VIBRATIONS AND PARTICLES

PROFESSOR COMPTON in *The Scientific Monthly* for April tells us that light is alternately a particle and a vibration. Would it not interest some of your readers if some physicist would now tell us why it can not be a particle and a vibration at the same time? Some minds are so constituted that they like not only to have an explanation of why a thing is so, but also a further explanation of why it is not something else. This is particularly true when one is unable to picture the first in one's mind, and the second is obvious.

Thus imagine water dripping from a swinging hose, resembling plane polarized light of a single wavelength. If we seize the hose and shake it irregularly we should have ordinary light. Or again, if instead of letting the hose swing, let the spheroidal drops change their ellipticities in various directions. These simple suggestions must have already occurred to many minds. In what way do they fail to satisfy recorded observations so completely that it is necessary to adopt a solution that it is difficult or impossible to conceive? It is quite possible that this matter has been treated in full elsewhere, but many of your readers do not have access to all the technical magazines, and I think a simple statement by some one in authority might be of general interest.

W. H. PICKERING

OBSERVATORY,
MANDEVILLE, JAMAICA

QUOTATIONS

THE CENTENARY OF THE LONDON ZOOLOGICAL GARDEN

ONE of the most famous institutions in the whole world—the Zoo—keeps its centenary to-day; but perhaps no formal celebration will be able to do justice to the place which the Zoo has made for itself in the national life. When history has recorded its progress, and science assayed its services to zoology and kindred studies, there remain influences and consequences much less amenable to statistics—an immense sum of human enjoyment, a vast body of popular literature, innumerable pictures and drawings serious and light, a continuous stream of humor, pathos and allegory of which the Zoo has been almost from the first an unfailing source. Of what other comparable institution can anything like the same be said? The honored originator of the Zoo, Sir Stamford Raffles, though he died before the gardens were actually opened, could have as little foreseen the developments of his new world as Columbus foresaw modern America. The centenary coincides with the highest peak of the Zoo's prosperity, for its rate of growth, when measured by income and numbers of fellows and visitors, has been in the last nine or ten years out of all proportion to the past. For this no doubt there are several causes, and they interact upon one another; but among them must certainly be reckoned good business management, the full recognition (though not until after a long struggle) of the value of light and open air for animals in captivity, with the consequent abolition of old, dark and airless places of confinement, the establishment of special new buildings like the aquarium and the reptile house, and the greater mobility of the age which enables many more visitors to go to Regent's Park than before, and so to bring in the resources necessary for improvements. The Zoo is unrivaled for the variety of specimens which it contains. It has developed, moreover, in a typically English way, for alone of important national collections of animals it receives no state subsidy. A few friends of zoology got together in the first place, formed a society and induced the government of the day to grant them a site on crown land; ever since then the Zoological Society has managed its own affairs, paid rent and rates, and lived entirely on subscriptions of the fellows, bequests and entrance fees. By its charter it can divide no profits; whatever it earns goes to the benefit of science and popular spectacle, and, as every one knows, its present prosperity is about to lead to new extensions on a much larger acreage at Whipsnade.

Through its hundred years the Zoo has, of course, been something much more than an exhibition of animals. The Zoological Society was founded for scientific purposes, and it has served them steadily. It now owns one of the most catholic libraries of zoology in existence. Its output of learned literature has been unceasing; its research continuous; its response to the calls made upon it prompt. The zoology, it need hardly be said, which was familiar to its founders is not the zoology of to-day. One of the projects which Raffles and his contemporaries had in mind was the domestication of more animals; here, however, zoology has been able to do next to nothing, for at best domestication at the Zoo means the taming of wild animals and not the creation of such conditions as will allow them to breed freely. In this respect, therefore, the dreams of the founders may be said to have been fruitless. In other respects the developments of science have outstripped their program. The zoology of their time, though systematic in its way, was in some aspects nearer that of Pope in his Essay than to Darwin's: the contemplation of the forms of life led directly to a natural theology, though it was by the study of breeding and acclimatization—one of the society's objects—that Darwin's thought was given its direction. The founders, however, hardly foresaw in their institution the present school of anatomy, cen-