To test this matter in another way, I captured a number of specimens and with finely pointed scissors cut the heart or dorsal vessel, at the middle of the thorax. These insects lived nearly twenty-four hours, proving that the circulation of blood is not dependent entirely upon the heart, and, in fact, these insects lived as long as others which were not mutilated at all, and were kept in the same dish merely as a check. I could not find that these insects differed in their actions in any way from those that were perfectly normal. Another set of specimens was treated by cutting not only through the heart, but also through the œsophagus where it passed through the prothorax, and thus the alimentary canal was severed. Specimens so treated died somewhat sooner than did the previous lot, although they also lived nearly twelve hours. It was also noticed of these insects that the tongue or proboscis was frequently extended and retracted as in the case of those insects in which the abdomen was removed. Another set of specimens was treated by cutting the nervous cord in the thorax just behind the posterior legs. This resulted in the paralysis of the hind legs, but did not appear to affect either the fore and middle legs or the wings. Where the cord was cut between the middle and hind legs, exactly the same result was obtained. Cutting the cord between the fore and middle legs, close to the middle legs, however, resulted in the paralysis of everything behind the fore legs, and of the wings as well; although the insect lived for more than six hours afterward, both the head and its appendages and the fore legs responding readily to stimulation. As a result of this crude series of experiments, it would seem that the vital point, or, better, the controlling nerve centre in flies, is located in that large ganglion situated in the prothorax, just above the fore legs, and that so long as this remains intact, the insect retains power of motion and evidences active life. Severing or piercing this ganglion, killed the insest at once.

LETTERS TO THE EDITOR.

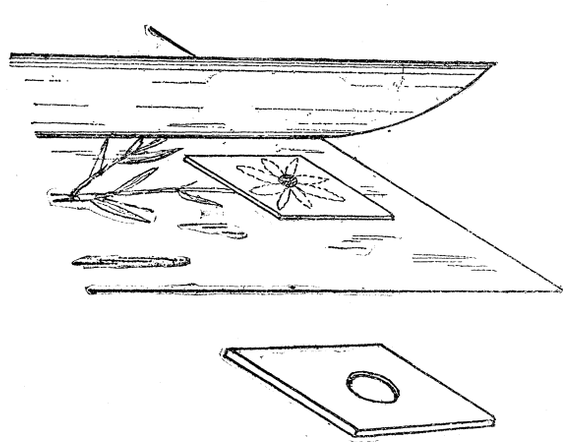
***Correspondents are requested to be as brief as possible. The writer's name is in all cases required as a proof of good faith.

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.

Herbarium Specimens.

In preparing specimens of the Composite family for the herbarium, it is difficult to press the flower so that the



rays will not wilter, owing to the fact that the head keeps the paper from pressing upon the rays. The following device has been used by the writer with much success in preventing this difficulty, and might be useful to students who are collecting autumn flowers.

A small square or disk is cut from blotting paper and a hole is cut in its centre, a little larger than the head of the flower. If, in pressing, this disk be put over the flower, allowing the head to come up through the hole in the centre, the rays can be pressed out flat. The thickness of the disk should vary accordingly as the head is thick or thin.

Richard H. Rich.

Beverly, Mass., Sept. 25, 1893.

Minnesota Mounds.

I read with considerable surprise Mr. Schneider's article entitled "Notes on Some Minnesota Mounds" in *Science* of Sept. 1, and I at once felt it to be my painful duty to correct some gross misrepresentations. I happened to be working in the same party with Mr. Schneider when he made the valuable discoveries which he describes and therefore am in a position to criticize his statements.

It is true that we found a number of Indian burial-grounds in the vicinity of Mille Lacs. Most of these were still in use, or had been so until quite recently. In two which I assisted in opening we found some decidedly modern relics, e. g., a U. S. ten cent piece used as a bangle, a glass butter-dish, a rubber comb and a jack-knife such as any Yankee boy might carry. These graves were arranged in rows and were usually covered with superstructures of wood, which might be compared to dog-kennels. We found a few graves rather older than the above, and which were covered with low mounds of earth, but even here there were traces of wooden stakes, which gave evidence of their recent origin. As to the mound at Lake Warren, which Mr. Schneider dug into, I confess that I was not present when it was opened. I have, however, seen the "relics" which were collected from it—in fact I am in a position to see them whenever I wish. Without stopping to question whether the age, sex and stature of the individuals could be accurately determined from the very fragmentary skeletons which he found. I would say that the bones are nearly as well preserved as some which we found in one of the covered graves above described and which I know to have not been buried more than twenty-five years. It is hardly necessary to point out the absurdity of supposing that a hole in which the "roughness of the sides" was still apparent could have been filled for several hundred years.

The specimens of pottery which he describes are merely fragments of baked clay utensils of the roughest sort, just such as all the American Indians manufactured before they obtained iron kettles from the whites.

In fact there is not the least evidence that any of these bones or relics are of any great age or that they belong to any race older than the Indians which inhabit this district at present. They are of no more value to the archæologist than bones dug from the nearest cemetery.

Francis B. Sumner.

University of Minnesota, Minneapolis, Minn., Sept. 23, 1893.

Origin of Gold.

I would like to draw attention to a somewhat fallacious deduction which appeared in an interesting little article, "The Origin of Gold," in your issue of Sept. 1st. The author mentions the remarkable fact that, in a part of Southern India, quartz-veins, though traversing both gneiss and belts of rocks, which have been termed the Dharwar, are gold-bearing in the Dharwar only, and are never productive in the gneiss. Mr. Lake then argues: "It is clear, therefore, that the gold cannot have been introduced into the reefs from below, for in that case there would be no difference in that respect between the reefs in the gneiss and the reefs in the Dharwar."

Without wishing to uphold the ascensional theory of the formation of lodes, it may be pointed out that the gold may have risen from below in both the veins in the gneiss and those in the Dharwar, but that owing to unfavorable conditions in connection with the gneiss (*e. g.*, absence of a precipitant) the gold has not been deposited in the veins in the gneiss. The case does not stand alone. The influence of the "country" on the productiveness of veins is a phenomenon well known and appreciated by mining engineers, and both the ascensional and the lateral secretion theories can be adapted to explain it.

It would have been interesting if Mr. Lake had given details of those observations which led him to believe that the schists of the district were lava-flows.

L. H. Linnell Cooke.

Glasgow, Scotland, Sept. 22nd, 1893.

A Phonetic Orthography.

A new system of English orthography is proposed in *Science* (July 21), by Prof. J. I. D. Hinds, of Lebanon, Tenn., and endorsed with slight alterations (*Science*, August 25), by Frederick Krafft, of Jersey City Heights.

Reform, not revolution, in English orthography, is very desirable; but reform, to be successful, must be in accord with the spirit of the English language; it must also be attempted a little at a time. "Great reforms progress slowly."

Any system proposed that is simply phonetic must fail for the following reasons: (1) Our alphabet is inadequate; (2) the people of different sections or schools pronounce many words differently; (3) everyone would spell according to his own ideas of pronunciation, and there would be no standard. The fact that Prof. Hinds and Mr. Krafft, who attempt to agree, differ is evidence of that.

People are not all born with perfect audition and perfect powers of enunciation. These are matters largely of education. Perfection in these two particulars is very rare. In order that two persons pronounce all their words alike they must be of the same race or family and have the same teachers all their lives.

In America, where the most perfect English is said to be spoken, there are great differences in some of the vowel sounds in the different sections of the country. In any neighborhood in the west the same differences may be found according to the section from which the different neighbors came. The state or section from which a man came may usually be determined by his speech.

Without laying claim to perfection myself, but only to show the differences of pronunciation in different parts of the country, I wish to point out discrepancies in the pronunciation of these two gentlemen:

Professor Hinds offers *aa* to represent the sound of *a* in *father*, and then gives as an example, *waaz* for *was*. That will not do. The sound of *a* in *was* is very nearly the sound of *o* in *dog*. It would better be represented *woz*. Again he gives *waac* for *watch*. The vowel sound in that word is identical with the sound of *o* in *not*, and should be represented by *woc* (wotch). Mr. Krafft's representation *wac*, as if to rhyme with *thatch*, is worse yet, and is probably a typographical error. *Laaf* will do for *laugh*, if he likes it; but is it not rather pedantic and affected? Better the sound of *a* in *last*. Let the following nonsense sentence be read aloud and the differences of sound of the vowel *a* noted: "Father laughed hard after Fanny's hairless watch-dog was last granted fat."

Laj in *villaj* will not do. *Villaje* is much pleasanter. The sound of *a* in *village* is as *a* in *mate*, shortened, unaccented, and rendered somewhat obscure, less in time than short *e* in *edge* and less open in quality.

With in Prof. Hinds's extract may be an oversight. *Widh* would be better.

O'r should be *oer*, — long sound of *o*, not short.

Murmur will do; but *yondur, sobur and hurd* will hardly do. They have not the sound of *u* in *up*. *Dher* by Prof. Hinds, in the same line, may do for *their* if the word is not emphatic; otherwise his *dhair* (probably *dhaer* was intended) for *there*, and Dr. Krafft's *thare* for both *there* and *their* would be better. Yonder, sober and herd, ordinary spelling, would be less liable to be mispronounced, considering that *e* followed by *r* differs from *e* in *met*.

Puel, skuel and *lues* are very bad, when *ue* is given to represent *u* in *rule*. Undoubtedly Prof. Hinds meant that *ue* should represent *oo* in *tool*. *U* in *rule* is the same as *u* in *mule*, except that in *mule* a *y* is distinctly sounded before the *u*, and in *rule* the *y* is indistinctly sounded on account of the preceding *r*. *Pool, school* and *loose* are much different from *pule, skule* and *luce*.

U in *playful* should not be sounded as *u* in *up*. It should be as *u* in *pull*. For this sound Professor Hinds proposes *oo*. The notation then should be *plaefool*.

Weind should be *wind* (short sound of *i*). The word does not rhyme with *mind* and should not be so read. The rhymes are allowable, not perfect.

Some words in the extract are lengthened, defeating one of the objects sought, as *waaz, vaekant, konfyuzhun*. Again, dissylables are written with a single vowel, as *sofnd, gabbld*.

Thus all this is designed to show the impracticability of a phonetic system. The one proposed is as good as any. No phonetic system will meet all requirements for the reasons here given: (1) Differences of pronunciation among different people, and (2) defective alphabet, necessitating the use of digraphs to represent some of the simple sounds.

Speaking of digraphs, how can we limit a simple sound to single digraph when our language now furnishes us with such a vast variety of digraphs, trigraphs, and even polygraphs to represent the different sounds? Take, for instance, the sound of *a* in *mate*. We are by no means limited to the twenty combinations presented by Professor Hinds. We must spell plague with *a-ue*. Naas with *aa*, Mælar with *æ*, and Græme with *æ-e*. Mr. Baehr is particular that we shall spell his name with *aeh*; while another Bhaer is equally strenuous that *hae* shall go into his name. Brahe, however, gives the letters another twist (ahe): while Mahlon drops the *e* entirely. *Praise* is stronger than *pain* in having a final *e*; and the Des Plaines River requires a final *es* to complete its orthography. Marais des Cygnes will have *ais*, Aisne *ais* and *e* final, while *chaise* (colloquially "shay") except the deacon's one-hoss one, carries the polygraph *aise*. We must remember to spell Basle with *as-e*, Naix and Morlaix with *aix*, Carhaix with *haix*, La Haye with *haye*, and Aux Cayes (O. K.) with *ayes*.

The Ray family is large and diverse. One branch clings to Rhe, showing *he;* another adds an *a* making it Rhea (*hea*); while a third, the Scotch Rea, omits the *h*. A gentleman of Ireland, who long ago built a castle (Castlereagh) near Lough Neagh (Nay), with his descendants, to this day spell the name Reagh with *eagh*; and a pioneer of the west, Mr. Reaugh (Ray), with probably a still more ancient lineage, delights in *eaugh*. The name of the late governor (Seay) of Oklahoma requires *eay* for its correct make-up; Payne wants *ay-e*, Cheyne *ey-e*, and a certain Swedish American, Hoeland, prefers *oe* in his name. When fully Americanized he will probably be Hayland.

Among words from the French, employé and resumé require an accented *e;* protegée one accented and one plain *e*, and the plural, pronounced similarly, an *s* additional, thus *ees*. Feting requires a plain *e*, crepe two, *e-e*, melee double *ee*, entrees *ees*, orgeat *eat*, entremets *ets*, mobilier *er*, and chef d'œuvre *ef* or *efs*, according to