the trade supplement will be given the department of "Industrial Progress," which they purpose making a useful feature of future issues. Recognizing that architecture, however artistic, is not pure art, and that its practitioners cannot draw solely upon their inner consciousness for the development of their designs, but must regard the demands of their clients for the latest improvements both in structure and fittings, they propose in this department to place before their readers new and valuable inventions, materials, and appliances as they are placed on the market, together with appropriate notices of those valuable reference books, the trade catalogues, as they appear. The "building news" will also appear in a regular department, and two new departments, "Architectural Engineering" and "Sanitary Engineering," will be given careful attention.

— The first number of the third volume of *The American Journal of Psychology* (published now by Clark University at Worcester, Mass.) is now in press, and will appear in January, 1890, and succeeding numbers thereafter quarterly. The typography of the journal has been changed and improved. A new department of minor contributions has been added for briefer records of original observation and research in laboratories and elsewhere, and for historical chapters upon various phases of psychological science. The digests and critical reviews of European literature, which have before formed so important a feature of the journal, will be continued, and made as complete as possible. Their scope will also be enlarged so as to include, besides the fields already represented, the psychological parts of criminology and anthropology. The editorial staff will be increased, and articles of unusual value and interest are promised. The price remains five dollars per year. The first and second volumes will also be furnished unbound at five dollars per volume till further notice.

— D. Appleton & Co. will publish immediately, "Around and About South America," by Frank Vincent, who relates his experiences of twenty months, made useful with maps and plans and fifty-four full-page illustrations; "An Epitome of Herbert Spencer's Synthetic Philosophy," by F. Howard Collins, with preface by Herbert Spencer; "James G. Birney and His Times," the genesis of the Republican party, with some account of Abolition movements in the South before 1828; and "The Religion of the Semites," in which the fundamental institutions are treated by Prof. Robertson Smith, and the *International Scientific Series* will receive a new volume on "The Physiology of Bodily Exercise," by Fernand Lagrange.

— Ginn & Company have just issued "An Elementary Treatise on the Method of Least Squares," by George C. Comstock, professor of astronomy in the University of Wisconsin and director of the Washburn Observatory. This treatise has grown out of attempts by the author to so present the subject to students that a working knowledge based upon an appreciation of its principles might be acquired with a moderate expenditure of time and labor. Believing that the ultimate warrant for the legitimacy of the method is to be found in the agreement between the observed distribution of residuals and the distribution represented by the error curve, Professor Comstock has abandoned altogether the analytical demonstrations of the equation of that curve, and presents it as an empirical formula, representing the generalized experience of observers. The evidence in support of a formula of this kind is cumulative, the few curves presented in illustration being considered as samples of the kind of evidence existing. Prominence is given to the distinction between accidental and systematic errors, and the limitations which result from the difference between these two classes of errors is insisted upon.

— *The Ophthalmic Review* begins its new volume with an American editor, Dr. Edward Jackson of Philadelphia, who succeeds Dr. James Anderson of London. It will hereafter contain original articles from American as well as English ophthalmic surgeons; with notices of all ophthalmological papers published here or abroad, and full reviews of the more important of them. The *Review* is now edited by J. B. Lawford, M.D., London; Karl Grossman, Liverpool; Priestley Smith, Birmingham; John B. Story, M.D., Dublin, and Edward Jackson, M.D., 215 South Seventeenth Street, Philadelphia, to whom all American communications concerning editorial matters, copies of papers, books for review, etc., should be addressed. The *Review* has hitherto devoted its space almost entirely to English and foreign contributions. Its success in this field has led the editors and publishers to increase its scope by including an index of American articles on ophthalmological subjects, reviews of the most important papers, original articles by well-known men, and reports of the meetings of the American Ophthalmological Society, and the section on ophthalmology of the American Medical Association.

— Gebbie & Co., Philadelphia, have just published a book on the drama, entitled "Players and Playwrights I Have Known: a record of the English stage from 1840 to 1880," by John Coleman.

— Funk & Wagnalls, have published "The Patience of Hope and Other Sermons, by the late Rev. Joseph H. Wright, with a brief Sketch of his Life," edited by Oliver J. Thatcher, Professor in the United Presbyterian Theological Seminary, Allegheny, Pa.

— The first number of *Kate Field's Washington* has made its appearance. It is a "national independent review," will be published every Wednesday, at Washington, and partakes largely of the individuality of its talented editor. Four dollars per year, ten cents per copy.

— The Belford Co. have in preparation "A New Encyclopædia of American Biography," intended to not merely cover the ground usually occupied by such publications, but to make special mention of the men and women who are doing the work and forming the thought of our own time. Mr. James R. Gilmore ("Edmund Kirke") is the editor.

— Mr. Justin Winsor is engaged upon a biographical and historical work to be entitled "Christopher Columbus: an examination of the historical and geographical conditions under which the Western Continent was disclosed to Europe, with an inquiry into the personal history of Cristoval Colon." Houghton, Mifflin & Co. will be the publishers.

— Dr. J. E. Oliver, of Boston, well known as a careful and intelligent student of American history, has edited, says the Boston *Transcript*, "the diary of William Pynchon, of Salem, and his book will be published at an early day. This diary was written during the middle and later years of the eighteenth century, and gives an accurate picture of Salem's social and political life in that interesting period. It will be issued by the Riverside Press."

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.*

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

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

What Dr. Flint has to Say about the Nicaragua Footprints.[1]

IN replying to Dr. D. G. Brinton's article of Nov. 18, 1887, issued by the American Philosophical Society, and republished in 1888 (No. 86) by the Philosophical Society of London, I entirely overlooked Dr. Brinton's quotations of Pablo Levy as authoritative for geological reference. I desire to correct the erroneous impressions caused by Levy's geological idiosyncrasies.

The volcanic convulsions that modelled the existing features of Nicaragua were acting in remote times only, in its south-western part. The lakes occupying the old craters give no indications of disturbance, while those of historical times have not changed the contour of their surface, except in small effusions of lava. The largest volcanoes are between Nindiri and Managua. The ash-eruptions of Cosequina, on the north-western confines of Nicaragua, have diminished in volume, and may be considered as extinct. Monotombo, on the north-western shore of Lake Managua, has had various ash-eruptions, but its contour remains about the same as when visited by the early Spaniards. Omotepe still keeps its cone-like contour. The last eruption in 1883 was not accompanied by trembling. Lava was thrown out near the old crater on the

[1] Extracts from a letter of Dr. Earl Flint of Revas, Nicaragua, to Hilborne T. Cresson of Philadelphia.

eastern slope, doing but little damage, however, as it was some distance from the town on that side. The ashes injured the crops on the eastern slope, and also those about Rivas. Smoke continued about three years in interrupted emissions, with violent rumbling, but no trembling of the earth. Like Monotombo, it is out of the axial line of the older and extinct volcanoes which lie between them and the primitive Cordilleras. If a line be drawn from Omotepe to Tipitapa, and thence to Cosequina, including Monotombo, the volcanic region of this district, in remote and recent times, is included within it.

This volcanic district referred to was the first occupied by early man, and even at the present time it is the most thickly populated. Strange to say, those who have written about this portion of Nicaragua, either in a historical or scientific sense, have entirely ignored it. Especially is this true in regard to its geology. Knowing this to be true, I requested Mr. I. Crawford, who is in the employ of the government, to give me his views in regard to the geological formation of this state. His remarks upon the subject are as follows.

"Geology, in the larger part of Nicaragua, promises many interesting and valuable revelations to scientists searching for evidences of time and life. It is generally supposed by the world at large, that Nicaraguans are rocked to sleep by earthquakes, but you know that this is a mistake. So far, I have not been obliged to tread in the footprints of scientific predecessors. The geology and mineralogy of this region has never been studied before. Organic matter in this country is not a kind of infusoria from active and extinct volcanoes; neither has all the organic matter in Nicaragua been incubated in the yet warm craters of extinct, nor singed by hot eruptions from active, volcanoes. Having been ordered by the commissioners of Granada to make a typical collection for exhibition at Paris, I was obliged to hurry over the mountains and ravines of this country in order to accomplish the work in time for shipment to France. The collection of geological and mineralogical specimens that I formed demonstrates that Nicaragua is not the volcanic region that Spanish gold-hunting and Indian-murdering priests declared it to be. This mistake has been copied so frequently by careless investigators that at present it passes unquestioned by our great European and America scientific associations. It is well known, that, so far, there never has been even a superficial examination of the geology and mineralogy of the region we speak of. Levy's history of Nicaragua contains so many evidences of its unreliability, that any person upon reading it is impressed at once with the fact that Levy is not relating what he saw, or obtained from reliable sources, in regard to the geology of this country: he is simply drawing upon his imagination. What a sad example for members of scientific associations who hurry into print, copying and publishing as facts things that they have not investigated, thus perplexing hardworking searchers for truth. I quote here the following paragraphs from one of my recent reports to the government of Nicaragua. 'On account of diversity in the geological formations, and for the sake of easy reference, I divide this country (Nicaragua) into three parts, called eastern, central, and western. The eastern is bounded on its south-western part as follows; commencing at 87° west longitude, from Greenwich, and 30° 30′ north latitude, and extending by an irregular line to 85° 50″ west longitude, and 12° 45″ north latitude, thence to 85° 9″ west longitude, and 11° north latitude. The geological formation of the eastern division in the northern part is composed of eozoic and lower Silurian rocks, minerals, and metals; some merely horizontal, others at various angles of inclination. The Silurian, which rests unconformably on the eozoic, is in places covered by alluvium formations. The middle and south-western parts of this eastern division are eozoic-Silurian and in some cases Devonian, each of the eras, in various places, well defined, but in that undisturbed condition in which the primitive upheaval and subsequent contractions left them, resting at various angles of inclination. No evidence of earthquakes, no volcanoes, no volcanic craters, are to be found in any part of this eastern division.' We call particular attention to this fact, and have been so much occupied by field work, in the mountains and ravines, that it has been impossible to publish a detailed account of it. The specimens collected will, however, keep fresh and tell the true story. In reference to glaciation, and moraines deposited by the glaciers, I found on the mesas near Metapa, at Totumbli, rocks and moraines deposited by the glaciers, and traced them toward the Pacific Ocean.

"North-eastward for about 7 leagues there is an elevated plain adjoining that part of the valley of Sebaco, in which, at the Rio Viejo, I found a large deposit of petrified bones of quaternary and tertiary animals. In my necessarily hurried examination of the deposit where the bones were found, I recognized no bones of the human body, but several bones of parts of the head.[1] There were also a few teeth of large marsupials. These unexpected discoveries in this hitherto supposed hotbed for volcanoes I have not yet carefully examined, but hope that time will soon be given for its future study. Particular attention is called to these peculiarities in the geological formation of this part of Nicaragua, which are not in harmony with, but opposed to, statements and maps of all historians about the geology and mineralogy of Nicaragua. I was too much hurried in my examinations to satisfy myself as to whether the bones were older, or were deposited, or which were the older formation, they or the glacier. The nearest moraines and glacier-marked rocks that I noticed were about two leagues distant, 200 feet higher than where the bones are. The glacier rocks may have been strewn over the valley on a surface deposit of 200 feet directly over the bones, or, as the valley was — I have some reason to believe — once much deeper than at present, most probably the moraines and glacier-marked rocks falling in the valley were washed down the Rio Viejo by large floods into the present Lake Managua, and therefore the deposit of bones would have been made subsequent to the glacier period."

A word about the glacial period and its relation to the fossil remains mentioned in the extracts of parts of Mr. Crawford's letter as occurring in the cuttings of the Rio Viejo and the great plain of Sebaco, emptying into Lake Managua, and his uncertainty about them. As they occur some 200 feet lower than the moraines to the north-east, requiring another visit to arrive at the truth, we must say that those on the large stretches of lowland, north of Lake Nicaragua, occur under like circumstances. These plains extend back to the base of the old Cordilleras. Their upper surface is composed of black alluvium lying along the northern bowlders, which were the make-up of an inland sea, or ocean inlet, shut in by the upheaval, after which the waters flowed back to the foothills, from, or due to, an accumulation of rainfalls washing down the alluvium. On the plain mentioned, north of the lake, were found the bones of what Professor Baird said belonged to *Elephas primogenitas;* while in the river banks to the east, formed of conglomerate detritus, stratified, and volcanic material (shown by pebbles of scoria, worn smooth), laborers, while excavating there in 1874, encountered a fossil human skeleton, some twenty feet below the surface.

Clear demarcations of geological epochs are found in this locality; and the question of ice age here will be decided in the near future so clearly that scientists will feel satisfied. It may be interesting also to mention, that, in 1863, while passing from Tipitapa to Talolinga, I noticed glacial deposits; also, on a hill back of San Carlos, sharp fragments of quartz rock of large dimensions are of glacial deposition. I called the attention of Professors Henry and Baird to these facts years ago, and requested the geologist of the first canal survey to visit the localities named, but he could not do so on account of press of work. In a letter to the *American Antiquarian* I asserted that the fossils mentioned were above the clay formation,[2] under the ash-eruption that covered the vegetation, whose fossil leaves may determine the geological period of Nicaragua, or the time of its disappearance. The coincidence of the fossil leaves with those in the sedimentary rocks formed here after the uplifted coast range, produced by the cataclysm, goes to show that the glacial age here was disappearing. Near by, to the north-east, the glaciers crowded on towards the fierce fires from the summits of the old Cordilleras, trying to assert a supremacy in that conflict of elements, both vieing in their work of desolation. The eternal

[1] A distinction between the bones of the human body and head is evidently here intended by Mr. Crawford and Dr. Flint. — H. T. Cresson.

[2] The ash-eruption did not extend north of the lakes to where the bones occur It was an epoch of repose, of long duration, during which the accumulation of alluvium was deposited around the lakes and over the glacial deposits in the location mentioned.

hills, supporting them, were unmoved; ashes and ejected scoriæ were spread upon their declivities, and thus, aided by subsequent rains and a tropical sun, has unburied the hidden bones of various animals in the water-ways. While those of the mastodon are also exhumed, their compeers of Siberia await for a distant future to regain a tropical sun. Which of the two is the older? That any lived after the disappearance here of the glaciers, proves nothing. With proper surroundings, they might exist to-day.

I desire to state clearly that the Rev. Stephen D. Peet's assertion that Dr. Brinton makes out on my own testimony that the foot-prints did not belong to eocene times, is in error, and needlessly so, as he had received from me an explicit denial of any connection of sand with the shells. The leaves, or dust of leaves, if any were with the shells, came from trees growing around the lake. No volcanic force has disturbed the location, at least in historic times. The sandal, or some covering to protect the feet, the Rev. Mr. Peet knew was ascribed to an impression sent to Harvard, from a location forty miles distant from those at the quarry, to the south-west, and on the other side, of the range of extinct volcanoes.

I never said that the "molten streams of lava found their way into Lake Managua." There is nothing of the kind found there on the lake border. Layers of tufa, made up of volcanic detritus, is the formation of all the district we speak of ; and at Masaya, Juotepi, etc., the Tiscapa lava flow spoken of by Levy must have occurred to that gentleman in his dreams. If Dr. Brinton had not quoted Levy in connection with my attempt to explain the history of the impressions I sent him, no such erroneous data would have gone forth in regard to the outbursts of lava that occurred. The mountain of Masaya, between Nindri and Managua, is the only notable locality. It passed over the old tufa. Monobracho also ejected lava, and it spread over the plain to the south-west of Granada. These mountains were in action long subsequent to those mentioned.

The Rev. Mr. Peet's assertion that Harvard and the National Museum have only slabs with impressions of feet to judge from, is also incorrect. If he will re-peruse his own *Antiquarian*, he will find there bitter complaints, on my part, in regard to the lack of care in the examination of fossils found with and separate from them, which alone would identify their geological age. His aim is undoubtedly to keep up the controversy. Truth is certainly not obtained by making direct denials of phenomenal occurrences that Dr. Brinton and Mr. Peet never saw or investigated. The "big-toe" argument will not apply to an arched instep. A long *os calcis* and a flat-footed race have the big toe perfect. Let us wait until one of the fossil feet are found. Before belittling finds of the class mentioned they should be compared with similar ones occurring under volcanic formations in other countries whose geological examination has been determined by competent men. "The great volcanic outburst that overran northern and central California," says Dr. L. G. Yates of Santa Barbara, "covered the relics of a race who were there, and lived there, previously, whose implements were found under Table Mountain, a bosaltic formation, two hundred feet in thickness. These relics are unique, and were made, and covered by lava, so long ago, that the river bed down which the lava ran (and where it still lies, forming the summit) is now high above the surrounding country, forming the Table Mountain, and where the mountains which were on either side of the old river-bed have been washed away, and their places now occupied by valleys and river-beds, and since which time the whole surface of the country has been changed, with a new surface soil, a new vegetation, and a new fauna."

Facts of this nature, by men of Dr. Yates's character, should not be ignored. No sceptic can doubt that man existed there in as remote times as here in Central America. I have often reported that there was a resemblance in the geological finds of the two. California has no greater variety of minerals; gold, silver, tin, lead, bismuth, platinum, nickel, zinc, iron, etc., are among the metals.

I want to call the attention of scientists to this neglected spot in Nicaragua, and convince them that man existed here long prior to the glacial era. Will some of the scientists in the United States do me the favor to look over the few shells sent by me to the National Museum. These specimens will tell the exact time (geologically) when man lived here in the caves, and subsisted on the very oysters (i.e., from the shells). The specimens may be seen among those I forwarded a few years ago, and which are now in some part of the National Museum.

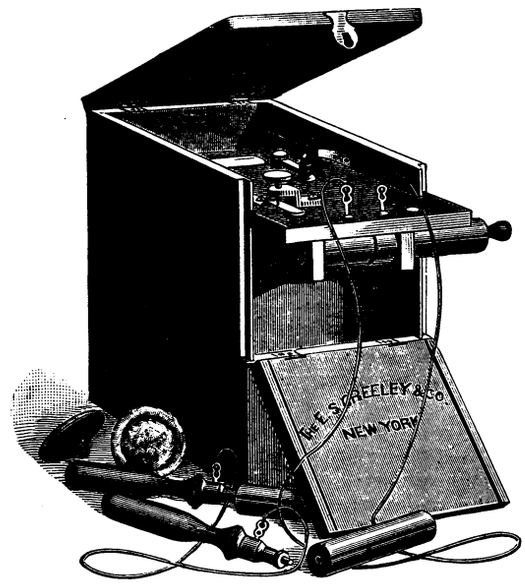
Science Text-Books.

IS there to be found a really good "Physics" for lads of twelve to fifteen, as good as Shaler's "Geology" and Packard's "Zoology"? Several firms publish and manage to "introduce" a lot of old rubbish as science text-books. It is a scandal that ought to be ventilated. I have just opened a "History" sent out by a firm that professes to patronize and popularize science, and my boys are promptly told, "For the history of the Creation, Deluge, and Dispersion, the reader is referred to the Scriptural narrative." It needs some patience to get through this *Aufklavüng* from stuff to real science. P.

INDUSTRIAL NOTES.

New Electro-Medical Apparatus.

AN improved form of Laclanche Faradic battery for the use of physicians and surgeons, is shown in the accompanying illustration. In this battery the exciting fluid is a simple and inexpensive solution of sal ammoniac and water, which will last without renewal from six to twelve months. The zinc element is a pencil of pure metal, the position of which is never disturbed, whether the battery is in action or not. It usually lasts over a year, and is replaced at slight expense. The carbon element does not require renewal, as a rule, oftener than once in two years.



The battery has a handsomely polished hard-wood case, opening at the top and at the front. It is provided with a metallic handle, which, together with all the metallic parts of the machine itself, is nickel-plated. The case measures nine and a quarter inches high, five inches and a half wide, and seven inches and a half long. In the case is a commodious electrode pocket containing a pair of interchangeable electrode handles, a pair of nickel-plated hand electrodes, and a sponge electrode. The battery cell is inclosed in an inner compartment, which, while it is closed up and completely separates the cell from the rest of the apparatus, is arranged with a sliding cover to give convenient access to it whenever required.

A feature of special importance is the fact that the cell and all its working parts are mounted on a polished ebonized slide, with automatic electrical contacts beneath its surface. The act of pulling out this slide a short distance serves to start the machine, and closing it up cuts out the cell and stops the action. This makes it impossible to close the case without cutting out the cell. This battery is manufactured by E. S. Greeley & Company of this city.