

might say that every other level was missing. It seems physically most likely that there would be some continuous kind of transition from this case to the case of a non-symmetrical rotator, where all the states are present, and the only possible way would be to have the missing levels gradually appear with increasing dissymmetry of the rotator, first with very small *a priori* probability, and finally assuming their normal *a priori* probability in a sufficiently assymmetrical rotator. The extreme case of symmetry might actually occur in the helium molecule, the intermediate state in the nitrogen.

Such an explanation demands that anomalous intensities should depend on the properties of the states, not of the transitions. On examination of the data one finds that in every case the lines starting or ending at a given rotational state are either all strong or all weak; there are never some strong and some weak lines from a single state. This holds both for the lines belonging to the various branches of a single band originating from a given state, and for lines of different bands which have the state in common. On the basis of this it is plausible that the effect should come from anomalous *a priori* probabilities of the alternate levels.

If the alternating intensities come from symmetrical rotations, some polyatomic molecules containing two or more like atoms might show them. For example, H₂O has the shape of an isosceles triangle, with the O at the apex. If this rotated about the axis passing through the O and bisecting the base perpendicularly, we should have a condition similar to what has been described, so that one rotational degree of freedom should show the effect, not the others. In NH₃, which forms a tetrahedron with the N at an apex and the three hydrogens in an equilateral triangle, a similar rotation would disclose a three-fold symmetry, which might lead to bands with every third line strong. Methane, CH₄, which is presumably a regular tetrahedron of H atoms with the C in the middle, would have a mode of rotation in which it had a two-fold symmetry, and this may explain why in the spectrum of methane two kinds of bands are observed, one with lines spaced about twice as far apart as in the other.

It is a pleasure to acknowledge my indebtedness to Dr. R. S. Mulliken and Prof. E. C. Kemble for very valuable advice and suggestions.

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The Real Meaning of the New Conception of Time.

THE fascinating presidential address of Dr. Jeans to the Royal Astronomical Society, published in NATURE for February 27, with its poetical allusions to children chasing a rainbow over the hills, and to what seems the successive extinction of the shires as one gazes at the country from the windows of an express, must have helped many of us to make fast our hold upon the principles of the general theory of relativity. Yet it is doubtful whether the full implications for the doctrine are generally realised—of such a statement, for example, as “The year 1927 has the same sort of existence as the county of Cornwall.” The legitimate inference surely amounts to nothing less momentous than this: that everything that has ever existed or happened, or that ever will exist or happen, in the universe, is immanent in physical space-time or ‘ether’; and that what to us participators in the drama being enacted on the space-time stage appears to be the *special* differentiation of the present—of *now*—from the past and the future, is merely an illusion due to our experiencing changes in a certain dimension of

the four-dimensional continuum, which imparts the impression of travelling along that dimension and hence the idea of flowing time.

Let us now imagine ourselves, not as pieces in the drama, as actors on the space-time stage from which we can only obtain a limited view of the picture, but as looking on to the stage from an external point of vantage. By the very terms, apparently, of the doctrine of relativity, we should be witnessing the whole evolutionary drama of the physical universe *coexisting* from ‘beginning’ to ‘end,’ beholding our ancestors of a thousand years ago with the earth as it then was in the same picture with our actual selves in 1926 and with our descendants of a thousand years hence with the earth as it will then be. The year 1926 would be differentiated in this synoptic view merely in this: that we should recognise from our non-spatial, non-temporal, point of vantage that what in the physical space-time landscape we are calling the present time—our present life—so far from constituting the fullness of life is but an eclipsed view of it.

I submit that, unless words have broken down under the strain to which expositions of relativity have subjected them and have lost their force and vitality, all this is a necessary deduction, signifying to the universe a realism of the grandest kind. Moreover, if space-time ether is thus the scroll, so to speak, upon which everything is recorded, including our own deeds and misdeeds, do we not find a purely *natural* interpretation of certain widely held tenets in religion? The point is, that if the geometry and the mechanics of the world are one, then every *physical* event must fit into the scheme, including our own physical lives and actions. The question of the *nature* of our higher mental or spiritual faculties, operating through matter, is not involved in these implications, but is obviously raised more insistently than ever.

L. C. W. BONACINA.

March 23.

A Planarian Species new to Britain.

SPECIMENS of *Planaria albissima*, Vejd., a Triclad Turbellarian not hitherto known to occur in Britain, Wales. My preliminary identification was confirmed by the kindness of Mr. E. Percival, of the University, Leeds. The species was found by Vejdovsky in spring-brooks in Bohemia, and Steinmann refers to it as ‘rare’; thus the occurrence in the mid-Cardiganshire area is of especial interest. In this area it is very general in distribution; I have found it in rivers and brooks of all types, and at altitudes ranging from practically sea-level to 1250 feet above. Many of the specimens are sexually mature, and asexual reproduction by transverse fission appears to be common.

KATHLEEN E. CARPENTER.

Department of Zoology,
University College of Wales,
Aberystwyth, March 20.

DR. CARPENTER has kindly allowed us to examine specimens which were undoubtedly mature *Planaria albissima*, Vejd. On comparing these with drawings of immature specimens taken near Leeds in May and October 1922 and March 1923, and Pately Bridge, we feel convinced that the specimens from Yorkshire belong to this species. So far we have failed to find examples in which the sexual organs are developed.

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