of similar implements does not serve the purpose of ethnological collections. From a collection of string instruments, flutes, or drums of 'savage' tribes and the modern orchestra, we cannot derive any conclusion but that similar means have been applied by all peoples to make music. The character of their music, the only object worth studying, which determines the form of the instruments, cannot be understood from the single instrument, but requires a complete collection of the single tribe. Here, however, it can be seen that each ethnological collection affords only very fragmentary instruction; that its real use is only to illustrate descriptions of the tribes. For a study of native art and its development, they are indispensable. For this purpose, duplicates, of which the superficial visitor of ethnological museums frequently complains, are absolutely necessary. They are the only means of determining what is characteristic of a tribe, and what is merely incidental.

Mason's method takes a place in ethnology similar to the former 'comparing method' in geography. A mere comparison of forms cannot lead to useful results, though it may be a successful method of *finding* problems that will further the progress of science. The thorough study must refer to the history and development of the individual form, and hence proceed to more general phenomena.

DR. FRANZ BOAS.

New York, May 13.

Explosions in coal-mines.

In *Science* for May 6, is a review of the report of the Atkinsons on explosions in coal-mines. One or two statements therein seem to convey an erroneous impression; notably, "At the working faces the dust is not often a serious evil," and, under remedial measures, that "watering the roadways . . . is of little avail as a means of preventing explosions, since the upper dust in every instance is left undisturbed."

The first quotation is manifestly an error, as dust-explosions can generally be traced to the firing of the dust in the working faces by blown-out shots, especially when such shots react against a tamping of coal-slack. In the main body of the article the argument seems to be in favor of the dust in the gangways as the proximate cause of explosion, while it is but the ultimate cause. The dust formed by cutting or breaking down coal has very little to do with the formation of an explosive mixture, because it is not impalpable enough. As the article states, the gangway dust is ground to an impalpable powder, and carried away by the air; but such dust would do little harm, did the return currents through the working places not lose their velocity and deposit this impalpable dust on the walls nearest the face, from the fact that the ventilating currents must sweep the faces free from smoke and foul air. In the only known American accident due to dust (the Pocahontas explosion), there was little evidence of initial explosive force along the gangways, but in the headings of dusty rooms there occurred a series of explosions that made the fact evident that fine dust in headings is the cause of so many accidents.

The Prussian commission showed that a certain percentage of volatile matter was necessary for an explosive dust, and experiments made at this place show that the temperature at which coals give up their volatile ingredients vary; so that a blown-out shot, from a hole tamped with coal slack, projected into a chamber whose walls are thickly powdered with fine dust, will have its flame prolonged by the dust of the tamping and the gases from that dust, and the case will be analogous to those stated by Professor Abel, where a small admixture of gas would render inert dusts explosive.

Finally, it has been found that watering dusty roads with brine at intervals of thirty days made the dusts less ready to rise in clouds, and stopped the formation of 'upper dust.' But the best way of all is to keep the roads clean by ballasting them at the outset with rock or shale free from carbon, and by picking off the coal shaken from cars. In the Pocahontas accident the explosive phenomena ceased as soon as the current left the region where the roads were ballasted with coal-slack, and the action in the parts ballasted with slate was a simple burning of the dust brought there by the current. In spite of an explosive coal, the parts of that mine last mentioned were comparatively free from dust, and the props nearly all standing, while in the former portion there was explosive action in nearly every working place, so that the tracks were torn to pieces and the props down. In mines of this nature, black powder should be avoided, and the coal should be wedged, or, if the coal must be shattered, the dynamite cartridge with water casing can be used with impunity.

EDWARD H. WILLIAMS, JR.

Lehigh univ., May 13.

Water-filtration.

It may be of interest to notice in connection with your note on the results of Dr. Swarts's experiments on the relation of water-filtration to bacterial development, that Dr. J. H. M. Munro, in his experiments on the nitrification of well-waters, discovered and called attention to the fact that a well-water nitrified more rapidly after filtration through a Lipscombe's charcoal filter in common use, than did an unfiltered sample of the same water (*Journ. chem. soc.*, 1886, p. 666).

WILLIAM FREAR.

State college, Penn., May 16.

The fact that an increase of micro-organisms would take place in a filter constantly in use, had already been demonstrated by Percy Frankland, England, and by several German investigators.

The series of experiments conducted by myself differed from theirs merely in using the filters found upon the local market, and in imitating as near as possible their use in ordinary family water-supply; cleansing in the first use by allowing the supply to pass through the filter to wash away detritus, and not by absolute sterilization, as in usual laboratory experiments. The filters used were variously packed with bone or animal charcoal, quartz, the two combined in layers, felt, and unglazed porcelain.

Such a result as that spoken of in *Science* (ix. p. 457) is to be expected, when we consider the mechanical work we have to do in filtration; for no amount of chemical change is expected except in Clarke's process, which is precipitation, not filtration. If the filter is a successful strainer, the suspended matters within the water are held back upon the surface of the strainer *and within* the interstices of the filtering media, whether it be gauze, asbestos, iron shavings, felt, or porcelain. The great mistake seems to be in believing, that by use of a current of water, or by removing the media and scrubbing the surface with a brush, all the filtrate is removed, for-

getting the amount held within the interstices of the media.

In those filters in which the mechanism or media is reversed for cleansing, the organic matter upon which the microbes are feeding and multiplying, and which has become attached to the walls of the spaces of the filtering media, are not removed, any more than the greenish scum is removed from the stones in a rapidly flowing brook: on the contrary, so tenacious is this material, that it forms in strings and streamers pointing with the current.

As is well known, commencing at the set bowl in a dwelling-house, a deposit forms upon the sides of the waste-pipe, continues downward, adhering to the sides of the trap and continuing to the drain-pipe and sewer, till it reaches the point of delivery. This deposit is, of course, composed of the wastes which have been thrown into the bowl, and which is fully charged with organisms whose function is to destroy and assist in nature's retrograde metamorphosis. The strongest flushing of this pipe does not remove the slime from its sides: how, then, can a retarded pressure of water wash away the organic matter adhering to the sides of our meshes of felt and our granules of quartz and charcoal?

The number of microbes in a given sample of water serving to render it harmful, has not been actually determined, any more than a specimen can be condemned for the amount of albuminoid, ammonia, or chlorine alone which it contains; still a water containing over a thousand microbes or colonies to the cubic centimetre of water is the highest limit consistent with purity in drinking-water. A water which contains fifty bacteria to the cubic centimetre before filtration will increase to over a thousand in seven days' use, no matter how much care is taken to cleanse the filter short of absolute sterilization.

The point of danger, however, lies in the fact that the two diseases which are communicable by ingestion into the alimentary canal of the excrement from them (typhoid-fever and cholera) are the ones which are liable to find their way into drinking-water from contamination by sewage finding its way into river and well supplies.

I am at present conducting experiments to determine how rapidly the germs of typhoid may increase within filters in the presence of sterilized water and in presence of the bacteria of drinking-water.

GARDNER T. SWARTS.

An American dialect society.

Is it possible to establish such an institution? It is certainly time. Year after year the older districts of the United States and Canada are getting less and less distinguished by those peculiarities in their vernacular which to the student of history and philology are of the utmost interest. Public schools, many newspapers, cheap books, a taste for reading, a notion that 'old-time' ways and dialect are not 'elegant,' and, above all, the more constant communication between different parts of the country, are doing much to tone down the people of the United States to what, from the philologist's point of view, is one dead level. In time the mountaineers of Tennessee and the hill country of the Carolinas, the 'crackers' of Georgia, and the picturesquely talking folk of the Arkansas bottoms and the lower Mississippi, will have lost many of their present peculiarities of speech. Even the New-Englanders, I am told (for I have not lived in America for more than twenty years), are fast abandoning many of those dialectic peculiarities which to a philologist are so suggestive. Even the Virginians, since they have gone into the great world, are no longer so readily 'berayed' by their speech. Now, therefore, is the time to collect vocabularies of these local dialects, with specimens gleaned from printed works illustrating the use of any particular word. Books, almanacs, election-addresses, and a host of similar ephemeral literature, might be gathered and deposited in the national library. Mr. Cable, by his novels, has done much to preserve the quaint Creole Louisianian speech; Mr. Johnston has in the same way done as much for the Georgian dialect; Miss Murfree for the Tennessee mountaineers; Mr. Page for the Virginians; a host of writers, *imprimis* Mr. Lowell, for the New-Englanders; and, not to go over the long roll of writers in American dialects, Mr. Harris has shown us what a wealth of folk-lore and folk-speech there is to be garnered among the southern negroes. But the next generation will have no such easy task as the present one. Even in slow-going England the Folk-lore society and the English dialect society came quite late enough into the field, and found that in a few years more the school boards and the desire to be 'genteel' would have effectually effaced those old-world differences of tongue which even in 1598, when Puttenham was writing his 'Arte of English poesie,' had begun to be blurred. Already many a precious relic of the past has been forever lost, and we can only be thankful that so much has been preserved. In America — I speak, of course, of the old colonial sections — there still linger peculiarities, and even bits of folk-lore, which have vanished out of the districts in the mother-countries from which the immigrants came. Now, therefore, is the time for snatching up what still remains, and I question whether there are not in the United States and in lower Canada quite as many dialects as there are in England. The 'Pennsylvania Dutchman' has even yet peculiarities in speech easily detected by those who know them, and there is scarcely an old state of the Union of which the same could not be said.

R. B.

Streatham, London, Eng., April 30.

Geography-teaching.

The article by Inspector Jolly, on 'Realistic and dramatic methods in teaching geography,' to which you refer in your number of May 12, is without doubt a clear and full statement of the various points of weakness in such work, and of the remedies to be applied.

He urges a greater use of material and a more rational and scientific method. On these two points hangs the whole matter. Every one who has ever taught geography knows that nothing can be done without an abundance of aids in the way of objects, pictures, models, globes, maps, etc.; and every one who has taught in the United States knows that objects, pictures, models, globes, and good maps are there very, very few.

A full assortment is not found in one single school; a good assortment, only in a small number, where men of wide views have had charge. There are two reasons for this condition of things, — one, that few schools take enough interest in the subject to procure what material can easily be had; the other,