always any kind of death that science will permit us to bring into the picture.

The only escape from this would be to prove that there is a death 2 which, necessarily, *accompanies* death 1—to prove that the observer must die when his instrument breaks. That is what I have sought for throughout the last nine years, and cannot find. Apparently, such simultaneous (in absolute time) destruction of all the infinite series of observers would demand a miracle.

Similar considerations apply in the question of free-will. We may construct, at any stage of the regress, a picture which will include both subject and object; and, in that picture, determinism will reign supreme. But the ultimate observer (who is, incidentally, the draughtsman) remains outside the world thus pictured, and with power to intervene. Prof. Stocks urges that this is merely an infinite series of evasions of the question. Yet, surely, it is clear that what is evaded is not the question, but the determinist verdict. The ultimate observer is not the slave of any constraint that his science can picture.

When no death can overtake you, and no objective circumstance can compel your choice: that is immortality, and that is free-will. But the really interesting thing is that, when these intuitive claims of our consciousness are recognised in that serial fashion which is the essential foundation ('nominalist' or otherwise) of the time picture, then—and not until then—does the world of physics become rational.

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I THOUGHT Mr. Dunne's demonstration that time as it is used in physics, is a mathematical device which is justified because, and to the extent that, it is adapted to the interpretation of experience, one of the most valuable parts of his book. It seems to me inadmissible to deduce qualities of experience from the character of a device voluntarily adopted to interpret it. Experience is not at the command of the arbitrary machinery of logic.

This seems to me almost axiomatic, but it might not be superfluous to go from the general to this particular case. If time is regarded merely as an indefinitely extended continuum—as in much physical work it is—it is not suitable for the complete correlation of our experience, because the fact that we necessarily move along it in a single direction is omitted. We must therefore supplement this conception (T_1) by the addition of such a movement, thereby introducing T_2. T_2 thus earns recognition only because it repairs the inadequacies of T_1. As Mr. Dunne admirably shows (pp. 35–36), it was not inherently necessary to start with an inadequate conception. We can describe a fraction as 1/3 or as 0·3, but if we adopt the second form it is necessary to continue beyond the first decimal place; and, in the matter of time, field physics has not done so. But to jump from that to the *independent* significance, of T_2, in which the observing experiencing individual may survive after he has ceased to be in T_1, is logically impossible. One-third is insufficiently represented by 0·3, but it is still worse to call it 0·03.

If one has to say 'yes' or 'no' to the survival question, I agree with Mr. Dunne that the onus of proof is on those who say 'no', but in science, unlike English law, 'Not Proven' is a possible, and often the only possible, verdict. I think it is so here.

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Spectrum of Nova Herculis, 1934

THE emergence of a displaced *B*-type absorption spectrum at the end of February, coupled with a drop in brightness to $3{\cdot}5^{m}$–$4{\cdot}0^{m}$, suggests that, after a most unusual life-history of two months, the nova is now developing along more normal lines. Accompanying the O II and N II absorption lines—displaced with a velocity of about − 900 km./sec.—there is to be seen an undisplaced bright band of [N II] at 5755·56. This can be traced back on the spectrograms to January 22.

We should like to correct our previous statement[1] that the forbidden lines of O I at 5577, 6300, 6363 A. had not previously been found in novæ. Dr. W. H. Wright observed the lines in Nova Ophiuchi, 1919[2], but the lines could not then be identified as [O I]. It is of interest to note that, while in the aurora and the night sky spectra, 5577 is the strongest line and in the nebula it is too weak to be observed, it is found in the nova of varying strength, but frequently about the same strength as 6363.

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[1] NATURE, **135**, 346; 1935.
[2] *Pub. of the Lick Obs.*, **14**, 12; 1920.

A Blue Flame in the System N_2O_5/O_3

WHEN dry nitric anhydride is vaporised in a stream of ozonised oxygen, and then passed through a glass tube heated by a small flame, the colourless gas becomes brown, through the formation of nitrogen dioxide, a short distance before the flame is reached. A narrow zone of a dark grey-blue colour is, however, seen hovering at the boundary, and this is preceded by a zone of clear blue. In a long tube, the blue flame thus formed 'strikes back' from time to time, at the rate of about 10 cm. per second, to the point at which the gas enters the tube, which is then filled from end to end with brown nitrogen dioxide. When the concentration of nitrogen pentoxide is low, the grey boundary between the colourless incoming gas and its pale brown decomposition products remains stationary and does not strike back.

It is suggested that the formation and disappearance of the blue zone may be due to the production and decomposition of a higher oxide of nitrogen; for example,

$$N_2O_5 + O_3 = 2\,NO_3(\text{blue}) + O_2\,;\quad 2NO_3 = 2NO_2 + O_2.$$

The temperature at the boundary is probably below 100°.

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