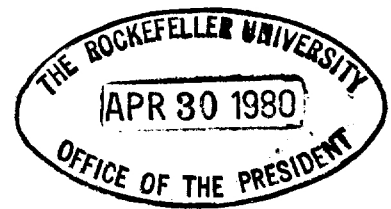


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April 28, 1980

President Joshua Lederberg
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Dear Josh:

Your query about the history of the comparative approach to the unravelling of metabolic pathways and physiological mechanisms is a challenging one. I cannot think of a recent scholarly treatment of this topic, but rather than delay my reply by looking for such an article, I offer the following recollections and references, which I hope will be of use to you.

Ed Tatum and I often talked about comparative biochemistry, and you may recall that the course he gave at Yale had that title. At that time I preferred "general biochemistry", which includes the comparative approach, because it seemed to me that "comparative biochemistry", at least as presented by Baldwin and Florkin, promised too much. Here I was following the tradition of "general physiology" as expounded by Claude Bernard and Jacques Loeb, among others.

Whatever the relative merits of the two terms, there can be little doubt that Ed derived his interest in the comparative approach from Van Niel, who in turn was strongly influenced by Kluver, in whose writings I have found the most incisive statements about the importance of this approach. That tradition, which of course goes back to Winogradsky and Beijerinck, emphasized the value of studying microorganisms for the understanding of metabolic processes common to all biological forms, and of exploring the specific variations in these basic processes as found in different microbes. No doubt your library has a copy of "Albert Jan Kluver, His Life and Work", edited by A. F. Kamp et al., and published by North-Holland Press in 1959. It contains several of Kluver's essays on his concept of biochemical unity and diversity, and also a lovely discussion by Van Niel (especially on pp. 114 ff.). Another book is the one by Kluver and Van Niel "The Microbe's Contribution to Biology" (Harvard University Press, 1956).

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In his introduction to Baldwin's little book "An Introduction to Comparative Biochemistry" (1st Ed., 1937; 4th Ed., 1964), Hopkins wrote of biochemistry that "One of its ultimate tasks is to decide on what, from a chemical standpoint, is essential for these manifestations [of visible physiological processes] as distinct from what is secondary and specific." Baldwin and also Florkin have developed this theme, although their own research dealt largely with invertebrate organisms, and with the occurrence of substances rather than with the metabolic processes in which they were involved. This approach goes back at least to 1903, with the appearance of Otto von Fürth's "Vergleichende chemische Physiologie der niederen Tiere." Aside from Florkin's little 1944 book "L'Évolution Biochimique", he has also written about this in the introductory chapter (with H. S. Mason) in Vol. I of the series "Comparative Biochemistry" (Academic Press, 1960). Florkin's work and writings are in a characteristic Franco-Belgian tradition, with Léon Fredericq and (more recently) Jean Roche as other major figures.

I suspect that much of this is well-known to you, but perhaps it includes some useful items. I shall be glad to help further, if I can, after my return from Europe in the middle of July. I leave in a few weeks, and am busy preparing lectures to give over there.

Yours ever,



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