

in the region 2110-2500  $\text{cm}^{-1}$  could be analysed into 13 of the possible 15 branches of the  $\nu_3$  band.

From these analyses the length of the C-D bond could be calculated. The effective bond

length,  $r_0$  (C-D), was found to be  $1.09181 \pm 0.00029$  Å. The corresponding value for methane,  $r_0$  (C-H), is  $1.09403 \pm 0.00016$ .

### EVOLUTION AS A TEST FOR ETHICS\*

**T**WENTY years ago, Professor Waddington wrote a book on "Science and Ethics" to which his present book *The Ethical Animal* is a sequel. He does not try, as some critics have stated, to derive ethics from a study of evolution. He believes, however, that evolution helps us to judge between different ethical systems. Here are his exact words (p. 30) "We have first to try to ascertain the general character of human evolution or indeed, of animal evolution as a whole. We have then to enquire, of any particular ethical belief which comes to our attention, how effective it is in mediating this empirically ascertained course of evolutionary change."

The same ideal was expressed over three centuries ago, by Chapman in Clermont's speech in "The Revenge of Bussy d' Ambois", who held

"That in this one thing all the discipline  
Of manners and of manhood is contained ;  
A man to join himself to the universe  
In its main sway, and make, in all things fit  
One with that All, and go on, round as it."

I think that this is a noble fallacy, but yet a fallacy.

I do not think we know enough about the universe, or even about evolution on our planet, to use our knowledge as a test of ethical systems. It is possible that on the basis of messages received from the artificial satellite circling round our planet, the inhabitants of one of the planets of Tau Ceti or Delta Pavonis are at present saying something like this about our species. "The inhabitants of G<sub>1</sub> 17898 III have now reached the stage of technical knowledge when they will be able to exterminate one another completely. Judging from their past behaviour it is certain that they will do this. On all the 7319 planets known to us where living beings descended from carnivorous ancestors learned to promote nuclear fission they killed one another. The best hope for the survival of such a species is the appearance of a series of tyrants who massacre in the name of some religious belief. This checks the growth

of physical knowledge. Unfortunately for the species now dominating the planet in question it did not produce enough men of the type of Charlemagne and Mahmoud of Ghazni, and is in consequence now doomed. From a broader point of view this is a welcome prospect, as some herbivorous species devoid of fighting instincts may possibly evolve a high brain organization on this planet in the next hundred million years".

I do not happen to believe this, but I think it entirely possible that it may be true. Waddington's mind seems to move in the rather narrow set of intellectual grooves fashionable in modern Britain. Thus on page 35 he writes of philosophy as "understood by the most influential modern school, the followers of the later Wittgenstein". This school is not very influential compared with many older (and in the reviewer's opinion more intellectually coherent) philosophies such as Thomism and Vedantism. And its influence is negligible compared with that of Marxism as developed by Lenin, which is a modern school. Waddington may believe that Marxism is false, but if he thinks it is less influential than the school of Wittgenstein, he is blind to historical fact.

I do not even believe in Waddington's account of how man became an ethical animal. I think our ancestors underwent a rather sudden change of habitat, perhaps a "fall" from trees, which rendered their ancestral instincts incompatible with survival. They lost most of them, which enabled them to start technology; but to perform the functions of instincts they had to produce ethics. The human needs for ethics may be a temporary and unhappy phase in evolution.

In spite of all these criticisms the book contains some interesting bits of thought, and I hope that it will stimulate others to more constructive criticism than my own. I hope it will be widely read in India. But if so I trust that nobody will say "The teaching of modern evolutionary biology, as Waddington has shown, is....". When we have studied evolution for two thousand years we may be able to use it as an ethical criterion. Or we may not.

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\* *The Ethical Animal*. By C. H. Waddington. (George Allen and Unwin, Ruskin House, 40, Museum Street, London, W.C. 1), 1960. Pp. 230. Price 25 sh.