follow that condition A, being now satisfied, will continue to be satisfied for all time?

If the answer be Yes, then of course $\frac{dH}{dt}$ will continue to be negative, until at length H reaches its minimum, and the system attains to perfection in the form of the Maxwell-Boltzmann law. If that is necessarily the future of our system, then, as Dr. Watson says, the Maxwell-Boltzmann law is not only a sufficient, but a necessary condition for permanence.

I am not aware, however, that this doctrine of (so to speak) final perseverance has ever been proved to be true. I do not think it can be regarded as axiomatic.

It seems to me that if we are to make our finite system reach perfection with any certainty, we must resort to the principle to which I appealed in my first letter on this subject—that every material system is constantly receiving disturbances from without, the effect of which is to keep condition A in working order, and so to make $\frac{dH}{dt}$ generally negative. Otherwise we must regard our system as only part of an infinitely extended system, the parts of which, when not too distant, mutually influence each other.

S. H. BURBURY.

Research in Education.

IT is quite unnecessary for Mr. D. S. T. Grant to suffer "dialectic annihilation" (see p. 5) in order to discover Prof. Armstrong's definite scheme of scientific education, inasmuch as in 1889-90 such a scheme was published by a Committee of the British Association, of which Dr. Armstrong was an active member.

As I believe many schools are still waiting for evidence as to the practicability of the scheme before adopting it, I venture to quote my own experience. I have been engaged for some time in practically applying this method to the teaching of girls of various ages, and am in a position to state that the scheme is perfectly workable.

It is not, of course, suggested that students should find out every known fact in chemistry or physics by a process of personal research—life is not long enough; but, if their early training be on these lines, they are in a much better position later on to accept, or if necessary reject, the work of others. A scientific method of thinking is of far more value than an accumulation of facts, and so it is extremely important that children should begin this kind of work before their logical perceptions have become obliterated by a continued application to irregular verbs. The problems set to young children are naturally of a very simple nature, and I do not leave the girls to themselves to "struggle to the truth by a process of trial and error." I state the problem to the class, and I usually find the girls have plenty of suggestions to offer as to its solution; these suggestions I criticise, and as soon as a practicable method has been found, the girls work it out for themselves. The early problems involve measurements of length, area, volume, and weight, and naturally the use of each new instrument is explained and illustrated. Simple physical problems follow these, such as experiments on relative density, and thus children are led to realise and appreciate the common properties of matter. After this training they are much more ready to solve elementary chemical problems. Certainly they could never work long enough to discover Dalton's laws for themselves, but they can quite appreciate classical experiments, and see how theory supplies an explanation of the facts. I am quite aware that if children are to work in this way they cannot be expected to sit still in their places with the look of passive receptivity on their faces, which is conventionally regarded as the proper appearance of well-disciplined scholars. They must move about, and should be encouraged to talk to each other about their work. I am convinced that a class of about eighteen is quite large enough if sound work is to be done; and if at any time their excitement becomes noisy, I find that a threat of numerical problems is quite sufficient to make them continue their practical work more peacefully.

It seems to me that physiology and hygiene, as usually taught in girls' schools, are absolutely pernicious and unscientific. Girls learn a list of the circulatory organs as they do the kings of England, and with less advantage. It would be considered criminal in them to doubt any of the facts in their books, although many are wrong, and yet, I take it, scientific training misses a great point if it does not engender a wholesome spirit of doubt. But the worst feature of all is the way in which girls are taught certain things in theory of the meaning of which they have not the faintest notion. They can tell one that water is H_2O, but the real significance of the symbol is perfectly unknown to them, and of course they are not able to understand it without some chemical training, in spite of the fact that some schools consider themselves very advanced and practical if the lessons are emphasised by the burning of hydrogen and the manufacture of oxygen. Numberless examples of similarly useless facts could be quoted, which are learnt under the name of hygiene—teachers, parents, and girls vainly believing that this is science. But all these facts are forgotten as soon as some examination is passed, and nothing is left behind; whereas a logical system of scientific training produces an effect on the mind which it is impossible to overrate. Surely the aim of education should be to produce not people who are full of facts, but those who can make the best use of the brains they possess, who are clear-headed, and able both to perceive and take advantage of opportunities that may be afforded them.

Central Foundation School for Girls, London. L. EDNA WALTER.

The Bibliography of Spectroscopy.

IT will be within the recollection of many of your readers that, in the year 1879, a committee was appointed by the British Association to report on the state of our knowledge of spectrum analysis, and I was asked to undertake the preparation of a bibliography of spectroscopy from the year 1870. It was not thought necessary to begin at an earlier date, for a bibliography of the subject is to be found in Roscoe's "Spectrum Analysis." With the help of several members of the committee, lists of spectroscopic papers were prepared, and appeared in the British Association Reports for 1881, 1884, and 1889. In that year Mr. H. J. Madan kindly consented to join the committee, and as he was then resident in Oxford he was able to afford valuable assistance in checking the references, and the section of the list that was published last year is almost entirely his work, as I had found it impossible to spare the time to go to London to look up the references in the libraries. Mr. Madan is now living in Gloucester, and therefore out of reach of scientific libraries; he has, notwithstanding, shown his interest in the subject by making frequent visits to Oxford and London to continue the work. He finds, however, that the work is hardly practicable for one so far removed from the great centres; and my object in writing this letter is to ask if any one will volunteer to relieve him from this duty—that is, on the supposition that the list is of real use to workers on spectroscopic subjects. Many of the readers of NATURE will be able to give valuable opinions on this matter, and probably to suggest improvements in the manner in which the list is drawn up.

It has been suggested that the four sections of the list should be rearranged and published as one continuous catalogue. The advantages of this for the purpose of reference are obvious; but from an estimate obtained last year, the cost of printing would not be less than £100. Dr. Tuckermann also very kindly proposed that the "Bibliography of Spectroscopy" drawn up by him and published by the Smithsonian Institution in 1888, should be incorporated with the British Association lists; this would very materially increase the expenditure.

Mr. Madan is quite willing to undertake gratuitously the literary work involved in the collection and rearrangement of the various sections. But the expense of publication is so great that the British Association can hardly be expected to bear the whole of it, although it is quite likely that a liberal grant might be made. Probably also grants might be obtained from other societies interested in the work, if it appears that the catalogue would be of special utility to those engaged in research. The balance might be met by a moderate charge for each copy sold.

Cooper's Hill, May 15. HERBERT MCLEOD.

An Aquatic Hymenopterous Insect.

NO doubt many of your readers are aware that, in 1863, Sir John Lubbock gave an account of an extraordinary hymenopterous insect which he had observed swimming in a basin of water taken from a pond at Chislehurst. Another observer (Mr. Duchess, of Stepney) had also found a single specimen about the same time; then, in 1881, Mr. Bostock found one in some pond water at Stone, Staffordshire, since which time it does not appear to have been recorded by any one. I have searched many ponds for it year after year, but without success.

On Saturday, May 4, the Quekett Microscopical Club held one

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