide range for racial and individual variability. His argument is lengthy and ingenious, and well worth close reading.

In such a study, where especially the characteristics of races are the chief topics of investigation, the anthropologist will act wisely if he follows closely the track of the general zoologist. With a few easily explained exceptions, the areas of characterization of the species man are identical with those of the higher living vertebrates; and it is very significant that zoologists acknowledge that no two of these regions are of equal rank in their capacity for the development of organic forms. This has direct bearing on the deep-seated differences between races, and explains how they can be radically diverse and yet members of the same species.

The Criminal Anthropology of Woman.

It is a fact that in all countries there are fewer convictions for crimes of women than of men. European statistics vary from the highest, 37 per cent, in Scotland, to the lowest, rather less than 6 per cent, in Italy. It is also noted that there is a very wide difference between city and country. The proportion of female criminals is always higher in rural districts, sometimes reaching nearly to that of the males.

Various explanations of these facts have been suggested. Some are complimentary to the sex, as that women are not given to intoxicants, nor to gambling, nor to roving; they are more timid, more religious, more tender-hearted, and their sexuality is more passive. There is something in all these reasons, but they do not satisfy Dr. G. Ferrero, who discusses the subject in the *Revue Scientifique*, March 26. He points out that the females of the ants, bees, and spiders are particularly cruel because they are particularly intelligent, and he reaches the ungallant conclusion that the woman of to-day is less criminal because less intelligent than the man. This difference is less in country districts than in cities; and, moreover, in cities a woman can obtain a living at less risk than by criminal acts, *par complaisance vers l'homme*. Her struggle for life is less desperate; she is less an egotist because she is protected more than men; she is less disturbed by new ideas because she is slow to perceive them. When she is bad, however, she is "very, very bad," surpassing men in callous cruelty and absence of pity or remorse. In support of these assertions he cites instances both from history and the courts of criminal procedure.

Buddhism in the Occident.

The position of the anthropologist in the study of religions should be altogether a judicial one, and not that of a disciple. One cannot regard it other than a mistake, therefore, that in Paris there has grown out of the scientific study of Buddhism a school of "Eclectic Buddhism," whose disciples are pledged to obey the principles of the school, to carry out the moral obligations it imposes, and are liable to expulsion if they transgress the "rule of conduct."

The "Master" is apparently Professor Leon de Rosny, whose lectures on Buddhism at the Sorbonne have excited much attention, and who is widely and favorably known in America as well as general ethnology. Last year he issued a brochure entitled "*La Morale du Bouddhisme*," which is probably the text-book of the school.

No one will doubt the solid ethical ground-work which

underlies all the "world-religions," Buddhism, Islam, and Christianity. It is in their religious philosophy that their sharp contrast is seen; and nothing could be more remote from the highest thought of modern Europe than the philosophy of Buddhism. This is well shown by what Barthélemy Saint Hilaire says of it in his "Life of Eugène Burnouf," published last year (p. 43), "At bottom, Buddhism is nothing more than the fanaticism of nothingness. It is the destruction of the individual carried remorselessly out to his last legitimate hopes."

The science of religion is as yet altogether too novel a branch of study to become creative or directive. It has before it a long period of analysis before it should presume to be synthetic. So this Parisian effort must be considered premature

Physical and Mental Correlation.

That veteran anthropologist, Professor Schaaffhausen of Bonn, observes in his "Anthropologische Studien" (p. 646), "One of the weightiest doctrines of anthropology is that of the constant correspondence between the development of the physical organization and the intellectual capacity."

So far as the relation between brain-structure and mental ability is concerned, probably no one who has himself studied the facts will deny this. But, in another direction, scientists are less in unison, and that is, where the question of personal beauty is concerned. Even so competent a physical anthropologist as Topinard repeats in his last work the assertion that there is no fixed canon or norm of human beauty; that it is merely a local and factitious notion, and is devoid of weight as a general factor of evolution.

This narrow opinion has, it is true, the sanction of Darwin, Humboldt, and the whole school of association philosophers; but how erroneous it is will readily be seen by reflecting on the application of the law of correspondence above quoted. Leaving aside obviously aberrant and morbid forms, such as mutilations and artificial deformities, it will be found that the underlying motive of the beautiful is that of highest function,—which is inseparable from highest capacity. The conditions required for such result are health, physical development, corporeal symmetry, and the culture of that which is peculiarly human as distinguished from what is merely animal.

When nations have ideals of beauty contrary to these principles, it is an indication of low culture and capacity. As they advance in these their ideals steadily near a definite and the same conception of the perfect human form; though it is not to be expected that the species will ever unite on any one fixed canon, because it is in the very nature and essence of the ideal that it can never become cabined, cribbed, confined within the material fetters of the real. One of the few anthropologists who have recognized and pointed out this gradual evolution of the ideal of beauty in the history of the species is Professor Gerland of Strasburg, in his treatise on general ethnography.

Relics of Glacial Man.

It has been shown by Chamberlain and Salisbury (*American Journal of Science*, May, 1891) that the Loess of the Mississippi valley basin overlies the glacial drift and so-called Orange Sand south of the limit of glaciation, and where it occurs north of this limit its relations are to the first glacial deposits. This identification lends especial importance to the finding of flint chips and arrow-heads in the Loess at Muscatine, Iowa, as related by F. M. Witter in the *Ameri-*

can Geologist, April, 1892. The evidence is not so direct or clear as one would like, but it should be enough to stimulate a thorough search in the locality.

A find of equal interest is reported from France. M. S. Meunier relates in *Le Naturaliste*, March 15, that near Montereau, in the Department of Seine et Marne, below five meters of quaternary gravels, a workman exhumed a piece of sawed horn of the extinct *Megaceros hibernicus*, and immediately adjacent to it a vase of very rude pottery, about three inches in diameter. The *Megaceros* belonged to the period of glacial cold, called by De Mortillet the Mousterien, and the association of pottery with the art of man in that early time is novel, but not at all incredible.

ASTRONOMICAL NOTES.

[Edited by George A. Hill.]

Winnecke's Comet.

WINNECKE'S periodic comet is now an easy object in a three-inch telescope, and, as it is very favorably placed for observations, it is hoped that those who have the instrumental equipment will include this object in their work. We continue the ephemeris of the comet by Dr. Haerdtl:—

	R.A.			Dec.	
	h.	m.	s.	°	'
May 31	10	53	13	+ 43	25
June 1		51	50	43	19
2		50	23	43	12
3		48	52	43	5
4		47	16	42	57
5		45	35	42	49
6		43	46	42	41
7		41	51	42	33
8		39	47	42	24
9		37	34	42	14
10		35	12	42	5
11		32	38	41	54
12		29	52	41	43
13		26	52	41	32
14	10	23	37	+ 41	19

Swift's Comet

The following is an ephemeris of Swift's comet. It is based upon a parabolic orbit computed by Dr. Berberich of Berlin. The epoch is for Berlin midnight:—

	R.A.			Dec.	
	h.	m.	s.	°	'
May 31	23	52	24	+ 37	16
June 1		54	36	37	30
2		56	46	38	3
3	23	58	54	38	26
4	0	1	1	38	48
5	0	3	6	39	10
6	0	5	10	39	32
7		7	12	39	53
8		9	11	40	14
9		11	9	40	34
10		13	5	40	54
11		14	59	41	14
12		16	51	41	34
13		18	41	41	52
14		20	30	+ 42	11

NOTES ON LOCAL BYTHOSCOPIDÆ AND CERCO-
PIDÆ.

IN the Bythoscopidæ, *Podiopsis viridis* Fitch is a rare insect with me, of which I have never taken more than a dozen specimens. Professor J. B. Smith mentions Fitch's *P. trimaculatus* as occurring in New Jersey, but as yet I have never been able to discover it, although it may be securely hidden among a lot of undetermined material so common to many entomological collections, and so detrimental to the science in not being recorded. As no list of the Hemiptera of this locality has ever been published, I have used Professor Smith's as a basis on which to establish the possible occurrence of many species, although the only species I am responsible for are those I have collected, many of which have been determined by Professor Van Duzee.

In *Bythoscopus* I have taken *pallidus* Fitch, now known as *Idiocerus pallidus* Fitch; this is not a common species, but is represented in my collection by a dozen specimens. *Bythoscopus seminudus* Say I have not taken, but it is no doubt a resident species, and is given from New Jersey.

Agallia is represented by two species, *A. sanguinolenta* Prov. and *A. quadripunctata* Prov., the latter species being quite common, and the former rare.

Idiocerus alternata Fitch, *I. lachrymalis* Fitch, *I. maculipennis* Fitch, and *I. suturalis* Fitch are all recorded from New Jersey, and are Fitch's types. So they should occur with us also, but I have never taken any of them as far as I know.

In the *Cercopidæ* we have quite a number of species, strong in character and abundant in numbers.

In the sub-family *Cercopinæ* I have never taken a single representative species; but Professor Smith records *Moncephora bicincta* Say as occurring in New Jersey, and it no doubt occurs here also.

In the sub-family *APHROPHORINÆ*, *Lepyronia quadrangularis* Say is very common on grasses and weeds (so-called). *Aphrophora parallela* Say and *A. quadrinotata* Say are rare, the first being the most common of the two species. Fitch's *Aphrophora sarogotensis*, now known as *Philaenus sarogotensis* Fitch, I have never found, although it should be with us.

Philaenus bilineatus Say, *P. lineatus* Linn., and *P. Spumaria* Germ. are recorded from New Jersey, and will no doubt be found to occur here also.

Clostoptera is represented in my collection by two species, *C. proteus* Fitch and *C. obtusa* Say, the former species being the most common. Professor Smith gives *C. achatina* Germ., *C. pini* Fitch, *C. testacea* Fitch, and *C. xanthocephala* Germ. as occurring in New Jersey.

In the sub-family *LEDRIINÆ* I have not as yet found a single representative species, although *Ledra perditia* is recorded from New Jersey, and should occur here also.

In the sub-family *GYPONINÆ* three species are represented: *Gypona* 8 *lineata* Say being the largest and most beautiful of the series. This insect varies in color from a delicate yellowish green to those who have the entire veining of the wings a brilliant scarlet, which suffuses the entire head and thorax also. These were taken from young, vigorous sprouts of *Platanus occidentalis* Linn. and also from the trunks of *Ulmus americana* Linn.; the latter were taken during a severe and protracted rain-storm, when they were apparently driven from the foliage, and sought shelter in the crevices of the rough bark. My experience has shown that such a time is very advantageous for collecting rare and new species

of Hemiptera, as very many species taken then have never been found by me in any other situation, and many can in this way be taken, which the sweep-net will fail to reach.

Gypona flavilineata Fitch is slightly greener in color and without the scarlet veining in the fore-wings. In size it is a trifle smaller. Many of these were taken from the trunks of elms with *S. lineata*, and also at electric lights.

There is great difficulty (in collecting Hemiptera) in knowing just where a certain species comes from. If one sweeps the grass, a myriad of weeds and plants are covered, and it is impossible to tell from which food-plant the species may come, or, if it is maintained by different plants, which one it is the most partial to.

The third species of *Gypona* is new, or at least is not known to Professor Van Duzee; this is much greener than the last, with a suggestion of brown on the inner edges of the fore-wings.

Xerophloea viridis Fobr., recorded from New Jersey, I have never taken here, nor have I seen *Paropholis peltata* Uhler, nor the two species of *Penthimia* *P. atra* Fabr., nor *P. americana* Fitch.

In the sub-family *TETTIGONINÆ* we are quite well represented. What we have before known as *Proconia undata* Fobr. is now referred to *Oncometopia* and known as *O. undata* Fobr. Professor Smith records *Proconia costalis* Fabr. as occurring in New Jersey, and also *Oncometopia obtusa* Fobr. and *O. orbona* Fobr. These also will no doubt prove to be resident species with us also.

Homalodisca coagulata Say, recorded from New Jersey, I have never taken. *Aulacizes irrorata* Fobr. is represented by two species, but they are without data, and I do not know if they were even taken in the State. I do not remember ever having taken this species.

Diedrocephala coccinea Forst. is very common with us, but shows such diversified markings that there appear to be two species, while still allowing ample color distribution. They occur from a pale green to a brilliant red, the red ones showing a fine green line on their fore-wings, and the green ones a fine red line. *Diedrocephala mollipes* Say is also common; it is more uniform in coloration. *D. noveboracensis* Fitch is of a brilliant green, and with me it is quite rare. Another species of *Diedrocephala* is new to Professor Van Duzee. This is much darker than either *mollipes* or *noveboracensis*. Dr. C. V. Riley's *Diedrocephala floviceps* I have never taken, although it is recorded from New Jersey.

Helochara communis Fitch is by no means common here, but is represented by a dozen specimens.

Evacanthus orbitalis Fitch I have never collected, but no doubt it will be found here. *Tettigonia* is represented by two species, *bifida* Say and *tripunctata* Fitch, the former being the most common of the two species. *T. trifasciata* Say I have never found, but it is recorded from New Jersey, and no doubt occurs with us also.

In the sub-family *ACOCEPHALINÆ* I have three representative species. *Acocephalus mixtus* Say is represented by about half a dozen specimens. *Parabolocratus vittulinus* Fitch is very rare indeed, and *Platymetopius frontalis* Van Duzee is represented by three specimens. Professor Smith also records in this sub-family *Hecalus fenestratus* Uhl., *Acocephala solidaginis* Harr., *Platymetopius acutus* Say, *P. albonotatus* Fitch, and *Selenocephalus vittulinus* Fitch, now referred to *Parabolocratus* as above.

After extended examination and research, I am inclined to believe with Professor Osborn that what is known as

"Silver Top" in grass is caused by the working of leaf-hoppers, and that the *Jassidae* furnish many of the insects as well as those in the families named in this paper. In our Park meadows, some of which are left to develop hay, "silver top" is very common, especially on the earlier grasses, and throughout the season a weakening and deforming of grass stalks are everywhere noticeable, which in most cases, no doubt, is due to the extraction of the juices by these insects. The node of the grass, especially on the upper side and for an inch or more, is very tender and succulent; but as we traverse the internode, we find it becomes more firm and woody, as it were. Every boy knows where to find the succulent portion of a grass-stem, and proceeds to pull it out, when it breaks just above the node at the tenderest place. This succulent feeding ground is soon discovered by the "hoppers" in their tours of prospecting up and down the stem; veritable "sappers, if not miners," they are often seen in numbers in such situations, and the punctures can also be noticed. The exhausted stems of the dead part of the grass culm show every sign of having been pumped dry by these creatures, as at that point nothing seems to be left but a bundle of woody fibres, and the internode for some distance diminishing in size from the loss of sap, and that loss occurring before the cells had been sufficiently developed to stand without collapsing. My success in finding Thrips, or Mero-myza, in the stems or under the leaf-sheaths has been no better than Professor Osborn's.

As I am working on a list with food-plants and habits of Hemiptera for New York State, I should be glad to receive from collectors information in regard to those found here and their distribution elsewhere, so that the list can be made as complete as possible; for all "local lists" are of the greatest value, not only to local students but to students of North American entomology also. EDMUND B. SOUTHWICK.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Four-Fold Space and Two-Fold Time.

ANY attempt at expounding popularly the recent developments of the old idea of space should be prefaced by the explanation that their tremendous value to mathematics is utterly independent both of their external reality and of the possibility of their realization. For example, had either M'Clelland or Preston ever glanced through Bolyai's "Science Absolute of Space," we would not to-day read in their excellent "Treatise on Spherical Trigonometry," p. 10, "The student must be careful, however, not to regard a solid angle as an *area*, but as a mere *number*, like the circular measure of a plane angle. . . . and the solid angle subtended at O by the $\frac{1}{n^{\text{th}}}$ part of the surface of the sphere is $\frac{4\pi}{n^{\text{th}}}$, which is thus a mere number." A solid angle is a magnitude as different from a mere number as is the current of electricity which kills a man. Though its scientific unit, the steradian, is American, yet they could have found it in the "Encyclopædia Britannica, in William Thomson's article "Mensuration."

Because these magnitudes, solid angles, have a natural unit, the steregon, and a scientific subsidiary unit, the steradian, therefore mathematicians, unused to the idea of a natural unit, blunder about them. To Bolyai belongs the honor of showing that each geometric magnitude has its natural unit, which never could have been discovered in Euclidean space, since

homaloidal, parabolic space appears as a limit in which the natural unit for length becomes indefinitely great, so calling, in practice, for an artificial unit for length, a finite sect, as the centimeter. The fundamental importance of the pseudospheric hyperbolic space of Bolyai and Lobatschewsky in no wise depends on whether C. S. Peirce is right in maintaining that such is the real space in which we live. It has already enriched us eternally by the gift of the Science of Comparative Geometry, and so of pure spherics.

Now, in his beautiful paper in Crelle, on "Single Elliptic Geometry," Professor Newcomb has used, unnecessarily we think, space of four dimensions. Elliptic space, though finite, is unbounded. But there is a sense in which hyperbolic space, though infinite, is bounded, and so its realization is naturally connected with that of four-fold space. For this the most fruitful idea has ever been Professor Sylvester's, of working up from two-dimensional beings. And here let me say that thinkers must not confine themselves as in the past to "an imaginary *plane* being," but must likewise draw from two dimensional spherics and pseudospherics. Not only must we think of a *flexible* closed shell turned inside out, as we turn a glove; we must try if we can realize that as the flexibility of the "thin hoop" mentioned by Dr. Hall is only needed because the hoop has as many dimensions as the space in which we wish to turn it, therefore can we not turn an inflexible closed shell, an unbroken eggshell, inside out, *without flexure*?

The corresponding generalizations for *time* are harder, because in time's domain we are one-dimensional beings; therefore our best space-method fails us. Cannot genius give us a next-best almost as good?

GEORGE BRUCE HALSTED.

University of Texas, Austin, Tex., May 22.

Family Traits.

IN your issue of May 20, "Veritas" again combats the proposition that family traits are a reality. The statement was made in my original communication that questions of descent were questions of heredity and environment, and that heredity, consisting as it does of questions relating to the reproduction of the race as an animal, must be referred to biology. The results of all departments of research for the last fifty years refer man to his place in nature as an animal, and as an animal a fit subject for biological investigation.

Will Veritas please explain how, if it be admitted that a man may resemble his father and grandfather, that with the great-grandfather the resemblance must cease? Is not every man the son of his father, and is his father not also the son of his grandfather, and so on from generation to generation back in an infinite series? If a man may or does resemble his father, that is the limit of the question, and further argument is unnecessary.

I freely admit that the Does of the present know, of their own knowledge, nothing of 100 per cent of the traits of John Doe the first. I was not referring to any positive knowledge held in this generation of the ninth generation from the present. Nevertheless John Doe of the seventeenth century had personal traits, and if the oldest Doe now living has seen and known 100 Does in perhaps five generations, and affirms that, out of the almost infinite diversity of traits that constitute human character, a few have been observed in all these generations common to a large majority of the 100 Does, I assert that there are "Doe" traits or "family traits," and in my former article I gave a scientific explanation of the occurrence of such traits, with a number of illustrations that were neither a figment of the imagination nor a delusion. If these are not facts, what are facts?

Moreover, in your issue of April 15, Ed. H. Williams Jr. gave a number of other reasons why family traits should descend on the male side strongest, that are either "facts" or delusions. Facts are established by observation of the repeated recurrence of identical phenomena under like conditions.

What fact is developed by speculation concerning a man's ancestor of the seventeenth century relative to the occurrence of traits common to forty people now living, who all bear his surname, and who are likewise his descendants? Suppose these

forty people are cousins to the entire population of Boston; does that relation either prove or disprove their possession of traits in common that do not appear among 40 other cousins of 40 different names?

ENQUIRER.

The Systematic Position of the Diptera.

In reply to the article, by Professor J. M. Aldrich, in *Science* of April 26, I will say that the Diptera are undoubtedly the most highly specialized order of insects. Professor Hyatt deserves credit for apparently being the first one to call attention to this idea and offer proofs to sustain it. His idea of what constitutes specialization is correct, from my standpoint. I realize the force of Professor Aldrich's remark, when he says that this line of reasoning will apparently lead us to the conclusion that the Pupipara are the highest insects; but I am inclined to believe that the higher families of Cyclorrhapha will be found to exhibit greater specialization. Everything points to their being of the most recent origin. If anything has been published on the the embryology of the Pupipara, I am not aware of it. Embryological research alone will clear up this point, and there is no reason in the world why it should not show that the Pupipara have long ago passed through stages now occupied by apparently more highly developed Diptera, but it is improbable, to say the least. If it can be demonstrated, I shall be glad to accept the Pupipara as the highest insects.

C. H. TYLER TOWNSEND.

Las Cruces, N. M., May 26.

A Botanical Congress and Botanical Nomenclature.

I HAVE read your note of May 20, with reference to the action of the Botanical Club of Washington upon the questions of a botanical congress and botanical nomenclature. It has always seemed to me wise for American botanists first to agree among themselves in reference to this matter, and then they will be in a better position to come to an understanding with the rest of the world. There is no more representative body of American botanists than the Botanical Club of the American Association. It is perfectly democratic; every botanist in the country can join it and take part in its discussions. It may be questioned whether its boundaries are not too ill-defined to make it a fit body to decide such important questions; but it is surely a capital place for their discussion.

JOHN M. COULTER.

Bloomington, Ind., May 25.

AMONG THE PUBLISHERS.

THE first number of the *Yale Review*, a quarterly journal of history and political science, has just been issued for the month of May. It is edited by Professor George P. Fisher and others of Yale University, but will welcome contributions from every quarter and from every school. The papers in this opening number are on "German Tariff Policy, Past and Present," by Henry Villard and Henry W. Farnam; on "The Demarcation Line of Pope Alexander VI," by E. G. Bourne; on "Legal

Societas Entomologica.

International Entomological Society, Zurich-Hottingen, Switzerland.
Annual fee, ten francs.

The Journal of the Society appears twice a month, and consists entirely of original articles on entomology, with a department for advertisements. All members may use this department free of cost for advertisements relating to entomology.

The Society consists of about 450 members in all countries of the world.

The new volume began April 1, 1892. The numbers already issued will be sent to new members.

For information address Mr. FRITZ RUHL, President of the Societas Entomologica, Zurich-Hottingen, Switzerland.

NEO-DARWINISM AND NEO-LAMARCKISM.

By LESTER F. WARD.

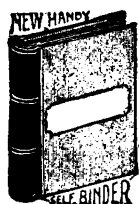
Annual address of the President of the Biologica Society of Washington delivered Jan. 24, 1891. A historical and critical review of modern scientific thought relative to heredity, and especially to the problem of the transmission of acquired characters. The following are the several heads involved in the discussion: Status of the Problem, Lamarckism, Darwinism, Acquired Characters, Theories of Heredity, Views of Mr. Galton, Teachings of Professor Weismann, A Critique of Weismann, Neo-Darwinism, Neo-Lamarckism, the American "School," Application to the Human Race. In so far as views are expressed they are in the main in line with the general current of American thought, and opposed to the extreme doctrine of the non-transmissibility of acquired characters.

Price, postpaid, 25 cents.

N. D. C. HODGES, 874 Broadway, N. Y.

A TEMPORARY BINDER

for *Science* is now ready, and will be mailed postpaid on receipt of 75 cents.



This binder is strong, durable and elegant, has gilt side-title, and allows the opening of the pages perfectly flat. Any number can be taken out or replaced without disturbing the others, and the papers are not mutilated for subsequent permanent binding. Filed in this binder, *Science* is always convenient for reference.

N. D. C. HODGES, Publisher,
874 Broadway, New York.

Exchanges.

[Free of charge to all, if of satisfactory character. Address N. D. C. Hodges, 874 Broadway, New York.]

Taxidermist going out of business has quantity of finely-mounted specimens of North American birds, mammals and reptiles and skins of birds for sale, including a full local collection of bird skins, showing some great variations of species; also quantity of skulls with horns of deer and mountain sheep, and mounted heads of same. Will give good exchange for Hawk Eye camera with outfit. Apply quickly to J. R. Thurston, 265 Yonge St., Toronto, Canada.

For exchange.—A fine thirteen-keyed flute in leather covered case, for a photograph camera suitable for making lantern slides. Flute cost \$27, and is nearly new. U. O. COX, Mankato, Minn.

To exchange; Experiment Station bulletins and reports for bulletins and reports not in my file. I will send list of what I have for exchange. P. H. ROLFS, Lake City, Florida.

Finished specimens of all colors of Vermont marble for fine fossils or crystals. Will be given only for valuable specimens because of the cost of polishing. GEO. W. PERRY, State Geologist, Rutland, Vt.

For exchange.—Three copies of "American State Papers Bearing on Sunday Legislation," 1891, \$2.50, new and unused, for "The Sabbath," by Harmon Kingsbury, 1840; "The Sabbath," by A. A. Phelps, 1842; "History of the Institution of the Sabbath Day, Its Uses and Abuses," by W. L. Fisher, 1859; "Humorous Phases of the Law," by Irving Browne; or other works amounting to value of books exchanged, on the question of governmental legislation in reference to religion, personal liberty, etc. If preferred, I will sell "American State Papers," and buy other books on the subject. WILLIAM ADDISON BLAKELY, Chicago, Ill.

For Sale or Exchange for books a complete private chemical laboratory outfit. Includes large Becker balance (200g. to 1-romg.), platinum dishes and crucibles, agate motors, glass-blowing apparatus, etc. For sale in part or whole. Also complete file of *Silliman's Journal*, 1862-1885 (62-71 bound); Smithsonian Reports, 1854-1883; U. S. Coast Survey, 1854-1869. Full particulars to enquirers. F. GARDINER, JR., Pomfret, Conn.

Wanted, in exchange for the following works, any standard works on Surgery and on Diseases of Children: Wilson's "American Ornithology," 3 vols.; Coues' "Birds of the Northwest" and "Birds of the Colorado Valley," 2 vols.; Minot's "Land and Game Birds of New England," 2 vols.; Samuels' "Our Northern and Eastern Birds," all the Reports on the Birds of the Pacific R. R. Survey, bound in 2 vols., Morocco; and a complete set of the Reports of the Arkansas Geological Survey. Please give editions and dates in corresponding. R. ELLSWORTH CALL, High School, Des Moines, Iowa.

To exchange Wright's "Ice Age in North America" and Le Conte's "Elements of Geology" (Copyright 1882) for "Darwinism," by A. R. Wallace, "Origin of Species," by Darwin, "Descent of Man," by Darwin, "Man's Place in Nature," Huxley, "Mental Evolution in Animals," by Romanes, "Pre-Adamites," by Winchell. No books wanted except latest editions, and books in good condition. C. S. Brown, Jr., Vanderbilt University, Nashville, Tenn.

Wants.

Any person seeking a position for which he is qualified by his scientific attainments, or any person seeking some one to fill a position of this character, be it that of a teacher of science, chemist, draughtsman, or what not, may have the "Want" inserted under this head FREE OF COST, if he satisfies the publisher of the suitable character of his application. Any person seeking information on any scientific question, the address of any scientific man, or who can in any way use this column for a purpose consonant with the nature of the paper, is cordially invited to do so.

WANTED.—We want any and all of the following providing we can trade other books and magazines or buy them cheap for cash: Academy, London, vol. 1 to 28, 35, Jan. and Feb., '89; Age of Steel, vol. 1 to 66; American Antiquarian, vol. 1, 2; American Architect, vol. 1 to 6, 9; American Art Review, vol. 3; American Field, vol. 1 to 21; American Geologist, vol. 1 to 6; American Machinist, vol. 1 to 4; Art Amateur, vol. 1 to 7, Oct., '4; Art Interchange, vol. 1 to 9; Art Union, vol. 1 to 4, Jan., '44, July, '45; Bibliotheca Sacra, vol. 1 to 46; Godsey's Lady's Book, vol. 1 to 20; New Englander, vol. 11; Zoologist, Series 1 and 1, Series 8 vol. 1 to 14; Allen Armendale (a novel). Raymer's "Old Book" Store, 243 4th Ave. S., Minneapolis, Minn.

WANTED.—By a young man, a Swarthmore College junior, a position as principal of a public high school in one of the Gulf States, or as instructor in botany, physiology, and geology in an academy or normal school. Address B., care of Librarian, Swarthmore College, Penn.

WANTED.—A teacher of Geology who is familiar with the fossils of the Hamilton Group, as instructor of Geology during July next at the Natural Science Camp on Canandaigua Lake. Apply to ALBERT L. AREY, Director, 229 Averill Ave., Rochester, N. Y.

WANTED.—To act as correspondent for one or two daily or weekly papers. Have worked on paper for about two years. Would like a position on editorial staff of humorous paper. Address GEO. C. MASON, 14 Elm St., Hartford, Conn.

TRANSLATOR wanted to read German architectural works at sight (no writing). One familiar with technical terms desired. Address "A.," Box 149, New York Post Office.

WANTED.—A position in a manufacturing establishment by a manufacturing Chemist of inventive ability. Address M. W. B., care of *Science*, 874 Broadway, N. Y.

WANTED.—Books on Anatomy and Hypnotism. Will pay cash or give similar books in exchange. Also want medical battery and photo outfit. DR. ANDERSON, 182 State street, Chicago, Ill.

WANTED.—A college graduate with some normal training, to teach the sciences, at \$1,800 per year, in a Southern college. A Baptist or a Methodist preferred. Must also be a first-class Latin scholar. A. H. Beals, Box K, Milledgeville, Ga.

ADDRESS WANTED.—Will some one please send the address of the Secretary of the American Philological Society. Also that of Herbert Spencer. "ADDISON," Room 84, 164 Madison St., Chicago, Ill.

Theories of Price Regulation," by Arthur T. Hadley; on "Massachusetts and the Saybrook Platform," by Williston Walker; and on "Labor Troubles between 1834 and 1837," by Evans Woollen, together with a few pages of comment and a number of book reviews. The articles are essentially of the same quality as those that have appeared on similar topics elsewhere in this country during the past ten or twenty years, but we fail to find in them anything new or striking. The appearance of this new *Review*, indeed, raises the question whether this subject of political science is not in danger of being run into the ground by our young and ambitious writers. The *Review* is published by Ginn & Co., of Boston, at 75 cents a number or \$3 a year.

—Professor W. O. Atwater, in an instructive article in *The Forum* for June, points out the curious fact, that, in the extraordinary applications of science to practical problems in recent years, one of the most important fundamental problems has been strangely overlooked, viz., the scientific study of food. The coming man will avoid four mistakes that are now largely made: (1) he will not buy as expensive kinds of food as are now generally bought, because some of the least expensive foods are the most nutritive and palatable; (2) with further scientific information the coming man will value foods in proportion to their

nutritive qualities; (3) if foods are bought and eaten with reference to their nutritive qualities, and not to mere fashion or habit, it would require a much less quantity to keep a man in his best working condition than is now generally consumed; (4) there will be a revolution wrought in the present way of cooking, which is both wasteful and primitive and far behind our advancement in almost every other art. Professor Atwater gives the results of practical studies in diets made to show these conclusions. And he asks: "Has man yet reached his highest development? The poorer classes of people — and few of us realize how numerous they are — the world over are scantily nourished. The majority of mankind live on a nutritive plane far below that with which we are familiar. We may hope for the best culture, not of the intellectual powers, but of the higher Christian graces in the minds and hearts of men, in proportion as the care of their bodies is provided for. Happily, with advance of knowledge comes the improvement of material conditions. May we not hope that the future development of our race will bring that provision for physical wants which is requisite for the best welfare of mind and soul?" President Dwight, in his article, also in the *June Forum*, on the recent action of Yale College in admitting women to its advanced courses, makes an eloquent discussion of the higher education of women in the United States.

Exhaustion

Horsford's Acid Phosphate.

A wonderful remedy, of the highest value in mental and nervous exhaustion.

Overworked men and women, the nervous, weak and debilitated, will find in the Acid Phosphate a most agreeable, grateful and harmless stimulant, giving renewed strength and vigor to the entire system.

Dr. Edwin F. Vose, Portland, Me., says: "I have used it in my own case when suffering from nervous exhaustion, with gratifying results. I have prescribed it for many of the various forms of nervous debility, and it has never failed to do good."

Descriptive pamphlet free.

Rumford Chemical Works, Providence, R. I.

Beware of Substitutes and Imitations.

CAUTION.—Be sure the word "Horsford's" is on the label. All others are spurious. Never sold in bulk.

FOSSIL RESINS.

This book is the result of an attempt to collect the scattered notices of fossil resins, exclusive of those on amber. The work is of interest also on account of descriptions given of the insects found embedded in these long-preserved exudations from early vegetation.

By CLARENCE LOWN and HENRY BOOTH.
12°. \$1.

N. D. C. HODGES, 874 Broadway, N. Y.

LITERARY OUTFIT FREE.

Anyone sending us \$1.00 at once and mentioning "Science," will receive a copy of "Historical Sketches and Events in the Colonization of America," by G. B. Hall. A square 8vo. book (6½x9 inches), 223 pages, illustrated. This is a regular \$2.00 book and a bargain at that price. . . . \$ 2 00
200 Private Library Labels; they should be used by all who own books. . . . 50
"The Library," a 100-page book containing a brief list of most important standard and miscellaneous books in every department of literature. Intended for those who are about forming a library. Hints about what books to read and how to buy them. . . . 50
1 year's subscription to the "Literary Light," a monthly magazine of Ancient, Medieval and Modern Literature. . . . 1 00

\$4.00 actual value for \$1.00. Sample copy of "Literary Light," 10 cents (postal card won't do).
Address, **Literary Light,**
243 4th Ave. S. Minneapolis, Minn.

ESTERBROOK'S STEEL PENS.

OF SUPERIOR AND STANDARD QUALITY.
Leading Nos.: 048, 14, 130, 135, 239, 333
For Sale by all Stationers.

THE ESTERBROOK STEEL PEN CO.,
Works: Camden, N. J. 26 John St., New York.

THE LATEST IMPROVEMENT
FOR STEREOPTICONS. OUR PATENT.
MULTI-FOCAL
ATTACHMENT.
PRODUCES PICTURES FROM 12 TO 20 FEET AT
ANY DISTANCE WITHOUT CHANGING THE OBJECTIVE
SEND FOR
DESCRIPTIVE CIRCULAR TO **QUEEN & CO. PHILA.**

THE CHEAPEST AND BEST!
PHOTO ENGRAVING CO.
67 PARK PLACE, NEW YORK.
ENGRAVING FOR ALL ILLUSTRATIVE AND
ADVERTISING PURPOSES.

PATENTS

For INVENTORS. 40-page BOOK FREE. Address
W. T. Fitzgerald, Attorney at Law, Washington, D. C.

THE WEEKLY BULLETIN OF NEWSPAPER AND PERIODICAL LITERATURE.

Catalogues and Classifies Each Week
**THE PRINCIPAL CONTENTS OF
THE PERIODICAL PRESS.**

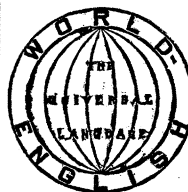
That huge mass of material heretofore inaccessible to the eager student is now rendered available. Special attention is invited to the Bulletin's

INDEX OF TECHNICAL LITERATURE

Send for a free sample copy and learn how

The Bulletin Supplies
The Articles Catalogued.

Address **THE WEEKLY BULLETIN,**
5 Somerset Street, - - Boston, Mass.



WORLD-ENGLISH.
25 Cents.

**HANDBOOK OF
WORLD-ENGLISH.**
25 Cents.

Ex-President Andrew D. White, of Cornell University, says: "I believe that the highest interests of Christian civilization and of humanity would be served by its adoption."

"So set down, our tongue is the best for the world to unite upon."—*Brooklyn Eagle*.

"The idea of Mr. Bell has much to recommend it, and the presentation is charmingly clear."—*American, Phila.*

"The result is a language which cannot fail to meet with acceptance."—*Boston Traveller*.

"World-English deserves the careful consideration of all serious scholars."—*Modern Language Notes*.

Sent, postpaid, on receipt of price.

N. D. C. HODGES, 874 Broadway, New York.

POPULAR MANUAL OF VISIBLE SPEECH AND VOCAL PHYSIOLOGY.

For use in Colleges and Normal Schools. Price 50 cents
Sent free by post by

N. D. C. HODGES, 874 Broadway, N. Y.

GEM OPALS. Cut ready for setting. Having purchased a large lot at the Mexican locality, we are offering them at about one-fifth jewelers' prices; 0c., \$1 \$1.50, \$2, \$3. This is a rare opportunity to secure a fine gem very cheap. 100 pp. Mineral Catalogue 15c., in cloth 25c. Supplement 2c. GEO. L. ENGLISH & CO., Mineralogists, 733 and 735 Broadway, New York City.

QUERY.

Can any reader of *Science* cite a case of lightning stroke in which the dissipation of a small conductor (one-sixteenth of an inch in diameter, say,) has failed to protect between two horizontal planes passing through its upper and lower ends respectively? Plenty of cases have been found which show that when the conductor is dissipated the building is not injured to the extent explained (for many of these see volumes of Philosophical Transactions at the time when lightning was attracting the attention of the Royal Society), but not an exception is yet known, although this query has been published far and wide among electricians.

First inserted June 19. No response to date.

N. D. C. HODGES,

874 BROADWAY, NEW YORK.

JUST READY.

THE LABRADOR COAST.

A Journal of two Summer Cruises to that region; with notes on its early discovery, on the Eskimo, on its physical geography, geology and natural history, together with a bibliography of charts, works and articles relating to the civil and natural history of the Labrador Peninsula.

By ALPHEUS SPRING PACKARD, M.D., Ph.D.

8°, 513 pp., \$3.50.

N. D. C. HODGES, 874 Broadway, N. Y.

THE RADIOMETER.

By DANIEL S. TROY.

This contains a discussion of the reasons for their action and of the phenomena presented in Crookes' tubes.

Price, postpaid, 50 cents.

N. D. C. HODGES, 874 Broadway, N. Y.

AUTHORS AND PUBLISHERS.

Material arranged and compiled for all kinds of works, excepting fiction. Statistics a specialty. Indexing and cataloguing. Address G. E. BIVER, 835 N. 16th Street, Philadelphia.

TO THE READERS OF SCIENCE.

PUBLISHER'S ANNOUNCEMENT.

OUR PLANS.

WITHIN the past six months the use of *Science* by scientific men and women as a medium for prompt publication and weekly discussion, has increased very materially, so that the pages are now well filled each week with original matter. As the number of those promising contributions is increasing at the rate of three or four each day, it cannot be long before *Science* at its present size will be too small for the amount of matter offered. We have under consideration therefore an enlargement of the paper by one-half, but must first learn the temper of our constituency as to an advance in price to \$5.00, which was the subscription price from the start for four years, up to June 30, 1887. Further, to carry out the proposed enlargement, we shall need five hundred additional subscribers. If you are not already a subscriber, are you willing to aid in making *Science* more worthy of American scientific work by becoming one?

It goes without saying, that the demand for scientific literature is limited, when compared with that for literature which is more to the public taste, so that the receipts of most of the Scientific Journals, in this country, do not pay quite for their printing and paper, to say nothing of the other items of expense. We say this merely to emphasize the fact, that generous and prompt support must be accorded this move if it is to succeed.

Titles of Some Articles Published in *Science* since Jan. 1, 1892.

Aboriginal North American Tea.
Actinism.
Amenhotep, King, the tomb of.
Anthropology, Current Notes on.
Arsenical Poisoning from Domestic Fabrics.
Anatomy, The Teaching of, to Advanced Medical Students.
Astronomical Notes.
Botanical Laboratory, A.
Brain, A Few Characteristics of the Avian.
Celts, The Question of the.
Collection of Objects Used in Worship.
Deaf, Higher Education of the.
Diphtheria, Tox-Albumin.
Etymology of two Iroquoian Compound Stems.
Eye-Habits.
Family Traits, Persistency of.
Fishes, The Distribution of.
Fossils, Notice of New Gigantic.
Grasses, Homoptera Injurious to.
"Healing, Divine."
Hemipterus Mouth, Structure of the.
Hypnotism among the Lower Animals.
Hypnotism, Traumatic.
Indian occupation of New York.
Influenza, Latest Details Concerning the Germs of.
Infant's Movements.
Inventors and Manufacturers, the American Association of.
Iowa Academy of Sciences.
Jargon, The Chinook.
Klamath Nation, Linguistics.
Lightning, The New Method of Protecting Buildings from.
Lissajou's Curves, Simple Apparatus for the Production of.
Maize Plant, Observations on the Growth and Chemical Composition of.
Mineral Discoveries, Some Recent, in the State of Washington.
Museums, The Support of.
Patent Office Building, The.
Pocket Gopher, Attempted Extermination of.
Psychological Laboratory in the University of Toronto.
Psychological Training, The Need of.
Rain-Making.
Rivers, Evolution of the Loup, in Nebraska.
Scientific Alliance, The.
Star, The New, in Auriga.
Storage of Storm-Waters on the Great Plains.
Teaching of Science.
Tiger, A New Sabre-Toothed, from Kansas.
Timber Trees of West Virginia.
Tracheæ of Insects, Structure of.
Vein-Formation, Valuable Experiments in.
Will, a Recent Analysis of.
Wind-Storms and Trees.
Wines, The Sophisticated French.
Zoology in the Public Schools of Washington, D. C.

Some of the Contributors to *Science* Since Jan. 1, 1892.

Aaron, Eugene M., Philadelphia, Pa.
Allen, Harrison, Philadelphia, Pa.
Baldwin, J. Mark, University of Toronto, Canada.
Barnes, Charles Reid, Madison, Wis.
Baur, G., Clark University, Worcester, Mass.
Beal, W. J., Agricultural College, Mich.
Beals, A. H., Milledgeville, Ga.
Beauchamp, W. M., Baldwinsville, N. Y.
Boas, Franz, Clark University, Worcester, Mass.
Bostwick, Arthur E., Montclair, N. J.
Bradley, Milton, Springfield, Mass.
Brinton, D. G., Philadelphia, Pa.
Chandler, H., Buffalo, N. Y.
Comstock, Theo. B., Tucson, Arizona.
Cragin, F. W., Colorado Springs, Col.
Davis, W. M., Harvard College, Cambridge, Mass.
Dimmock, George, Canobie Lake, N. H.
Farrington, E. H., Agricultural Station, Champaign, Ill.
Ferree, Barr, New York City.
Flexner, Simon, Johns Hopkins University, Baltimore, Md.
Foshay, P. Max, Rochester, N. Y.
Gallaudet, E. M., Kendall Green, Washington, D. C.
Garman, S., Museum of Comp. Zool., Cambridge, Mass.
Golden, Katherine E., Agricultural College, Lafayette, Ind.
Hale, Edwin M., Chicago, Ill.
Hale, George S., Boston, Mass.
Hale, Horatio, Clinton, Ontario, Canada.
Hall, T. Proctor, Clark University, Worcester, Mass.
Halsted, Byron D., Rutgers College, New Brunswick, N. J.
Haworth, Erasmus, Oskaloosa, Iowa.
Hay, O. P., Irvington, Ind.
Haynes, Henry W., Boston Mass.
Hazen, H. A., Weather Bureau, Washington, D. C.
Hewitt, J. N. B., Bureau of Ethnology, Washington, D. C.
Hicks, L. E., Lincoln, Neb.
Hill, E. J., Chicago, Ill.
Hill, Geo. A., Naval Observatory, Washington, D. C.
Hitchcock, Romyn, Washington, D. C.
Hotchkiss, Jed., Staunton, Va.
Howe, Jas. Lewis, Louisville, Ky.
Hubbard, Gardiner G., Washington, D. C.
James, Joseph F., Agricultural Dept., Washington, D. C.
Johnson, Roger B., Miami University, Oxford, O.
Kellerman, Mrs. W. A., Columbus, O.
Kellicott, D. S., State University, Columbus, O.
Macloskie, G., Princeton, N. J.
McCarthy, Gerald, Agricultural Station, Raleigh, N. C.
MacDonald, Arthur, Washington, D. C.
Marshall, D. T., Metuchen, N. J.
Mason, O. T., Smithsonian Institution, Washington, D. C.
Nichols, C. F., Boston, Mass.
Nuttall, George H. F., Johns Hopkins University, Baltimore, Md.
Oliver, J. E., Cornell University, Ithaca, N. Y.
Osborn, Henry F., Columbia College, New York City.
Osborn, Herbert, Agricultural College, Ames, Iowa.
Pammel, L. H., Agricultural Station, Ames, Iowa.
Pillsbury, J. H., Smith College, Northampton, Mass.
Ruffner, W. H., Lexington, Va.
Schufeldt, R. W., Washington, D. C.
Scripture, E. W., Clark University, Worcester, Mass.
Slade, D. D., Museum Comp. Zool., Cambridge, Mass.
Smith, John B., Rutgers College, New Brunswick, N. J.
Stevenson, S. Y., Philadelphia, Pa.
Stone, G. H., Colorado Springs, Col.
Thurston, R. H., Cornell University, Ithaca, N. Y.
Todd, J. E., Tabor, Iowa.
True, Frederick W., National Museum, Washington, D. C.
Turner, C. H., University of Cincinnati, Cincinnati, O.
Ward, R. DeC., Harvard University, Cambridge, Mass.
Ward, Stanley M., Scranton, Pa.
Warder, Robert B., Howard University, Washington, D. C.
Welch, Wm. H., Johns Hopkins University, Baltimore, Md.
West, Gerald M., Clark University, Worcester, Mass.
Williams, Edward H., Lehigh University, Bethlehem, Pa.