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-