Elements of Botany, including Organography, Vegetable Histology, Vegetable Physiology, and Vegetable Taxonomy, and a Glossary of Botanical Terms. By EDSON S. BASTIN. Chicago, G. P. Engelhard & Co. 8°.

IF one can judge by the number of text-books on botany which have been published in this country during the last few years, either the number of botanical students must be very large, or the different text-books must treat the subject inadequately, for each new work has for its ostensible purpose the 'filling of a long-felt want.' What the want is, is not easy to say, unless it be a book which shall contain every thing in small compass, and that is a practical impossibility. The 'Elements of Botany,' by Professor Bastin, certainly gives a great deal in small compass, and must be considered one of the best treatises on the subject yet published in this country. It is evidently the work of a teacher, rather than a specialist, and gives the substance of what must usually be sought in several different text-books, and, while it cannot replace other well-known treatises, it forms a good introduction to them. The illustrations are numerous and generally good, and the style is clear and as attractive as could be expected considering the condensed form. Two-thirds of the book are devoted to organography and histology, — subjects which are best adapted to beginners. The chapters on physiology are very brief, but the subject is well treated. The same can hardly be said of the chapters on vegetable taxonomy, by which the author understands a description of the different classes of the vegetable kingdom. The illustrations of this part are not so good as those of the earlier parts, and the descriptions are not infrequently obscure, and also at times incorrect. The yeast-plant, for instance, cannot be said to belong to the *Schizomycetes*. It is to be regretted that authors of botanical text-books to be used by beginners almost invariably crowd a general account of the different classes into a few pages at the end. Treated in this way, the subject is always unintelligible, or next to unintelligible, and the space had better be used in amplifying other subjects and the student referred to larger and special works for an account of the classes.

An Introduction to Greek Sculpture. By L. E. UPCOTT. Oxford, Clarendon Pr. 12°.

NO book of similar aim and scope can compare for a moment with this little book. It was originally written as a guide to the author's collection of casts and photographs from the antique at Marlborough College. It is now enlarged somewhat, and has in view a museum of casts and photographs adapted to the needs of a school or college. Mr. Upcott mentions the religious origin of Greek sculpture, notes its peculiar characteristics, and traces its development from the half-mythical Dædalus to the Græco-Roman period. The book is at once clear, compact, and comprehensive, and the best manual of Greek sculpture in the language.

The Graphical Statics of Mechanism. By GUSTAV HERRMANN. New York, Van Nostrand. 16°.

THIS is a translation into English of Professor Herrmann's work, which has already been published in German and French. The great advantage which the method presents is its simplicity. By the use over and over again of a few easily mastered principles, the most complicated problem may be solved. No knowledge of higher mathematics is required in its mastery, and no handling of lengthy and involved algebraic formulas is necessary in its use. The object of the treatise is principally to facilitate study for the students of technical schools, upon whose time and industry increasing demands are made from day to day.

NOTES AND NEWS.

THE earthquake of Central Asia, the principal shock of which occurred on June 19, has a remarkable feature in common with the Charleston earthquake. In most cases chains of mountains prevent the spreading of the shocks, but in these cases high ranges were crossed. The Charleston earthquake traversed the Alleghanies, and that of Vernoye — the situation of which may be seen on our map of Central Asia (Aug. 5) — was felt on the Issik-Kul, though the chains of the Ala-tau lie between the centre of the disturbance and that lake. The epicentre was in the district of Aksai, about fifteen miles west of Vernoye. About 800 persons are said to have been killed by falling houses and rocks rolling down from the mountains. Numerous fissures were formed on the northern slope of the Ala-tau, particularly near Vernoye. East of this place the shocks were less destructive. Part of the shore of Issik-Kul moved three feet downward. An expedition is at present at work to investigate the geological structure of the disturbed area.

— We learn that the Signal Service has ordered the abandonment of the following stations on the Pacific coast: Monterey, San Luis Obispo, Bakersfield, Modesto, Indio, San Bernardino, Carson, Yreka, Santa Rosa, and Mendocino City. As soon as the official intention was announced, the publisher of the San Francisco *Chronicle* came forward and offered to provide observers, pay for telegrams, warnings, and so forth, provided that the government would allow the instruments to remain. This offer has been accepted.

— It will be of interest to learn, says *The Publishers' Weekly*, that the adherents of the international language Volapük have just held a congress at Munich, presided over by Professor Kirchhoff of the University of Halle. It was decided to use the home spelling for proper names, to drop the ceremonial form 'you' (employing 'thou' in the singular), and to make some few simplifications in spelling and grammar. The most important action was the establishment of a Volapük academy, to whom all future grammatical and lexicographical difficulties shall be submitted. Eighteen academicians were elected, representing Germany, Hungary, Austria, Holland, Russia, Sweden, France, Spain, Portugal, Italy, Asia Minor, England, and North America. The American representative is Mr. Charles E. Sprague of New York.

LETTERS TO THE EDITOR.

*** The attention of scientific men is called to the advantages of the correspondence columns of* SCIENCE *for placing promptly on record brief preliminary notices of their investigations. Twenty copies of the number containing his communication will be furnished free to any correspondent on request.*

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

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

Is there a Diamond-Field in Kentucky?

THE great similarity of the peridotite of Elliott County, Ky., to that of the South African diamond-fields has attracted considerable attention, and hundreds of prospectors, moved by 'interesting possibilities,' have visited the region in search of gems and precious metals.

In May, 1885, when the peridotite of Kentucky was studied in the field, the character of the diamond-bearing rock in South Africa was not yet fully understood, and consequently no search was made at the time for diamonds. Recent developments, however, rendered it desirable that they should be intelligently sought for; and upon the invitation of Mr. J. R. Procter, the State geologist of Kentucky, we were sent by Maj. J. W. Powell, the director of the United States Geological Survey, to make the investigation.

The locality is easily reached by way of the East Kentucky Railroad, which ends in Carter County at Willard, where conveyance may be obtained of the farmers to traverse the remaining ten miles to the best exposures of the peridotite along Isom's Creek, in Elliott County.

The peridotite alters and disintegrates readily; but, from the fact that the declivity of the surface is considerable, the transportation of material almost keeps pace with disintegration, and there is no great accumulation of residuary deposits upon the narrow divides and hillsides. The specific gravity and durability of the gems found in connection with peridotite are generally greater than those of serpentine and other products of its alteration. On this account the gems accumulate upon the surface and in favorable positions along adjacent lines of drainage. Our plan was to search by sifting and carefully panning the stream-beds receiving the drainage directly from the surface of the peridotite, and to enlist the services of the people in the neighborhood to scrutinize the steep slopes where gems weathered out of the peridotite might be exposed. Particular attention was directed also to the examination of the

solid rock and residuary deposits which so closely resemble the diamantiferous material of the South African mines.

The accompanying map, introduced, with corrections and additions, from the United States Geological Survey, Bulletin No. 38, shows the distribution of the exposed peridotite and the soil resulting from its disintegration. It is only a sketch-map, and does not pretend to a high degree of accuracy, but will be found of great service in the field.

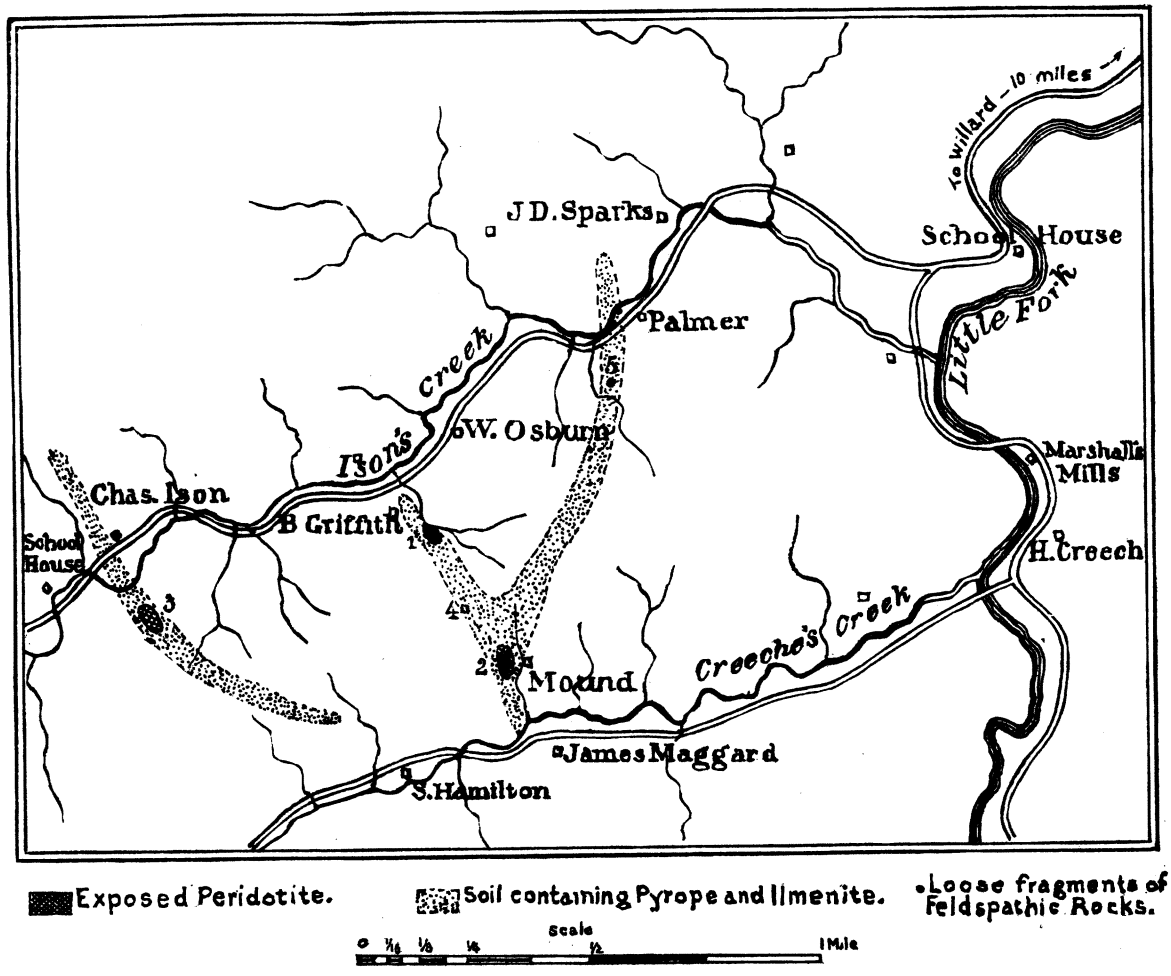
The embankment, which was formerly regarded as the site of an old furnace, has proved to be an Indian mound in which arrow-heads and fragments of celts have been found. Several years ago the mound was opened to a considerable depth by Mr. James Maggard, who reports ashes near its centre. The excavation made for us during our brief sojourn did not reach the ashes. The mound is composed chiefly of the sand resulting from the disintegration of the adjacent peridotite, and a number of pieces of peridotite, preserving all their form, but entirely altered with the exception of the garnet and ilmenite, which only appear broken up. The olivine had changed, however, to a deweylite-like mineral, so soft and of such a structure that it has received the local name of 'mutton tallow,' and, when first taken out, can be worked as readily as that substance.

It is about one hundred feet in diameter and thirty feet in height, and some large trees had originally grown on the top. Until our recent visit the actual contact of the peridotite and shale had not been observed. It is exposed in the bed of a small branch of Isom's Creek, within a hundred yards of Charles Isom's house. The intrusion of the peridotite has displaced and greatly fractured the shale, besides locally indurating it, and enveloping a multitude of its fragments. The latter are dark-colored, like the peridotite, and are strongly contrasted with the light-colored dolomitic nodules of secondary origin.

Besides the pyropes, a few of which are good enough for cutting, several fairly good specimens of a green pyroxene have been found, and are here reported for the first time. When suitably prepared, they will make worthy additions to the gem collection of the National Museum. They resemble the same transparent mineral from Arizona. The South African specimens of the mineral are a little more opaque, but of a richer green color.

During a careful search over a small area for nearly two days, no diamonds were found; but this by no means demonstrates that diamonds may not yet be discovered there.

The remarkable similarity between the peridotite of Kentucky and that of the Kimberley and other diamond-mines of South Africa is very striking, and, when this alone is considered, the probability of finding diamonds in Kentucky seems correspondingly great; but when we reflect that the carbonaceous shale, and not the peridotite itself, is the source of the carbon out of which the diamond is formed, and that the shale in Kentucky is much poorer in carbon than that of the South African mines, the probability of finding diamonds there is proportionally diminished. H. Carvill Lewis (*Science*, viii. p. 346) remarks concerning the South African mines, that "recent excavations have shown that large quantities of this shale surround the mines, and that they are so highly carbonaceous as to be combustible, smouldering for long periods when accidentally fired." In the chemical laboratory of the United States Geological Survey, Mr. J. Edward Whitfield determined 37.521 per cent of carbon in the shale from near the Kimberley mine, while the blackest shale adjoining the peridotite near Charles Isom's in Kentucky, he found to contain only 0.681 per cent of carbon. After all the carbonates were removed by dilute hydrochloric acid, the residue was combusted in oxygen, and the carbon weighed as carbonic dioxide. The peridotite, at the time of its intrusion, must have been forced up through a number of coal-beds, and at a greater depth it penetrated the Devonian black shale, which is considerably richer in carbon than the shale now exposed at the surface. It is possible, and not improbable, that if the theory of the igneous origin of diamonds first proposed by Roscoe Cohen (Proceedings of



the Manchester Literary and Philosophical Society, Oct. 7, 1884, p. 5), and later independently advanced by H. Carvill Lewis, be true, a number of diamonds may have been formed in the Kentucky peridotite; but the general paucity of carbon in the rock adjacent to the peridotite is certainly discouraging to the prospector.

The best time to search for gems in that locality is immediately after a heavy rain, when they are most likely to be well exposed upon the surface. It is proposed to keep up the search economically by those most interested, by furnishing to responsible individuals in the vicinity a number of rough diamonds mounted in rings, for comparison, that they may know what to look for under the most favorable circumstances.

J. S. DILLER.
GEO. F. KUNZ.

New York, Sept. 12.

The Classification of Lakes.

SEVERAL years ago I presented to the Boston Society of Natural History a paper on the classification of lake-basins, in which the many varieties of lakes were grouped under three heads, according as they were made by constructive, destructive, or obstructive processes. The first heading included lakes made by mountain-folding and other displacements; the second consisted chiefly of basins of glacial erosion; the third contained the greatest number of varieties, such as lakes held by lava, ice, and drift barriers, delta and ox-bow lakes, and some others. The classification proved satisfactory, in so far as it suggested a systematic arrangement of all kinds of lakes that have been described; but it now appears unsatisfactory, inasmuch as its arrangement is artificial, without reference to the natural relations of lakes to the development of the drainage systems of which they are a part. A more natural classification is here presented in outline.

When a new land rises from below the sea, or when an old land is seized by active mountain-growth, new rivers establish themselves upon the surface in accordance with the slopes presented, and at once set to work at their long task of carrying away all of the mass that stands above sea-level. At first, before the water-ways are well cut, the drainage is commonly imperfect: lakes stand in the undrained depressions. Such lakes are the manifest signs of immaturity in the life of their drainage system. We see examples of them on new land in southern Florida; and on a region lately and actively disturbed in southern Idaho, among the blocks of faulted country described by Russell. But as time passes, the streams fill up the basins and cut down the barriers, and the lakes disappear. A mature river of uninterrupted development has no such immature features remaining. The life of most rivers is, however, so long, that few, if any, complete their original tasks undisturbed. Later mountain-growth may repeatedly obstruct their flow; lakes appear again, and the river is rejuvenated. Lake Lucerne is thus, as Heim has shown, a sign of local rejuvenation in the generally mature Reuss. The head waters of the Missouri have lately advanced from such rejuvenation; visitors to the National Park may see that the Yellowstone has just regained its former steady flow by cutting down a gate through the mountains above Livingston, and so draining the lake that not long ago stood for a time in Paradise Valley. The absence of lakes in the Alleghany Mountains, that was a matter of surprise to Lyell, does not indicate any peculiarity in the growth of the mountains, but only that they and their drainage system are very old.

The disappearance of original and mountain-made lakes is therefore a sign of advancing development in a river. Conversely, the formation of small shallow lakes of quite another character marks adolescence and middle life. During adolescence, when the head-water streams are increasing in number and size, and making rapid conquest of land-waste, the lower trunk-stream may be overloaded with silt, and build up its flood-plain so fast that its smaller tributaries cannot keep pace with it: so the lakes are formed on either side of the Red River of Louisiana, arranged like leaves on a stem; the lower Danube seems to present a similar case. The flood-plains of well-matured streams have so gentle a slope that their channels meander through great curves. When a meander is abandoned for a cut-off, it remains for a time as a crescentic lake. When rivers get on so far as to form large deltas, lakes often collect in the areas of less sedimentation between the divaricating channels. Deltas that are built on land, where the descent of a stream is suddenly lessened and its enclosing valley-slopes disappear, do not often hold lakes on their own surface; for their slope is, although gentle, rather too steep for that: but they commonly enough form a lake by obstructing the stream in whose valley they are built. Tulare Lake in southern California has been explained by Whitney in this way.

The contest for drainage area that goes on between streams heading on the opposite slopes of a divide sometimes produces little lakes. The victorious stream forces the divide to migrate slowly away from its steeper slope, and the stream that is thus robbed of its head waters may have its diminished volume clogged by the fan-deltas of side-branches farther down its valley. Heim has explained the lakes of the Engadine in this way. The Maira has, like an Italian brigand, plundered the Inn of two or more of its upper streams, and the Inn is consequently ponded back at San Moritz and Silvaplana. On the other hand, the victorious stream may by this sort of conquest so greatly enlarge its volume, and thereby so quickly cut down its upper valley, that its lower course will be flooded with gravel and sand, and its weaker side-streams ponded back. No cases of this kind are described, to my knowledge, but they will very likely be found; or we may at least expect them to appear when the northern branches of the Indus cut their way backwards through the innermost range of the Himalaya, and gain possession of the drainage of the plateaus beyond; for then, as the high-level waters find a steep outlet to a low-level discharge, they will carve out cañons the like of which even Dutton has not seen, and the heavy wash of waste will shut in lakes in lateral ravines at many points along the lower valleys.

In its old age, a river settles down to a quiet, easy, steady-going existence. It has overcome the difficulties of its youth, it has corrected the defects that arose from a period of too rapid growth, it has adjusted the contentions along the boundary-lines of its several members, and has established peaceful relations with its neighbors: its lakes disappear, and it flows along channels that meet no ascending slope on their way to the sea.

Certain accidents to which rivers are subject are responsible for many lakes. Accidents of the hot kind, as they may be called for elementary distinction, are seen in lava-flows, which build great dams across valleys: the marshes around the edge of the Snake River lava-sheets seem to be lakes of this sort, verging on extinction: crater lakes are associated with other forms of eruption. Accidents of the cold kind are the glacial invasions: we are perhaps disposed to overrate the general importance of these in the long history of the world, because the last one was so recent, and has left its numerous traces so near the centres of our civilization; but the temporary importance of the last glacial accident in explaining our home geography and our human history can hardly be exaggerated. During the presence of the ice, especially during its retreat, short-lived lakes were common about its margin. Claypole has just described the extinct 'Lake Cuyahoga' in Ohio as of this kind. We owe many prairies to such lakes. The rivers running from the ice-front, overloaded with sand and silt, filled up their valleys and ponded back their non-glacial side-streams; their shore-lines have been briefly described in Ohio and Wisconsin, but the lakes themselves were drained when their flood-plain barriers were terraced; they form an extinct species, closely allied to the existing Danube and Red River type. As the ice-sheet melts away, it discloses a surface on which the drift has been so irregularly accumulated that the new drainage is everywhere embarrassed, and lakes are for a time very numerous. Moreover, the erosion accomplished by the ice, especially near the centres of glaciation, must be held responsible for many, though by no means for most, of these lakes. Canada is the American type, and Finland the European, of land-surface in this condition. The drainage is seen to be very immature, but the immaturity is not at all of the kind that characterized the first settlement of rivers on these old lands: it is a case, not of rejuvenation, but of regeneration; the icy baptism of the lands has converted their streams to a new spirit of lacustrine hesitation unknown before. We cannot, however, expect the conversion to last very long: there is already apparent a backsliding to the earlier faith of steady flow, to which undisturbed rivers adhere closely throughout their life.