

Rheostasis

The Physiology of Change

N. MROSOVSKY

University of Toronto

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Preface

Homeostasis has been a guiding principle in physiology for the last hundred years. That it has survived so well attests to its value. As a concept, however, homeostasis has received relatively little critical evaluation, despite Cannon having written that his account was “inadequate and provisional.” There are, in fact, a number of considerations that are not adequately dealt with by current formulations of homeostasis. What happens, for instance, when the demands of two different regulatory systems clash? How can constancy of the *milieu intérieur* be maintained in such circumstances.

A point that is not generally appreciated is that the body does not always seek constancy of its internal environment. It does not always react in ways that prevent change. On the contrary, sometimes physiological mechanisms actively promote change. Specialists studying particular organs or systems have, of course, realized this. The scientific literature already contains numerous explanations couched in terms of changing set-points. One may read of the resetting of baroreceptors, osmostats, chemostats, and alphasstats. Adjustments to thermostats, gonadostats, mechanostats and lipostats have already been proposed. But some name is needed to recognize the generality of these phenomena. Rheostasis is a convenient term for designating changes in regulated levels.

Changes in regulated levels have often initially been regarded as failures of homeostasis. Only later has the adaptive value of some of these changes been discerned. Keeping the internal environment constant is not always an overriding imperative.

This book is a reexamination and elaboration of the concept of homeostasis to include changes in regulated levels, rheostasis. Its main chapters collate, compare, and categorize examples of rheostasis for a variety of physiological variables. Conflicts between different regulatory systems emerge as a common circumstance promoting rheostasis, but too little is known about changes in regulated levels to sketch in more than a few rudiments. It is hoped, nevertheless, that an attempt to look at homeostasis from a more evolutionary perspec-

tive and to elaborate on what is already a very useful concept may constitute a small step toward establishing some valid principles. If even that is too ambitious, then perhaps at least some readers will share the pleasure of comparing the physiology of change in apparently disparate phenomena.

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