and reindeer are well known; still more remarkable are those from the Kessler hole, near Schaffhausen, in Switzerland. A sketch of a reindeer feeding, now in the Rosgarten Museum, Constance, and one of a horse, in the Schaffhausen Museum, both from this locality, are so true to nature that one is surprised that they could have been drawn by a person not regularly instructed. Yet the draughtsman lived at a time when the Linth glacier covered the site of the present city of Zurich, and the musk-ox and reindeer pastured where now grow the vineyards of the Rhine.

Several curiously inscribed stones and shells have within the last few years been found in the eastern United States, regarded by their owners as the work of aboriginal artists. Two of them represent the mammoth; others, scenes from life, as battles. While not to be rejected at once, grave suspicion attaches to all such for obvious reasons, the first of which is the constant recurrence of frauds in American antiques. There is now no doubt that Professor Wright was deceived in the small terra-cotta image from a great depth in Montana which he described; and it is very easy for an enthusiast to fall into such snares.

An Aboriginal Pile-Structure.

A late issue of the Peabody Museum of Archæology is a report upon pile-structures in Naaman's Creek, near Claymont, Delaware, by Dr. Hilborne T. Cresson. It will be remembered that in *Science*, Vol. XV., p. 116, etc., there was a correspondence on the character of the structure which these pile-remains indicated. The facts as set forth in the pamphlet now published show that at the mouth of Naaman's Creek three groups of pile-buts were discovered, in a line running from north to south across the creek. In the immediate vicinity, at various depths in the mud and gravel, about 700 stone implements were found, some quite rude, of argillite, others highly finished, of jasper, slate, quartz, etc.

As the mouth of the creek where it falls into the river was evidently a favorable camping and fishing ground for the natives, these implements might reasonably have been expected in such a locality. Was their presence in any way related to that of the piles? Dr. Cresson conjectures that the piles originally formed native fish-weirs. It may be so, but a careful study of the plans which he furnishes, and an inspection of the piles themselves at Cambridge, lead me to think they were intended as supports for some structure which rested upon them. Were they the rude piers of some early Swedish bridge across the creek? Were they the abutments of an ancient wharf? Were they the foundations of dwellings? The average size of the groups, about 12 by 6 feet, would answer the requirements of the latter theory; and palefittes were by no means unknown among the American aborigines.

MEDICAL BOTANY.

BY CHARLES FREDERICK MILLSPAUGH, M.D.

IN looking over the prospectuses of the various medical colleges of the United States, one fails to find in a great majority of them anything to indicate that the important subject of medical botany is taught One wonders at the apathy of medical institutions in this respect when pausing to consider the fact that seven-tenths of the drugs in general use have a vegetable origin, and an action upon the animal economy analogous to their botanical relationship.

I fully agree with Professor Barnes[1] in his statement that, to the general public (and I am sorry to add, to the average Board of Instruction as well), the first thought arising to the mind when botany or botanist is mentioned, is a vague picture of "a sort of harmless crank," wandering about fields, woods, and bogs, picking insignificant weeds and carrying them home, principally to tear them in pieces when he gets there. I urge, with the professor, the necessity of modernizing botanical instruction in colleges and normals, and would add to the list pharmaceutical and medical institutions. Examine the text-books on materia medica used in these latter institutions, and what do you find? Simply an alphabetical arrangement of drugs. This does not meet the needs of the subject treated, for a student should be trained to study drugs in accordance with their analogy to other drugs, and not according to their indexial position in a language. In order to do this he must have, not a rudimentary knowledge of botany and vegetable chemistry, but a thorough and systematic attainment of the subject, not only as represented by the flora of the campus and surrounding woods and fields, but of the world at large. Upon opening these actual text-books we shall find atropine, an inflamatory poison, preceded by aspidium, an anthelmintic, and followed by aurantia, a simple carminative, none of these bearing the least rational relation to the others. An index would have found these drugs readily, while their disposal in this manner will teach the student nothing, nor will it in the least assist his memory to retain the uses of them.

Drugs of botanical origin are as closely allied to each other medically as the plants from which they are derived are botanically; therefore in the above illustration atropine should have been preceded by stramonium and followed by hyoscyamus. Again genera and families of plants have true and constant familial and generic drug action, and the individual species of these have idiosyncracies of action peculiar to themselves. To continue the same illustration, belladonna and atropa, with their *atropa-atropine;* stramonium, with its *datura-atropine;* and hyoscyamus, with its *hyoscyamine;* together with other Solanaceæ — to which botanical family they belong — all cause delirium, but its character differs in each drug; they all dilate the pupil, but the expression of the face under the dilation is dissimilar; they all cause spasmodic action, but the spasms are varied; and among other symptoms they all cause an eruption of the skin, but in each case the eruptions may be readily distinguished. This study may be carried through the whole range of the drug action, not only in the family here presented, but through the whole natural plant system as well. This being true, should not the medical student's first training in materia medica be a thorough course in systematic botany?

Pure science in the collegiate study of drugs has of late been set aside for the greater study of the less useful questions of etiology and diagnosis. Of what immediate care to the patient are hours of scientific and exhaustive guesswork as to what caused him to be ill, when he knows that this is followed by but a moment's thought expended upon the more vital question of what drug should be employed to make him well again? Take up the first medical magazine at your hand; in it you will doubtless find a long dissertation upon some case in practice. Column after column will be found to be devoted to the elucidation of points of diagnosis and etiology, and suppositions, perhaps, of bacterial invasion and cell disintegration, then a line or two to therapy, then the post mortem.

Careful, comprehensive, differential, and comparative study of botany and vegetable chemistry in their relation to

[1] Science, Vol. XX., page 62.

materia medica must be followed in order to educate a good therapist, and the sooner our medical institutions make a requisite of this branch, the better it will be for patients treated by their graduates.

ON THE PRESENT TENDENCY TOWARDS HIGHER STANDARDS OF PROFESSIONAL EDUCATION.

ONE cannot but observe with pleasure, in the present general advance and spread of higher education, that this advance is affecting not only the institutions of higher learning themselves and the general population, but also the strictly professional or technical schools. And whilst I wish in this short paper to refer more especially to law and medicine, my remarks will apply also to other — perhaps to all other — professions.

The medical education of this country has, deservedly enough, for many years been looked upon with little favor, and has ill stood the test of competition with the methods of other countries; but now we are observing a great change in this respect, and there is no doubt that before many years the degree of M.D. from an American university will be as valuable a certificate on its face as can anywhere be obtained. Medical courses of four years' duration are now being adopted, or have already been adopted, by the leading medical schools in the country. The requirements in preliminary education have also greatly increased, and one may hope that before long such subjects as botany and zoology may be added to the requirements of a good English and general education from the intending student of medicine. State legislation itself has not been idle, and we find in the State of New York, for example, that no person can practise medicine without undergoing an examination conducted by the State Board of Examiners. A requirement of preliminary education has also been added, and though as yet no more than an elementary education is required, we may hope for better things in future.

As regards the profession of law, the advance is perhaps even more marked; more marked, that is, as regards legal education, for we no not find that the advance in the requirements for admission to the bar has been so considerable as might be desired, though they have been by no means neglected. Three-year law-school courses, which not so long since were unheard of, have now become the rule rather than the exception; and even in those schools which still see fit to maintain a two-years' course for the degree of bachelor of laws, a graduate course has been commonly added. Towards the general extension of the study of law so as to include the Roman or Civil Law, the tendency is by no means general, caused no doubt by the non-requirement of this branch for admission to the legal profession. Some universities, indeed, in their college courses, offer instruction in this subject; but it must be remembered that the majority of law-students are not college graduates, and so the breadth of their legal knowledge will be measured by the instruction given in the law school, however the depth and extent of what subjects they do touch upon may be increased afterwards. Yale is, I believe, alone among the universities in this country which gives extended courses in the civil law, and encourages their study by the bestowal of a degree (that of D.C.L.); but even then the course is one taken by but few students, and, as the catalogue says, is intended for those who intend to be something more than practising lawyers. This is not as it should be, and we must look to the future for more general study of this subject, for without it law can hardly be taught as a science, for law is — and should be known as — a science.

Education preliminary to the study of law has also risen greatly. Latin is now a usual requirement, and we may doubtless soon see it a universal one.

The day is not far distant then, let us hope, when the title Doctor or Lawyer will in itself mean an educated man.

N. H.

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 Elm-Leaf Beetle, Galeruca xanthomelæna Schr.

IN *Science*, No. 492, for July 8, 1892, Dr. C. V. Riley records the facts, that at Washington, D.C., the imagos from the first brood of larvæ of the above insect had already appeared, and that eggs from beetles of this summer brood had been obtained June 28. In a letter dated July 27, Dr. Riley informs me that from these eggs larvæ had been obtained and that these larvæ were then pupating. Dr. Riley's observations are positive, and prove

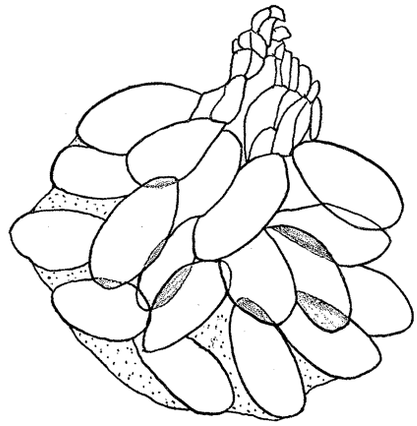

FIG. 1.

that there are two broods at least of this insect at Washington, D.C. They prove also that the beetles will mate and oviposit readily in confinement, and that there is only a brief interval between the appearance of the beetles and oviposition for the second brood of larvæ. This means that the beetles of both sexes are sexually mature when they emerge from the pupæ, or that they mature very rapidly and copulate within a very brief period after assuming the imaginal form. The accuracy of these observations I do not question; but neither do I admit that I am in error in claiming that in New Jersey, north of New Brunswick, there is only a single brood of this insect.

My acquaintance with the beetle at New Brunswick began in 1889, in which year I protected the large number of elms in and near the college campus and about the Experiment Station by spraying with a London purple mixture. In the Report of the College Experiment Station for 1888, Dr. George D. Hulst, my predecessor in office, had stated that there were two broods of the insect annually; and on the appearance of the summer brood of beetles, I made ready to spray again as soon as the second brood of larvæ should begin to appear on the protected trees. They never did make their appearance, and I was unable to find a second brood on any other trees in the city. Dr. Hulst, in response to questions, informed me that he had noticed only one brood of larvæ in 1888; but there had been a cyclonic storm about the time they became mature, which freed the trees and covered the ground beneath them with thousands of the slugs, only a few of which ever found their way back to their food.