PHILOSOPHY OF SCIENCE GROUP

Supplement Number 4

to the Bulletin of the

BRITISH SOCIETY FOR THE HISTORY OF SCIENCE

Vol. 1 MARCH, 1951 No. 5

Discussion on Some Philosophical Problems of Cosmology

Held at University College, London, on 12th June, 1950.

Dr. G. J. Whitrow, in opening the discussion, said that Professor Dingle in his Presidential address in March, 1950, had said that as the observable universe is only a part of what we imagine to be the whole universe, we must therefore introduce considerations over and above the ordinary scientific process of inductive generalization, and that these considerations are philosophical in character.

Among questions concerning considerations of a philosophical character are the following :—

(i) *The uniqueness of the universe.* We can extrapolate in many different ways, and we can describe the observable region in more than one way. He (Dr. Whitrow) suggested that the universe should be regarded as a unity which can be viewed from many different mental standpoints, and that many different descriptions of it are possible.

(ii) *The time of the universe.* Professor Dingle had argued that finite time-scales for the past are illegitimate, if epochs can be located in them ' before time was ', since such epochs would have no correlatives in the infinite time-scale. He (Dr. Whitrow) pointed out that, if such an argument were admitted as valid, then presumably one would equally be allowed to say that finite scales for low temperatures were also illegitimate, since in thought at least one could imagine temperatures below the Kelvin zero which would have no correlatives in a scale formed by taking $\log T$ in place of T.

(iii) *The steady-state or non-steady-state behaviour of the universe.* This had been raised recently by theoretical cosmologists, but the solution suggested by the believers in continuous creation raised more problems than it answered. Dr. Whitrow discussed some of these problems in detail.

Mr. S. Toulmin* said two groups of topics have preoccupied cosmologists recently : (i) empirical problems of astrophysics, concerned with such things as the distribution and motions of the nebulae and their past history, and (ii) theoretical and conceptual problems, about the relation between geometry and physics, and the meaning for theoretical physics of such terms as ' simultaneity ' and 'distance'. These two groups of topics must be recognised as being logically distinct : they became linked through an historical accident, and if we treat the connection as anything stronger we are liable to get into avoidable philosophical trouble.

The habit of treating the terms ' space-time ' and ' the universe-as-a-whole ' as synonyms, and then going on to use the latter phrase to refer to the

* It is regretted that in Bulletin No. 4, " Proceedings at Meetings ", under 12th June, 1950, the second speaker in this discussion was incorrectly stated to have been " Mr. S. Tomlinson ".

assemblage of nebulae, etc. which the astronomer studies, leads only to conundrums about ' whether the presence of matter causes the curvature of space-time or whether this curvature is itself responsible for the existence of matter '. One might as well ask whether the steepness of a hillside caused the contours on the hillside to cluster or whether the clustering of contours was responsible for the steepness ; for ' space-time ' is not the name of a stuff filling the world in addition to stars and other things—rather, in speaking about ' space-time ' we are talking about the same old things in quite a new way. This helps to shew the importance of Professor Dingle's distinction between ' universal laws ' (like the law of gravitation), and ' laws of the universe-as-a-whole ' (e.g. that space-time has a positive curvature), and explains the justice of his assertion that, in stating a ' law of the universe ', " you are saying nothing at all about any particular part of the universe ". For to suppose that you were, would be like imagining that, in discussing whether or no there was an Absolute Zero of temperature, one was saying something about the properties of actual liquids and solids at particular temperatures—whereas this is rather a question about our theoretical concept of ' temperature ', and so about our method of representing thermal phenomena.

With ' time ' as with ' temperature ', there is no reason why the theoretical astrophysicist should not use either an infinite time-scale or a finite one, providing that he takes care not to beg any empirical questions when introducing his time-scale (as one would in the case of temperature if one projected −100°C on our present scale to—∞ on the new one, instead of −273·16°C). Some of the arguments presented by Professor Dingle in his Chairman's address suggested that one could rule out certain of the time-scales used by Milne on *a priori* grounds, but his arguments are not cogent. Whether in fact Milne did avoid begging empirical questions in setting up his theoretical time-scales is, however, another matter, about which Professor Dingle is right to be dubious.

The discussion then became general.

https://doi.org/10.1017/S0950563600001846 Published online by Cambridge University Press