

# Contents

## Volume 1

EDITORS' PREFACE	xiii
PLENARY SESSION. WORLD FOOD PRODUCTION - ENVIRONMENT - PESTICIDES	
Introduction - H. GEISSBÜHLER	3
Objectives and Strategies of World Food Production - E. KNÜSLI	5
The Future of Plant Protection in Agriculture - K.V. NOVOZHILOV	15
Chemicals in the Environment and their Effects on Ecosystems - J.H. KOEMAN	25
The Toxicologist's Responsibility in the Evaluation of Plant Protectants - D. HENSCHLER	39
Pesticide Research to Maintain and Improve Plant Protection - J.E. CASIDA	45

## Volume 2

EDITORS' PREFACE	xiii
MAIN TOPIC I. SYNTHESIS OF PESTICIDES	
<i>SYMPOSIUM Ia. HETEROCYCLIC CHEMISTRY IN PESTICIDE SYNTHESIS</i>	
Introduction by Chairman - G. KEMPTER	57
Heterocyclic Synthesis by Rearrangement - A.J. BOULTON and A.R. KATRITZKY	58
Syntheses and Transformations of Nitrogen and Sulphur Containing Bicyclic Heterocyclic Systems - B. STANOVNIK and M. TISLER	65
Synthesis of BMC-Analogous N-Heterocycles from 1.2-, 1.3-, 1.4-, and 1.5-Diamines - G. KEMPTER	75
Synthesis of Pesticidal Bis-trifluoromethyl-imino Substituted Heterocycles - K. GROHE, W. BRANDES and I. HAMMANN	82
Dimethyl-maleic Anhydride, a New Synthesis and Versatile Uses of an Old Compound - M.E. BAUMANN and H. BOSSHARD	85
Synthesis and Herbicidal Activity of 4-Acylpyrazole Derivatives - T. KONOTSUNE, K. KAWAKUBO and T. YANAI	94
Synthesis and Plant Growth Regulator Properties of C-o-Carboxyphenyl Derivatives of Five and Six Membered Heterocycles - R.L.N. HARRIS, J.L. HUPPATZ, J.N. PHILLIPS and T. TEITEL	99
Synthesis of Isocoumarins and their Biological Activities - K. MAEKAWA and H. YOSHIKAWA	104

*SYMPOSIUM Ib. ORGANOMETALLIC AND ORGANOPHOSPHORUS CHEMISTRY FOR SYNTHESIZING  
NEW PESTICIDES*

Introduction by chairman - J.T. MARVEL	108
Potential Phosphorus-Containing Intermediates for the Synthesis of Pesticides - W. KLOSE	109
Synthesis and Selectivity of Action of Some New Thiophosphoro-organic Insecticides - M.I. KABACHNIK and T.A. MASTRYUKOVA	120
Synthesis and Properties of O-Aryl O-Alkyl S-Alkyl-Phosphorothioates - J. DRABEK and V. FLÜCK	130
Synthesis and Insecticidal Activity of 1,3,2-Oxazaphospholidines- M. ETO and S. TAWATA	135
Glyphosate and Related Chemistry - J.E. FRANZ	139
Transition Metal Carbene Complexes in Organic Synthesis - C.P. CASEY	148
Methods of Synthesizing mixed Trialkyltin Chlorides - W. WEHNER	158

MAIN TOPIC II. CHEMICAL STRUCTURE AND BIOLOGICAL ACTIVITY

*SYMPOSIUM IIa. STRUCTURE-ACTIVITY CORRELATIONS IN RECENT CLASSES OF INSECTICIDES*

Introduction by Co-chairman - J.D. SIDDALL	165
Recent Structure-Activity Correlations in Synthetic Pyrethroids - M. ELLIOT and N.F. JANES	166
Chemistry, Absolute Structures and Biological Aspect of the Most Active Isomeres of Fenvalerate and other Recent Pyrethroids - I. NAKAYAMA, N. OHNO, K. AKETA, Y. SUZUKI, T. KATO and H. YOSHIOKA	174
Comparative Metabolism of Pyrethroids, Derived from 3-Phenoxybenzyl and $\alpha$ -Cyano-3-Phenoxybenzyl Alcohols - J.E. CASIDA, L.C. GAUGHAN and L.O. RUZO	182
Benzospiro Pyrethroids - D.G. BROWN and R.W. ADDOR	190
Conformational Studies of Phenothrin Analogs and Implications on Insecticidal Activity - A.J. HOPFINGER and R.D. BATTERSHELL	196
New Insecticides. Combined DDT - Isosteres and Pyrethroid Structures - G. HOLAN, D.F. O'KEEFE, K. RIHS, R. WALSER and C.T. VIRGONA	201
Nitromethylene Insecticides - S.B. SOLOWAY, A.C. HENRY, W.D. KOLLMEYER, W.M. PADGETT, J.E. POWELL, S.A. ROMAN, C.H. TIEMAN, R.A. COREY and C.A. HORNE	206
Synthesis and Structure-Activity Relationships in a Series of Nitrophenyl Carbamates - A.C. BAILLIE	218

*SYMPOSIUM IIb. STRUCTURE-ACTIVITY CORRELATIONS IN RECENT CLASSES OF HERBICIDES,  
PLANT GROWTH REGULATORS AND FUNGICIDES*

Introduction by Chairman: H.P. FISCHER	222
Structure-Activity Correlations of Recent Herbicides in Phytosynthetic Reactions - A. TREBST and W. DRABER	223
The Chemical Structure and Herbicidal Activity of Alloxydim-sodium and Related Compounds - I. IWATAKI and Y. HIRONO	235
Chemical Constitution and Activity of Bipyridinium Herbicides - L.A. SUMMERS	244
Phenoxy-phenoxy-propionic Acids and Derivatives as Grass Herbicides - H.J. NESTLER, P. LANGE LÜDDEKE, H. SCHÖNOWSKY and F. SCHWERDTLE	248
Structure-Activity Relationship of Cyclic Imide Herbicides - K. WAKABAYASHI, K. MATSUYA, H. OHTA and T. JIKIHARA	256
The Trifluoromethanesulfonanilide Class of Herbicides and Plant Growth Regulators - T.L. FRIDINGER	261
Structure-Activity Correlations in Control of Linolenic Acid Content of Plant Membranes by Substituted Pyridazinones - J.B. St. JOHN, F.R. RITTIG, E.N. ASHWORTH and M.N. CHRISTIANSEN	271
Triazolyl-O,N-acetals, Chemistry, Activity and Structure - W. KRÄMER, K.H. BÜCHEL, W. MEISER, W. BRANDES, H. KASPER and H. SCHEINPFLUG	274

MAIN TOPIC III. NATURAL PRODUCTS WITH BIOLOGICAL ACTIVITY

*SYMPOSIUM IIIa. NATURALLY-OCCURRING INSECT REGULATORS AND INSECTICIDES*

Introduction by Chairman - J. MEINWALD	283
Some Terpenoid Insect Antifeedants from Tropical Plants - I. KUBO and K. NAKANISHI	284
Nematicidal Substances from Plants - K. MUNAKATA	295
Insect Control Using Natural Products - E. SHAAYA and R. IKAN	303
A Novel Insecticidal Secondary Metabolite from the Entomopathogenic Fungus <u>Entomophthora virulenta</u> - N. CLAYDON	307
Purification and Properties of Silkworm Prothoracicotropic Hormone - A. SUZUKI, H. NAGASAWA, A. ISOGAI, S. TAMURA and H. ISHIZAKI	311
Recent Discoveries in Insect Pheromone Chemistry - J.H. TUMLINSON	315
Stereochemical Evidence of Dual Chemoreceptors for an Achiral Sex Pheromone in <u>Lepidoptera</u> - O.L. CHAPMAN	323
Chemical Defence in the Termite <u>Ancistrotermes cavithorax</u> - R. BAKER, P.H. BRINER and D.A. EVANS	330

*SYMPOSIUM IIIb. NATURALLY-OCCURRING PLANT GROWTH REGULATORS AND FUNGICIDES*

Introduction by Co-chairman: L. SUKH DEV	335
Naturally-occurring Plant Growth Inhibitors as Models for the Synthesis of New Growth Retardants - K. SCHREIBER	336
New Plant Growth Regulators Isolated from Higher Plants - G.L. STEFFENS, J.G. BUTA, L.E. GREGORY, N.B. MANDAVA, W.J. MEUDT and J.F. WORLEY	343
The Role of the Source of Ethylene on the Development of an Abscission Layer in Olive Pedicels - Y. BEN-TAL, I. KLEIN and S. LAVEE	347
Fungicidal Components of Creosote Bush Resin - S. FERNANDEZ, L.M. HURTADO and F. HERNANDEZ	351
Plant Growth Regulators Produced by Microorganisms - S. TAMURA	356
Chemistry and Plant Growth Regulating Activity of Fusicoccin Derivatives and Analogues - A. BALLIO	366
Moniliformin and Related Cyclobutenediones - D. BELLUS and H.P. FISCHER	373
The Influence of Antagonistic Fungi on the Spore Formation of Rust Fungi - H.R. FORRER and J. WERDER	383

## Volume 3

EDITORS' PREFACE xiii

### MAIN TOPIC IV. BIOCHEMISTRY OF PESTS AND MODE OF ACTION OF PESTICIDES

#### *SYMPOSIUM IVA. UPTAKE AND TRANSLOCATION OF XENOBIOTICS IN PLANTS*

Introduction by Chairman: L.V. EDGINGTON	391
Transcuticular Movement of Xenobiotics - J. SCHÖNHERR	392
Movement of Xenobiotics in Plants - Perspectives - C.E. PRICE	401
The Uptake and Translocation of Foliar-Applied Herbicides Using an Explant System - R.C. KIRKWOOD	410
Penetration, Translocation and Metabolism of C-14 Aminocarb Insecticide in Conifers - K.M.S. SUNDARAM	416
Physiological and Physicochemical Requisites for the Transport of Xenobiotics in Plants - R.A. CHRIST	420
Phloem Loading and Transport of Weak Acids - C.E. CRISP and M. LOOK	430
The Uptake and Translocation of a New Systemic Fungicide Phenapronil (RH 2161) - R.A. MARTIN and L.V. EDGINGTON	438
Some Patterns of Distribution of Systemic Pesticides in Small Trees and Hops - J.G. ALLEN	443

#### *SYMPOSIUM IVb. MECHANISMS OF PESTICIDE-TARGET INTERACTION*

Introduction by Chairman: R.D. O'BRIEN	448
The Interaction of Pesticides with Gates, Receptors and Enzymes of the Nervous System - R.D. O'BRIEN	449
Chitin as a Target for Pesticide Action: Progress and Prospects - T. MISATO, K. KAKIKI and M. HORI	458
Formamidine Pesticides: A Novel Mechanism of Action in Lepidopterous Larvae - A.E. LUND, R.M. HOLLINGWORTH and L.L. MURDOCK	465
Mode of Action of Diphenylethers and Related Herbicides on Mosquito Larvae - M. IKEUCHI, S. YASUDA and S. MATSUNAKA	470
Herbicide Interaction with Plant Biochemical Systems - W. DRABER and C. FEDTKE	475
Receptors for Plant Growth Regulators - M.A. VENIS	487
Characterization of a Common Molecular Target for Selected Structures of Photosynthesis-Inhibiting Herbicide - C.J. Van ASSCHE	494
Studies on the Mode of Action of Some Alpha-Substituted Pyridine Compounds in Plants - C.L. FOY and I. CHANG	499

## MAIN TOPIC V. PESTICIDE DEGRADATION

### *SYMPOSIUM Va. BIOCHEMICAL ASPECTS OF PESTICIDE DEGRADATION*

Introduction by chairman: K.I. BEYNON	507
Oxidative Processes in Pesticide Transformation - J. MIYAMOTO and H. OHKAWA	508
Hydrolytic Mechanisms of Pesticide Degradation - D.J. ECOBICHON	516
Conjugation Reactions of Pesticides and their Metabolites with Sugars - H.W. DOROUGH	526
Conjugation Reactions with Amino Acids Including Gluthathione - I.J.G. CLIMIE and D.H. HUTSON	537
Metabolism of the Rice Herbicide, Molinate (Ordram) in the Rat - J.R. de BAUN, D.L. BOVA, C.K. TSENG and J.J. MENN	547
Investigations into the Degradation of Bentazon in Plant and Soil - S. OTTO, P. BEUTEL, N. DRESCHER and R. HUBER	551
Anaerobic Metabolism of Lindane and Related Compounds by Liver Microsomes - N. KURIHARA, K. TANAKA and M. NAKAJIMA	557
Toxaphene Composition, Structure-Toxicity Relations and Metabolism - M.A. SALEH and J.E. CASIDA	562

### *SYMPOSIUM Vb. THE SIGNIFICANCE OF NON-BIOLOGICAL PESTICIDE TRANSFORMATIONS*

Introduction by Chairman: D.G. CROSBY	567
The Significance of Light-Induced Pesticide Transformations - D.G. CROSBY	568
Chemical Conversion of Pesticides in the Soil Medium: The Organophosphates - B. YARON	577
The Chemical and Non-Chemical Decomposition of Linuron and Chlorbromuron in Soils of Different Types - T. CSERHÁTI, É. JANOS and M. KECSKÉS	586
Chemical Toxication of Pesticides in the Environment - R. ENGST	590
Procedures for the Non-Biological Detoxification of Pesticides and their Toxic Transformation Products - W.D. MARSHALL	598
Transformation and Degradation of Pesticides with a Chlorinated Double Bond on Treatment with Ozone - S. GAB	608
Constituents of Commercial Methoxychlor (DMDT, 2,2-bis-(p-methoxyphenyl)-1,1,1-trichloroethane) - R.H. MITCHELL and P.R. WEST	613

MAIN TOPIC VI. PESTICIDE RESIDUES

SYMPOSIUM VIa. THE RELIABILITY OF RESIDUE DATA

Introduction by Chairman: J.A.R. BATES	619
The Influence of Sampling Methods and Other Field Techniques on the Results of Residue Analysis - A. AMBRUS	620
The Interlaboratory Study in Pesticide Residue Analysis - J.A. BURKE	633
Reproducibility in Pesticide Analysis Determined by Tests with Unknown Samples - R.E. KAISER	643
The Inevitability of Variability in Pesticide Residue Analysis - W. HORWITZ	649
The Reliability of Fungicide Deposit Data Obtained Using Sprays of Two-Drop-Size Ranges in an Apple Orchard - J.G. ALLEN, K.J. HALL and L.D. HUNTER	656
Internal Laboratory Quality Control in the Routine Determination of Chlorinated Pesticide Residues - M. CARL	660
The Canadian Check Sample Program on Pesticide Residue Analysis: Reliability and Performance - W.P. COCHRANE and W. WHITNEY	664
The Variability of Residue Results, with Particular Reference to the Codex Study on Organochlorines in Butterfat - K.E. ELGAR	668

SYMPOSIUM VIb. THE INTERPRETATION OF RESIDUES AND RESIDUE DATA AS RELATED TO TOXICOLOGY AND LEGISLATION OF PESTICIDES

Introduction by chairman: L.G. LADOMERY (FAO)	673
The 'Acceptable Daily Intake' as a Quantified Expression of the Acceptability of Pesticide Residues - O.E. PAYNTER and R. SCHMITT	674
The Setting of Maximum Residue Limits in Food - Their Role and their Relation to Residue Data - A.J. PIETERS	680
Toxicological Basis of the ADI - Present and Future Considerations - D.J. CLEGG	688
Principles for the Permission of Pesticides from the Food-Hygienic Point of View - H. ACKERMANN and R. ENGST	692
Techniques for Deriving Realistic Estimates of Pesticide Intakes - J.P. FRAWLEY and R.E. DUGGAN	696
Types of Pesticide Residue Data in Foods and their Characteristics - R.C. TINCKNELL	701
Problems Associated with Residue Data Obtained from Food Control Activities in Relation to Maximum Residue Limits and to the Acceptability of Food - G. BRESSAU	704
Regulatory Toxicology and Tolerances of Pesticide Residues in Latin America and Caribbean Region - M.E.W. ALEMEIDA, D. de MELLO, N. RODRIQUEZ and W.F. ALMEIDA	709
Concluding Summary - W.P. MCKINLEY	712

MAIN TOPIC VII. FORMULATION CHEMISTRY

*SYMPOSIUM VIIa. THE ROLE OF THE FORMULATION IN BIOLOGICAL ACTIVITY*

Introduction by chairman: I.J. GRAHAM-BRYCE	717
The Scope for Improving Pesticidal Efficiency through Formulation - I.J. GRAHAM-BRYCE and G.S. HARTLEY	718
Some Effects of Formulation on the Biological Activity of Herbicides Applied to Foliage - K. HOLLY and D.J. TURNER	726
Influence of Formulation on the Activity of Pesticides Acting as Residual Deposits or by Direct Contact - W. MAAS	734
The Efficacy, Environmental Impact and Mechanism of Release and Dispersal of Pesticidal Materials Emitted from a Controlled Release Dispenser - N.F. GARDARELLI	744
Biological Applications of Scanning Electron Microscopy to the Study of Pesticide Formulations - C.A. HART and C.E. PRICE	754
Microencapsulation of Methomyl, Zinc Phosphide and Copper Sulphate - Methodology and Activity - A.H. EL-SEBAE, S.M. IBRAHEIM, S.A. EL-FIKI and S.N. SRIVASTAVA	763
Effects of Surfactants on the Adsorption and Leaching of Metoxuron in Soils - A.G. KANELLOPOULOS, M. WISSON and K. KIRKLAND	766

*SYMPOSIUM VIIb. THE PHYSICOCHEMICAL PROPERTIES OF FORMULATIONS*

Introduction by chairman: J.W. Van VALKENBURG	771
Influence of Particle Size on Pesticidal Activity - W. MAAS	772
Surfactants Control Pesticide Formulation - A. COSTEA, D.F. ANGHEL and G. POPESCU	780
The Effect of Additives on the Micelle Formation and the Hydrophile- Lipophile Balance of Nonionic Surfactants - L. MARSZALL and J.W. Van VALKENBURG	789
Rheological Measurements in Development and Quality Control of Suspension Concentrates - H.B. WINZELER, R. VOGEL and A. DUDLER	798
Volatility of ULV Formulations - A. GRUBENMANN and E. NEUENSCHWANDER	810
Quality Control of Carbamate Pesticides - W. HAUMESSER	816
Adsorption of Lignosulphonates on Pesticides from Aqueous Solution and the Stability of the Resulting Dispersions - T.F. TADROS	820

AUTHOR INDEX	827
SUBJECT INDEX	829