

CONTENTS

Preface	xi
Keynote Address	
Multiple Pathways to Spring, W.R. Dawson	1
Invited Contributions	
Comparison of Thermal Responses Between Rest and Exercise During Cold Water Immersion, R.E. Reinertsen, T.T. Volla, M. Sandsund, T. Eid, and M.K. Bakkevig	15
Seasonality of Daily Torpor in a Migratory Hummingbird, S.M. Hiebert	25
Getting By on High: Ecological Energetics of Arctic and Alpine Grouse, K. Martin, R.F. Holt, and D.W. Thomas	33
Hibernation in Birds: Comparisons with Mammals, A.R. French	43
The Physiology of Hibernation in an Egg-laying Mammal, the Echidna, S. Nicol and N.A. Andersen	55
Energetics of Social Hibernation, W. Arnold	65
Factors Affecting Hibernation Commencement and Spring Emergence in Siberian Chipmunks (<i>Eutamias sibiricus</i>), M. Kawamichi and T. Kawamichi	81
Thermoregulatory "Strategies" of Two <i>Apodemus</i> Species Inhabiting a Cold Environment on Mount Hermon, A. Haim, A. Rubal, and J. Harari	91

Individual Energetic Strategies in Winter-Adapted Djungarian Hamsters: The Relation Between Daily Torpor, Locomotion, and Food Consumption, <i>T. Ruf and G. Heldmaier</i>	99
Sexual Differences in Hibernaculum Contents of Richardson's Ground Squirrels: Males Store Food, <i>G.R. Michener</i>	109
Patterns of Body Temperature Change in Hibernating Arctic Ground Squirrels, <i>B.M. Barnes and D. Ritter</i>	119
Effects of Captivity on Peak Rates of Oxygen Consumption of Winter-caught Deer Mice and Black-capped Chickadees, <i>R.W. Hill, P.E. Lederle, and D.L. Beaver</i>	131
Dietary Lipids and Thermal Physiology, <i>F. Geiser</i>	141
Regulation of Gut Structure and Function in Hibernators, <i>H.V. Carey</i>	155
Metabolic Fuel Utilization During Hibernation, <i>J. Dark and N.F. Ruby</i>	167
Energy Requirements of Hibernating Alpine Marmots, <i>G. Heldmaier, S. Ortmann, and G. Körtner</i>	175
Diet Affects Hibernation in Turkish Hamsters, <i>T.J. Bartness, E.S. Hall, P. Trayhurn, and B.D. Goldman</i>	185
Circadian Rhythmicity and Photoperiodism in the Djungarian Hamster, <i>G.R. Lynch, W. Puchalski, R.R. Margraf, and M.A. Rea</i>	193
Photoperiodic Control of Reproduction and Hibernation in the European Hamster (<i>Cricetus cricetus</i>): Morphological and Functional Analysis, <i>B. Canguilhem, M. Masson-Pévet, B. Vivien-Roels, and P. Pévet</i>	201
Regulation of Cardiac Cytosolic Free Ca^{2+} at Low Temperature in the Richardson's Ground Squirrel, <i>B. Liu and L.C.H. Wang</i>	207
Plasma Membrane Proton Transport and Hamster Brown Adipocyte Thermogenesis, <i>B.A. Horwitz and J.S. Hamilton</i>	217

Seasonal Lipolysis in Hibernators, <i>G.L. Florant, J. Foster, P.K. Ram, and N. Edens</i>	225
Sleep, Hypothermia, and Hibernation: Metabolic Rate and the Control of Breathing Pattern in Golden-mantled Ground Squirrels, <i>W.K. Milsom, S. Osborne, P.F. Chan, J.D. Hunter, and J.Z. MacLeod</i>	233
Temperature Regulation, Enzyme Kinetics, and Metabolic Depression in Mammalian Hibernation, <i>A. Malan</i>	241
What Is a Bout of Hibernation? <i>H.C. Heller, D.A. Grahn, L. Trachsel, and J.E. Larkin</i>	253
Calcium and Temperature Dependent Neural Mechanisms in CA1 Pyramidal Cells in the Rat and Hamster Hippocampal Slice, <i>J.M. Horowitz and M.P. Thomas</i>	265
The Suprachiasmatic Nucleus Mediates Rhythms of Hibernation and Daily Torpor in Rodents, <i>I. Zucker, N.F. Ruby, and J. Dark</i>	277
On Possible Mechanisms of the Septohippocampal System Participation in the Neural Control of Hibernation, <i>A.B. Belousov</i>	291
Is Endogenous Opioid Involved in Hibernation? <i>L.C.H. Wang</i>	297
Immediate Early Gene Expression in Brain Across the Hibernation Cycle, <i>T.S. Kilduff, B.F. O'Hara, E.L. Sutin, F.L. Watson, L. Bitting, and H.C. Heller</i>	305
Possible Involvement of Endogenous Adenosine in Hibernation, <i>T.F. Lee, F. Nürnbergger, and L.C.H. Wang</i>	315
Adaptive Changes of Hypothalamic Thermosensitive Neurons After Exposure to Cold Environmental Temperature, <i>F.-K. Pierau, J. Schenda, B. Tzschentke, M. Konrad, and H. Sann</i>	323

Regulation of Brown Adipose Tissue Function in Cold-Adapted Animals: Lack of β_3 -Adrenergic Receptors in Brown Adipose Tissue of Cold-Adapted Guinea Pigs, J. Himms-Hagen, N. Bégin-Heick, A.-L. Kates, J. Triandafillou, M. Ghorbani, and S. Kucharczyk	331
Why Are Brown Fat Cells from Cold-acclimated Animals Not Better? J. Nedergaard, L. Unelius, A. Jacobsson, M. Mühleisen, P. Svoboda, and B. Cannon	345
Species Distribution of Brown Adipose Tissue: Characterization of Adipose Tissues from Uncoupling Protein and Its mRNA, P. Trayhurn	361
Genes in the Cold: A Survey of the Regulation of Gene Expression in Brown Adipose Tissue, B. Cannon, A. Jacobsson, and J. Nedergaard	369
Brown Adipose Tissue and the Uncoupling Protein UCP: Cellular and Molecular Studies, S. Klaus, A.M. Cassard-Doulcier, O. Champigny, C. Gelly, S. Raimbault, L. Casteilla, F. Bouillaud, and D. Ricquier	381
Muscle Function in Hibernators, S.J. Wickler, D.F. Hoyt, F. van Breukelen, and C.N. Rice-Warner	389
Increased Lipoprotein Lipase Activity in Brown Adipose Tissue During Arousal of the Hibernating Garden Dormouse (<i>Eliomys quercinus</i> L.), L. Ambid, S. Le Gouic, and M. Nibbelink	399
Lipoprotein Lipase Is Differentially Regulated in Brown and White Adipose Tissue During Seasonal Acclimatization in the Djungarian Hamster, M. Klingenspor, S. Stöhr, and G. Heldmaier	409
Membrane Adaptations in Ectotherms and Endotherms, A.J. Hulbert	417
Handling of Sodium Ion by the Plasma Membrane: Differences That Account for Failure of Cold-Sensitive Cells, J.S. Willis and M. Marjanovic	429

Differential Gene Expression in the Liver During Hibernation in Ground Squirrels, S.L. Martin, H.K. Srere, D. Belke, L.C.H. Wang, and H.V. Carey	443
Perspectives on Molecular Function in Hibernators: Insights from Quiescent States of Invertebrates, S.C. Hand	455
Identification and Characterization of Novel Types of Plasma Protein Specific for Hibernation in Rodents, N. Kondo and J. Kondo	467
Myocardial β -Adrenergic Receptor Complex in Hibernation, S.A. Morris, G. Florant, M. Saxon, G. Chen, and J.P. Bilezikian	475
Molecular Control of Prehibernation Brown Fat Growth in Arctic Ground Squirrels, B.B. Boyer, B.M. Barnes, J. Kopecky, A. Jacobsson, and J. Hermanska	483
Hypothalamic Neuropeptides, Metabolic Hormones, and Seasonal Fattening in Golden-mantled Ground Squirrels, T. Boswell and G.J. Kenagy	493
Integrated Physiological Responses Promoting Anuran Freeze Tolerance, R.E. Lee, Jr., and J.P. Costanzo	501
Muscle Disuse in Hibernation: Gene Expression and Morphology, J.M. Steffen, Y. Li, P.S. Steele, K.M. Klueber, and W.K. Milsom	511
Molecular Mechanism for Selective Retention of Essential Fatty Acids During Hibernation, R.A. Coleman, G.L. Florant, N. Mostafa, T. Xia, and B.G. Bhat	519
Point Counterpoint	
Does Nonshivering Thermogenesis Exist in Birds?	
Overview, C. Carey	527

Existence of Nonshivering Thermogenesis in Birds, C. Duchamp, F. Cohen-Adad, J.-L. Rouanet, E. Dumonteil, and H. Barré	529
Does Regulatory Nonshivering Thermogenesis Exist in Birds? R.L. Marsh	535
Acidosis, Q_{10} , and Metabolic Depression: Causation or Epiphenomena in Mammalian Hibernation?	
Overview, P.R. Morrison	539
Metabolic Depression During Hibernation: the Role of Respiratory Acidosis, W.K. Milsom	541
Suppression of Metabolic Rate in Hibernation, G. Heldmaier, R. Steiger, and T. Ruf	545
Metabolic Rate Reduction During Hibernation, F. Geiser	549
Why Do Hibernators Periodically Arouse?	
Overview, C. Carey	553
Hibernators Periodically Arouse in Order to Sleep, B.M. Barnes, C. Omtzigt, and S. Daan	555
Neurochemical Regulation of Arousal from Hibernation, L.C.H. Wang	559
Index	563