

soft and pulpy. This mare was then digested in spirit for ten days more, pressed off and filtered, the resulting tincture distilled off till it became of the consistence of syrup, and then added to the previous solution

I intended weighing the residuum after each process of digestion, but through an oversight the spirit was added before I could test the solvant properties of each menstrumn. shall, however, do so carefully in future experiments. The "fluid extract" formed of these com- couplet-

bined solutions I find to be exactly equal to <sup>1</sup> "By deas have little deas, upon their backs, to bite 'eta -the solutions of eleganing omployed, and each Aut little deas have suminer deas, and so of layton and the volume of glycerine employed, and each drachm represents half a drachm of powdered ergot, and may be considered a dose

By this process I believe all the active properties of ergot should be obtained in a very desirable form; the liquid is sweet, concen-trated, and should be permanent. I would suggest that it be kept in graduated or drachm (3) bottles, to avoid measuring under unfavorable circumstances.

My object in writing this paper is, to place My object in writing this paper is, to place these attract each other, but at the same a proparation of an indispensable medicine in time keep their distance, just as is the case the hands of medical practitioners, with some with the heavenly bodies. The atoms of one p confidence that it will not disappoint their compound do not resemble those of another reasonable expectations. Should it realise in weight, or size, or mutually gravitating these expectations there will be little diffi-power. But as they are indivisible, it is be-culty in making it quite palaable if there be tween them that we must conceive all cheminot some objection to doing so, lest from its resemblance to treacle, accidents might happen.

Several medical friends to whom 1 communicated my idea, have tried and are trying it but it is obvious that a more extended trial than any obtainable by suc! means is necessary to establish its theraputic value.

that would be of value. I have omitted to enter into any chemical details, as they would be wearisome and little edifying to the would be wearizome and little edifying to the dently intends his theory to be used as a majority of your readers, who have little time criterion, or control in all future analytical for them; but I have thought it right to let | results, and already views it as the birththem know what they were invited to adopt, instead of appealing to them by a lvertisement, as is the fashion now-a days.

## The Atomic Controversy.\*

It is one of the most remarkable circumstances in the history of mon, that they should in all times have sought the solution of human problems in the heavens rather than upon the earth. Sixty years ago, a memorable instance of this truth occurred, when Dalton borrowed from the stars an explanation of the fundamental phenomena of chemical combination. Carbon and oxygen unite in a certain proportion to form " carbonic acid;" and this proportion is found to ductive basis. There can be no doubt, how- the observed simplicity, if used as an argu-be invariable, no matter from what source ever, that the atomic theory has been accept ment, cuts both ways. Possibly we are mis-the compound may have been prepared. But ed by the majority of chemists, as may be taken in connecting the ideas of matter and earbon and oxygen form one other combina- is en on even a cursory inspection of the cur-tion, namely, "carbonic oxido"—the gas rant literature of their science. Our present whose delicate live finme we often see in our intention is to give such a summary of the fires. Carbonic cyide may be obtained from many sources; but, like carbonic acid, its composition is always exactly the same. These two bodies, then, illustrate the law of Definite Proportions. But Dalton went a step further. He found that, for the same weight of carbon, the amount of oxygen in "carbonic acid" was double that which exists in carbonic oxido. Several similar instances

From Macmillan's new periodical, Nature.

. . . \*/

\*\*\*\*\*

1762

or quadrupled itself. Honce the law of Mul- | have the same capacity for heat; they all, ple Proportions. The question was-in fact, | when in the gascons state, have a volume the question is-how to account for these which is an even multiple of that of one part laws. Dalton soon persuaded himself that by weight of hydrogen. But bodies in the matter was made up of very small particles, free or uncombined state-such, in fact, as or minimum and the of very small particles free of alternment attended at the second of the second o a chemist, he would have rejected the famous

"Let the divisions be ever so minute," he said, "the number of particles must be finite; | just as in a given space of the universe, the number of stars and planets cannot be infin-We might as well attempt to introduce ' it... a new planet into the solar system, or to annihilate one already in existence, as to create t or destroy a particle of hydrogen." All substances, then, are composed of atoms; and these attract each other, but at the same cal action to take place; and an atom of any particular kind must always have the same weight. The atom of carbon weighs 5; the atom of oxygen weighs 7. Carbonic acid, containing one of each, must therefore be in-variably constituted of 5 carbon, and 7 oxygen : carbonic acid must in like manner contain 5 carbon and 14 oxygen. Here, As I don't practice I have nothing to add | then, Dalton not only states that he has accounted for the two laws we have mentioned by making a single assumption ; but he eviplace of chemical enterprise.

Such, and so great, was the atomic theory of Dalton; founded, certainly, on erroneous numbers, but containing in itself the germ of their correction; aspiring in the command in innumerable conquests, and setting itself for | the rise or fall of the chemical spirit.

It is hardly necessary to make any detailed ' review of the history of the atomic theory. Berzelius made it a starting-point for researches which, on the whole, have been unsurpassed in their practical importance, and engrafted upon it his celebrated electrical moreover, we have no alternative but to adintention is to give such a summary of the atomic question as may be serviceable to at the Chemical Society on Thursday last.

The modern supporters of the atomic theory agree with Dalton in the fundamental suppositions we have given above; but assert that they have a much stronger case. The phenomena of gaseous combination and spe-cific heat have indeed changed the numerical aspect of the theory, but not its substance. The simplicity of all the results we have ac-

was found to be of deep purplish colour, as were found of two elements forming com-thick as treacle nearly, and the marc quite pounds in which, while the weight of the one tions is itself a great argument for the soft and pulpy. This marc was then digested remained constant, the other doubled, trebled existence of atoms. They all, for example, state they all have the same volume. Again, select a series of chemical equations, in which water is formed, and eliminate between them so as to obtain the smallest proportion of water, taking part in the transformation they represent. It will be found that the number is 18; which necessarily involves the supposition that the oxygen (16) in water (18) is an indivisible quantity. To put this last point another way : hydrochloric acid, if treated with soda, no matter in what amount only forms one compound (common salt). Now we know that the action in this case consists in the exchange of hydrogen for sodium. But if hydrogen were infinitely divisable, we ought to be able to effect an inexhaustible number of such exchanges, and produce an interminable variety of compounds ef hydrogen, sodium, and chlorine; hydrochloric acid being the limit on the one side, and common salt (sodic chloride) terminating the other. No such phenomenon occurs; and, since matter must be infinitely or finitely divisible, and has been thus proved not to be the former, it must be the latter. Atoms, therefore. really exist; and chemical combinations is inconsistent with any other supposition. Those who hold the contrary opinion are bound to produce an alternative theory, which shall explain the facts in some better way.

## Now let us hear the plaintiff in roply.

The atomic theory has undoubtedly been of great service to science, since the laws of definite and multiple proportions would probably not have received the attention they descrve, but for being stated in terms of that theory. Yet we must discriminate between these laws, which are the simple expression of experimental facts, and the assumption of atoms, which preceded them historically, and therefore has no necessary connection with For it was the Greek atomic theory them. which Dalton revived. Nor has any substance yet been produced by the atomists, which we cannot find means to divide. If, doctrine. Davy and Faraday refused to mit the infinite divisibility of matter, even admit it; Laurent and Gerhardt accepted it that is consistent with the simple ratios in doubtfully, or in a much modified form, which bodies combine; for two or more in-Henry declared that it did not rest on an in- finites may have a finite ratio. Therefore, division at all; at any rate, the connection has never been justified by the opposito side. Again, admitting the argument based on the formation of common salt, the atomic those who take an interest in the discussion theory does not tell us why only one-third of the hydrogen in tartaric acid can be exchanged for sodium; why, indeed, only a fraction of the hydrogen in most organic substances can be so exchanged. Yet, the explanation of the one fact, when discovered, will evidently include that of the other. On the whole, it appears that the atomic theory demands from us a belief in the existence of a limit to division. No such limit has been