DIFFERENT HEADINGS, WITH ONE OR TWO EXAMPLES.

MACROCHRONE.	EON.	PERIOD.	ERA.	EPOCH.	MICHROCHRONE.
(Greatly extended time.)	("A space of time, a life-time.")	("An interval of indefinite time.")	("A succession of years between two fixed points.")	("A pause.")	(Comparatively short time.)
Examples. Neptunia (all aqueous rocks.)	Paleozoic Eon.	Permia, Carbonaria, Devonia, Siluria	Austria (Mt. limest.), Cambria	Iowaia, Potsdamia, Acadia	Karkaskia, St. Louis, etc., etc.

EXAMPLES SHOWING THE ADAPTABILITY OF CERTAIN HEADINGS TO MOST OF THE MODERN LANGUAGES.

		System. ("An assemblage of objects ranged in regular sub-ordination, or related by some common law.") Σύδεημχ (το) Le système. Das System, Il sistéma. El sistéma.	*Sub-system.*	*Group.* ("An assemblage of objects in a certain order.") Le Groupe. Die Grüggen. Il grúppo. El grúpo.	*Sub-group* or *Section.* Sectio. La section. Die section. La sezione. La seccion. or *grade* or *member*, with slight modifications can be used in the above languages.

ABBREVIATED FORMS WITH SOME EXAMPLES.

		For *Periods.* Roman numerals, I, II, III, etc., or Capital letters A B C, etc., applied thus: I = Silusia. or A = "	For *Eras.* Arabic numerals 1, 2, 3, etc., applied thus: 2. = Canadia, 1. = Cambria	For *Epochs.* Small letters a, b, c, etc., [repeated for the epochs of each era.] 2^b= Vitrè-Murcia, 2^a=Llandeils-Esthonia, 1^b= Potsdamia, 1^a= Acadia	For *Members*, marks used to the right and above the era letter, similar to the power-sign in mathematics. Thus to designate the Burlington member of the Iowa subcarniferous, we would write: III. $9^{a''}$ or C. $9^{a}a''$

of the leading present equivalents is submitted below, in which it will be observed that one great object, kept in view, was the recording particularly by the Epoch names, such localities as are noted for having given us remarkable fossils, characteristic of that peculiar formation, whether found in well-known regions of Europe and America, or in such distant countries as Patagonia, N. Zealand, the Cape of Good Hope, Greenland or Spitzburgen, etc.

NOTE TO TABLE 1.

To further facilitate the understanding of some of the suggestions submitted, a tabular view is subjoined, giving different headings, with their definitions from standard dictionaries, as well as a conspectus of the symbols.

NOTE TO TABLE 2.

Probably some difficulties, and, despite of care exercised, some errors in the details may be pointed out; but if the general principles are found acceptable, or suggestive of such discussion as may ultimately lead to unification of our Geological Nomenclature, the object proposed, in the preparation of this paper, will be attained.

A NEW MATERIAL FOR STOP-COCKS AND STOPPERS FOR REAGENT BOTTLES.*

BY H. W. WILEY.

For some time I have been working with a compound invented by Mr. T. J. Mayall, of Reading, Mass., and known as the Mayall metal. One form of this compound was intended as a material for journals, pneumatic tubes, etc. It is made of 5 to 6 parts graphite, 1 part rubber and ½ part sulphur. Instead of sulphur, sulphide of antimony can be used. The material is a perfect self-lubricant and to a high degree resists the action of acids and alkalis.

From its properties I was led to believe that it would be especially useful for chemical apparatus, in the manufacture of stop-cocks, connecting tubes, etc. My expectations were fully realized.

I have used it with success for burettes, cocks for hydro-sulphuric acid, stoppers for hydrote bottles, etc, These never stick, no difference how firmly they are pressed in nor how long they are left. The material is firm and elastic and will hold threads nearly as well as a metal.

I regard it as peculiarly useful for stop-cocks for acids, especially hydro-sulphuric. It is capable of a high polish, and will not tarnish. Slightly modified in composition it is used for covering houses and plating the bottoms of ships. Placed on ships it seems to prevent entirely the adhesion of barnacles, Strange as it may seem, it also makes an excellent insulating material for telegraph wires. I have not yet tried the effect of ozone upon it and only partially of permanganate of potassium.

* Read before the A. A. A. S., Cincinnati, 1881.

PHONETICS OF THE KAYOWE LANGUAGE.*

BY ALBERT S. GATSCHET.

Books printed in Indian languages often render those tongues in a most imperfect manner, on account of the deficient knowledge of Indian phonetics on the part of the authors. The Kayowe language is a fair average specimen of Indian pronunciation, and is very rich in sounds, having no less than forty-four sounds, if we count in the long and the nasalized vowels. In its phonetic series the most conspicuous fact is the prevalence of the nasals and the total absence of dsh, tch, which are so conspicuously frequent in the majority of American languages, of r and of v. The palatal series is represented by one consonant only; the guttural and dental series are well represented, while in the labial series p, b, and m are the only frequent sounds. F is found in some words only, where it alternates with p, pai, or fai, land, earth. Among the sounds not frequently met with are sh, w

* Read before the A. A. A. S., Cincinnati, 1881.

Nasalizing is a prominent feature in Kayowe phonetics, more so in the vocalic than in the consonantic series No word begins in l or w. Final syllables of words terminate just as often on a consonant as in a vowel, but all other syllables usually end in a clear or nasalized vowel. Every diphthong is adulterine; that is, every combination of two colliding vowels differing from each other can be pronounced as a monosyllable and a dissyllable. Thus we can pronounce as well ze-iba as zeiba arrow. The fact that every vowel can become nasalized (and many of the consonants also) is one of the curious features of the language. This nasalization is either the one observed in the French an, in, on, un, or it consists in the addition of an n to the vowel. All these Kayowe peculiarities are very commonly observed in the majority of American languages, and also in most of the unwritten languages of other parts of the world. The standard orthography which is adopted for recording a written literary language exercises undoubtedly some influence upon the pronunciation of the natives, but where the language is not fixed by writing, we perceive constant alternation of the sounds pronounced with the same vocal organ, as of the gutturals, dentals, and labials among themselves.

"This is also the case in Kayowe, and a full list of the sounds in it is as follows:

CONSONANTS:

Gutturals: k, g, kh (aspirate), h, ng.
Palatals: y.
Linguals: ḱ, g̱, sh, l.
Dentals: t, d̲, s̲, z, n, nd, 'dl.
Labials: p, b, f, w, m, mb.
VOWELS: a, ā, â, ä, e, ē, ĕ, (the primitive vowel), i, ī, î, o, ō, u, ū, û."

TYPICAL THIN SECTIONS OF THE ROCKS OF THE CUPRIFEROUS SERIES IN MINNESOTA*.

By PROFESSOR N. H. WINCHELL.

This paper was in pursuance of the same line of investigation as that by the same author read last year before the Association, but gave the detailed methods by which general results had been attained in the study of the stratigraphy of the cupriferous rocks. By means of the microscopic examination of the crystalline rocks of the series, two groups of rocks were discovered, one being those generally accepted as igneous by Pumpelly, Chamberlin and by Owen, and the other the result of change from the sedimentaries. The former one dark colored and heavy, consisting essentially of labradorite, augite and magnetite, but the latter are lighter colored, generally showing a reddish tint, and consist essentially of orthoclase, quartz and hornblende. It is the latter group that in this connection possesses the greatest interest, as the author regards them as the true equivalents of the shales and sandstones that in some places are seen interbedded, without metamorphism, with the igneous rocks of the other group. They play a very important part in the geology of northeastern Minnesota, where, in their varied lithology, exhibiting different stages of crystallization, they not only are spread over a large geographical area, but afford some of the most interesting geological studies.

The author suggested that probably the titaniferous iron ore which is so largely associated with the igneous rocks of the cupriferous series, had its origin in the ferruginous shales of the sedimentary series, by the reduction of the oxides with which they are colored, at the time of the igneous disturbances.

The paper was accompanied by a series of fifty thin sections made by the author, with brief descriptions, and by samples of the rocks from which they were taken, intended to illustrate the lithological distinctions pointed out.

* Read before the A. A. A. S., Cincinnati, 1881.

WORKED SHELLS IN NEW ENGLAND SHELL-HEAPS.*

By PROF. EDWARD S. MORSE.

Mr. Morse called attention to the fact that heretofore no worked shells had been discovered in the New England shell heaps. A similar absence of worked shells had been noticed in the Japanese shell heaps. Worked shells were not uncommon in the shell heaps of Florida and California. Mr. Morse then exhibited specimens of the large beach cockle (Lunatia), which showed unmistakable signs of having been worked. The work consisted in cutting out a portion of the outer whorl near the suture. To show that this portion could not be artificially broken he exhibited naturally broken shells of the same species, both recent and ancient, in which the fractures were entirely unlike the worked shells.

A REMARKABLE INSTANCE OF RETENTION OF HEAT BY THE EARTH.†

By H. C. HOVEY.

The fact is well known that heat may be retained for a long period by the rocks and soils of the earth; but it is seldom that dates can be fixed with approximation to accuracy as can be done in the instance the particulars of which are now given.

My attention was called, a year ago, by Mr. James Hudson, manager of the Albion mines, in Pictou county, Nova Scotia, to a peculiar area including about two acres of ground, where the snow never lay long without melting, and the frost, even in severe winters, never penetrated but for a short distance. All over this space are scattered fused masses of clay and ironstone, resting on the outcrops of what are locally known as the "Main" and the "Deep" seams of bituminous coal, which at this point are about 450 feet apart and partially affecting the outcrops of other seams. On inquiry as to the probable date of the fire that had left this area of scoriæ and ashes, I was told that this portion of Nova Scotia was visited early in the seventeenth century by French explorers, and that an account of the harbor called Pictou was given in 1672 by Monsieur D'Enny, who was appointed Governor of the Gulf of St. Lawrence in 1654. The name "Pictou" is said to be derived from a Micmac word signifying *fire*; and the traditions of the Indians still point to this locality as having been, a long time ago, the scene of a fierce and long-continued fire, which made them avoid the place as being visited with the anger of the gods.

The coal measures of Pictou were discovered in 1798, at the very point now described; and the discoverers represented the spot as covered with ashes, over which grew large hemlock trees. About twenty years ago, while a drain was being dug in this locality, a tree was cut down that showed 230 rings of annual growth; and three feet below the root of this tree a large piece of wood, fashioned by some sort of axe, was found in a good state of preservation. It is Mr. Hudson's opinion that at least 300 years must have passed since the extinction of the fire at this point, and it is known that none has been rekindled since; its ignition may have been effected by chemical action, or by a stroke of lightning, or by artificial means applied to one of the so-called springs or feeders of inflammable gas that issue along the outcrops of these unusually thick seams.

Last spring it was found necessary to sink a small pit at the crop of the Deep seam on this area, in doing which

* Read before the A. A. A. S., Cincinnati, 1881.

† Read before the A. A. A. S., Cincinnati, 1881.