SCIENCE

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THE KLAMATH NATION.

III.—MYTHOLOGY AND GENERAL ETHNOLOGY.

THE Klamath mythology, as is generally found to be the case with any mythology belonging to a people who speak a language radically distinct from all other tongues, has peculiar features well worthy of notice and of comparison with other and more widely known forms of belief. The principal deity is K'múkamtch, a name which Mr. Gatschet renders the "Old Man of the Ancients," or the "Primeval Old Man." The expression, "man," however, seems in strictness not to be comprised in it, as we are further informed that it is composed of *kmutcha*, "he is old," and the termination *amtch*, having a similar meaning, "old, ancient, primeval, by-gone." "The Most Ancient," or "The Oldest Being," would seem to be the nearest interpretation. He is otherwise designated *P'tishamtch nalam*, "Our Old Father," and *P'laitalkni*, "The One on High." He created the world and all that it contains. Various stories are told of the mode of these creations. According to one account he made plants and animals, including men, by *thinking* and *wishing*, "this probably implying (as Mr. Gatschet suggests) that, after forming an idea of some creature, he made that idea a reality by the strong energy of his will,"—a method which accords with the Mosaic account of creation. Other myths speak of his family, comprising a father, a wife or wives, a daughter, and Aishish, "his son by adoption." "The name of his daughter," we are told, "is not given, but she represents the clouded or mottled evening sky. When (in the myth) she leads him to the underworld, they meet there a vast crowd of spirits, who for five nights dance in a large circle around a fire, and on each of the intervening days are changed into dry bones. K'múkamtch takes with him some of these in a bag, and, when reaching the horizon at daybreak, throws the bones around the world, in pairs, and creates tribes from them, the Modocs being the last of these. Then he travels in the path of the sun till he reaches the zenith, builds his lodge, and lives there now with his daughter."

Mr. Gatschet holds this divinity to be a nature-god, representing usually the sun, but sometimes the sky. He bears a certain likeness to the primal Aryan deity, whose mythological and ethnological history, as *Dyaus-pitar* (Heaven-father) in India, *Zeus pater* in Greece, and Jupiter in Italy, has been so happily traced and elucidated by Professor Max Müller. Like Zeus and Jupiter, also, in the vulgarizing imaginations of later mythologists, he assumes the form of a man or, in his more comic adventures, of a lower animal. He takes then, in Klamath myths, the typical form of the wise and knowing *skel*, the pine-martin, "which changes its black winter fur to a brown coating in the hot months of the year, and thereby becomes a sort of portent to the Indian." As *Skel-amtch*, "Old Martin," he becomes the hero of as many fanciful legends as those of Zeus in his various animal disguises.

His adopted son, Aishish, is the second and, in some respects, the most interesting figure in the Klamath pantheon. His name signifies "the one secreted," or "concealed," and is given to him in allusion to the manner of his birth, which resembled that ascribed in the Greek myth to Bacchus. In his attributes, Aishish rather recalls the other sons of Zeus, Apollo and Hermes, or the Hindoo Krishna. He is beautiful in appearance, beloved and admired by men, and is the husband of many wives, selected by him among the birds, butterflies, and the smaller quadrupeds. He is a social and friendly deity, and often makes his appearance at festive assemblies for archery and gambling (which is deemed a manly and not degrading sport), when he shows himself unrivalled in these accomplishments. He is finely attired in garments of his own making, ornamented with beads. He is constantly at variance with his reputed father. Mr. Gatschet finds his prototype in the moon. "The moon is the originator of the months, and the progress of the months brings on the seasons, with the new life seen sprouting up everywhere during spring and summer. So the quadrupeds and birds, which are the first to appear after the long winter months, are considered as the wives of Aishish, and the flowers of summer vegetation are the beads of his garments."

The other elementary deities of the Klamaths are mysterious shadowy beings, too dimly defined, in our author's opinion, to deserve the name of gods. Among them are Kaila, the earth; Leméish, the thunder; Yamash and Muash, the north and south winds; and Shukash, the whirlwind. There are mythic stories relating to spirits of the dead, to giants and dwarfs, and to deified animals. But none of them seem to be of much real significance, or to influence greatly the lives of the people. Their mythology, like their traditional history, was cramped in its development by a peculiar superstition, which strictly forbade the utterance of the name of any deceased person. This superstition made the worship of ancestors impossible, limited all thought about a future life, and abolished all historical tradition,—for, as the author pertinently asks, "How can history be told without names?" The Klamath religion, therefore, appears simply as the reverence for certain nature-powers. It has no torturing or mangling rites, like the flesh-piercing and finger-mutilation of the Dakota and Blackfoot tribes, and no grossly immoral and anti-social traits, like some of the Mexican and Peruvian observances.

The belief in a future life, though obscured, is not entirely extinguished by the superstition which has been mentioned. The disembodied soul, now a nameless phantom, hovers for a time about its late abode, and then, rising in the air, follows the sun in its westerly course, till it reaches the spirit-land in the sky, E-eni, or Ayayani, "somewhere near K'múkamtch." "Its arrival there is afterwards revealed by dreams to the mourning relatives, who express in songs what they have seen in their slumbers." There is a guardian, we are told, over the spirits in their passage through the sky, called the Wâsh Kmush, or the *gray fox*. "This name is evidently borrowed from the coloring of the sky, as it appears during a polar night, and must be compared to another beast name,

Wán or Wanáka, the *red fox*, which is the symbol of the sun-halo." Not all souls, however, attain the home of the spirits. Of Kmúkamtch we are told, "He provides for mankind whom he has created, but does not tolerate any contravention of his will; for he punishes bad characters by changing them into rocks or by burning them." Thus we find that the Klamath mythology, like the Greek, though in many parts childish, absurd, and inconsistent, had yet, in a certain degree, reached the important point where religion is combined with morality.

Mr. Gatschet promises, in a future volume, some further information concerning the social usages of the Klamath nation. But he adds a few weighty sentences on this subject, which deserve special consideration. "The Klamath Indians," he tells us, "are absolutely ignorant of the gentile or clan system as prevalent among the Haida, Thlingit, and the Eastern Indians of North America. Matriarchate is also unknown among them; every one is free to marry within or without the tribe, and the children inherit from the father." According to certain theories which have been proposed of late years by writers of much eminence, the Klamath nation would appear from these facts to have reached a very high degree of social advancement. It has emerged from the primal and bestial condition of promiscuous intercourse, euphemistically and absurdly styled "communal marriage;" it has passed through the "gentile" organization, and the matriarchal and exogamous stages, and has attained the loftiest grade of the most highly civilized European nations. The recent admirable work of Mr. Edward Westermarck on the "History of Human Marriage" has disclosed the unsubstantial character of the bases on which these fantastic theories were reared. But to get to the root of the matter something further should be said, or rather has been already said, and may here be repeated. In the volume for 1889 of the British Association for the Advancement of Science, I have expressed, in some "Remarks on North American Ethnology," introductory to the excellent report of Dr. Franz Boas on the Indians of British Columbia, the conclusions to which — in common, I think, with most American ethnologists — I have been led by a prolonged study of the tribes of this continent and a comparison of them with other tribes and races. As these conclusions have since been strongly reinforced by the results of the careful investigations of Mr. Gatschet and Dr. Boas, as well as by the comprehensive studies of Dr. Brinton, as set forth in his valuable works on "Races and Peoples" and "The American Race," I may venture to add a summary of them as a fit completion of the present review.

I have urged that "in our studies of communities in the earliest stage we must look, not for sameness, but for almost endless diversity, alike in languages and in social organizations. Instead of one 'primitive human horde' we must think of some three or four hundred primitive societies, each beginning in a single pair or group of children bereft of their parents, and left, in the early settlement of a country, isolated from all kindred and neighbors, each pair or group expanding in their posterity to a people distinct from every other, alike in speech, in character, in mythology, in mode of government, and in social usages. The language may be monosyllabic, like the Khasi and the Paloung; or agglutinative in various methods, like the Mantshu, the Nahuatl, the Eskimo, and the Iroquoian; or inflected, like the Semitic and the Sahaptin. Its forms may be simple, as in the Malayan, the Maya, and the Haida, or complex, as in the Aryan, the Basque, the Algonkian, and the Athapascan. The old theoretical notion, that the more complex and inflected idioms have grown, in the process of ages, out of the simpler agglutinative or monosyllabic forms, must be given up as inconsistent with the results of modern researches.

In like manner, we find among primitive communities every form of government and of social institutions — monarchy among the Mayas and the Natchez, aristocracy among the Iroquoians and the Tshimsians, democracy among the Algonkians and the Shoshonees, descending almost to pure, though perhaps peaceful, anarchy among the Athapascans, the Eskimos, and various other families. In some stocks we find patriarchal (or 'paternal') institutions, as among the Salish and the Algonkian; in others, matriarchal (or 'maternal'), as among the Iroquoian and the Haida. In some the clan-system exists; in others it is unknown. In some exogamy prevails; in others endogamy. In some, women are honored, and have great influence and privileges; in others they are despised and ill-treated. In some, wives are obtained by capture, in others by courtship, in others by the agreement of the parents. All these various institutions and usages exist among tribes in the same stage of culture, and all of them appear to be equally primitive. They are simply the forms in which each community, by force of the special character of its people, tends to crystallize.

We frequently, however, find evidence, if not of internal development, at least of derivation. Institutions, creeds, and customs are in many cases adopted by one stock from another. As there are now 'loan-words' in all languages, so there are borrowed beliefs, borrowed laws, and borrowed arts and usages. Then, also, there are many mixed communities, in which, through the effect of conquest or of intermarriages, the physical traits, languages, or institutions of two or more stocks have become variously combined and intermingled. In short, the study of human societies in the light of their classification by linguistic stocks is like the study of material substances in the light of their classification by the chemical elements. In each case we find an almost infinite variety of phenomena, some primitive and others secondary and composite, but all referable to a limited number of primary constituents: in chemistry, the material elements; in ethnology, the linguistic stocks. Such is the result of the latest investigations, as pursued on the Western Continent, where for the first time a great number of distinct communities, in the earliest social stages, have been exposed to scientific observation, with all their organizations and workings as clearly discernible as those of bees in a glass hive."

It is to be hoped that the Bureau of Ethnology and the British Association will continue their valuable researches and publications on this subject until all the distinct aboriginal stocks which survive in western North America, from Alaska to Lower California, have been as thoroughly studied and their physical and mental traits, languages, mythologies, and social systems made known as completely as this can now be done. From a comparison of the results of these inquiries two important gains to science may be confidently anticipated. (1) It will be made evident — as the facts already adduced in this review sufficiently show — that the physical differences in the varieties of men can be adequately explained by climatic and other local influences, and thus all ground for affirming the existence of several human species, evolved from different sources, will disappear. (2) The "Aryocentric" theory of linguistics and ethnology, which, during the past seventy years, has perverted and hampered those sciences as seriously as the geocentric theory for many centuries perverted and

hampered the science of astronomy, will be utterly demolished. All the special excellences which have been claimed for the speech and mental traits of the Indo-European stock, will be found exemplified in as high degree among some of the American nationalities. The singular opinion which has been maintained by writers of no mean distinction, that the descendants of a barbarous community of nomadic herdsmen who, four or five thousand years ago, wandered over the central plains of Asia and Europe, and, moving southward, gradually gained from Assyrian, Egyptian, and Dravidian sources the elements of culture, are endowed by nature with certain peculiar gifts of intellectual and moral greatness which entitle them to subdue, dominate, regulate, and, if they think proper, entirely suppress and exterminate any alien community that comes in their way, will be found to be as directly opposed to scientific truth as it is to the first principles of humanity and justice.

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THE LAFAYETTE GRAVELS.

PRESIDENT CHAMBERLIN, accompanied by Professor R. D. Salisbury, has spent the holidays in the south and southwest, examining the beds of gravel and sand called by Dr. Hilgard the "Orange Sand," but recently renamed by him "Lafayette." The same beds have also been called "Appomattox" by Mr. McGee. The party went first into the north-western part of Alabama and adjacent parts of Mississippi, where this formation, as well as an older one composed of very similar materials, is seen in great force. This older formation is the Tuscaloosa of the Alabama survey, equivalent to the Potomac of the Middle States. From Sheffield they went across to Columbus, Ga,, where they were joined by Mr. W. J. McGee. At Columbus the same two formations are admirably exposed, as well as a third, a division of the Columbia formation of Mr. McGee, the "River Terrace" of the Alabama survey.

From Columbus the party came to Montgomery, where the Lafayette gravels and sands are to be seen in contact with the sands of the Eutaw division of the Cretaceous. From Montgomery they went to Tuscaloosa, where they were met by Dr. Smith and spent a day in examining the beautiful exposures of the Tuscaloosa and Lafayette formations in the railroad cuts at Cottondale, at Box Spring, and in the gullies of the town of Tuscaloosa. Sir Charles Lyell, in describing the geological formations at Tuscaloosa, says: "The lower beds of the horizontal Cretaceous series in contact with the inclined coal measures, consist of gravel, some of the quartzose pebbles being as large as hens' eggs, and they look like an ancient beach, as if the Cretaceous sea had terminated here, or shingle had accumulated near a shore."[1]

Professor Tuomey afterwards showed that these pebble beds belonged to a much more recent formation, for he traced them southward and found them overlying the Tertiary rocks of the lower part of the State.[2]

As a matter of fact, both the Cretaceous (if the Tuscaloosa or Potomac shall prove to be Cretaceous, as seems most probable) and the Post-Eocene deposits are exposed in the gullies cut in the slopes of the hill towards the river in Tuscaloosa. All the large gravel belongs, however, in all probability, to the later formation, which we now call Lafayette, while the underlying stratified clays and cross-bedded sands are of older date, the clays containing many plant remains which fix the age as probably Cretaceous. It thus seems that Sir Charles Lyell was mistaken in his identification of the gravel beds as Cretaceous, while Professor Tuomey, though undoubtedly correct in his classification of the gravel and overlying red loam, did not discriminate between these and the underlying laminated clays and cross-bedded sands, which were first clearly distinguished in Alabama by Harper and Winchell, and afterwards described in detail by Smith and Johnson in 1883 and following years.[3]

The age of these later gravels has lately become matter for difference of opinion among geologists. Professor Tuomey thought that they belonged to the Drift, though having but few points of resemblance to that formation at the north. Dr. Hilgard also has always considered them as belonging to the Quaternary, and, more or less remotely, of glacial origin. Messrs. McGee and Chamberlin, on the other hand, consider them much older than the Quaternary, and as probably Pliocene, because of their occurrence beneath beds which these geologists consider the very oldest of the Quaternary series. The vigorous manner in which the study of this formation is being pushed in widely-separated parts of the United States, leads us to hope that these differences of opinion will soon be reconciled.

From Tuscaloosa the party went westward to Vicksburg, Natchez, and other points on the great river, where the same gravel beds are exposed in contact with the overlying Port Hudson and Loess of unquestioned Quaternary age. From New Orleans the party will return to their homes.

E. A. S.

ARTIFICIAL LANGUAGES.

THE enthusiasm for the creation of new international languages was at its height a few years ago, but is by no means over. The too well-known *Volapük* is probably the best of them, and has set the stone rolling; it tries to combine the peculiar, especially phonetic, features of most European languages. It is doing good work as a medium of commercial correspondence, but probably will never be adopted as a medium for conversation, and through the agency of time is subjected, like other languages, to phonetic and many other changes. Some attempts dating from 1891 have adopted the principle of uniting the elements of the Romance languages only into a new form of speech. "Un lingua internazional" was composed by Julius Lott in Vienna (Springergasse 32); "Un lingue commun pro le cultivat naziones" by Dr. Alberto Liptay and "fixed up" for Spanish, French, and German speaking people; another, perhaps the most consistent in its principle, is "Nov Latin," by Dr. Rosa of Turin. A passage taken from Lott's "Suplent folie" reads as follows: "Le doktes inter si pote usare le historïk ortografie, ma le homo de komercie ese saep in dubie en use de dublkonsonantes. Sin perdite pro le klarité noi pote tolerare le skripzion; gramatik pro grammatika, etc. In il question le majorité averé le decision." In reading this sort of jargon we cannot help asking ourselves, Would it not be greatly preferable to use plain French or Italian to make oneself understood?

Another more elaborate "Attempt towards an International Language" was written by Dr. Esperanto of Warsaw, Russia, and translated into English by Henry Phillips, Jun. (New York, Holt, 1889. 56 p. 8°). It combines radical elements of the Germanic and the Romance languages, and tends to put into reality the principle, that "a language

[1] "Travels in the United States, Second Visit," Vol. II., p. 68 (Harper & Bro.).

[2] "First Biennial Report on the Geology of Alabama," p. 160.

[3] Bulletin No. 43, U. S. Geol. Surv., "On the Tertiary and Cretaceous Strata of the Tuscaloosa, Tombigbee, and Alabama Rivers."

of this kind must be extremely easy, so that it can be learned without difficulty." Indeed, Esperanto's grammatic rules are few in number, for they are all gathered upon four pages only. A part of the Lord's Prayer sounds as follows: "Panon nian chioutagan donu al nihodiaŭ; kaj pardonu al ni shuldantoj; ne konduku nin en tenton, sed liberigu nin de la malvera char." An International-English and an English-International vocabulary stands at the close of the small volume. The real name of the author who has hidden himself and his ingenious system under the pseudonym of "The Hopeful" is Dr. Samenhof.

NOTES AND NEWS.

IN has been long known that glass is attacked and dissolved in small quantities by ordinary water. This dissolving process Herr Pfeiffer, according to *Nature*, has recently sought to prove and measure by change in the electric conductivity of the water (*Ann. der Physik*). He measured the increase of conductivity undergone by one cubic centimetre of pure water when it has been in contact for one hour with one square centimetre of glass surface, and concluded that the amount of glass dissolved at 20° C. was one to two millionths of a milligram. He found, too, that with temperature rising arithmetically, the growth of solubility is considerably more rapid than that of a geometrical series; that the increase of conductivity of the water for a given kind of glass under like conditions is a characteristic constant; and that later, when a certain quantity of alkali is dissolved, further action involves a dissolving also of silicic acid, and the salts then formed may cause a decrease of conducting power.

— R. W. Shufeldt, M.D., delivers, during January, four lectures on biology, at the Catholic University of America, Washington. The titles are: "Its History and Present Domain," "Its Relations to Geology," "Its Value as a Study," "Its Growth and Future Influence."

— Towards the end of last March the citizens of Sydney were astonished, as we learn from *Nature*, by the sudden discoloration of the water in Port Jackson. In the harbor the water presented in many places the appearance of blood. This remarkable phenomenon, which was soon found to be due to the presence of a minute organism, has been made the subject of a paper, by Mr. Thomas Whitelegge, in the Records of the Australian Museum (Vol. I. No. 9). On March 31, Mr. Whitelegge went to Dawe's Point and got a bottle of water, in which there was a good supply of the organism in question. At first he thought it was a species of the genus Peridiniidæ; but further research convinced him that it was a new species of the closely allied genus, Glenodinium. So far as Mr. Whitelegge is able to judge, fully one half of the shore fauna must have been destroyed by these small invaders. The bivalves were almost exterminated in those localities where the organism was abundant during the whole of the visitation. Mr. Whitlegge is of opinion that the great destruction of life brought about by an organism apparently so insignificant is of the highest interest from a biological point of view, showing, as it does, how limited is our knowledge of the causes which influence marine food supplies. This, he points out, is particularly the case in regard to the oyster, which has often mysteriously disappeared from localities where it formerly abounded.

— In a report by the British vice-consul at Alexandria, it is stated that the plague of locusts which has been devastating Morocco has been extending itself to Egypt. Some little time ago, clouds of locusts made their appearance and settled, for the most part, on the banks of the Nile or on the edge of the desert, forming large yellow patches, easily discernible at a distance. They at once began to breed, and, although immediate steps were taken to destroy them, large numbers of the eggs have already been hatched. An examination of about thirty deposits of eggs is said to have shown that the usual number laid by each female is from ninety-seven to a hundred. The government at once issued the strictest orders to the mudirs to use every possible means to destroy the locusts, and competent officials were sent round the country to organize and direct the work of extermination Millions of locusts and eggs have been destroyed, but there are still large numbers in the country. When eggs are discovered, either the field is ploughed up or flooded, or the eggs are collected and destroyed. The old locusts are easily destroyed while breeding, but the young crickets, in the earliest stage, when they are hopping about in every direction, give more trouble. The usual method followed in this case is to enclose the spot in which the crickets are found by a number of men drawn up in the form of a crescent. A ditch is then dug from one horn of the crescent to the other, and the men close in, driving the young locusts, by means of palm branches, into the ditch, where they are destroyed and buried. When the young locusts are further developed, they cease to hop, and march in densely packed armies. It is at this stage that they are said to be most destructive, but they are more easily exterminated, as they move slowly, and can be surrounded with fuel and burned. From the energetic measures taken by the government, it is hoped that this pest may be stamped out before any serious harm has been occasioned, but as many eggs are still known to be deposited in the country, it is impossible to foretell the extent of the calamity, and it is possible that many eggs are being hatched in the desert. Up to the present time it is reported that little damage has been done to the cotton crops, but it is difficult to obtain any reliable information on the subject. The system employed in Cyprus for the destruction of locusts has been adopted in Egypt when practicable. Another insect plague, in the shape of a repulsive-looking scale insect, made its appearance in Alexandria some time ago, and last year committed great ravages in the gardens adjacent to the town, attacking trees, shrubs, and the fruit of the date palm. Various measures have been tried, but the only efficacious one appears to be that of cutting the branches and carefully brushing the boughs. Unfortunately, however, no general regulation has yet been put into force, and consequently the efforts of some individuals are nullified by the apathy of others, and the plague still continues and threatens to spread throughout the country. The insect has been classified as *Crossotoma Ægyptiacum*, and was probably imported from America It is popularly known as *cotonina*, from its resemblance to cotton. A decree has now been issued, prohibiting the transport of trees and shrubs from Alexandria to other parts of the country.

— A large and influential meeting has been held in the Liverpool Town Hall, the Mayor in the chair, for the purpose of establishing a geographical society for the city. It was decided, on the motion of Mr. Forwood, M P., to establish such a society. Mr. Forwood said that statesmen had a knowledge of continents, but they had no knowledge of the value of the trade in these continents. He felt sure that if, some years ago, those who were at the head of public affairs in this country had been informed by a practical society, such as he had no doubt would be formed in Liverpool, that in Africa there were great resources, that there was a great field for the expansion of this country's trade, the condition of the map of Africa would be very different from what it now was. He had before him a map prepared by the African section of the Chamber of Commerce, which showed that the coast lines of different countries interlaced, but that no arrangement seemed to have been made by any one of them as to who was to have the sphere of influence in the interior. Many railways had been by British enterprise recently built in Mexico, Central America, and the Argentine, but there was really nothing known in this country about the resources of these countries, and there was no place where this information could be got. Such a centre of information in Liverpool would be of inestimable value. Probably their society would take a more practical and less scientific line than the Royal Geographical Society, who were giving them their cordial sympathy and support.

— The Meteorological Office of Paris has recently published its Annals for the year 1889, in three volumes, as in previous years. Vol. I., under the title of Memoirs, says *Nature*, contains a treatise by M. Fron on the course of the thunder-storms during the year,

accompanied by daily charts. M. Moureaux has published the details of the magnetic observations made at St. Maur, with a summary of the disturbances; eight plates reproduce exactly the photographic curves of the most remarkable disturbances. M. Angot gives the results of the first simultaneous observations made at the Central Meteorological Office and on the Eiffel Tower. The diurnal variation of pressure at the summit of the tower shows that the first minimum (4h.–5h. A.M.) is much more pronounced in all months at the summit than at the base, and appears to occur rather later. The first maximum (9h.–10h. A.M.) is much less important at the summit, especially during the summer months, and also appears to occur later. The second minimum (2h.–3h. P.M.) is much less important at the summit, and the second maximum (about 10h. P.M.) is rather more pronounced at the summit than at the base. The temperature of the air at the summit of the tower during the night differs constantly from that of St. Maur by less than the normal value; during the day, on the contrary, the difference of temperature is much greater between the two stations than the normal value. The wind, during all months, has a diurnal variation quite different from that at the Central Office; the maximum occurs at the middle of the night, while the minimum occurs at about 10h. A.M., and rather later in winter. Vols. II. and III. contain respectively the general observations and the rainfall values at the various stations.

— Two theories have been proposed to explain the formation of blowholes in steel castings, neither of which has so far succeeded in satisfying all parties. When it was discovered at Terrenoire that an addition of silicon to the molten metal tended towards the production of sound castings, the theory was advanced that the blowholes were due to carbonic oxide, which compound is broken up by silicon at high temperatures. But the discovery that the gas contained in these blowholes was principally hydrogen and nitrogen, with but a small proportion of carbonic oxide, did much to unsettle this theory, though its advocates by no means abandoned the field. In a recent work, M. Le Berrier, Engineer-in-Chief of mines and professor at the Conservatoire des Arts et Métiers, has proposed a theory, according to *Engineering*, which accounts for the effect of silicon in producing sound castings and also for the presence of hydrogen in these blowholes. According to him, a bath of cast steel is a super-saturated solution of hydrogen and nitrogen. If it solidifies quietly, nothing disturbs the molecular equilibrium, but if, by a secondary reaction, bubbles of some other gas are produced in the body of the molten fluid, this disengagement, feeble as it may be, destroys the equilibrium, just as in a super-saturated solution of a gas in a liquid, the passing in of a few bubbles of some other gas may cause the disengagement of the first. This carbonic oxide, though forming only a small part of the total gas set free, is quite capable of liberating the other gases with which the blowholes are mainly filled.

— The Brooklyn Institute of Arts and Sciences January Bulletin is as follows: Jan. 4, Department of Microscopy, lecture by W. J. Kerstetter of New York on "Nature as Revealed by the Microscope;" Jan. 5, Department of Philology, first lecture in the series on "The Modern Novel," by Professor Hjalmar H. Boyesen of Columbia College, "Victor Hugo," with personal reminiscences; Jan. 5, Department of Entomology, lecture by Professor George Macloskie of Princeton College on "Some Notes on the Physiology of Insects;" Jan. 6, Department of Geology, lecture by Professor Henry L. Fairchild of Rochester University on "The Age of Reptiles;" Jan. 7, Department of Political and Economic Science, lecture by Mr. Elio S. Youtcheff, a Bulgarian exile, on "The Policy of the Czar in the Expulsion of the Jews and the War Movement in Europe;" Jan. 7, Department of Painting, meeting at the Brooklyn Art Association Building; Jan 8, Regular Monthly Meeting of the Board of Trustees; Jan. 8, Department of Electricity, illustrated lecture by Mr. Osborn P. Loomis on "Practical Experiences in Dynamo Designing;" Jan. 9, Department of Political and Economic Science, first lecture in the course on "The Great Political Leaders of the Empire State," by Professor Charles H. Levermore of the Massachusetts Institute of Technology, Boston, "William Livingston and the Sons of Liberty;" Jan 11, Department of Astronomy, paper by Mr. Garrett P. Serviss, president of the Department, on "The Periods of Rotation of Mercury and Venus;" Jan. 11, Annual Meeting of the Corporation of the Institute for Election of Trustees; Jan. 12, Department of Philology, lecture in the series on "The Modern Novel," by Professor Hjalmar H. Boyesen, "The French Novel;" Jan. 12, Department of Engineering, lecture by Mr. C. J. H. Woodbury, vice-president of the Boston Manufacturers' Fire Insurance Company of Boston, on "The Proper Construction of Buildings to Resist Destruction by Fire;" Jan. 13, General Meeting of Members of the Institute, lecture by Sir Edwin Arnold on "The Light of the Orient;" Jan. 14, Department of Zoology, lecture by Mr. Ernest Ingersoll of New York on "The Embryology and Structure of the Turtle;" Jan. 15, Department of Psychology, first lecture in the course on "The Psychology of Aesthetics," by Dr. Benjamin Ives Gilman of Cambridge, Mass., "Musical Notes;" Jan. 15, Department of Geography, lecture by Mr. Robert D. Benedict on "The Hereford Map of the World," or "The World as Known in the Thirteenth Century;" Jan. 16, Department of Political and Economic Science, second lecture in the course on "The Great Political Leaders of the Empire State," by Professor Charles H. Levermore, "The Clintons and the Rise of the New York Democracy;" Jan. 18, Department of Archæology, lecture by Professor Daniel G. Brinton of the University of Pennsylvania on "The Origin and Early Distribution of the White Race;" Jan. 18, Department of Physics, by invitation of the secretary of the Pratt Institute, the Department will visit and inspect the work of that institution; Jan. 19, Department of Philology, lecture in the course on the Modern Novel, by Professor H. H. Boyesen, "Realism and Romanticism;" Jan. 19, Department of Botany, lecture by Dr. Smith E. Jelliffe, curator of the Department, on "Mosses;" Jan. 20, Department of Architecture, lecture by Professor A. D. F. Hamlin of Columbia College on "The Great Museums of Europe;" Jan. 20, Department of Mineralogy, General Exhibition of Minerals from the Famous Patterson Quarries; Jan. 21, General Meeting of the Members of the Institute, address by the Rt. Rev. John J. Keane, president of the Catholic University of America, on "Leo XIII. and the Social Problems of the Day;" Jan. 22, Department of Psychology, lecture in the course on the "Psychology of Aesthetics," by Dr. Benjamin Ives Gilman, "Simultaneous Structure, Chords;" Jan. 22, Department of Electricity, lecture by Dr. A. D. Rockwell of New York on "The Uses of Electricity in the Treatment of the Human Body;" Jan. 23, Department of Mathematics, subject for discussion: "The Teaching of Geometry;" Jan. 23, Department of Political and Economic Science, lecture in the course on "The Great Political Leaders of the Empire State," by Professor Charles H. Levermore, "Martin Van Buren and the Triumph of the New York Democracy;" Jan. 25, Department of Music, the Second Concert given by the Department will be conducted by Mr. Max Spicker, first vice-president of the Department, assisted by Mr. Arthur Friedheim, piano; Mr. Richard Arnold, violin; Mr. Rudolph Nagel, cello; and Miss Olive Fremstadt, alto; Jan. 26, Department of Philology, lecture in the series on "The Modern Novel," by Professor H. H. Boyesen, "The Russian Novelists and Nihilists;" Jan. 26, Department of Photography, lecture to be announced; Jan. 27, Department of Philology, French Section, lecture by Professor Charles Sprague Smith of New York on "Victor Hugo's L'Année Terrible;" Jan. 27, Department of Physics, lecture by Mr. Walter H. Weed of Washington, member of the U. S. Geological Survey, on "Geysers and the Physics of Geyser Action;" Jan. 28, General Meeting of the Institute, address by the Hon. Theodore Roosevelt, United States Commissioner of the Civil Service, on "The National Service;" Jan. 29, Department of Psychology, lecture in the course on "The Psychology of Aesthetics," by Dr. Benjamin Ives Gilman, on "Successive Structure, Measure;" Jan. 29, Department of Chemistry, lecture by Mr. Lucien Pitkin of New York on "The Germ Theory in its Relation to Sanitary Chemistry;" Jan 29, Department of Philology, German Section, lecture by Professor Frederick W. Grube on "The Philology of German Case Endings;" Jan. 30, Department of Political and Economic Science, lecture in the course on "The Great Political Leaders of the Empire State," by Professor Charles H. Levermore, "Thurlow Weed, William H. Seward, and the Rise of the Republican Party."

SCIENCE:

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Attention is called to the "Wants" column. All are invited to 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.

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PRISMATIC SANDSTONE FROM MISSOURI.[1]

ON the right bank of the St. Francois River, in S. 31; T. 33, N.; R. 6 E., about 200 yards south-west of the St. Louis Granite Company's quarry, near Knob Lick, in Madison County, Mo., is a little sandstone ridge, trending north-west and south-east, nearly 200 yards long, 10 yards wide, and not more than 8 to 10 feet high above the nearly level ground on either side. The country rock here is the Cambrian sandstone, which overlies the granite, as is beautifully illustrated at the quarry near by. This little ridge is interesting on account of the peculiar form of the sandstone composing it. In places where the soil has been somewhat worn away, instead of revealing flat layers of sandstone, as can be found near by in any direction, the surface is covered with fragments of sandstone of a prismatic form, resembling in shape the basaltic columns so well known in different parts of the world. In size the prisms range from about three-fourths of an inch to one and a half inches in diameter, and from three to eight inches in length. They are not uniform in geometrical outline, some having four sides, some five, and a few six. Quite often two and occasionally three prisms adhere together, side by side, but generally so loosely that they can easily be broken apart. In such cases the boundary between them is usually a single plane, but sometimes two new planes are exposed by the breaking, forming a re entrant angle on one prism. Fig. 1 fairly represents a combination of two of these prisms.

The nature of the rock was studied quite carefully, both macroscopically and microscopically, and it was found to be nothing but an ordinary, somewhat irregularly indurated, fine-grained sandstone. The grains of quartz are water-worn, as is usual. The induration is produced by the interstitial spaces being more or less filled with silica, but the thin sections examined showed no instance of secondary growth of the quartz crystals.

[1] Published by consent of the State Geologist of the Geological Survey of Missouri. Read before the Iowa Academy of Sciences, Des Moines, Dec. 30, 1891.

The existence of the ridge is probably due to the induration of the sandstone. Why this limited area should be thus indurated, and the surrounding country should not be, there seemed to be no obtainable evidence. However, this of itself is of little importance. But the prismatic form of the sandstone is much more interesting. The specimens gathered were on or near the surface, and were not seen *in situ;* but from their great abundance it must be argued that they extend downwards for a considerable distance. It was first thought that possibly a dike rock had once existed here, which had assumed the prismatic character, and that in some way by surface decay it had left moulds into which the sand had been carried. But a careful examination revealed no indication whatever of there ever having been a dike here, although they are quite common in the surrounding country. The granite close by is older[2] than the sandstone, and could not therefore have played any part in the matter by metamorphosing the sandstone in any way.

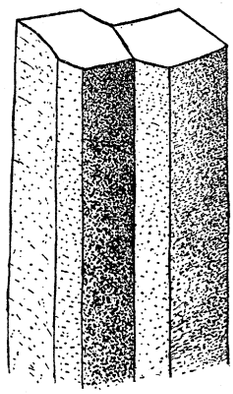

FIG. 1.

If any of the readers of *Science* know of any other occurrence similar to this, or can suggest any cause likely to have produced this peculiar formation, it is hoped they will give the information through the columns of *Science.*

ERASMUS HAWORTH.

Oskaloosa, Iowa.

[2] See Bull. No. 5, Mo. Geol. Surv., p. 12, et seq.

ORTHOGRAPHY OF GEOGRAPHICAL NAMES.

IN 1885 the Council of the Royal Geographical Society, impressed with the necessity of endeavoring to reduce the confusion existing in British maps with regard to the spelling of geographical names, in consequence of the variety of systems of orthography used by travellers and others to represent the sound of native place-names in different parts of the world, formally adopted the general principle which had been long used by many, and the recognition of which had been steadily gaining ground, viz., that in writing geographical native names vowels should have their Italian significance and consonants that which they have in the English language. This broad principle required elucidation in its details, and a system based upon it was consequently drawn up with the intention of representing the principal syllabic sounds.

It will be evident to all who consider the subject that to ensure a fairly correct pronunciation of geographical names by an English-speaking person an arbitrary system of orthography is a necessity. It is hardly too much to say that in the English language every possible combination of letters has more than one possible pronunciation. A strange

word or name even in our own language is frequently mispronounced, — how much more with words of languages utterly unknown to the reader. The same necessity does not arise in most continental languages. In them a definite combination of letters indicates a definite sound, and each nation consequently has spelt foreign words in accordance with the orthographic rules of its own language. It was therefore not anticipated that foreign nations would effect any change in the form of orthography used in their maps, and the needs of the English-speaking communities were alone considered.

The object aimed at was to provide a system which would be simple enough for any educated person to master with the minimum of trouble, and which at the same time would afford an approximation to the sound of a place name such as a native might recognize. No attempt was made to represent the numberless delicate inflections of sound and tone which belong to every language, often to different dialects of the same language. For it was felt not only that such a task would be impossible, but that an attempt to provide for such niceties would defeat the object.

The adoption by others of the system thus settled has been more general than the council ventured to hope. The charts and maps issued by the Admiralty and War Office have been, since 1885, compiled and extensively revised in accordance with it. The Foreign and Colonial Offices have accepted it, and the latter has communicated with the colonies requesting them to carry it out in respect to names of native origin. Even more important, however, than these adhesions is the recent action of the Government of the United States of America, which, after an exhaustive inquiry, has adopted a system in close conformity with that of the Royal Geographical Society, and has directed that the spelling of all names in their vast territories should, in cases where the orthography is at present doubtful, be settled authoritatively by a committee appointed for the purpose. The two great English-speaking nations are thus working in harmony. Contrary to expectation, but highly satisfactory, is the news that France and Germany have both formulated systems of orthography for foreign words, which in many details agree with the English system. The Council of the Royal Geographical Society, by printing the rules in "Hints to Travellers," and by other means, have endeavored to ensure that all travellers connected with the society should be made aware of them; but as it is possible that some bodies and persons interested in the question may still be in ignorance of their existence and general acceptance, they feel that the time has come again to publish them as widely as possible, and to take every means in their power to aid the progress of the reform. To this end, and with a view to still closer uniformity in geographical nomenclature in revisions of editions of published maps, a gigantic task requiring many years to carry out, the council have decided to take steps to commence tentatively indexes of a few regions, in which the place-names will be recorded in the accepted form.

The rules referred to are as follows: —

1. No change is made in the orthography of foreign names in countries which use Roman letters: thus Spanish, Portuguese, Dutch, etc., names will be spelt as by the respective nations.

2. Neither is change made in the spelling of such names in languages which are not written in Roman characters as have become by long usage familiar to English readers: thus Calcutta, Cutch, Celebes, Mecca, etc., will be retained in their present form.

3. The true sound of the word as locally pronounced will be taken as the basis of the spelling.

4. An approximation, however, to the sound is alone aimed at. A system which would attempt to represent the more delicate inflections of sound and accent would be so complicated as only to defeat itself. Those who desire a more accurate pronunciation of the written name must learn it on the spot by a study of local accent and peculiarities.

5. The broad features of the system are: (*a*) That vowels are pronounced as in Italian and consonants as in English. (*b*) Every letter is pronounced, and no redundant letters are introduced. When two vowels come together each one is sounded, though the result, when spoken quickly, is sometimes scarcely to be distinguished from a single sound, as in *ai*, *au*, *ei*. (*c*) One accent only is used, the acute, to denote the syllable on which stress is laid. This is very important, as the sounds of many names are entirely altered by the misplacement of this "stress."

6. Indian names are accepted as spelt in Hunter's "Gazetteer of India," 1881.

ELECTRICITY IN AGRICULTURE.[1]

FROM the time electricity became a science much research has been made to determine its effect, if any, upon plant growth. The earlier investigations gave, in many cases, contradictory results. Whether this was due to a lack of knowledge of the science on the part of the one performing the experiments, or some defect in the technical applications, we are not prepared to say; but this we do know, that such men as Jolabert, Nollet, Mainbray, and other eminent physicists affirmed that electricity favored the germination of seeds and accelerated the growth of plants, while on the other hand Ingenhouse, Sylvestre, and other savants denied the existence of this electric influence. The heated controversies and animated discussions attending the opposing theories stimulated more careful and thorough investigations, which established beyond a doubt that electricity had a beneficial effect on vegetation Sir Humphrey Davy, Humboldt, Wollaston, and Becquerel occupied themselves with the theoretical side of the question; but it was not till after 1845 that practical electro-culture was undertaken. Williamson suggested the use of gigantic electro-static machines, but the attempts were fruitless. The methods most generally adopted in experiments consisted of two metallic plates — one of copper and one of zinc — placed in the soil and connected by a wire. Sheppard employed the method in England in 1846, and Foster used the same in Scotland. In the year 1847 Hubeck in Germany surrounded a field with a network of wires. Sheppard's experiments showed that electricity increased the return from root crops, while grass perished near the electrodes, and plants developed without the use of electricity were inferior to those grown under its influence. Hubeck came to the conclusion that seeds germinated more rapidly and buckwheat gave larger returns; in all other cases the electric current produced no result. Professor Fife in England and Otto von Ende in Germany carried on experiments at the same time, but with negative results, and these scientists advised the complete abandonment of applying electricity to agriculture. After some years had elapsed Fichtner began a series of experiments in the same direction. He employed a battery, the two wires of which were placed in the soil parallel to each other. Between the wires were planted peas, grass, and barley, and in every case the crop showed an increase of from thirteen to twenty-seven per cent when compared with ordinary methods of cultivation.

Fischer of Waldheim, believing atmospheric electricity to aid much in the growth and development of plants, made the following tests:—

He placed metallic supports to the number of about sixty around each hectare (2.47 acres) of loam; these supports were provided

[1] Abstract of the January Bulletin of the Hatch Experiment Station, Amherst, Mass., written by Clarence D. Warner.

at their summit with electrical accumulators in the form of crowns surmounted with teeth; these collectors were united by metallic connection. The result of this culture applied to cereals was to increase the crop by half.

The following experiment was also tried: Metallic plates sixty-five centimetres by forty centimeters were placed in the soil. These plates were alternately of zinc and copper and placed about thirty metres apart, connected two and two, by a wire. The result was to increase from twofold to fourfold the production of certain garden plants. Mr. Fischer says, that it is evidently proved that electricity aids in the more complete breaking up of the soil constituents. Finally, he says that plants thus treated mature more quickly, are almost always perfectly healthy, and not affected with fungoid growth.

Later, N. Specnew, inspired by the results arrived at by his predecessors, was led to investigate the influence of electricity on plants in every stage of their development; the results of his experiments were most satisfactory and of practical interest. He began by submitting different seeds to the action of an electric current and found that their development was rendered more rapid and complete. He experimented with the seeds of haricot beans, sunflowers, winter and spring rye. Two lots of twelve groups, of one hundred and twenty seeds each, were plunged into water until they swelled, and while wet the seeds were introduced into long glass cylinders, open at both ends. Copper discs were pressed against the seeds, the discs were connected with the poles of an induction coil, the current was kept on for one or two minutes, and immediately afterwards the seeds were sown. The temperature was kept from 45° to 50° Fahrenheit, and the experiments repeated four times. The following table shows the results: —

	Peas. Days.	Beans. Days.	Barley. Days.	Sunflowers. Days.
Electrified seeds developed in.....	2.5	3	2	8.5
Non-electrified seeds developed in.....	4	6	5	15

It was also observed that the plants coming from electrified seeds were better developed, their leaves were much larger and their color much brighter than in those plants growing from non-electrified seeds. The current did not affect the yield.

At the Botanical Gardens at Kew, the following experiment was tried:—

Large plates of zinc and copper (.445 of a meter and .712 of a meter) were placed in the soil and connected by wires, so arranged that the current passed through the ground; the arrangement was really a battery of (zinc | earth | copper). This method was applied to pot herbs and flowering plants and also to the growing of garden produce; in the latter case the result was a large crop and the vegetables grown were of enormous size.

Extensive experiments in electro-culture were also made at Pskov, Russia. Plots of earth were sown to rye, corn, oats, barley, peas, clover, and flax; around these respective plots were placed insulating rods, on the top of which were crown shaped collectors — the latter connected by means of wires. Atmospheric electricity was thus collected above the seeds and the latter matured in a highly electrified atmosphere; the plots were submitted to identical conditions, and the experiments were carried on for five years. The results showed a considerable increase in the yield of seed and straw, the ripening was more rapid, and the barley ripened nearly two weeks earlier with electro-culture. Potatoes grown by the latter method were seldom diseased, only 0 to 5 per cent against 10 to 40 per cent by ordinary culture.

Grandeau, at the School of Forestry at Nancy, found by experiment that the electrical tension always existing between the upper air and soil stimulated growth. He found plants protected from the influence were less vigorous than those subject to it.

Macagno, also believing that the passage of electricity from air through the vine to earth would stimulate growth, selected a certain number of vines, all of the same variety and all in the same condition of health and development. Sixteen vines were submitted to experiment and sixteen were left to natural influences. In the ends of the vines under treatment, pointed platinum wires were inserted, to which were attached copper wires, leading to the tops of tall poles near the vines; at the base of these same vines other platinum wires were inserted and connected by copper wires with the soil. At the close of the experiment, which began April 15, and lasted till September 16, the wood, leaves, and fruit of both sets of vines were submitted to careful analysis, with the the following results:

	Without conductor.	With conductor.
Moisture per cent.....	78.21	79.84
Sugar.....	16.86	18.41
Tartaric acid	0.880	0.791
Bitartrate of potash.....	0.180	0.186

Thus we see that the percentage of moisture and sugar is greater and the undesirable acid lower in those vines subject to electrical influence than in those left to natural conditions. There are also experiments which prove the beneficial effects of electricity on vines attacked by Phylloxera.

The following experiments were made at this station: Several plots were prepared in the greenhouse, all of which had the same kind of soil and were subjected to like influences and conditions. Frames in the form of a parallelogram, about three feet by two feet, were put together; across the narrow way were run copper wires in series of from four to nine strands, each series separated by a space about four inches wide, and the strands by a space of one-half an inch. These frames were buried in the soil of the plot at a little depth, so that the roots of the garden plants set would come in contact with the wires, the supposition being that the currents of electricity passing along the wires would decompose into its constituents the plant food in the vicinity of the roots and more readily prepare it for the plants. The electric gardens were thus prepared and each furnished with two common battery cells, so arranged as to allow continuous currents to pass through each series of wires. Near each electric garden was a plot prepared in the same manner, save the electrical apparatus. We will call the two gardens A. and B.

The place chosen for the experiments was in a part of the greenhouse which is given up largely to the raising of lettuce, and the gardens were located where much trouble from mildew had been experienced. The reason for this choice of location was to notice, if any, the effect of electricity upon mildew, this disease being, as is well known, a source of much trouble to those who desire to grow early lettuce. The soil was carefully prepared, the material taken from a pile of loam commonly used in the plant house.

Garden A was located where mildew had been the most detrimental; the experiments began the first of January and closed the first of April. For the garden, fifteen lettuce plants of the head variety were selected, all of the same size and of the same degree of vitality, as nearly as could be determined; the plants were set directly over the wires, so that the roots were in contact with the latter; the plants were well watered and cared for as in ordinary culture, and the fluid in the battery cells was renewed from time to time, that the current of electricity might not become too feeble. At the close of the experiments the following results were noted.

Five plants died from mildew, the others were well developed and the heads large. The largest heads were over the greatest number of wires and nearest the electrodes. It was further noticed that the healthiest and largest plants, as soon as the current became feeble or ceased altogether, began to be affected with mildew. On examining the roots of the plants it was found that they had grown about the wires, as if there they found the greatest amount of nourishment; the roots were healthy and in no way appeared to have been injured by the current, but, rather, much benefited by the electrical influences.

Beside garden A was prepared another plot of the same dimensions, having the same kind of soil and treated in like manner as the first, but the electrical apparatus and wires were wanting. At the close of the experiments only three plants had partially developed, and two of these were nearly destroyed by mildew — one only was free from the disease. The results, therefore, show that the healthiest and largest plants grew in the electric plot.

In the second experiment, which we called B, twenty plants of the same variety of lettuce and of equal size were taken. The treatment given was the same as the plants in plot A received. Five plants only remained unaffected with mildew; seven died

from the disease when they were half grown; the rest were quite well developed but at the last part of the experiment began to be affected. Several heads were large, the largest being over the greatest number of wires and nearest the electrodes. Examination of the roots disclosed the same phenomena as in A.

Near plot B were also set twenty other plants, subjected to like conditions as the first, but without electricity; all but one died from mildew before they were half grown, the solitary plant that survived being only partly developed at the close of the experiment, and even this was badly affected with the desease.

Everything considered, the results were in favor of electricity. Those plants subjected to the greatest electrical influence were hardier, healthier, larger, had a better color and were much less affected by mildew than the others. Experiments were made with various grasses, but no marked results were obtained.

The question would naturally arise whether there may not be a limit reached where electricity would completely overcome the attack of mildew and stimulate the plant to a healthy and vigorous condition throughout its entire growth. From the fact that the hardiest, healthiest, and largest heads of lettuce grew over the greatest number of currents and nearest the electrodes, it would seem that electricity is one of the agents employed by nature to aid in supplying the plant with nourishment and to stimulate its growth. To what extent plants may be submitted to electrical influence, or what strength of current is best suited to them and what currents prove detrimental to their development, have not been determined as yet, but it is desirable to continue this research until some definite information shall be gained on these points. Probably different varieties of plants differ greatly in their capacity for enduring the action of electric currents without injury — experiment alone must determine this.

It has been proved that the slow discharge of static electricity facilitates the assimilation of nitrogen by plants. Faraday showed that plants grown in metallic cages, around which circulated electric currents, contained fifty per cent less organic matter than plants grown in the open air. It would seem from the researches of the latter physicist, that those plants requiring a large percentage of nitrogen for their development would be remarkably benefited if grown under electric influence.

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.

The First Locomotive Run in America.

IT was in 1829, the same year in which Stephenson, with his "Rocket," demonstrated the practicability of rapid steam traction on railways. The engine was named the Stonebridge Lion. It was made in England and imported by the Delaware and Hudson Canal Company, and designed to draw coal from their mines in Carbondale to the head of their canal in Honesdale, Penn. On its arrival, it was placed on the railway and run from Honesdale to Seeleyville, a little over a mile. It was found to be too tall to go under a highway bridge over the track at that place, and was reversed and run back to Honesdale. All parts of the railway above the surface of the ground were built on trestles, and the heavy engine racked them so much as to endanger safety. For these reasons the locomotive was set off by the side of the track, and a board shed built over it. The railway was planked, and horses employed to draw the cars. The engine stood there safe for several years.

The writer was personally acquainted with these facts. Two men who rode on that trip are living at this time.

In 1840 and 1841, while I was a student in the Honesdale Academy, I found the boards on one side of the shed torn off and the engine exposed to view. I spent many hours in trying to study out its mechanism and movement. No published description of a steam engine was then within my reach. The Stonebridge Lion had four wheels, three or three and a half feet in diameter, and the boiler rested directly on the axles. The cylinders were vertical, one on each side of the boiler near the hind wheels. There were two heavy iron walking-beams a few feet above the boiler, and to one end of each a piston-rod was attached by Watt's parallelogram. The other ends of the beams were joined by swinging-rods to cranks at right angles to each other on the forward wheels. There was no whistle or bell, I think. The engineer stood on a small open platform behind the boiler.

Soon after 1841 the engine began to be carried off piece by piece, mostly by blacksmiths and machinists; and I am told that only one small piece of the iron is now in existence in its primitive form. If the engine had been kept intact, it would be worth almost its weight in silver for exhibition in Chicago in 1893.

M. H.

The Historical American Exhibition at Madrid.[1]

ONE of the most interesting and instructive celebrations proposed for the year 1892 is the Spanish celebration, the chief feature of which will be an exhibition at Madrid, termed the Historical American Exhibition, the special object of which is to illustrate primitive American life and the history of the period of discovery and conquest. In selecting the prehistoric and early historic eras for illustration, the Spaniards will make their own exhibition complete in itself, without in the least competing with the Chicago exhibition.

The plan of the exhibition is, within its limits, a very broad one, comprising five general divisions, viz., prehistoric America, the historic period, Indian industrial arts, cartography, nautical instruments, etc., and the fine arts and kindred subjects. Under the head of prehistoric America, plans, models, reproductions, drawings, etc., are solicited of ancient caves and caverns, and anything that may help to show the use of these primitive places as human dwellings. Similar models, drawings, or photographs are desired of American menhirs, dolmens, and mounds, as well as lacustrine dwellings. All sorts of implements and objects relating to this period are desired, such as stone weapons, articles of bone and horn, pottery, ornaments, utensils of bone, wood, stone, and other materials, with fossil or animal bones throwing light on the archæology of this time. Examples of all the ages and periods of primitive life as they can be traced on the American continent are wanted.

In the historic period the objects desired include models of ancient American buildings, architectural remains, plans, models, and drawings of restored monuments. Examples of sculpture, bas-reliefs, architectural paintings, and other forms of painted decoration form another class. Under industrial art is included clothing and adornment of the aborigines and uncivilized Indians, with implements of war, offensive and defensive. Jewels of gold, silver, bone and ivory, pottery, household utensils, and articles used in transportation by water and land, constitute another division of this branch, while written documents in native tongues, pictures, and photographs of Indians and effigies showing native costumes, models of Indian dwellings, and Indian crania, form a third division.

The department of cartography includes maps, plans, charts, and drawings, and all that concerns ancient cartography, with models of vessels anterior to the voyage of Columbus, as well as those he himself used. A section is devoted to nautical instruments, with the idea of illustrating the instruments, charts, and maps in use at the period of discovery, while objects in personal use by Columbus and pictures of the same are also desired. The fine arts department includes ancient architectural monuments, sculpture, paintings, industrial and artistic work following the discovery, American coins, literary and scientific publications, manuscripts, charts, and plans of all kinds, from the discovery to the middle of the eighteenth century.

Most liberal inducements are offered to intending exhibitors from America. The exhibition will be held in the new library and national museum building in the park at Madrid, which will be used for the first time for this purpose, the exhibition serving as a sort of inauguration of the structure, which has been a num-

[1] This letter appeared also in The Nation.

ber of years in building. It will be opened on Sept. 12, 1892, and will close on Dec. 31 of the same year, thus preceding the Chicago exhibition, which it is designed, in a measure, to supplement. All objects, if securely and properly packed, will be forwarded gratis to Madrid, and returned to the exhibitor free of expense, the exhibition not only bearing the cost of transportion, but also, when desired, attending to the arrangement and display of the objects without any charge. Those who desire special cases of their own may provide them, and special buildings may also be erected in the park if the design is approved by the general committee. All objects for the exhibition will be admitted duty free into Spain if they are withdrawn at the close of the exhibition, but two months will be allowed after the end of the exhibition before articles need be returned.

An international jury, proportionate to the number of the exhibitors from different countries and the importance of their exhibits, will examine the articles displayed and award the prizes. These will consist of a first prize of honor, a gold medal, a silver medal, a bronze medal, and honorable mention, each medal being accompanied with a diploma.

The exhibition covers, of course, the entire American continent, but to insure its complete success the active co-operation and assistance of citizens of the United States is especially desired. There is every reason why Americans should both be interested in this exhibition and take part in it. The conditions are liberal, the prizes ample, and the time is especially convenient to intending exhibitors at the Chicago exhibition, as objects may be exhibited both at Madrid and at Chicago. Nor is the novelty of the exhibition its least merit. Early American history has always been a favorite topic of study among European scholars, but it is safe to say that if this exhibition is carried out as it is planned, it will offer Europeans the first opportunity they have had to study primitive American life in its completeness. American collections are very rich in the materials most desired at Madrid, and it is most sincerely to be hoped that the gracious invitation of the Spanish people to participate in their Columbian celebration will meet with a generous and hearty support from American scholars and collectors. BARR FERREE.

New York.

At What Time were the Galapagos Islands Discovered?

I SHOULD be greatly obliged to anyone who could give me some information in regard to the discovery of the Galapagos Islands. The first notice I have been able to find is in the Atlas of Abraham Ortelius, published in 1570, where the Islands are spelled "Galopegos" and "Galepegos" (Ortelius, Abraham, "Typus Orbis Terrarum," 1570; second edition, 1580; "Theatrum oder Schaubuch des Erdkreys, Autdorff, Americae sive novi orbis novae descriptio," 1570). On the splendid map of Diego Ribero, prepared between 1527 and 1529, the Galapagos Islands are not represented (Ribero, Diego, J. G. Kohl, "Die beiden aeltesten General Karten von America ausgeführt in den Jahren, 1527 and 1529, auf Befehl Kaiser Carl's, v.," Weimar, 1860). It seems therefore probable that these islands were discovered in the beginning of the sixteenth century, before 1570. The word *galapago* itself seems to be of South American origin; it means land-tortoise G. BAUR.

Clark University, Worcester, Mass., Jan. 10.

BOOK-REVIEWS.

School and College; devoted to secondary and higher education. Edited by Ray Greene Huling. Vol. I., No. 1, January, 1892. Boston, Ginn & Co.

MAGAZINES and newspapers devoted to educational subjects multiply apace, so that if our teachers are not properly informed on matters relating to their work, it will not be for want of the means of intercommunication. This latest comer in the field is a magazine of sixty-four pages, to be issued every month except July and August, at twenty cents a number, or $1.50 a year. The articles in this opening number show very plainly the influence of the educational ideas just now prevalent; indeed, they may be said to show little else. The writers appear to agree that the study of Greek is destined to be abandoned; though the editor speaks of this as an event that is inevitable rather than as one to be desired. The most interesting paper in the magazine is that by President Andrews of Brown University on "Some of the Next Steps Forward in Education," its most important point being the suggestion that teachers ought to enter into closer moral and social relations with their pupils. Mr. B. C. Burt has an article advocating the beginning of philosophical study at an earlier age than is now customary; but unless the subject can be made more easily intelligible than it is in his article, we fear that his wishes will not be realized. Mr. John Tetlow gives an account of "The Greek Method of Performing Arithmetical Operations," which will be of interest to mathematical students; and Mr. James H. Blodgett has a brief paper on "Secondary Education in Census Years." The rest of the magazine is occupied with educational news, both domestic and foreign, a few book reviews of no great value, and several brief "Letters to the Editor." The new magazine has some good points, and its field, though narrow, may be made interesting by proper cultivation; but it seems to us that an improvement in the quality of our educational literature is more important than an increase in its quantity.

Geological Survey of Alabama. EUGENE ALLEN SMITH, Ph.D., State Geologist. Report on the Coal Measures of the Plateau Region of Alabama, by Henry McCalley, Assistant State Geologist, including a report on the Coal Measures of Blount County, by A. M. Gibson, with a Map of the Coal-Fields and two Colored Geological Sections across the Plateau Region and Intermediate Valleys. Montgomery, Ala., 1891.

IN the Report of Progress of the Alabama Geological Survey, for the years 1877–8, the division of the Warrior Coal-Field into "Plateau Region" and "Warrior Basin" was first made by Dr. Smith, the State geologist. Characteristic of the Plateau Region is the circumstance that the limestone beds which underlie the capping of Coal Measures are above the general drainage level of the country. This arrangement of the two classes of strata determines in great measure the character of the scenery, for the removal by erosion of the more perishable limestone causes the undermining of the harder strata above, which from time to time break off with nearly vertical faces, forming cliffs which overlook all the valleys. The three principal valleys that traverse this region, in a north-east and south-west direction, are anticlinal valleys, more or less complicated by faulting and overlapping; they are Wills's, Murphree's, and Brown's Valleys, the latter being an extension into this State of the great Sequatchee Valley of Tennessee. Between these anticlinals the Coal Measures occupy shallow synclinal troughs, which also show secondary undulations, with axes nearly at a right angle to the axes of the synclinals and anticlinals, i.e., approximately north-west and south-east. In the anticlinal valleys strata down to the Cambrian are exposed, but in the smaller valleys, cut by streams in the synclinal troughs, only the subcarboniferous measures are reached by the erosion.

Towards the south-west the Coal Measures and their underlying strata slope gradually and more rapidly than the topography, and the Plateau Region thus grades insensibly into the Basin, where none of the beds underlying the coal are above drainage. In the Plateau Region, and particularly in its north-eastern portion, only the lowest of the rocks of the Coal Measures are left capping the mountains, viz., the two conglomerates with their intervening and underlying beds; but further towards the south-west, other higher members of the Coal Measures come in and the plateau like character is in equal measure lost.

The Report for 1877–8, above referred to, and a subsequent Report for 1879–80, contained notes chiefly on the Coal Measures of the Warrior Basin. In 1886 a large volume from the pen of Mr. McCalley, "On the Warrior Field," was published by the survey. This report also was concerned chiefly with the Measures of the Warrior Basin, though containing some notes on part of the Plateau Region. The present volume deals with the Measures of the Plateau Region alone, and presents about all the information at this time available. The two colored sections exhibit well the geological and topograhic features of this region, and show the gradual sinking of the strata towards the south-west and the passage into the Basin proper.

The two conglomerates named above are identical with the Upper and Lower Conglomerates of Professor Safford of Tennessee. They are usually some twenty-five to thirty feet apart, though sometimes separated by a hundred and fifty feet of other strata, and sometimes in direct contact with each other. The lower conglomerate is usually the harder of the two, and is often called the "Mill-stone Grit." In the north-eastern part of the region the most important coal-bearing beds are below this lower conglomerate, and have an average thickness of fifty feet, but there are places where the sub-conglomerate measures have a thickness of seven hundred feet or more, as in parts of Blount County.

The principal seam of coal in the sub conglomerate measures is the Cliff Seam, immediately under the lower conglomerate or cliff rock. Its thickness, like that of all these lower coal seams, is extremely variable, ranging from a few inches to five or six feet. Fifteen or twenty feet below the Cliff Seam is the Dade or Eureka Seam, likewise very variable in thickness, passing, within limited areas, from a few inches to twelve or fourteen feet. This great variability in the thickness seems generally to be due to undulations in the strata forming the floor of the beds, though in some cases to variations in the roof or cover. While there are two or three other seams below these, the two just named have furnished most of the coal mined in the plateau region, and of this the Cliff Seam has yielded the greater part. Between the two conglomerates there is another good workable seam, the Sewanee Seam, from two to three feet in thickness.

While the upper conglomerate forms generally the surface rock over the Plateau Region, there are in many places, and especially as we go south westward, overlying strata with their coal seams, none of which, however, have been worked in this section, but which become more and more important in the direction of the Basin above mentioned, and yielding all the coal there mined. In that direction also the sub-conglomerate coals lose their importance, being mined nowhere in Alabama except in the north-eastern portion of the Plateau Region in Madison, Jackson, and DeKalb Counties.

In these lower Coal Measures there are, very generally, beds of clay iron-stone (carbonate), and of black band, which may some day come into use.

Homilies of Science. By DR. PAUL CARUS. Chicago, Open Court Pub. Co. 12°. $1.50.

THIS book consists of articles on various topics in science, religion, and morals, contributed at intervals to the *Open Court* newspaper, of which Dr. Carus is editor. He tells us in his preface that in early life he intended to be a preacher in the Christian church; his inclination toward the religious life being partly due to his native disposition, and partly, no doubt, to the example of his father, who was a doctor of theology and an officer in the church of eastern and western Prussia. But his studies led him, as they have led many others in our time, to doubt the truth of many of the Christian doctrines, and ultimately to complete religious and philosophical scepticism. He therefore abandoned his intention of entering the church, and after a time became a preacher of the new doctrines that he had adopted, the most conspicuous of which is a blank materialism — a materialism which is not in the least disguised by calling it "monism." But while abandoning all distinctly religious views, Dr. Carus has held fast to the supremacy of the moral law and the need of moral improvement in personal and social life, and the earnestness with which he preaches these truths constitutes the main interest of this book. His remarks on God and immortality will be far indeed from pleasing religious minds; but what he says on ethical subjects, though containing nothing particularly new, will find an echo in the hearts of good men of every creed. He is wholly uninfected with the socialistic heresies now so widely prevalent, and he sternly rebukes those free-thinkers who regard morality with indifference, and scoff at its requirements.

In all that he says about the need of moral improvement and the dignity of man's moral nature, it is needless to say that we cordially agree with him; but we are by no means prepared to follow him in his rejection of all religious belief. We do not believe that the world will abandon theism, though it will undoubtedly abandon many of the traditional dogmas of Christianity, if it has not already abandoned them. Nor can we agree with Dr. Carus in thinking that the views set forth in his book are the last word of science and philosophy on religious themes. On the contrary, we regard the present as emphatically an age of transition in religion and philosophy; and we believe that the religion of the future will be quite different from the doctrine of Dr. Carus, widely prevalent as his views undoubtedly are at the present time. But as an example of existing tendencies, as well as by its moral earnestness, this book will interest the reader.

AMONG THE PUBLISHERS.

IN *St. Nicholas* for January Eliza Ruhamah Scidmore, favorably known as a writer on Japanese subjects, tells of "Two Queer Cousins of the Crab" — the giant crab and the little mask-crab that carries the impress of a human face upon its shell.

— John Wiley & Sons have in preparation a work by Simpson Bolland, entitled "The Iron Founder."

— "It would be a wise and timely move," says *Outing* for January, "to prohibit the sale of grouse of all kinds and quail for, say, a period of at least three years. This would give a fair idea of just how much the market-shooters are responsible for the decrease of our game, and should so lessen the annual slaughter as to give the birds every chance to increase."

— Charles Scribner's Sons have now ready "The Real Japan," studies of contemporary Japanese manners, morals, administration, and politics, by Henry Norman, with seventy illustrations from photographs taken by the author; also "The Development of Navies During the Last Half Century," by Captain Eardley-Wilmot, which forms a volume in the Events of Our Own Time Series.

— Macmillan & Co. will publish in the course of January Mr. Henry Jephson's account of the "Rise and Progress of the Political Platform." The work is in two volumes, of which the first deals with the long struggle for the rights of public meeting and of free speech during the reigns of George III. and George IV. The second volume follows the progress of the platform from the agitation for the first reform bill to that which preceded the reform act of 1884. Mr. Jephson finally treats of the position and power of the platform in the present day.

— A unique experiment will be tried in the February issue of *The Ladies' Home Journal*. The entire number has been contributed in prose, fiction, and verse by the daughters of famous parentage, as a proof that genius is often hereditary. The work of thirty of these "daughters" will be represented. These will comprise the daughters of Thackeray, Hawthorne, Dickens, James Fenimore Cooper, Horace Greeley, Mr. Gladstone, President Harrison, William Dean Howells, Senator Ingalls, Dean Bradley of Westminster, Julia Ward Howe, General Sherman, Jefferson Davis, and nearly a score of others. Each article, poem, or story printed in this number has been especially written for it, and the whole promises to be a successful result of an idea never before attempted in a magazine.

— The *Quarterly Journal of Economics* for January contains an important article by Hon. Carroll D. Wright on the "Evolution of Wages Statistics," showing the gradual process by which the statistics of labor have been perfected in the last twenty years, the United States leading the way. S. M. Macvane writes on "Capital and Interest," and H. Bilgram of Philadelphia on "Böhm-Bawerk's Positive Theory of Capital." J. A. Hill makes a careful study of the recent "Prussian Income Tax," and W. B. Shaw presents his annual review of "Social and Economic Legislation by the States in 1891." Various notes and memoranda and the usual careful bibliography for the preceding quarter make up a number having great variety of contents and of interest.

— *The Chautauquan* for February presents the following table of contents: The Battle of Monmouth, by John G. Nicolay; Domestic and Social Life of the Colonists, V., by Edward Everett Hale; Trading Companies, II., by John H. Finley; States made from Territories, II., by Professor James Albert Woodburn; Sunday Readings, selected by Bishop Vincent; Physical Culture, I.,

by J. M. Buckley, LL.D.; National Agencies for Scientific Research, by Major J. W. Powell, Ph.D., LL.D.; The Bureau of Animal Industry, by George W. Hill; Highbinders, by Frederic J. Masters; Our Ships on the Lakes and Seas, by Samuel A. Wood; The Present Position of German Politics, by George Wheeler Hinman, Ph.D.; Spain, Cuba, and the United States, by Rollo Ogden; How a Bill Presented in Congress Becomes a Law, by George Harold Walker; The Balkan States and Greece; Strawberry Hill, by Eugene L. Didier; The Woman's Congress, by Isabel Howland; Legal Domestic Relations, by Mary A. Greene, LL.B.; Making and Testing Flour, by Emma P. Ewing; Opportunities for Women in Washington, D.C., by Mrs. Emily L. Sherwood; Daughters of the Fatherland, by Miss E. S. Braine; How to Restore Health, by Hermine Welten; What Next in Women's Societies? by Margaret W. Noble; Seawomen, by Margaret B. Wright. The editorials treat of The Ethics of Story Telling, Republican South America, and How to Live with Others. There are the usual departments devoted to the Chautauqua Literary and Scientific Circle.

— P. Blakiston, Son, & Co., Philadelphia, have nearly ready a reprint of Gower's (W.R.) "Manual of Nervous Diseases," second edition, issued here by special arrangement with the author. They have just published Greig Smith's "Abdominal Surgery," fourth edition; Muskett's "Prescribing and Treatment in Diseases of Children;" Blair's "The Organic Analysis of Potable Waters," second edition; and will issue very shortly "A Manual of Autopsies," by Dr. Isaac Blackburn, a revised edition of Naphey's "Therapeutics," and a volume on "Diseases of the Throat, Nose, and Ear," containing a large number of colored wood engravings printed with the text, by E P. McBride, F.R.C.P., Edinburgh.

— Ginn & Co. announce "Outline of Lessons in Botany, for the Use of Teachers, or Mothers studying with Their Children," by Jane H. Newell, Part II.: "Flower and Fruit." The course begins early in March with the crocuses and other early bulbous plants, and continues with lessons on some common house-plants, in order that the pupil may be familiar with the ordinary botanical terms before taking up the spring wild-flowers. Spring flowers are then studied, in the order of their blooming, together with the forest trees, the blossoming fruit-trees, and some of our common weeds. These studies are not analytic only, but deal with the life-habits of the plants, their adaptations for fertilization, dissemination, and protection. Lessons on the stamens, the pistil, inflorescence, the fruit, and other topics are given in connection with the flower studies. The book aims to encourage habits of correct observation, and suggests points for the class to investigate. The book will be found valuable to persons studying by themselves, as it contains copious references to the literature of the subject, as well as original studies. The book contains a classification chart including sixty families.

CALENDAR OF SOCIETIES.

Women's Anthropological Society of America, Washington.

Jan. 9.—Alice C. Fletcher, A Talk on Folk Lore.

Publications received at Editor's Office.

CARUS, DR. PAUL. Homilies of Science. Chicago, Open Court Pub. Co. 12°. 327 p. $1.50.

CHAMBERS'S ENCYCLOPAEDIA. New edition. Vol. viii. Peasant to Roumelia. Philadelphia, Lippincott. Royal 8°. 828 p. $3.

EARDLEY-WILMOT, CAPT. S. The Development of Navies during the last half-century. New York, Scribner. 12°. 311 p. $1.75.

HART, ALBERT BUSHNELL. Epoch Maps, Illustrating American History. New York, Longmans. 8°. Paper. 50 cents.

HELEN KELLER. Souvenir of the first summer meeting of the American Association to Promote the Teaching of Speech to the Deaf. Washington, Volta Bureau. 4°. 16 p.

HOPKINS, G. IRVING. Manual of Plane Geometry on the Hevristic Plan. Boston, D. C. Heath & Co. 187 p. 12°. 75 cents.

HUIDEKOPER, RUSH SHIPPEN. Age of the Domestic Animals. Philadelphia, F. A. Davis. 8°. 225 p. $1.75.

HUNT, THOMAS STERRY. Systematic Mineralogy. New York, The Scientific Pub. Co. 8°. 409 p.

MASTERPIECES OF AMERICAN LITERATURE. Boston, Houghton, Mifflin & Co. 12°. 470 p.

MAYCOCK, W. PERREN. A First Book of Electricity and Magnetism. London, Whittaker & Co. 16°. 147 p. 60 cents.

MINERALS: a monthly magazine. Vol. i. No. 1. New York, The Goldthwaites. 8°. Paper. 30 p. $1 per year. 10 cents a copy.

NEW YORK STATE REFORMATORY. Sixteenth Year-Book, containing the annual report of the Board of Managers for the year ending Sept. 30, 1891. Elmira, N. Y. S. Reformatory Press. 8°. Paper.

NISSEN, HARTVIG. A B C of the Swedish System of Educational Gymnastics. Philadelphia, F. A. Davis. 12°. 116 p. 75 cents.

OHM, G. S. The Galvanic Circuit Investigated Mathematically. Trans. by William Francis. New York, Van Nostrand Co. 18°. 269 p. 50 cents.

POWELL, J. W. Tenth Annual Report of the U. S. Geological Survey, 1888-89. Part i., Geology. Part ii., Irrigation. Washington, Government. 2 vols. 4°. pp. 792, 131.

SCHOOL AND COLLEGE: devoted to secondary and higher education. Edited by Ray Greene Huling. Vol. i. No. i. Jan., 1892. Boston, Ginn & Co. 8°. Paper. 64 p. $1.50 a year; 20 cents a number.

SCOTT, ALEXANDER. An Introduction to Chemical Theory. Edinburgh, A. J. C. Black. 12°. 274 p. $1.25.

SEXTON, SAMUEL. Deafness and Discharge from the Ear. New York, J. H. Vail & Co. 12°. 89 p.

THE PHILOSOPHICAL REVIEW: bi-monthly. Edited by J. G. Schurman. Vol. i. No. i. Jan., 1892. Boston, Ginn & Co. 8°. Paper. 128 p. $3 a year; 75 cents a number.

WILD, H. Aunalen des. Physikalischen Central-Observatoriums. Jahrgang, 1890. Theil i. St. Petersburg, Haiserlichen Akademie der Wissenschaften. 4°. Paper.

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.—(1) A white man versed in wood and iron working, able to work from specifications and plans, suited for an instructor of boys; his business to have charge of shops of school, outline and direct the work for foremen and students; salary to be $1,000 per annum (nine months). (2) A man (black preferred) to teach the colored, iron working and forging, subordinate to the preceding; salary, $720. (3) A man (white) competent to take classes in engineering (assistant's position), but with the ability to perform any of the work required in any of the ordinary engineering courses of our universities; salary from $1,000 to $1,500. A. H. BEALS, Milledgeville, Ga.

WANTED.—Two or three efficient computers with good knowledge of Spherical Trigonometry and ready use of logarithms, for temporary employment in the office of the Coast and Geodetic Survey. Applicants should furnish evidence of their fitness for the work. Apply by letter to the Superintendent, Coast and Geodetic Survey, Washington, D.C.

WANTED.—*Science*, No. 178, July 2, 1886, also Index and Title-page to Vol. VII. Address N. D. C. Hodges, 874 Broadway, New York.

A YOUNG MAN (31) would like a position in a college, laboratory, or observatory, is also willing to assist at a steam engine, etc. Address J. W., care of *Science*, 874 Broadway, New York.

WANTED.—A position in the philosophical or pedagogical department of a college or university by a young man (30) who has had five years' practical experience in teaching, and who has done four years' post-graduate work in philosophy, devoting his attention during the last two years especially to study and original investigation in scientific psychology and its applications in education. Address E. A., care *Science*, 874 Broadway, N. Y. City.

WANTED.—A suitable position in Washington, D. C., not connected with the Government, and with a salary not to exceed $650 a year, by an experienced biologist with six years' university training. Applicant has been a skilful surgeon for fourteen years; is a practical photographer, cartographer, and accustomed to the use of the typewriter. He is also capable of making the most finished drawings, of any description, for all manner of illustrative purposes in science; trained in museum methods and work; also field operations and taxidermy in its various departments, and modeling, production of casts, restorations of paleontological specimens and similar employments. Address U. S. R., care *Science*, 47 Lafayette Place, N. Y.

Exchanges.

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

Wanted to buy or exchange a copy of Holbrook's North American Herpetology, by John Edwards. 5 vols. Philadelphia, 1842. G. BAUR, Clark University, Worcester, Mass.

For sale or exchange, LeConte, "Geology;" Quain, "Anatomy," 2 vols.; Foster, "Physiology," Eng. edition; Shepard, Appleton, Elliott, and Stern, "Chemistry;" Jordan, "Manual of Vertebrates;" "International Scientists' Directory;" Vol. I. *Journal of Morphology;* Balfour, "Embryology," 2 vols.; Leidy, "Rhizopods;" *Science*, 18 vols., unbound. C. T. McCLINTOCK, Lexington, Ky.

For sale.—A 6½ x 8½ Camera; a very fine instrument, with lens, holders and tripod, all new; it cost over $40; price, $25. Edw. L. Hayes, 6 Athens street, Cambridge, Mass.

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.

For Sale or Exchange for books a complete private chemical laboratory outfit. Includes large Becker balance (200g. to 1-10mg.), 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.

For exchange or sale at a sacrifice, an elaborate microscope outfit. Bullock stand; monocular objectives, one-sixth homeogeneous immersion, four-tenths, and three inch, Bausch & Lomb, also one-fourth and one inch Spencer. Four eye-pieces. Objectives are the best made. Address Mrs. Marion Smith, 41 Branch Street, Lowell, Mass.

— Saxon & Co., London, will publish in March an English edition of Félix Régamey's "Japon Pratique," an explanation of the Japanese modes of working in wood, metal, lacquer, porcelain, and stuffs, accompanied by more than a hundred designs.

— Macmillan & Co. announce for early publication a new volume of the Library of Philosophy, entitled "The Philosophy of Aesthetics," by Bernard Bosanquet, A.M., author of "Logic; or, the Morphology of Knowledge," and translator of Lotze's "System of Philosophy."

— Longmans, Green, & Co. announce a new edition of "A Hand-book of Florida," by Charles Ledyard Norton.

— The opening article of the February *Popular Science Monthly* will be on "Personal Liberty," by Edward Atkinson and Edward T. Cabot. It bears chiefly on the labor question, giving the results of an exhaustive examination of the decisions of the courts concerning restrictions on hours and modes of labor, regulation of the method of payment, etc. The pottery articles in the industrial series will be followed by two on another attractive subject — the making of musical instruments, by Daniel Spillane. The first of these, to appear in February, is devoted to "The Piano-Forte." It describes the precursors of this instrument, and recounts the steps of improvement by which this country has reached its present high position in the piano manufacture. The article is illustrated. President David Starr Jordan of Stanford University will have an account of how the hot-springs and lava-cliffs of the Yellowstone Park were formed, and what adventures have befallen the finny inhabitants of its lakes and streams. The article is called "The Story of a Strange Land," and it will be illustrated with several full-page and smaller views. "Urban Population" is the subject of the fourth of the Lessons from the Census, by Hon. Carroll D. Wright. It shows just how much ground there is for the current apprehension in regard to the increase of the slum population of cities. This paper also will appear in the February number.