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# REFLEX CONTROL OF POSTURE AND MOVEMENT

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## Preface

The last decades have seen a great many papers devoted to the proprioceptive mechanisms engaged in posture and movement.

Following the pioneering studies of the physiological behaviour of mammalian spindles and Golgi tendon organs, responding to stretch and contraction, a generation of competent experimenters has elucidated in detail the role of the proprioceptive input in the reflex regulation of muscle tone and servoassistance of movement. Similarly, the reactions of motoneurons and interneurons have been subjected to study, in relation to both proprioceptive and supraspinal descending volleys, with a view to understanding interactions between central programmes and peripheral feedback control of movement.

In recent years, more consideration has been given to the mechanisms that are subjected to proprioceptive influences from the neck and the extrinsic eye muscles; new experimental facts have served to throw light upon the effects of neck afferents on the motoneurons of their own muscles, as well as on supraspinal structures involved in the cervical control of posture and movement.

The proprioceptive input from the somatic musculature is supplemented by other afferent systems intervening in the regulation of tonic and phasic motor activity. Detailed studies have greatly clarified the significance of labyrinthine regulation of oculomotor and spinal motor activity, especially that of the neck motoneurons. Likewise the influence of neck and visual inputs on the vestibulo-ocular and vestibulo-spinal reflex arcs has been studied in several investigations.

Specialization may now be said to have advanced to a level where it has become hard for a single worker to embrace adequately both the structural and functional aspects within one circumscribed field of study. This is the point at which the present Symposium volume will become useful. One has, in current work, become increasingly aware of the urgent need for understanding how the proprioceptive, labyrinthine, and visual inputs enter the motor control systems, and how they interact at segmental and suprasedgmental levels to ensure appropriate adjustment of the motoneuronal output. It is hoped that this volume will stimulate investigators to bridge the enormous gap between the actual complexity of each individual contributing system, and the emerging principles of their interaction in the service of an integrated final act.

To this end, the general theme of the Symposium was treated in several sessions, each one devoted to one of its aspects. Clarifying discussions were devoted to the role of the proprioceptive, labyrinthine and visual inputs in the control of reflex posture and movements. Some sections were concerned with the integration of different sensory inputs at segmental and supraspinal levels and to their significance for the coordination of body, head, and eye movements.

The plan of the Symposium and the selection of participants were completed after consultations with members of the Organizing Committee. For valuable suggestions thanks are due to Drs. E. Bizzi, E.V. Evarts, V. Henn, M. Ito, A. Lundberg, W.D. Willis and V.J. Wilson.

The meetings were held in the Scuola Normale Superiore, the old institution harbouring European cultural and scientific traditions, sited at Pisa's beautiful mediaeval Piazza dei Cavalieri. This privilege was highly appreciated by the participants and we, at this time, want to express our thanks to the Rector, Professor E. Vesentini and the Dean, Professor L.A. Radicati, of the Scuola for the permission to gather for lectures and discussions at this historical site. Their presence at the inauguration was gratefully noted. Similarly, the presence of the Vice Rector of Pisa University, Professor G. Falcone, the Dean of its Medical School, Professor G. Pellegrino, and the head of its Physiological Institute, Professor G. Moruzzi, was greatly appreciated.

The Fondazione Giovanni Lorenzini, the Italian National Research Council, the International Brain Research Organization, and the National Institute of Neurological and Communicative Disorders and Stroke at the National Institutes of Health in Bethesda, U.S.A. kindly agreed to sponsor the Symposium. Organizing it was made possible by a generous grant from the Fondazione Giovanni Lorenzini. For this we want to express our gratitude to its President, Professor R. Paoletti, and its Secretary, Dr. E. Folco. Grants from the Italian National Research Council and the companies of Montedison and Formenti are gratefully acknowledged. Finally, we owe a quite special debt of gratitude to the assistants, secretaries and technicians of the Institute of Physiology for their care and cooperation in the service of the Symposium. Help was willingly given and efficiently put into action.

Ragnar Granit  
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