TIBS – January 1985 I

Trends in Biochemical Sciences

Control analysis of metabolic systems

We would like to draw to the attention of readers of *TIBS* an agreement on nomenclature which we feel would help readers of past and future publications in this field. This concerns the way the control behaviour of complete systems is analysed both theoretically and experimentally. There have been significant developments in the last 10 years or so (for reviews see Refs 1–4). Although there is complete agreement about definitions and theorems, owing to historical factors there has developed a variety of nomenclatures and terminologies in different groups working in the same area. Many workers have felt that a uniform nomenclature should be adopted in the future. In the following we present the consensus of the undersigned for further usage.

The two principal types of coefficients are defined in Table I. The first type concerns measurements in complete systems (global coefficients), the second type measurements on the 'isolated' parts (local coefficients).

For the various other names and symbols used in the past, see Ref. 4.

Table I Principal types of coefficients

Definitions	Symbols	Name	
Global coefficients			
$\frac{\delta V}{V} / \frac{\delta P}{P} = \frac{\delta \ln V}{\delta \ln P}$	C^{V}_{P}	Control coefficient	Where V stands for any variable in the system (flux, pool concentration, free energy, etc.) and P for any parameter (independent variable) whose change causes the change in V (enzyme concentration, turnover number, etc.)
Local coefficients			
$\frac{\delta v}{v} / \frac{\delta S}{S} = \frac{\delta \ln v}{\delta \ln S}$	ϵ^{v}_{S}	Elasticity coefficient	Where v stands for the rate of any functional entity 'isolated' from the system (enzyme, permease, translocator, organelle, etc.) and S stands for any molecular species (effector) which affects the function directly (substrate, product, inhibitor, co-factor, etc.) For the more complex functional entities (e.g. mitochrondria) the term 'Overall elasticity coefficient' should be used.

References

1 Groen, A. K., Van der Meer, R., Westerhoff, H. V., Wanders, R. J. A., Akerboom, T. P. M. and Tager, J. M. (1982) in *Metabolic Compartmentation* (Siess, H., ed.) pp. 9–37, Academic Press
2 Porteous, J. W. (1983) *Biochem. Soc. Trans.* 11, 29–31
3 Porteous, J. W. (1983) *Trends Biochem. Sci.* 8, 195–197
4 Westerhoff, H. V., Groen, A. K. and Wanders, J. A. (1984) *Bioscience Reports* 4, 1–22

The undersigned will in all future publications use this nomenclature and symbolism and it is hoped that other workers will follow our example.

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