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### Editorial postscript to 'Contemporary aspects of evolution' (*Experientia* 39 (1983) 805-844)

Evolution has come to be a central theme in biology, and science in general, and is destined to remain so for a long time. Every new aspect – from the genetic code to social complexity – immediately attracts attention. The flow of Charles Darwin Centennial Commemoratives suggests that the more we find out about biological mechanisms, the more difficult it becomes to formulate an integrated hypothesis of evolution.

There is some confusion about the meaning of Darwin's theory of evolution, confusion to which Darwin himself contributed in no small manner. Having already established with others the principles of evolution (Darwin doing so, of course, with his own masterly and definitive set of arguments), he concentrated on the *mechanism* of evolution and indeed seems to have considered his 'natural selection' hypothesis as the more important contribution. Not many biologists nowadays doubt that the basic tenets of his hypothesis, variation and selection, remain valid in principle. But the mechanisms involved are infinitely more complex than could have been foreseen in his time.

We were pleased to present, in the August 1983 issue of *EXPERIENTIA*, just a few interesting examples, and it is encouraging to see that some discussion in the form of letters to the editor has ensued.

H. Gloor, Geneva

*Letter:* Comments to the 'Introduction' and the 'Conclusion' of the reviews on 'Contemporary aspects of evolution' (*Experientia* 39/8, August 1983).

J.M. Smith's remarks on the article 'Complex-irreversibility and evolution' which read as follows: 'That the bridge from physics to biology is still difficult to cross is illustrated by Walker's article. Thus, I find myself in agreement with much of what she says in the first part of her article which is mainly concerned with physical principles, and yet I disagree with almost everything she later says on evolution' imply that the author of this article is believed to be a physicist. There is no doubt about this conviction in C. Petit's 'Conclusion', where she writes: 'The integration of the theory (of evolution) with the laws of physics is, however, not possible yet and Walker's attempt results in several conclusions which cannot be accepted by a biologist'.

As a matter of fact, the author of the article in question majored in Zoology at the University of Zürich (Ph.D. with Prof. E. Hadorn) and has worked as an invertebrate zoolo-

gist ever since. Incidentally, she has also lectured on the theory of evolution since 1970 (Imperial College London, Universities of Zürich and Geneva, Post-Graduate School of INPA Manaus).

The essential correctness of the physical views expressed is largely due to the generous help of theoretical physicists (M. Delbrück, and also my colleagues from Imperial College, mainly R.M. Williams and T.W.B. Kibble). Thus it might be fairer to concede that the bridge from biology to physics was crossed rather successfully. The bridge from the old synthesis of the fifties to renewed questioning seems to be more difficult to cross, and special acknowledgments are due to *Experientia* for opening up such new paths.

In view of the overwhelming volume of facts and figures that have accumulated in recent biology, I am of the opinion that attempts toward a synthetic theory between physics and biology are long overdue. The theoretical physicists of five to eight decades ago arrived at spectacularly successful models on the basis of a comparatively slender body of factual data. But, then, theoretical physics has always been a noble profession, whereas theoretical biophysics has, as yet, not even acquired academic legitimacy.

It is hoped that the article will stimulate discussion along new lines and possibly stimulate arguments over the points in question rather than merely provoke statements of categorical disagreement.

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When I wrote: 'The integration of the theory (of evolution) with the laws of physics is, however, not possible yet', I was not thinking in terms of a hierarchy among sciences. Physics can be helpful to the theory of evolution on two levels: while punctual applications have facilitated the solution of many important problems, the globalist, probabilist approach is valuable because of its rigor. But the construction of global models comes up against serious problems – such as our ignorance regarding the role of regulation genes or genic pool integration mechanisms. In this sense, I do not believe that synthesis is possible yet.

C. Petit, Paris