

Inhaltsverzeichnis. — Contents.

Peptides (Bound Amino Acids) and Free Amino Acids. By R. L. M. SYNGE	1
A. Peptides (Bound Amino Acids)	3
I. Higher Plants	4
II. Algae	5
III. Fungi	6
IV. Glutathione	8
V. Pterotic Acid Derivatives etc.	8
B. Amino Acids	9
I. Amino Acids Found in Plants	10
II. Determination of Free Amino Acids: General Methods	13
III. Special Methods for Free Amino Acids	15
IV. Some Results of Analyses for Free Amino Acids in Plant Materials	17
References	18
Proteins By N. W. PIRIE	23
A. Methods for Separating Protein from Non-Protein Nitrogenous Material	23
B. Methods for Determining Protein	25
1. Determination of Total Dry Matter	25
2. Determination of Nitrogen	25
3. Determination of Amino Acids	26
4. Determination of the Peptide Bond	26
5. Physical Methods	28
6. Methods Depending on Specific Activities	29
C. The Amino Acid Composition of Tissues and Isolated Proteins	29
D. Leaf Proteins	33
I. The Normal Mature Leaf	33
II. The Proteins of Virus Infected Leaves	46
III. The Immature Leaf and Other Young Tissues	56
E. Proteins from Miscellaneous Parts of the Plant	58
1. Flowers	58
2. Fruits	58
3. Pollen	59
4. Proteins in Latex	59
5. Proteins in Roots, Tubers and Other Underground Parts of the Plant	61
F. Proteins in Algae	64
References	65
Seed Proteins. By J. PACE	69
A. Some General Considerations	69
I. The Major Seed Proteins	69
II. Other Seed Proteins.	77
1. Enzymes	77
2. Inhibitors and Toxic Proteins	80
III. Amino Acid Composition	83
B. Procedures	86
I. Choice and Preparation of Initial Material	86
II. Extraction	88

C. Experimental Procedures for the Preparation of Different Types of Protein Fractions from Seeds	90
I. Globulin Fractions	90
II. Prolamine from a Cereal Grain	96
III. Enzymes, Inhibitors and Toxic Proteins	97
References	104
Methods of Determining the Nutritive Value of Proteins. By J. DUCKWORTH	106
A. Evaluation for Ruminants	107
B. Evaluation for Non-Ruminants	108
I. Techniques Involving Chemical Analysis, or Microbiological or Enzymatic Assay	108
II. Techniques Involving the Use of Animals	110
1. Simple Substitution Technique	112
2. Successive Substitution Technique, with Nitrogen Balance Trials	112
3. Gross Protein Value	113
4. Biological Value of Protein	114
5. Net Protein Value	115
6. Protein Efficiency Ratio	115
7. Carcase Analysis Technique	115
8. Protein Repletion Techniques	117
References	117
Urea and Ureides. By M. V. TRACEY	119
A. The Occurrence of Urea and its Precursors in Plants	120
I. Intermediates in Purine Catabolism	122
1. Uric Acid and Uricase	122
2. Allantoin and Allantoinase	123
3. Allantoic Acid and Allantoicase	124
4. Urea and Urease	124
II. Arginine as a Urea Precursor	125
III. Canavanine as a Urea Precursor	126
IV. Citrulline and Hydantoin	126
V. Thiourea	127
B. Some Analytical Principles	127
I. Uric Acid	127
II. Allantoin and Allantoic Acid	128
III. Urea	129
IV. Arginine, Canavanine, Citrulline and other Compounds	131
References	140
Chlorophylls: Analysis in Plant Materials. By JAMES H. C. SMITH and ALLEN BENITEZ	142
A. Chlorophylls <i>a</i> and <i>b</i>	143
I. Structure and Distribution	143
II. Preparation	143
III. Physical Properties of Chlorophylls <i>a</i> and <i>b</i>	147
IV. Qualitative Test for Chlorophylls <i>a</i> and <i>b</i>	150
V. Tests for Purity	150
VI. Pheophytins <i>a</i> and <i>b</i>	151
VII. Quantitative Determination of Chlorophylls <i>a</i> and <i>b</i>	154
B. Chlorophyll <i>c</i>	162
I. Preparation of Chlorophyll <i>c</i>	162
II. Physical Properties of Chlorophyll <i>c</i>	164
III. Qualitative Tests	165
IV. Pheophytin <i>c</i>	166
V. Quantitative Determination of Chlorophyll <i>c</i>	167
C. Chlorophyll <i>d</i>	167
I. Preparation of Chlorophyll <i>d</i>	167
II. Physical Properties of Chlorophyll <i>d</i>	169
III. Qualitative Tests	169
IV. Pheophytin <i>d</i>	169
V. Quantitative Determination of Chlorophyll <i>d</i>	171

D. Chlorophyll <i>e</i>	172
E. Protochlorophyll	172
I. Preparation of Protochlorophyll	172
II. Physical Properties of Protochlorophyll	173
III. Analytical Tests	174
IV. Protopheophytin	175
V. Quantitative Determination of Protochlorophyll	176
F. Bacteriochlorophyll	177
I. Preparation of Bacteriochlorophyll	177
II. Physical Properties of Bacteriochlorophyll	179
III. Qualitative Tests	180
IV. Bacteriopheophytin	180
V. Quantitative Determination of Bacteriochlorophyll	182
G. Bacterioviridin	182
I. Preparation of Bacterioviridin	183
II. Physical Properties of Bacterioviridin	183
III. Qualitative Tests	184
IV. Bacterioviridin Pheophytin	184
H. Special Topics	185
I. Preparatory Procedures	185
II. Spectrophotometry	186
III. Chromatography	189
IV. Miscellaneous Procedures	192
V. Chlorophyllase	194
References	195
Haematin Compounds. By E. F. HARTREE	197
A. Spectroscopic Methods	197
I. Introduction	197
II. Spectroscopes for Analytical Purposes	199
III. Apparatus for Comparison Spectroscopy	200
IV. Pupillen-Spektroskop	206
V. A Comparison of the Microspectroscope and Pupillen-Spektroskop	207
VI. The Spectrocolorimeter	207
VII. Hartridge Reversion Spectroscope	208
VIII. Intensification of Absorption Spectra at Low Temperatures	208
IX. Detection of Haematin in Plant Tissues	210
X. Estimation of Total Haematin	211
B. Cytochromes	215
I. Spectral Characteristics	215
II. Types of Cytochrome Spectra in Plant Materials	216
1. Cytochromes in Tissues Devoid of Chlorophyll	216
2. Cytochromes in Leaves	218
3. Cytochrome in Marine Algae	220
4. Soluble Cytochrome Components	220
III. Quantitative Estimation of Cytochromes	222
IV. Cytochrome Oxidase	223
C. Haematin Enzymes: Peroxidase and Catalase	229
I. Peroxidase	231
II. Catalase	235
III. Spectroscopy of Peroxidase and Catalase	239
D. Root Nodule Haemoglobin	239
References	244
Nucleic Acids, their Components and Related Compounds. By R. MARKHAM	246
A. Occurrence in Plants	246
B. Nucleic Acids: General Structure and Composition	247
C. Absorption Spectra	250
I. Nucleic Acids	250
II. The Smaller Constituents	251

D. The Reactions and the Identification of the Purines and Pyrimidines, their Ribosides and Nucleotides	253
I. The Purines: General Reactions	253
II. The Pyrimidines	255
III. The Nucleosides	256
IV. The Nucleotides	257
E. Paper Chromatography	258
I. General Considerations	258
II. The Detection of Nucleic Acid Derivatives on Chromatograms	259
III. The Separation and Identification of Purines, Pyrimidines and Nucleosides	263
F. The Quantitative Analysis of Nucleic Acids for their Bases	265
I. Ribonucleic Acids.	265
II. The Quantitative Analysis of DNA	267
G. Separation and Identification of Nucleosides and Nucleotides	269
I. Paper Chromatography	269
II. Methods for the Identification of the Isomeric Nucleotides	271
III. Ion Exchange Chromatography	273
IV. The Separation of Nucleic Acid Derivatives by Electrophoresis on Paper	278
H. Some Enzymes Used in Nucleic Acid Chemistry	288
I. Determination of Phosphate and Carbohydrate	290
I. The Analysis of Phosphorus	290
II. The Diphenylamine Reaction for Deoxypentose	290
III. The Estimation of Pentoses	291
J. Other Methods for the Analysis and Determination of Nucleic Acids	291
I. Analysis of Ribonucleic Acids by Means of Silver Precipitation	291
II. The Recognition of the Nucleic Acids in Tissues by Microscopical Methods	292
III. The Estimation of Nucleic Acids in Tissues	293
K. The Isolation of Nucleic Acids from Plant Tissues	298
I. The Isolation of Deoxyribonucleic Acid from Wheat Germ	298
II. Isolation of Ribonucleic Acids from Plant Tissues	299
L. Other Purines and Pyrimidines in Plants	299
I. Vicine and Divicine	299
II. The Methylated Xanthine Derivatives (Caffein and Theobromine)	300
References	303
Adenosine Diphosphate, Adenosine Triphosphate. By HARRY G. ALBAUM	305
A. Occurrence and Distribution	306
B. Isolation of Adenosine Triphosphate	306
I. Difficulties in Isolation	306
II. Criteria for Purity	307
III. The Isolation of Adenosine Triphosphate from Mung Beans (<i>Phaseolus aureus</i>)	309
C. Determination of Adenosine Triphosphate	313
I. Enzymatic Determination	313
II. Identification of ATP by Paper Chromatography	315
III. The Quantitative Estimation of ATP by Column Chromatography	317
D. The Status of Adenosine Diphosphate	318
References	319
Codehydrasen I und II (Diphospho-pyridin-nucleotid und Triphospho-pyridin-nucleotid). Von K. HASSE	320
A. Einleitung	320
B. Analytische Verfahren zur Bestimmung der Codehydrasen	322
I. Allgemeines	322
1. Der Zustand der Codehydrasen im pflanzlichen Material u. ihre Extraktion	324
2. Bestimmung von Diphospho-pyridin-nucleotid	326
3. Bestimmung von Triphospho-pyridin-nucleotid	326
II. Die „THUNBERG-Technik“	327
III. Manometrische Methoden	330
IV. Spektrophotometrische Methoden	334

C. Darstellung von Codehydrasen	338
1. Darstellung von Diphospho-pyridin-nucleotid	339
2. Darstellung von Triphospho-pyridin-nucleotid	340
3. Darstellung der Dihydro-codehydrasen	342
Anhang	342
Literatur	343
Thiamine and its Derivatives. By R. A. PETERS and J. R. P. O'BRIEN	345
A. Properties of Thiamine Relevant to its Determination	347
I. Physical and Chemical Properties	347
II. Biological Effects of Thiamine Related to its Determination	349
B. Distribution of Thiamine in Plants	350
C. Methods for Determination of Thiamine	351
I. Extraction of Thiamine from Biological Materials	353
II. Biological Methods for the Determination of Thiamine	354
III. Enzymatic Methods	355
IV. Microbiological Methods	356
V. Chemical Methods for the Determination of Thiamine	358
1. The Azo Method	359
2. Thiochrome Method	360
3. Micromethods for Estimation of Thiamine by Thiochrome Method	363
VI. Spectrophotometric Estimation of Thiamine	364
References	365
The Alkaloids. By B. T. CROMWELL	367
A. General Introduction	367
I. Distribution in the Plant	368
II. The Isolation of Alkaloids	369
1. Extraction	369
2. Fractionation	370
III. The Quantitative Estimation of Alkaloids	372
IV. Reagents	373
1. General Alkaloid Reagents	373
2. Special Reagents	374
B. The Alkaloids of <i>Aconitum</i> spp.	375
I. Properties	375
II. Isolation	377
III. The Estimation of the Total Alkaloids of Aconite Root	379
C. The Alkaloids of <i>Areca</i> Nut	380
I. Properties	380
II. The Isolation of the <i>Areca</i> Alkaloids	381
III. The Detection and Estimation of <i>Arecoline</i>	381
D. The <i>Berberis</i> and <i>Hydrastis</i> Alkaloids	382
I. Properties	383
II. The Distribution of the Alkaloids within the Plant	384
III. The Isolation of the Alkaloids	385
IV. Qualitative Tests for the Alkaloids	387
V. The Quantitative Estimation of <i>Berberine</i> and <i>Hydrastine</i>	388
E. The Alkaloids of the <i>Calabar</i> Bean	391
I. The Isolation of <i>Physostigmine</i> from <i>Calabar</i> Beans	391
II. Methods for the Detection and Estimation of <i>Physostigmine</i>	391
F. The <i>Cinchona</i> Alkaloids	393
I. Properties	394
II. The Distribution of Alkaloids in <i>Cinchona</i> Bark	397
III. The Isolation of the Crystallizable Alkaloids	398
IV. The Qualitative Reactions of the <i>Cinchona</i> Alkaloids	399
V. The Estimation of the Total Alkaloids of <i>Cinchona</i> Bark	400
VI. The Determination of the Individual Crystallizable Alkaloids	401

G. The Curare Alkaloids	405
I. Properties	405
II. The Isolation of L-Curine and D-Tubocurarine chloride	406
III. Qualitative Reactions of D-Tubocurarine chloride	407
IV. The Quantitative Estimation of D-Tubocurarine chloride	408
H. The Alkaloids of Ergot	409
I. Properties	410
II. The Isolation of the Ergot Alkaloids	411
III. Detection and Estimation of the Ergot Alkaloids	413
I. The Alkaloids of Gelsemium spp.	416
I. Properties	416
II. Isolation of Alkaloids	417
III. The Detection and Estimation of the <i>Gelsemium</i> Alkaloids	417
J. Alkaloids of Gymnosperms	418
I. The Alkaloids of <i>Ephedra</i> spp.	418
II. Properties	419
III. The Isolation of Ephedrine and Pseudoephedrine from <i>Ephedra</i> spp.	419
IV. Qualitative Tests for Ephedrine	420
V. The Quantitative Estimation of Ephedrine	420
VI. The Alkaloid of Yew (<i>Taxus baccata</i> L.)	422
K. The Alkaloids of Hemlock (<i>Conium maculatum</i> L.)	423
I. Properties	423
II. Isolation of the Alkaloids	424
III. The Detection and Estimation of the Hemlock Alkaloids	424
L. The Alkaloids of <i>Holarrhena</i> spp.	426
M. The Ipecacuanha Alkaloids	428
I. Properties	428
II. The Isolation of the Alkaloids	429
III. Qualitative Tests for the Ipecacuanha Alkaloids	430
IV. The Quantitative Estimation of the Total Alkaloids	430
N. The Alkaloids of Liliaceae	432
I. The Alkaloids of <i>Colchicum</i> spp.	432
II. The Veratrum Alkaloids	436
O. The Lobelia Alkaloids	442
I. Properties	442
II. Estimation of Alkaloids in Lobelia Tissues	443
P. The Alkaloids of <i>Lolium perenne</i> L. and other Grasses	444
Q. The Alkaloids of Opium	448
I. Properties	448
II. Isolation of the Major Alkaloids from Opium	450
III. Qualitative Tests for the Opium Alkaloids	453
IV. The Quantitative Estimation of the Opium Alkaloids	455
R. The Alkaloids of the <i>Papilionaceae</i> (Lupinine Group)	460
I. Sparteine	461
II. Cytisine	462
III. N-Methylcytisine	464
IV. Anagyrene	464
V. Other Alkaloids	465
1. Calycotomine	465
2. Monspessulanine	466
3. Retamine	466
4. Lupanine	466
5. Lupinine	467
6. Hydroxylupanine	467
7. Virgiline and Virgilidine	467
8. Ammodendrine and Matrine	468
S. The Alkaloids of <i>Peganum harmala</i> L.	468
I. Properties	468
II. The Isolation of Harmine and Harmaline	469
III. The Detection and Estimation of the Harmala Alkaloids	469

T. The Alkaloids of <i>Pilocarpus</i> spp.	470
I. Isolation of the Alkaloids	471
II. Properties	471
III. The Detection and Estimation of the Alkaloids of <i>Pilocarpus</i>	471
U. The Alkaloids of Pomegranate	473
I. Properties	473
II. The Isolation of the Alkaloids	474
III. The Estimation of the Pomegranate Alkaloids	474
V. The Alkaloids of <i>Solanum</i> spp.	476
I. Properties	476
II. The Isolation of Solanine	477
III. The Detection and Estimation of the Alkaloids of <i>Solanum</i>	478
W. Alkaloids of <i>Strychnos</i> spp.	480
I. The Isolation of Strychnine and Brucine	481
II. Properties	481
III. The Detection of Strychnine	482
IV. Estimation of Strychnine	484
X. The Tobacco Alkaloids	487
I. Properties	488
II. The Isolation of the Major Alkaloids	489
III. The Detection of the Alkaloids of <i>Nicotiana</i> spp.	490
IV. The Quantitative Estimation of the Alkaloids	491
Y. The Tropane Alkaloids	496
I. Properties	497
II. Isolation of the Tropane Alkaloids	499
III. The Detection of the Tropane Alkaloids	499
IV. The Quantitative Estimation of Total Alkaloids of <i>Belladonna</i>	500
V. The Estimation of the Coca Alkaloids	507
Z. The Yohimbe and Quebracho Alkaloids	508
I. Properties	508
II. The Isolation of Yohimbine	509
III. The Detection of the Yohimbe and Quebracho Alkaloids	509
IV. The Quantitative Estimation of the Total Alkaloids of Yohimbe Bark	510
References	511
Amine und Betaine. Von E. WERLE	517
A. Allgemeine Verfahren zur Anreicherung und zum Nachweis der Amine	517
B. Verfahren zur Isolierung der Amine	521
C. Quantitative Bestimmung von Aminen	532
D. Nachweis und Identifizierung von Aminen mit Hilfe der Papierchromatographie	537
I. Isolierung der Amine aus der Pflanze	537
II. Trennung und Nachweis durch Papierchromatographie	537
III. Mikrobiologische und pharmakologische Bestimmung von Aminen	548
E. Spezieller Teil	548
I. Methylamine	548
II. Äthanolamine	556
III. Cholin	559
IV. Acetylcholin	570
V. Diamine	573
VI. Butyl- und Amylamine	577
VII. Amine mit aromatischen Substituenten	579
VIII. Histamin	584
F. Betaine	595
I. Allgemeines	595
1. Mikrochemischer Nachweis der Betaine	596
2. Nachweis der Betaine in Pflanzen	598
II. Spezieller Teil	599
1. Betain	599
2. Hypaphorin	604
3. Stachydrin	606
4. Ergothionein	610

5. Hercynin (Histidinbetain)	613
6. Betonicin und Turicin	614
7. Trigonellin	615
Literatur	619
Pantothensäure und Coenzym A. Von E. WERLE	624
A. Pantothensäure	625
I. Mikrobiologische Bestimmung	626
II. Biologische Bestimmung von Pantothensäure mit Hilfe des Wachstumstestes bei Ratten und Küken	632
III. Chemische Bestimmung der Pantothensäure	633
B. Coenzym A	636
1. Coenzym A-Bestimmung nach KAPLAN und LIPMANN (1948)	636
2. Rasche spektrophotometrische Bestimmung des Coenzym A nach KORFF (1953)	640
Literatur	641
Riboflavin, Folic Acid and Biotin. By F. M. STRONG	643
A. Riboflavin	643
I. Distribution in Plants	643
II. Principles of Detection and Estimation	643
III. Quantitative Determination of Riboflavin	645
1. Fluorometric Method	645
2. Microbiological Method	647
3. Other Flavins	651
B. Pteroylglutamic Acid and Related Compounds	651
C. Biotin	656
References	659
Melanins. By M. THOMAS	661
A. Notes on the Isolation and Analysis of Dark Pigments	662
B. Some Properties which have been Used in Attempts to Identify Pigments as Melanins	663
C. The Detection of Tyrosinase and its Substrates in Plants Producing Presumptive Melanin	665
D. Inhibitors and the Possible Nature of Dopa-Oxidase and Tyrosinase	667
E. The Infrequent Appearance of Melanins as Secondary Plant Products	667
F. Intermediate Stages in Melanogenesis in vitro and Suggestions Concerning the Chemical Structure of Melanins	668
References	675
Blausäure-Verbindungen. Von P. SEIFERT	676
I. Qualitativer Nachweis von Blausäure	679
1. Freisetzung der Blausäure	679
2. Nachweis-Methoden	680
II. Quantitative Methoden	683
Literatur	687
Senföle, Lauchöle und andere schwefelhaltige Pflanzenstoffe. Von A. STOLL u. E. JÜCKER	689
A. Einleitung	689
B. Schwefel und einfache Schwefelverbindungen	690
C. Schwefelsäureester, Sulfonsäuren, Sulfite, Thioäther	692
I. Schwefelsäureester	692
II. Sulfonsäuren	692
III. Thioäther, aliphatische Di- und Polysulfide und Sulfoxyde (Lauchöle)	692
IV. Die Bestimmung von Alliin	698
D. Thioaldehyde	702
E. Thioharnstoffe und L-5-Vinyl-2-thiooxazolidon	703
F. Senföle und Senfölglykoside	703
Literatur	716
Sachverzeichnis (deutsch-englisch)	719
Subject Index (English-German)	743