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# COMMENTARII

VOL. IV

N. 5

## PLENARY SESSION

ON

THE ORIGIN AND EARLY EVOLUTION  
OF LIFE (Part I)



REFLECTION ON SCIENCE AT THE DAWN  
OF THE THIRD MILLENNIUM (Part II)



ROUND TABLE ON THE PROBLEMS  
OF THE ORIGIN OF LIFE (Round Table)

22-26 October 1996

Round Table *corrigenda*

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EX AEDIBVS ACADEMICIS IN CIVITATE VATICANA

MCMXCVII

dire ce texte? Le texte de la création ne veut pas dire qu'il y a eu six jours, il veut dire que tout a été créé par Dieu, le monde des six jours est le monde tel qu'il existait, mais le grand enseignement de ce texte qui est un texte poétiquement génial aussi c'est que Dieu est créateur.

Alors, la question c'est que je pense que dans l'enseignement chrétien quotidien ces choses là se sont encore mal passées dans bien de cercles religieux. Donc le problème si vous voulez je dis c'est un problème plus catéchétique que théologique, c'est qu'au niveau des instruments pédagogiques il y a un gros effort à faire je pense, puisque la réponse à votre étudiant ... je crois, s'il a vu quelqu'un qui lui a expliqué bien, on aurait pu lui montrer qu'il était prisonnier finalement d'un faux problème, je crois.

### ESCHENMOSER (*Chairman*)

Now, in order not to create a rather rare situation that the Chairman is the major contributor to the discussion, I would like to go on now and ask Dr. Joshua Lederberg for his statement.

### LEDERBERG

I was originally going to focus on some questions about the early biochemical origin of life and I'll come to that in a moment, but if you permit me I would also preface with a remark in the spirit of the present discussion.

If I may go beyond theology, if you permit me to use that expression, there's an intrinsic paradox and I don't think it is readily resolved. Most of us here who are working scientists analyse the human body, analyse mechanism, give the most materialistic and mechanistic views that we are able to do in our examination of human beings, and we realize which is the flyspeck in the cosmos. But we also don't behave that way. We behave as human beings, we've a humanistic perspective, we've

a respect for the dignity of human individuals which does not derive in any way from our scientific judgment.

So, whether it's a question of theological terms or not there's in fact a paradox that we have to resolve within ourselves, and I don't think that they are reconciled, I think they represent different facets of our own personality, but perhaps we'll have more argument about that.

What I wanted to turn to is another part of our discussion, and then has to do with the gap between the production of ~~carbon~~ <sup>carbon</sup> (?) chains, namely organic molecules, and the RNA world, which has been a very large part of our discussion in the last several days. In my view a great deal of detail about that has been swept under the rug and we've given the impression that all the problems are solved, when in fact here much of that still remains to be done. There's a vast gap and that gap will remain until this transition can be reconstructed in the laboratory. Until that time this is a metaphysical position, not a scientific demonstration.

Now, I personally have now a great confidence that this transition will be consummated, but I do not regard it as a scientific demonstration, it's my way of life.

Above all, in fact, there are very few scientific facts that stand without constant revision, and that principle applies here as well. I don't know what we'll then find about the terms of the ... (?) equation, and what the probabilities are of the emergence of life one place or another, I think these are wild conjectures that we just grasp over the years, they are not just demonstrable from a deterministic standpoint.

I personally agree that'll be deterministically controlled, but that's because of the person that I am, not a consequence of demonstration.

The most important role, after all, of a scientific assertion is as a working hypothesis, the definition of a research programme that one hopes will be fruitful, and I've no doubt it is the best choice here to behave as if there were a ~~clear~~ (?) mechanistic pathway from the inorganic to the organic world, I think it's our only option at this stage.

clear

DRAKE

We've seen enormous progress in the last 168 years, I'm dating this back to the synthesis of urea by Wöhler (?), and this notion of the accessibility of the organic to analysis has had one fruitful victory after another. Why should we stop now at this stage, even if there's a ponderable gap that we don't know exactly how to fill. If we did stand still for the next 168 years, then perhaps it would be legitimate to abandon that working hypothesis of chemical evolution, but I'm quite certain that something is going to happen. We'll see things in 168 weeks, which will continue to alter and expand our perspective in other directions.

Wöhler

But as to the details of the research programme, this is an appeal to my colleagues, I really feel that they are too faddishly involved with a sort of (?) RNA as a primordial biopolymer that happens to be the one that we've understood the best in most recent history. We know that RNA ~~will ... can fall (?)~~, can make enzymatic activity, and so on and so forth, what seems to me a very large leap from the organic to RNA as the specific biotic polymer.

Where is the nucleotide pool ~~(?)~~ free of fatal contaminants that would enable such a synthesis?

The first biotic polymer does not have to be very fast, does not have to be very efficient, does not have to have a perfect structure. It's really enough a beginning, it's enough that we have sufficiency (?) of the rudiments of self-replicability in the catalytic activity so that it begins the pathway of the evolutionary cumulation of biological potency.

That may pose some difficulties, that's the very first steps that may be so feeble in the biotic capability. They may have turned over times of years or decades that would still be consistent with the first step and hard to replicate in the laboratory. Perhaps they will, perhaps not.

But my plea is: please, look for other intermediary polymers for more readily available pools.

But the philosophical side of this argument is what science really consists of. It should never be dogmatic assertion, ~~it~~ should be: these are the fruitful paths for further inquiry.  $\tau$