

*protomaba* were seen, varying in form, and creeping with moderately rapid, slug-like movements. They contained no nucleus, and presented only a few granules in their interior. In the same drop of fluid, and also in others subsequently examined, more than a dozen very active *monads*, one four-thousandth of an inch in diameter, were seen, each provided with a long rapidly moving lash by which neighboring granules were freely knocked about. There were many smaller motionless and tailless spherules of different sizes, whose body substance presented a similar appearance to that of the monads, of which, in Dr. Bastian's opinion, they were in all probability earlier developmental forms. There were also several unjointed bacteria, presenting most rapid progressive movements, accompanied by quick axial rotations. Many torula corpuscles and other fungus spores, also existed, as well as portions of a mycelial filament, containing equal segments of colorless protoplasm within its thin investing membrane.

Until the panspermatists offset these experiments by an exhaustive series, showing that living forms do not originate under the conditions described by Dr. Bastian, there would seem to be but one escape for them, and that is to assert (contrary to all experience) that the temperature of 230° Fah., or even 275° Fah., is lower than the thermal death point of the invisible germs of these simple organisms.

#### MICA MINES IN NORTH CAROLINA.

Among the most interesting relics thus far discovered of the mysterious race of mound builders, who occupied the Mississippi valley previous to the advent of the more barbarous Indians, are numerous ornaments of mica. Like the weapons of hammered copper from Lake Superior, the shells from the Gulf of Mexico, the implements of Mexican stone and of iron ore from Missouri, these plates, of a mineral not found in the Great Valley, give a plain hint of the extensive commercial relations of those prehistoric people.

The mica was evidently mined in Western North Carolina where their long-abandoned workings have lately been reopened, and made the scene of a very modern enterprise.

Seven years or so ago, a prominent citizen of North Carolina set some laborers to work in one of the ancient mines, in search of silver, supposing that metal to have been the one sought for by the original miners. A considerable quantity of mica was thrown out, but its value was not recognized until a sample, which had been sent to Knoxville as a curiosity, was seen by a Mr. Clapp, who followed up the clue and leased the mine for its mica, and revived an industry which has added immensely to the wealth of the region. The mine is known as Blaylock's, about twelve miles from Bakersville, the county seat of Mitchell's county. Four or five other ancient mines have since been reopened in the same neighborhood, besides many new ones in the same and adjoining counties.

A correspondent of the *Tribune* reports that the mica trade has given general occupation to the population of Mitchell county, and has made money plentiful and thereby enabled the county to pay off its indebtedness, which it would otherwise have been unable to do. Mines have also been opened in Yancy, Heywood, Burcome, McDowell, and other counties. The business is still in its infancy, and the methods of mining are exceedingly primitive; yet the amount of mica produced is more than enough to supply the large and growing demand for the article. Dealers and manufacturers supply the mines with patterns ranging in size from two by three inches up to fifteen inches square, according to which the mica is prepared for market. The dark or brandy-colored mica brings the best price. Associated with the mica is an abundance of decomposed snow-white felspar, which will no doubt be utilized, in time, for the manufacture of porcelain.

#### TYNDALL ON TYPHOID.

Professor Tyndall has dropped for the nonce the role of physicist for that of physician, and deals, in a recent publication, with the subject of typhoid fever, discussing the important question as to whether that disease can ever have a spontaneous origin from fecal fermentation or must of necessity always spring from a germ, the last derived from a pre-existing case of fever. Following closely the data obtained by Dr. Budd, as well as those of other investigators in the same field, Professor Tyndall asserts positively that the weight of evidence is in favor of the view that the disease, like small pox, arises wholly from contagion. He holds that the body is the seat of the development of the germ, and that the latter is not originated from noxious effluvia, however foul; and in support of this, he cites the fact that, during the foul condition of the Thames in 1858, the community residing upon the banks enjoyed a singular immunity from fever. Even in rural districts, it is asserted that, where the air is purest, typhoid has been known to rage, and to be traceable directly to personal communication.

It would not be expected that so radical a denial of generally accepted views could be promulgated without arousing challenge from the medical profession, and already several of the most eminent English physicians have adduced strong evidence in contradiction of Professor Tyndall's assumptions. Dr. Alfred Carpenter states that typhoid is contagious only in a limited degree, and that by proper precautions its attack may be prevented. Dr. Murchison says that, during nine years, in the London Fever Hospital, 3,555 cases of enteric fever were treated in the same wards with 5,144 patients not suffering from any specific fever. Not one of the latter contracted enteric fever, although the use of disinfectants was exceptional, and they were brought in contact with the excreta of the former class. The same authority gives repeated instances, occurring in his own practice, confirming the opposite of Professor Tyndall's conclusions.

So many cases have occurred, where the existence of typhoid has been traced directly to sewers, foul drains, and similar receptacles of filth, that arguments far more cogent than those of Professor Tyndall will be required to convince us that no danger of pestilence lurks therein. Add to this that it has been repeatedly shown that hospital attendants in personal communication with typhoid patients are remarkably exempt from the disease, and without further review of the great mass of confirmatory evidence brought by medical writers against Tyndall's theory, we cannot but conclude with the *London Medical Journal* that the Professor has in this case, as was charged against him in his recent researches on sound, studied but one side of the question.

It may be well to remark in this connection that Professor Tyndall's most recent efforts are not wholly bearing out the reputation for scientific acuteness and philosophical caution so ably won by him in his earlier labors.

Dr. Lionel Beale—himself a scientist of no inconsiderable celebrity—makes a strong point against Tyndall in a recent communication to the *London Times*, in stating that, though he has followed Tyndall's track for years, he is unable to comprehend Tyndall's course of reasoning. Referring to the latter's Belfast speech, in which the speaker said that the material ideas were not his belief "in hours of clearness and vigor," Dr. Beale rather pertinently suggests the question of which Tyndall we are to believe, Tyndall whose brain, when weak and unhealthy, produces materialistic theories, or Tyndall, when clear and vigorous, repudiating the same ideas? Altogether the eminent Professor has latterly contrived to encircle himself in a kind of fog as to his doings and sayings, which prevents people of ordinary discernment from relying so implicitly on his conclusions as they otherwise might.

#### HOW TO INVESTIGATE SPIRITUALISM.

There has been lately an extraordinary revival of spiritualism, and it again challenges the general attention. Nearly all the newspapers, and some of the most respected of the literary magazines, without reservation or protest lend their columns to its advocates. The *Daily Graphic* for more than a month has made spiritualism its specialty, pursuing it with such pertinacious enterprise as it did the Atlantic balloon project of last year. And, most significant of all, many distinguished scholars and clergymen, to whom the *Graphic* had addressed a circular letter, inviting their cooperation in an investigation, signify their approval of the *Graphic's* plan and a profoundly respectful appreciation of the spiritualistic pretensions. This revival of spiritualism is probably due to the new phase which the spiritual manifestations have taken on: Materialization. In place of raps, tips, trumpet blowing, tying, levitations, ponderations, etc., performed by or through the medium, we now have the spirits appearing *in propria persona*, with bodies apparently of flesh and blood, and nicely dressed in such clothes as they wore when they dwelt in the mortal coil.

Now these things seem to justify us in recurring to the subject of spiritualism, and in improving the opportunity to point out some things which Science has to do with it. And to make the matter short, we will limit our remarks to the alleged physical phenomena, the movements or changes of matter. We leave out of view, of course, the religious aspects of spiritualism; and for its bearings on psychology and physiology, we refer to what Faraday, Carpenter, Tyndall, and others have written. We point out, however, the evident fact that spiritualism rests on the physical manifestations. Take them away, and its bottom is knocked out pretty clean.

In the first place, then, we can find no words wherewith to adequately express our sense of the magnitude of its importance to Science if it be true. Such words as profound, vast, stupendous, would need to be strengthened a thousandfold to be fitted for such a use. If true, it will become the one grand event of the world's history; it will give an imperishable luster of glory to the nineteenth century. Its discoverer will have no rival in renown, and his name will be written high above any other. For spiritualism involves a stultification of what are considered the most certain and fundamental conclusions of Science. It denies the conservation of matter and force; it demands a reconstruction of our chemistry and physics, and even our mathematics. It professes to create matter and force out of nothing, and to annihilate them when created. If the pretensions of spiritualism have a rational foundation, no more important work has been offered to men of Science than their verification. A realization of the dreams of the *châir vite*, the philosopher's stone, and the perpetual motion is of less importance to mankind than the verification of spiritualism.

But some may say that we exaggerate the pretensions of spiritualism, and that spiritualists, in the ratio of their intelligence, make claims which are modest and moderate; and perhaps the average man says that, although a great part of spiritualism is deception and imposture, yet there is something about it which is new and true. To such we say that if there is any truth in it, of interest to Science, however small, it is worth while to seek for it with great diligence and labor; its discovery will surely bring an abundant reward. If we positively knew that there was contained in spiritualism a scintilla of new fact about matter, though it were as the needle in all the haystacks or as the grain in all the sands of the sea, we would not discourage the ambitious man of Science in his search for it. Mr. Crookes, as the discoverer of thallium, has achieved a great eminence in Science, and he is now nobly employing his talent in the investigation of spiritualism, if he find in it, positively, something new to Science. He does not need to be told that, if he really discovers his psychic force or any other unknown force capable of acting on matter, all the future ages will name him with Galvani and Newton. Finally, say we emphatically, if there be truth in spiritualism, in whole or in any part, let it be investigated. But con-

cerning such investigations, in view of very serious harm which heretofore has often been caused by shallow and superficial dallyings with the subject, we thoughtfully and solemnly advise that no investigation is worthy of the name unless it is inspired by the passionless common sense of Science. Also remember this: The evidence required to establish a fact is proportioned to the improbability of the fact.

We come now to what with many readers will be reckoned the gist of the whole matter: How to investigate spiritualism. We name the plan which we are to propose, the scientific method of investigating spiritualism, and we thus name it, while feeling the most exalted respect for Science and knowing that some will discover in it only what they call horse sense.

These two theories, and these only, are tenable regarding most of the spiritual manifestations: They are real, and true, and honest, or they are a culpable fraud. The mediums in these cases are either the most worship-worthy of mortals, or they are cheats and liars. The raps and the materialization, the first and the last of the spirit exhibits, are surely of the sort in question. (And here we venture to suggest that if we take away from spiritualism all the alleged phenomena which belong to the same category, almost nothing is left.) Concerning raps and materializations, there is a question of fraud or no fraud; and this is a question of such a fundamental character that the answer to it is conclusive of the whole matter. It may seem to some that the case ought to be referred to the police detective rather than to the man of Science; and we are obliged to confess that a detective's advice may be as good as ours. The methods of Science are direct, logical, and on the shortest path to the truth; the man of Science always aims at the bull's eye. The method of the skilled and intelligent detective is, without doubt, identical with the scientific. Cases somewhat similar to that of the fraud or no fraud of raps and materializations have often come up for decision; an allusion to some of these throws a clear light on the present discussion. Our ancestors believed in ghosts, and they fired stones and bullets to test their faith. The proceeding was scientific, but suited only to an age ruder than ours. We warn the over-zealous scientist that, although a bullet could not harm a materialized spirit, no medium or his confederate is bullet-proof. An action for murder or manslaughter would probably lie in a case wherein any one was killed in a scientific investigation of materialization. The well known story of Fulton investigating the motive power of a perpetual motion by means of a hatchet is a fine illustration of the application of the principles of Science. Lamp-black, printer's ink, and green paint have been slyly smeared on the trumpets, ropes, etc., of the dark *séance*, and the truth was speedily declared in the unconscious ornamentation of the medium's lips or hands. And, best of all, strong lights have been turned on to the supposed spirits performing tomfooleries, and it was instantly manifest whether they were genuine or not. In all these cases it was a touch and a go, and the truth declared itself beyond any man's cavil. Devices which were so simple, and yet so sufficient, were surely scientific, and they indicate, and perhaps sufficiently describe, our notion of scientific investigation of one class of spiritual manifestations. But we add a few hints especially touching the investigation of materializations. Let the tests be applied directly, if possible, to the materialized spirit, with the intent to determine who or what it is. A dark lantern, or some other appliance for turning on light, is likely to be useful. A lasso would be very serviceable in the hands of one skilled in its use; it is said the Mexicans can lasso anything that runs or stands. A little squirt gun loaded with a few ounces of ink, or even the boy's blow-gun charged with Scotch snuff, might be available in eliciting truth where more pretentious instruments would fail. If the investigator, from doubts of his skill or other reasons, prefers to discard all the apparatus and appliances of art, let him, in the non-resisting spirit of a Quaker and in the name of Science, suddenly lay a strong and firm hand on the dress or the body of the spirit, and hang on like a Tartar till the whole truth comes to relieve him.

We repeat: Our scientific plan is simple, direct, conclusive. We commend it to Mr. Crookes and Colonel Olcott, and especially to all those who are in the road which leads to a faith which has lost its senses and is idiotic. To us, the Eddy materializations are supremely puerile and silly; they cannot appear differently until a scientific demonstration has shown that they are not the chicanery of the practised and disreputable Eddy family. But the peace of society is disturbed, and something must be done for quiet, or many good friends will get to Bedlam. We earnestly hope that a scientific investigation of materialization will be made speedily; the investigator will receive our most cordial thanks. We have no hope of any good to come out of the class of spiritual manifestations which we have been considering. It is a notable fact that investigations so far have elicited absolutely nothing which was of moment to physical Science. Spiritualism has furnished striking illustrations to the expounders of mental pathology, but to the humanitarian it has seemed a terrible epidemic. In future times, it will probably be considered the blot and the shame of the nineteenth century.

AMERICAN apples, says the *London Grocer*, are now selling at moderate rates in provincial towns, both in England and Ireland. The highly colored and well flavored Baldwin is the commonest kind as yet. As usual, they come in barrels, without any kind of packing materials, and come, as a rule, in excellent condition. That apples should be sent several thousand miles, and then be sold as cheaply as home-grown fruit, is a noteworthy fact. At this rate of progress, fruitless and cold regions will soon be supplied with the finest fruits at a cost that places them within the reach of all classes.