pounds of powder will be used. The shell will contain from 300 to 400 pounds of nitro-glycerine, enough to blow up any vessel afloat if struck right. The muzzle of the gun will protrude for ten feet under water, and the projectile will be carried from 750 to 1,000 feet. The projectile will extend eight feet beyond the muzzle of the gun before firing. We intend to try the gun for the first time at Newport next July, having obtained from Congress an appropriation for making the tests.

"With a few such vessels as the 'Destroyer' will be when equipped with our gun, the armed fleets of the world could be swept out of existence. I believe that this invention will revolutionize naval gunnery throughout the world. One of our shells can be sent right through the netting and into the side of a vessel, where a torpedo could not penetrate. Commodore Folger of the Ordnance Department has written a letter to me, saying that he has prepared a heavy steel netting for a target, upon which our gun can be tested. Later we shall buy an old hulk and blow it up with one of our percussion shells, to show the efficacy of the new gun.

"I think that if the test proves satisfactory the government will arm some of the naval vessels with it. For the price that one of our big new ships would cost we could build and arm five of the smaller ships, which would be able to sink the best navy afloat. If the nations should arm their navies with these guns, it would so enhance their destructive power that the powers would not dare to go to war with each other. Since ships have been armed with the Hotchkiss rapid-firing guns, there has not been a naval battle. In a sea fight these guns would cause terrible havoc. Vessels of the 'Destroyer' type are to be heavily armored, so that they can approach any vessel without being injured. These vessels will be only a foot out of the water, and that part will be armored, so very little will be exposed to an enemy's guns. One of these vessels, made to steam at great speed, can be made very effective."

Mr. Bushnell was associated with Ericsson in the construction of the "Monitor."

HEALTH MATTERS.

African Arrow Poison.

THE poisons used by the natives of Africa to render fatal the wounds made with their arrows, as described by Mr. Stanley in his recent work on Africa, are, when fresh, of most extraordinary power. Faintness, palpitation of the heart, nausea, pallor, and beads of perspiration break out over the body with extraordinary promptness, and death ensues. One man is said to have died within one minute from a mere pin-hole puncture in the right arm and right breast; another man died within an hour and a quarter after being shot; a woman died during the time that she was carried a distance of a hundred paces; others died in varying spaces of time up to a hundred hours. The activity of the poison seemed to depend on its freshness. The treatment adopted, as we learn from the *Medical and Surgical Reporter*, was to administer an emetic, to suck the wound, syringe it, and inject a strong solution of carbonate of ammonia. This carbonate-of-ammonia injection seems to have proved a wonderful antidote, if it could be administered promptly enough. One of the poisons with which the weapons are smeared is a dark substance like pitch. According to the native women, it is prepared from a local species of arum. Its smell when fresh recalls the old blister plaster. It is strong enough to kill elephants. This poison is not permitted to be prepared in the village. It is manufactured and smeared on the arrows in the bush. These results of the African arrow poison are quite remarkable; but it would be interesting to know if they owe any thing to fear and its effects, or if similar results can be obtained by inoculating the lower animals.

Inoculation of Dog Serum as a Remedy for Tuberculosis.

In a series of communications made in the course of the last two years to the Société de Biologie, MM. Héricourt and Richet have given the results obtained by the injection of the blood of an animal refractory to tuberculosis, such as the dog, into the economy of one susceptible to the onslaughts of the bacillus. They have demonstrated experimentally, according to the *Lancet*, that such a proceeding exerts a retarding influence on the evolution of tuberculosis artificially communicated, without, however, stopping it altogether. With a view of intensifying these partially protective properties of canine blood, they inoculated the dog with a large dose of very active tuberculous matter, and one month later (the animal having lost flesh, and exhibiting manifest signs of ill health) injected into the peritoneal cavity of three rabbits seventy cubic centimetres of the dog's blood. A week later these rabbits were, with three other test-rabbits, inoculated with strong tuberculous virus, with the result that in twenty-five days two of the latter had succumbed, the rest surviving. Their ultimate fate is not recorded. Encouraged by these results, MM. Héricourt and Richet have extended the application of their method to tuberculous human beings, employing the serum only, and selecting the interscapular region as the seat of inoculation. M. Richet reports (Société de Biologie, Jan. 24) that four phthisical men have, since the early part of December, 1890, been subjected to this novel treatment. The results obtained seem to warrant the assumption that the introduction of the serum of dog's blood into the human economy counteracts, to some extent at least, the noxious influence of Koch's bacillus.

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.*

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

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

Can One see the Blood-Corpuscles in his own Eyes?

TO some this may seem an idle question, — an absurdity; but when we remember that the sensitive layer of the retina is on the back side, and that there are blood-vessels in front of it, it may not seem so improbable. Nevertheless, the ease with which it may really be done is quite surprising.

If the eyes are turned toward a dimly lighted blank space, and adjusted to see distant objects, or as when we "gaze on vacancy," there will appear flitting across the illuminated area small bright spots. They will seem to flash into vision, pass over a few degrees, usually in a curved path, then suddenly disappear. The circumstances found favorable for observing this phenomenon are to look toward the sky or a snowy surface on a cloudy day, or on a brighter day with the eyes nearly closed. Seldom more than a dozen of these luminous points may be seen at once, and usually not more than two or three distinctly.

They may be easily distinguished from the tear-drops trickling over the front of the eye, which are often visible at nearly the same time, by their being of uniform size, and moving rapidly in different directions; while the tears are of variable size, like raindrops on a window-pane, and move slowly downward, or by the motion of the eyelids upward.

They are not to be confounded with *muscæ volitantes*, which are of variable shape, size, and color, and, besides, slow of motion, and not so quickly disappearing.

That these minute bodies are really red corpuscles floating through the retinal capillaries, is indicated by the following facts: —

1. They move in definite paths. Having noted one, another will be seen to pass exactly the same path in from half a second to two seconds.

2. They always move in the same direction in the same path, never back and forth.

3. They are of uniform size, and appear to be of a yellowish color.

4. By comparing them with objects of known size at known distances, they have been approximately estimated to correspond in size to red corpuscles. Accurate measurements seem impracticable from the nature of the case.

The reason that they are visible while the capillaries in which they float are not, is easily explained by the familiar principle that we become insensible to that which is constantly present, and are specially impressed by that which is transient or novel. The familiar experiment of Purkinje shows us that the capillaries may become visible when light comes from a novel direction, so

as to throw their shadows on a new portion of the rod-and-cone layer. From the nature of the case, the corpuscles cannot be rendered invisible, like the capillaries.

The phenomena described above were first observed by the writer a dozen years ago; and, though it is probable that others have observed the same, consultation with persons and books that would be likely to furnish the information of such knowledge have shown that these facts are either unknown, or at least not generally known. That the facts here published may be observed by any one seems proved by the fact that they have been corroborated by almost every one who has made the attempt under the writer's direction. J. E. TODD.

Tabor College, Tabor, Io., Feb. 16.

Classification of American Languages.

IN your issue of Feb. 6 appears an article by Major J. W. Powell, chief of the Bureau of Ethnology of the Smithsonian Institution, on the study of what he calls "Indian" languages, with a list of families in the United States.

This article contains statements so much at variance with the leading authorities in linguistic science, that they should not be allowed to pass in silence.

In the first place, the term "Indian languages," applied to those spoken by the native tribes of this continent, is a misnomer based on an ancient blunder, and has been repudiated by all modern writers of weight. The so-called "Indians" are the "American race," and their languages are "American languages," by the common consent of ethnographers. Is the Bureau of Ethnology a sanctuary for the preservation of exploded errors, that it throws its influence into the scale to perpetuate this discarded blunder?

Much of the article alluded to is devoted to explaining and defending the nomenclature adopted by the bureau. In several points it requires still further defence. The arbitrary assumption of the date 1836, anterior to which the "law of priority" is decreed not to hold good, is not justified by the reasons given.

The dictum that "no family name shall be recognized if composed of more than one word," is not merely arbitrary, but has nothing in its favor and much against it. Frequently a class-name compounded of two words is particularly useful, as conveying a much wider idea than a single word. This is fully recognized by the best linguists of the day. Thus, Friedrich Müller employs the terms "Indo-Germanic," "Ural-Altaic," etc. The reasons assigned for rejecting such compounds are quite inadequate, and contrary to the practice of the highest authorities.

The adoption of the termination *an* or *ian* to denote families or stocks of languages is not original with our Bureau of Ethnology, though the article might lead the reader to suppose it a new device. Some writers adopted it long before the bureau was organized, but the plan did not meet with general approval. The cacophony of such words as "Eskimauan," "Muskhogean," etc., in Major Powell's list is apparent to every one who has not had the advantage of that training by the bureau to which he refers with pride as destroying all sense of euphony.

But the portion of the article in question which will most completely "knock the wind" out of those old-fogy linguists in Europe, and those in our own country who have been reared on Aryan and Semitic tongues, is Major Powell's declaration that "grammatic similarities are not supposed to furnish evidence of cognation;" that in his classification grammatic structure has been neglected, and lexical elements only considered.

Now, if it were said that in most instances we are obliged to depend on lexical elements because the grammatic structure has not been ascertained, the position would be sound and in accord with the recognized principles of the science of language; but to place the words of a tongue above its grammar in instituting comparisons is a feat of such daring or of such ignorance, that it requires a man long accustomed to frontier life to venture it. If there is any one principle in modern linguistics which we may look upon as thoroughly established, it is that the grammatic framework of a language is incomparably more stable than its lexicon. If there has ever been an instance where a language of agglutination has changed into one of inflection, it is not recorded "in the books." It is precisely the grammar which is the permanent part of a language, and not its vocabulary. Modern Turkish has borrowed three-fourths of its words from Arabic, Greek, Persian, etc.; but its grammar remains almost precisely that of the pure stock, the Yakut of the delta of the Lena. This principle is as true of American tongues as of others, and the evidence of it has been abundantly set forth by Friedrich Müller and Lucien Adam. D. G. BRINTON, M.D.

Philadelphia, Penn., Feb. 20.

The Food of Moles.

IT is stated in the "Encyclopædia Britannica" that moles are entirely carnivorous, are exceedingly rapacious, and will die if left longer than eight or ten hours without food. I recently kept a living mole for a time to study its habits. I shut it in a ventilated wooden box, giving it a tin lid full of water, and some grains of corn. It drank the water, refused the corn, and, while kept strictly in the dark, was quiet. After twelve hours' captivity I offered it boiled rice, which it refused. After sixteen hours' fasting, it ate bread and milk, though not freely. When I had had it twenty hours, I gave it cracked oats, soaked well in milk, but uncooked. This it ate ravenously. I then released it in the room, and it travelled about, seeking a place to burrow, and made itself troublesome tearing at the carpet and upholstery. I threw down a large thick woollen mitten, which it speedily found and entered, thrusting its head into the thumb. If undisturbed, it would hide in this way for hours, the light and warmth of the room seeming greatly to annoy it. It lived in the mitten for three days, coming out to eat oats soaked in milk, but refusing cooked oats. It was given one small meal of raw meat. At the end of four days it was killed, being apparently in a healthy condition, and not having lost any flesh.

JULIA MCNAIR WRIGHT.

Fulton, Mo., Feb. 20.

Cold and Warm Waves.

TWO rival theories have been propounded recently regarding the origin of the waves or masses of cold air which appear to traverse the country toward the east. One of these finds the source of cold in the upper regions of the atmosphere, and considers that the cold air above mixes with that below, and thus gradually approaches the earth's surface. Those supporting the other theory, however, deny that any considerable cold can be brought down in this way, because the compression to which the air would be subjected would heat it, but they claim that the cold is due to the radiation of heat through the very clear sky which is a well-nigh invariable accompaniment. Without expecting to establish the exact truth in this matter, it has yet seemed a subject of much importance; and it may be well, at this stage in the discussion, to set forth a few facts that may be of use in the final solution of the problem.

Those who have been making forecasts of the weather have recognized for more than a dozen years three great classes of temperature falls: 1. Those which come with the advance of areas of high pressure; 2. Those which follow immediately in the rear of great storms independently of any high area; 3. Those which occur under a combination of these two causes. It should be noted that the first two classes do not invariably occur even when the conditions seem favorable, and great care is needed in examining other conditions, which, though apparently remote, may yet become exceedingly important factors in the development of the cold wave. The occurrence of the cold is independent of the wind, though the extent of the wave is markedly dependent on the rapidity of its advance, and a rapid motion has a tendency to increase the wind. Some have thought that the wind brings the cold; but this cannot be the case, for often there is no wind, or at least it rarely attains fifteen miles per hour, while the cold wave advances at double that velocity. One of the essential conditions needed for a cold wave is an elimination of the moisture in the air, and this removal of moisture is oftentimes very remarkable. In one case three-fourths of this moisture was removed in 110