Contents

Foreword         Gordon M. Shepherd  iii
Preface          Richard L. Doty     v
 Contributors    xi
Introduction and Historical Perspective  Richard L. Doty  xv

I. OLFAC TION

A. Anatomy and Neurobiology

1. Anatomy of the Human Nasal Passages
   Dean M. Clerico, Wyatt C. To, and Donald C. Lanza  1

   Bert Ph. M. Menco and Edward E. Morrison  17

3. Olfactory Mucosa: Composition, Enzymatic Localization, and Metabolism
   Xin Xin Ding and Alan R. Dahl  51

4. Molecular Neurobiology of Olfactory Transduction
   Cheil Moon and Gabriele V. Ronnett  75

5. Neurogenesis in the Adult Olfactory Neuroepithelium
   Alan Mackay-Sim  93

6. Developmental Anatomy of the Olfactory System
   Meng Inn Chuah, James E. Schwob, and Albert I. Farbman  115

7. Anatomy and Neurochemistry of the Olfactory Bulb
   Igor L. Kratskin and Ottorino Belluzzi  139

8. Central Olfactory Structures
   Thomas A. Cleland and Christiane Linster  165

9. Sensory Physiology of Central Olfactory Pathways
   Donald A. Wilson and Regina M. Sullivan  181
B. Functional Measurement, Ontogeny, and Genetics

10. Psychophysical Measurement of Human Olfactory Function, Including Odorant Mixture Assessment
    *Richard L. Doty and David G. Laing*
    203

11. Electrophysiological Measurement of Olfactory Function
    *Gerd Kobal*
    229

12. Functional Neuroimaging of Human Olfaction
    *Noam Sobel, Bradley N. Johnson, Joel Mainland, and David M. Yousem*
    251

    *Luca Turin and Fumiko Yoshii*
    275

14. Olfactory System Cybernetics: Artificial Noses
    *Krishna C. Persaud*
    295

15. Olfaction and the Development of Social Behavior in Neonatal Mammals
    *Richard H. Porter and Benoist Schaal*
    309

16. Genetics of Olfactory Perception
    *Nancy L. Segal and Tari D. Topolski*
    329

17. Mammalian Pheromones: Fact or Fantasy?
    *Richard L. Doty*
    345

18. Psychophysical Evaluation of Olfaction in Nonhuman Mammals
    *Lloyd Hastings*
    385

19. Methods for Determining Odor Preferences in Nonhuman Mammals
    *Richard L. Doty*
    403

20. Olfactory Memory
    *Aras Petrulis and Howard Eichenbaum*
    409

C. Clinical Applications and Perspectives

    *Richard E. Frye*
    439

22. Clinical Disorders of Olfaction
    *Claire Murphy, Richard L. Doty, and Heather J. Duncan*
    461

23. Odor Perception in Neurodegenerative Diseases
    *Richard L. Doty*
    479

24. Olfactory System Neuropathology in Alzheimer’s Disease, Parkinson’s Disease, and Schizophrenia
    *Gregory S. Smutzer, Richard L. Doty, Steven E. Arnold, and John Q. Trojanowski*
    503
Contents

25. Multiple Chemical Intolerance
   Claudia S. Miller
   525

26. The Olfactory System and the Nasal Mucosa as Portals of Entry of Viruses, Drugs, and Other Exogenous Agents into the Brain
   Harriet Baker and Mary Beth Genter
   549

27. Influence of Environmental Toxicants on Olfactory Function
   Lloyd Hastings and Marian L. Miller
   575

28. Evaluation of Olfactory Deficits by Structural Medical Imaging
   Cheng Li, Richard L. Doty, David W. Kennedy, and David M. Yousem
   593

29. Plasticity Within the Olfactory Pathways: Influences of Trauma, Deprivation, Stem Cells, and Other Factors
   Joel Maruniak
   615

30. Head Injury and Olfaction
    Richard M. Costanzo, Laurence J. DiNardo, and Evan R. Reiter
   629

II. GUSTATION

A. Anatomy and Neurobiology

31. Saliva: Its Role in Taste Function
    Robert M. Bradley and Lloyd M. Beidler
    639

32. Morphology of the Peripheral Taste System
    Martin Witt, Klaus Reutter, and Inglis J. Miller, Jr.
    651

33. Central Taste Anatomy and Neurophysiology
    Edmund T. Rolls and Thomas R. Scott
    679

34. Molecular Physiology of Gustatory Transduction
    Timothy A. Gilbertson and Robert F. Margolskee
    707

35. Gustatory Neural Coding
    David V. Smith and Thomas R. Scott
    731

36. Development of the Taste System: Basic Neurobiology
    Charlotte M. Mistretta and David L. Hill
    759

B. Functional Measurement, Ontogeny, and Genetics

37. Contemporary Measurement of Human Gustatory Function
    Marion E. Frank, Thomas P. Hettinger, Michael A. Barry, Janneane F. Gent, and Richard L. Doty
    783
| 38. | Human Perception of Taste Mixtures | 805 |
|     | *Hendrik N. J. Schifferstein* |
| 39. | The Ontogeny of Human Flavor Perception | 823 |
|     | *Judith R. Ganchrow and Julie A. Mennella* |
| 40. | Genetics of Human Taste Perception | 847 |
|     | *Adam Drewnowski* |
| 41. | Psychophysical Evaluation of Taste Function in Nonhuman Mammals | 861 |
|     | *Alan C. Spector* |

### C. Clinical Applications and Perspectives

| 42. | Nutritional Implications of Taste and Smell | 881 |
|     | *Richard D. Mattes* |
| 43. | Conditioned Taste Aversions | 905 |
|     | *Kathleen C. Chambers and Ilene L. Bernstein* |
| 44. | Clinical Disorders Affecting Taste: Evaluation and Management | 935 |
|     | *Steven M. Bromley and Richard L. Doty* |
| 45. | Head Injury and Taste | 959 |
|     | *Richard M. Costanzo, Laurence J. DiNardo, and Evan R. Reiter* |

### III. OTHER CHEMOSENSORY SYSTEMS

| 46. | The Vomeronasal Organ | 967 |
|     | *Peter A. Brennan and Eric B. Keverne* |
| 47. | Trigeminal Chemosensation | 981 |
|     | *Richard L. Doty and J. Enrique Cometto-Muñiz* |
| 48. | The Structure and Function of the Nervus Terminalis | 1001 |
|     | *Marlene Schwanzel-Fukuda and Donald W. Pfaff* |

Author Index
Subject Index