consistent with a continental structure in which 15 km. of granite rested on 30 km. of tachylyte, with dunite below. Two simple examples, in which the curvature of the Earth had been neglected, indicated that the variation in apparent time of transmission caused by the erroneous use of a geodesic (here rectilinear) path was small, but in certain cases, particularly for waves arriving near the anticentre, the effect might be very important.

CORRESPONDENCE.

To the Editors of ' The Observatory '.

On the Mean Life-time of the Cluster Type Variables.

GENTLEMEN,—

According to the theory of the rotation of the Galaxy developed by Oort and Lindblad, the galactic system consists of several kinematically independent subsystems. This circumstance has important consequences for cosmogony, and the purpose of this note is to call attention to one of these.

Each subsystem is specified by the corresponding frequency-function in the phase-space. If stars of some type belong to a given subsystem A, they will remain in A despite all changes in their physical constitution, which may occur in the course of time, provided only the masses remain unchanged.

Now there is a subsystem in the Galaxy unlike any other, viz., the system of cluster type variables. We are certain that the masses of these stars remain practically unaltered during an interval of time of the order of 10^9 years. Therefore if the duration of the variability ("mean life time" of these variables) is small compared with this figure, the subsystem under consideration will contain a large proportion of stars which will at some time become cluster type variables as well as of stars which were at some time in the past such variables. According to the mass-luminosity relation the stars of both kinds will have the same luminosity as the c.t. variables. The less the mean life-time of variables the smaller will be the proportion of c.t. variables in their own subsystem.

However, according to the existing data, the number

of non-variable giants in this subsystem cannot be of higher order of magnitude than the number of variables.

As far as we can see, there remain therefore only two possibilities :—(1) The mean life-time is of the order of 10^9 years or longer. (2) The life-time is short compared with 10^9 years, but the stars which turn into cluster type variables and the stars into which the cluster type variables transform break the mass-luminosity relation and are " white dwarfs " of some sort.

It seems that the second possibility is very improbable.

I am, Gentlemen,

Yours faithfully,

V. AMBARZUMIAN.

Astronomical Observatory
of the University, Leningrad,
1935 February 14.

The Origin of the Comets and Meteorites.

GENTLEMEN,—

I am gratified in having drawn from Dr. Crommelin a statement (*Observatory*, **58,** p. 87) of the case for the comets as originating within the solar system, which, carrying his wide authority, is not likely to omit any important feature. But he does not mention the difficulties that have impressed me. Thus why should the cometary orbits be all so nearly parabolic ? Why should their oblique paths cross the plane of the solar system in all directions without any regard to its configuration ? And, one may add, a difficulty generally recognized, if the comets are frittering away into meteor showers, and will not endure long, and so are a transient phenomenon, how could or did they arise in their sporadic manner within the solar system not so long ago ? On the critical side his present main consideration appears to result as follows :—For comets coming from nearly stationary positions " outside the solar system " and thus far away, " the combined probability . . . . for showing appreciably parabolic motion would be . . . . about one in a million ". A critic might propose to accept this conclusion with the phrase " outside the solar system " replaced by " inside the solar system, but at a very great distance ", and then the result would take the form that it is space *within* the solar system, " that would need to be very densely packed with comets, and tremendously so in its outer parts ", to provide the average visible