precipitate when treated with the iodo-hydrargyrate of potassium; the unsatisfactory character of this test, however, arises from the fact that it does sometimes cause a distinct yellowish-white precipitate in the dhatoora solution. I have frequently observed that if this re-agent be applied *immediately* after the residue of the etherial solution has been dissolved in acidulated water, a precipitate will be formed; while, if the same solution is allowed to stand a few hours, it no longer gives a precipitate with the re-agent, though it still retains the power of dilating the pupil. The same re-agent always produces a similar yellowish-white precipitate in solutions prepared from extract of belladonna; it also always produces a more abundant cream-coloured curdy precipitate in solutions prepared from aconite. It has been said that these several precipitates may be distinguished from each other under the microscope. I have been unable to confirm this statement: the test tubes containing the several precipitates, after being allowed to stand for twenty-four hours, present different appearances to the naked eye, but when a little of the precipitate is examined under a magnifying power of about 200 diameters, it appears to be resolvable, in each case, into minute, transparent, spherical granules, remarkably uniform in size, but more or less aggregated, in proportion to the amount of precipitate present. To the naked eye, the precipitate, in the case of aconite, appears as a flocculent cream-coloured curdy mass, gently floating in the lower portions of the liquid; in the case of dhatoora and belladonna, the smaller quantity of precipitate not only subsides entirely, but also becomes adherent to the bottom of the tube, and has a rather bright yellow colour when looked at from below.

If a solution of sulphate of daturia, in the proportion of one grain to an ounce of water, is treated with the same re-agent, the precipitate formed presents precisely the same appearances to the naked eye; but when examined microscopically, a number of bright-yellow scaphoid crystals will be seen lying in the midst of the spherical granules. If similar crystals could be obtained from small quantities of dhatoora seeds or belladonna, treated as above described, this would be sufficiently characteristic to distinguish them from aconite in any case which would occur in practice. I have, however, only been able to obtain them when the pure alkaloid itself was used.

The next test which has been described as capable of distinguishing atropia or daturia from aconitia, is boiling sulphuric acid. This is said to produce a brown colour and suffocating fumes with aconite, while with atropia it gives rise to a pink colour and a sweet odour. In the minute portions which have to be operated upon in actual practice, I am afraid this test would not afford much help where any doubt previously existed; the presence of any organic matter will give rise to a "dark-brownish colour," and fatty matters will cause "suffocating fumes." More stress has however, been laid on the usefulness of bichloride of platinum to distinguish between solutions containing aconite and atropia. A chemist and toxicologist of such experience as Professor W. Herepath appears to state in a contribution to No. 3, Vol. VII of the *Pharmaceutical Journal*, that solutions of atropia may be distinguished from those of aconite by the chloride of platinum; this re-agent causing a precipitate when atropia is present, but none with aconite. Again, in a little book lately published as "The Toxicologist's Guide," I find that the non-precipitation by chloride of platinum, when added to a solution of an alkaloid, is considered to be characteristic of aconite. If these statements could be confirmed in actual practice, this re-agent would afford a very valuable aid in the cases of poisoning under consideration. I am, however, obliged to consider this test as utterly useless and unreliable, as will be presently shown. In the meantime, I would beg to state distinctly that I do not desire to throw any doubt on the accuracy of the above named observers, nor can I admit that my own observations are wanting in accuracy, because the results do not correspond with those recorded by men of acknowledged great experience. The fact is that the alkaloids are complex bodies, which are liable to undergo great and rapid changes; it appears probable from analogy, and also from experience, that their chemical properties may vary considerably within certain limits, while their physiological action remains unaltered. This is probable from analogy with the allotropic conditions of non-metallic elements, and with the homologous forms of narcotine which have been investigated; it is further probable from the experience related above, *viz.*, that a solution prepared by Stas' process from dhatoora seeds will sometimes yield a precipitate with iodo-hydrargyrate of potassium, while at other times it will not, both solutions being equally capable of causing dilatation of the pupil. If this hypothesis is accepted, until proved or disproved by the advance of our knowledge of the chemistry of the alkaloids, it will explain why such observers as Herepath and Grove should have stated in the pages of the same journal, the one that aconitia *is*, and the other that it *is not*, precipitated by chloride of platinum. I have before me records of nine applications of this re-agent to solutions of aconite and atropia prepared and tested physiologically as above described; the results in each case are tabulated below:

Action of Solution of Bichloride of Platinum on Solutions of Dhatooria or Atropia and Aconitia.

	Solution of Aconitia.	Solution of atropia.
1.	Whitish precipitate.	No change.
2.	Dark purple colour, but no precipitate	Milky precipitate.
3.	Ditto ditto	Ditto ditto.
4.	No alteration of colour; flocculent precipitate.	Cloudy-whitish.
5.	No colour; no precipitate.	No change.
6.	No colour; precipitate after eight hours.	No change.
7.	No change.	No change.
8.	Precipitate after standing twenty hours.	Cloudy.
9.	No colour; no precipitate.	No change.

The chloride of gold test has appeared to me still more variable and uncertain in its action. The tannic acid test is perhaps more useful, though still unreliable, as it precipitates both aconitia and atropia, the precipitate in solutions of aconitia of similar strength is, however, more abundant than that produced by this re-agent in solutions of atropia.

ANIMAL RADIATION.

ROUGH NOTES ON NO. 1 OF DR. BONAVIA'S "CONTRIBUTIONS TO THE CHOLERA LITERATURE," IN THE "INDIAN MEDICAL GAZETTE" OF LAST MONTH.

By ROBERT HARVEY, M.B.,
Assistant-Surgeon, Bengal Army.

Quid levius plumâ? Pulvis. Quid pulvere? Ventus. Quid vento? Mulier. Quid muliere?—

"*Nihil*," answers spiteful Catullus,* though we do not believe him. "Æther," we can fancy to be the reply of Dr. Bonavia—"Æther, levissima, tenuissima, intangabilis, universalis."

We must admit him to be right. Intangible, imponderable, invisible, and wholly *subjective* as it is, facts which cannot well be gainsaid, point to its existence. Of itself—its nature and properties—we know nothing; nothing, that is, save that by it, and through it, the radiation waves of heat and light are transmitted to the earth from the heavenly bodies. Whether the power, apparently claimed for it by Dr. Bonavia, of taking

Where?—Ed., I. M. G.

the place usually assigned to the air, and transmitting the waves of light and sound and atomic motion over the surface of the earth, really belongs to it, is another matter. We are not aware that it has yet been proved.

Admitting, however, for the sake of argument, that it *is*—this ether—the real transmitter of vibrations over the earth, and admitting too the existence of an inter-atomic motion, let us try to examine Dr. Bonavia's hypothesis of animal radiation by the light of his own data, and see whether he has failed, and if so, in what and how he has failed, in substantiating his theory by the examples he has adduced in support of it.

A careful examination of Dr. Bonavia's paper has given us the following ideas of his beliefs. *First*, that in nature,—spread universally over space and matter, and penetrating deeply into the substance of all matter (so deeply indeed, as to find its way between the ultimate molecules of every body, molecules so infinitesimal that neither themselves nor the spaces between them are visible to the highest powers of the best microscope), there is a subtle and imperceptible essence or ether, known only by its effects, and capable of transmitting vibration originated by the movements of the molecules aforesaid. *Secondly*, that between the ultimate atoms of all organized or unorganized matter, certain inter-atomic movements may take place, and are in fact constantly taking place, and communicating vibrations to the surrounding ether. *Thirdly*, that on the force and intensity of the inter-atomic movements depend the force and volume of the vibratory waves, and the distance to which they are carried. *Fourthly*, that the *idiosyncratic* character of a given individual depends in a great measure on the general character of the inter-molecular movements of his nervous system, changing though these movements constantly are, and expressing as they do, according to Dr. Bonavia himself, the totality of the conditions under which the individual is living at the moment. *Fifthly*, that the inter-atomic movements of one person may, and do, by continual percussion and re-percussion of their etherial waves, bring the inter-atomic movements of a second person into synchronous unity with themselves. *Sixthly*, that where such synchronism is established, the waves evolved by the atomic motions of the first person acquire a greatly increased power of transmission to the second, a power which, if the cases he cites are to the point, is practically unlimited by space or distance. And upon these suppositions, and these data, he seeks in the present paper to explain various strange physical and mental phenomena which, as he asserts, are unexplainable upon other grounds; and indicates that in continuing the series, he will bring the hypothesis to bear upon the diffusion and spread of diseases, and especially of cholera.

Such we gather to be Dr. Bonavia's views crudely expressed; and since he asks any one to *criticise fairly* the statements he has put forward, we shall endeavour to do so: premising, however, that we cannot accede to his conclusions, and that, *quoad* conclusions, we consider his whole hypothesis of animal radiation untenable and unsound.

Admitting, as we said before, the existence of a universal ether, and the possibility of its transmitting motive waves communicated to it in all directions; and admitting that motion is possible between the ultimate atoms of any given body, and that this motion may be communicated to ether and spread by it, let us pause for a moment to see where these admissions land us. In acknowledging the transmission of vibrations from molecules to ether, we must acknowledge *the universality* of these movements. Everything in nature is constantly originating them. Not only the nervous system of man, not only the light and heat, ever changing, on the surface of the earth, but every living being, every blade of grass, even the mighty masses of the everlasting hills, are every moment giving rise to countless myriads of atmospheric or etherial waves, each spreading through space in all directions, each meeting in its course cross-waves more or less powerful than itself,—changing its course, and interfering, we are justified in believing, with its propagation. In theory, no doubt, an undulation once established will, like the brook, "go on for ever," but practically, and so far as human appreciation is concerned, this is not the case. A cannon shall be fired, and shall originate undulations of light and sound. Were no disturbing causes at work, had light and sound been hitherto non-existent, theorists tell us that these undulations would spread continuously, and be evident to all men. As it is, the waves caused by the explosion do not cease to exist, but they cease, and that rapidly, to be appreciable. It matters not whether it is a four or a four hundred-pounder, save in degree. The larger gun creates the larger waves; which are seen and heard the longer distance, but in either case the opposition of other and contrary waves, the multitudinous currents given off on all sides by an infinite variety of substances, soon so deaden and lessen the waves, both of sound and light, that they become as if they were not, and men take no cognizance of their existence.

No evidence, so far as we know, has ever been adduced to show that the undulations produced by molecular movements are stronger, more intense, or more easily propagated than the undulations of light, though they may probably have the advantage of those of sound; and it appears to us in the highest degree improbable that they can, (taking the countless obstacles they must necessarily meet with into consideration), except under very rare and exceptional circumstances, spread to any great distance, and yet Dr. Bonavia asks us to believe that these vibrations, weak as he himself confesses them to be, can, in spite of all obstacles, without insulator or conductor, save a mysterious synchronism with a second person, and in defiance of counter-vibrations, myriads in number, find their way unaided to the attuned atoms at a distance of thousands of miles. The case of the officer wounded in India, communicating the intelligence to his wife in England, involves such a transmission. If such phenomena ever take place, we believe that the causes of them must be sought elsewhere than in animal radiation. We say *if* advisedly, for we are not sure that any well-authenticated instance of such a case has ever been recorded. The sources of self-deception in so-called cases of "presentiment" are enormous, and it is generally *ex post facto*, that some one or other of the natural changes of hopes and fears is remembered to have occurred about the time of the event. How, it is fair to ask, does Dr. Bonavia account for the enormously larger number of presentiments which do *not* come true? If animal radiation produce the one class, it can hardly produce the other; and it seems more natural and more likely that in each case the cause is not different but identical, namely, a natural operation of the mind forming the presentiment, which would naturally be much turned to the absent one, and would (naturally also) look at the issues of war in all their bearings—now hoping for escape, now fearing death for the object of its thoughts. Whichever way the issue turned, it would be quite possible for such a person to say, without intending to mislead, "I had a presentiment." Now, in the event of the death of the absent one, it is easy to *assert* that the presentiment was due to animal radiation, acting as described by Dr. Bonavia: but let us suppose for a moment that the officer escaped, and that his wife asserted a presentiment of his escape. How does radiation explain this? Are the atomic movements capable of assuring a man in the certainty of his life? Will any one venture to suggest that the man's own atomic movements first originated a presentiment of escape in *his* mind, which he in turn, by a strong mental effort, communicated to the synchronously attuned atoms of his wife's nervous system? This would be more than even Dr. Bonavia claims, and would amount to making atomic vibrations take the place of mind as an originator of thought.

And here we must digress for a moment, to point out what seems to us the main tendency of Dr. Bonavia's paper. We

believe that, following the example of too many modern physiologists, he is endeavouring to bring purely *mental* phenomena under the operation of a *physical* law. He appears to accept brain, or the nervous system generally, as the man. "Few," he says, "will doubt that the nervous system is the essential portion of man. It is the thinking and the feeling structure." This we deny. Strictly and scientifically speaking, man, as he exists on earth, has *no one essential* portion. He is a composite being, made up of mind and brain, nervous, respiratory, circulatory systems, *cum multis aliis*, each of which is as *essential* to him as the other. Speaking generally, however, and using the conventional mode of expression, the MIND is the essential portion. The nervous system is the *means* only, the *channel* only, by which the mind receives its impressions, and promulgates its intentions and its thoughts. Man's body, and *par excellence* his brain, is nothing more, if we understand it aright, than a habitat for his mind, and a complicated machine by which his mind manifests itself to its fellow minds. And to our thinking any other explanation is, to use a homely phrase, a mere putting of the cart before the horse, a palpable mistaking of effects for causes.

Let us illustrate our meaning a little more fully. In mediæval churches it was a common thing to see under the crucifix on the road some such legend as the following:

"Effigiem, dum transis, pronus honora; sed non effigiem, sed quem designat adora."

The pious hands which first raised the image took care to explain its symbolic meaning. But in process of time an ignorant and illiterate people, passing by the writing below, lost the real meaning of the sign, and began ignorantly to worship it for itself alone. Similar, as it appears to us, is the position of many of our modern physiologists.

The good old school of psychologists, who, finding the highest development of reason and the highest development of brain co-existing, set up the brain as the sign or image of the mind, were careful to explain that it was not the mind itself. The later workers in the field, throwing pure psychology aside, and substituting for it the investigations of mere animal physiology, have many of them apparently come to consider brain and mind to be identical, and seek to explain all the thoughts and workings of the mind by the physical changes, atomic or otherwise, which take place in the brain, considering these changes (which are the simple manifestations of mind in act towards matter) as producing and evolving mental phenomena

Now if mind and matter be as we, in common with many whose opinions are entitled to consideration, believe, *separate* and *distinct*, governed by different laws, and acting in ways totally diverse, we are right in considering any attempts to force mental processes into unison with physical laws, mischievous and absurd, as tending greatly to retard, instead of to advance the true progress and true interests of science.

We believe that most, if not all, of the phenomena adduced by Dr. Bonavia in support of his theory, may be as well explained, if not better, as the result of purely mental forces. Let us advert to the instance of the wounded officer. We have indicated our grounds for disbelieving that atomic vibrations could carry the news to his wife. The undulations appear to us too weak to pass over the immense distance in the case supposed. The operations of the mind, however, are not trammelled by the laws which may divert or check etherial vibrations. We all know, each of us in his own person, and by his own consciousness, that the mind can fly "untravelled"—to use a fine expression of Arnold's—from one corner of the world to another, from earth to heaven, at will. And we are justified in thinking that if such presentiments ever happen, it must be by some mental process, rather than by the action of any atomic waves. How the mind would act we are not prepared to say, and are content to remain ignorant till some second Newton shall arise to bridge the gulf between mind and matter.

> "Star to star vibrates light: may *soul* to *soul*
> Strike thro' *a finer element* of her own?
> So,—from afar,—touch as at once?"

says Tennyson, and we cannot help thinking that the poet in his ignorance of physiological dogmas, has gone nearer the truth than Dr. Bonavia with his animal radiation.

Dr. Bonavia gives us another illustration in support of his theory, which he says cannot be explained except by it,—the fact of a wife's coming to resemble her husband, or a husband his wife after marriage; and he accounts for this in the following words:—"The atomic motion of the nervous system of the one is attuned to that of the other, by the oft-repeated percussion of ether waves passing from one nervous system to the other. An equilibrium takes place, and their features and organs, besides character and thoughts, become moulded after the same fashion."

We confess that we can gather from this no very definite idea as to how this synchronism is brought about. Dr. Bonavia tells us "an equilibrium takes place," and he shews us the *means*,—to wit, "the oft-repeated percussion of ether waves," by which it is established, but he leaves us in total darkness as to the *modus operandi* of the waves, and as to the exact meaning of the synchronism itself. As we understand him, "synchronism" between two persons simply means that the atomic motions of the one act in a similar way to those of the other, and give off similar vibrations; and as he asserts "that the atomic motion of the nervous system plays a great part in moulding the form and character of an animal," it follows that when these movements are similar (synchronous) in two persons, their features and organs become similar as well.

But Dr Bonavia tells us that these inter-atomic movements, causing this animal radiation, are of "a very complex nature," and are "at any *one* moment the result of *all* the conditions under which, at that moment, the body may be situated." How then are we to account, even admitting the possibility of a synchronism while the pair are living together under similar conditions, for the maintenance of the synchronism in the case first cited, when the persons are thousands of miles apart, living under conditions the most opposite in every respect. By Dr. Bonavia's hypothesis, if a bodily likeness were developed in the first instance, we should expect it to cease, and the features to change once more, when different physical conditions caused a divergence in the nature of the inter-atomic movements.

An easier, readier, and better solution of the difficulty is not far to seek, if we turn to psychology to help us. It is a well-known and undisputed fact that the mind has an influence, and no small influence either, in moulding and giving expression to the human features. As the mind is cultivated, and its powers augmented by action, the features change too, become more refined, more mobile, more *spiritual*. That the mind acts on the bodily tissues *through* the *medium* of the atomic movements of the nervous system, is probably true, and so far Dr. Bonavia is right; but then he now here alludes to the mind as influencing these movements, which he attributes to various "mechanical, chemical, thermic, or electric causes;" thus, as in the former case, setting up the image for the reality, and attributing to the atomic movement powers which belong solely to the mind which governs them. How it is, and in what way it is, that the mind acts on these complex mechanical, chemical, thermic, electric, and other causes which go to constitute, according to Dr Bonavia, the atomic movements and animal radiation of mankind, we cannot say—we do not know. But we would refer Dr. Bonavia and our readers to Mr. Isaac Taylor's "World of Mind" for some suggestive hints on the subject. In Section X, pages 135 *et sequentia*, he endeavours to shew, and we think successfully, that the first rudiment of mind is POWER or FORCE in relation to the masses of the material

world. And this force or power would be amply sufficient to originate the atomic movements.

Whether this supposition be satisfactory or not,—and it can be supported, and is supported by Mr. Taylor, by arguments stronger and more conclusive than any Dr. Bonavia has adduced,—we have no hesitation in expressing our belief that in these changes of face and form, of thoughts and character, it is the mind which acts—how it matters not—on the molecules by which the changes are effected; and that the molecules themselves, apart from the governing mind, have the power to originate change neither in the matter nor in the mind: and we object to Dr. Bonavia's hypothesis that it tends directly to abolish the true study of the phenomena of mind *as mind*, and to consign it to a neglected corner in works on physiology—in a word, to degrade the godlike reason of man to "a fortuitous concourse of atoms."

To return for a moment to the cause of resemblance between husbands and wives, the explanation of which we have left unfinished. Having seen that the mind is the prime mover in the changes which mould and form the features, it is not difficult, we think, to see that where too kindred minds are at work, each in daily intercourse and exchange of thoughts and ideas with the other, each constantly dwelling on and sympathising with the peculiarities of the other, each "clinging close and ever closer" to the other, they become, as time goes on, identified more or less perfectly with each other,—one mind, so to speak, in separate bodies, and becoming thus attuned, and acting thus harmoniously together, in process of time the features of the two assimilate also. This is just what Dr. Bonavia asserts takes place, with the important difference that the mind, and not the dashing of atomic waves, is the efficient cause. The mind doubtless acts, as we have said before, by and through the nervous system, and in so acting induces molecular movements, but it must not be forgotten that Dr. Bonavia attributes the effects to the causation of the molecules themselves; and the fault we find with his hypothesis is, that it begins by taking up the chain of events by the middle, rather than tracing it from its end; that he confuses the *means by which* a certain cause operates, with the cause itself, and in fact virtually places *the means* for *the cause*.

We have not time, and the length to which these remarks have already extended, warns us that we have not space, to enter fully into other of Dr. Bonavia's statements. Enough has already been said to indicate our opinion that he has taken up much too narrow a position in his attempt to explain complex mental processes by the physical fact of animal radiation; and we have endeavoured to shew in two instances that he has failed properly to apply his theory to his facts We believe, moreover, that many of the so-called facts cited by Dr. Bonavia must be much more carefully investigated than they have yet been, before they can be received as facts at all.

We decline to enter on the *questio vexata* of animal magnetism. Our own knowledge of the subject is limited in the extreme, but we believe there can be no doubt that unprincipled and designing men have turned it to all the purposes of trickery and deception; and we shall require more evidence than we at present possess, before we admit as part or parcel of science an influence which has done more than any one cause to fill the lunatic asylums of the United States. When more facts are forthcoming, if any truth shall be found to underlie the mass of falsehood and roguery on the surface, we believe that a much broader and wider foundation than the narrow basis of animal radiation will be required philosophically to account for it.

Can any of our readers give us an instance of a circumstantial presentiment, recorded *before* the event feared had occurred? Does any one know a man who can discover the presence of a cat without seeing or hearing it? We have, if we mistake not, heard ere now of "some that are mad when they *behold* a cat," but have hitherto agreed with Hood that it was from "born antipathy," or accepted Shakespeare's dictum—"there is no reason to be rendered." Can the peculiar physiological effect said in the same passage to be occasionally produced by the bagpipe, be traced to the operation of animal radiation?

We await with curiosity Dr. Bonavia's remaining papers, to see how he applies his theory to the diffusion of diseases. If it be possible for a man in India, stricken of cholera, to communicate it by atomic vibration to his wife in London, we shall certainly have a startlingly new view of the spread of the disease, but we do not anticipate that Dr. Bonavia will ask us to believe so much as that. Though he may allow the vibrations to pass, we trust he will set up some barrier against the poison.

In conclusion, we would say that if we appear to have used strong language to express our beliefs as given in these notes, it is because of the strong conviction which we entertain, that the present tendency of physiologists to reduce all phenomena—mental and physical—to fixed rules, and to explain everything by the data yielded by the scalpel or the microscope, is a tendency in the wrong direction. We have endeavoured to keep within the limits of fair criticism, and while we have no expectation of changing Dr. Bonavia's views as to animal radiation, we expect that he will at least give us the credit of not having misrepresented him.

Political Agency,
Bhurtpore, *Jan. 20th*, 1867.

CONTRIBUTIONS TO THE CHOLERA LITERATURE.

By E. BONAVIA, M.D.

(Continued from page 3, Vol. II., No. 1.)

Note.—I may as well inform the reader that what I have written and intend to write about cholera in this periodical is merely a *hypothesis;* as such, it may be useful as an indication—as a new standing point—from which we may observe the phenomena connected with this disease. The known and often contradictory phenomena of cholera are more likely to be colligated by some such *dynamic* hypothesis, than by one in which a *material* poison is the main agent. To search for the ultimate cause of any phenomenon is of course beyond the bounds of science. Phenomena occur in an endless chain or circle, one giving rise to another, and so forth; so that it is impossible for human investigation ever to reach a phenomenon which can be called *ultimate*. What we are endeavouring to discover is, what phenomenon or set of phenomena immediately precedes cholera, in the chain of sequences, in order that we may, if possible, prevent the disease from occurring, avoid or neutralize it when it does occur. (When not otherwise stated, all italics are mine).

No. II. *Origin of Cholera.*—Before discussing the origin of cholera, I must prepare the reader by reviewing the various influences to which, at any moment, the nervous system, the essential part of man, may be exposed.

1*st.*—Man is subject to influences emanating directly from the sun, whether these be of light, heat, electricity, magnetism, or attraction. With regard to the latter force, if the sun is capable of attracting the fluids of the earth towards it, man being on the side of the earth which is exposed to the sun, must come under the same influence of attraction (whatever that may be). We must, for similar reasons, grant some influence to the moon; and when the sun and moon are acting in the same direction, such influence is increased.

2*nd.*—Man, living on the surface of the earth, although able to move on it, forms an integral part of it, and must more or