INDEX OF SUBJECTS, 1975

Α

- Absidia regnieri. Microbiological hydroxylation. Part XX, hydroxylation of dioxygenated 5α-androstanes with the fungi Absidia regnieri and Syncephelastrum racemosum, 2040.
- Acetals, monobutylidene, of 1-deoxy-D-galactitol, 1323.
 - Isomerism in bicyclic diacetals. Part I, 1,3:2,4- and 1,4:2,3-di-O-methylene-erythritol, 666. Part II, bicyclic methylene diacetals in the *galacto*, *arabino*, and *ribo* series, 675.
 - Microbiological hydroxylation. Part XVI, incubation of derivatives (mainly acetals) of 5α -androstane ketones with the fungi Calonectria decora, Aspergillus ochraceus, and Rhizopus nigricans, 1356.
- Acetamides. αα'-Dicyano-(1,3-dithiacyclobutane-2,4-diylidene) diacetamides (desaurins) from thiazine derivatives, 1417.
- Acetates. Cyclization of ethyl acetoacetate and substituted salicylaldehydes in the presence of ammonium acetate, 2025.
- Acetoins, photodecomposition of, 1590.
- Acetolysis of D-homo-5α-androstan-17αβ-yl tosylate: a novel rearrangement involving the steroid backbone. D-Homo-steroids. Part IV, 916.
- Acetoxylation, Thiele-Winter, of quinones. Part VI, methoxy- and hydroxy-(phenyl)-1,4-benzoquinones and (4-substituted phenyl)-1,4-benzoquinones, 309. Part VII, some bromo-derivatives of phenyl-1,4-benzoquinone, 314.
- Acetylenes, fluorinated. Part VI, some thermal and photochemical reactions of NN-bistrifluoromethylamino-substituted acetylenes, 1074.
 - natural. Part XLVII, biosynthetic experiments with the fungus *Lepista diemii* (Singer). Biogenesis of the C₈ acetylenic cyano-acid diatretyne 2, 424. Part XLVIII, absolute configurations of a C₇ diynol, a C₉ diynetriol, and a C₉ dihydroxy-diynone from fungal cultures, 687.
 - Addition reactions of heterocyclic compounds. Part LVII, reactions of pyridines with acetylenic esters in the presence of carbanion sources, 438. Part LVIII, reactions of nitrogenous heterocycles with acetylacetylene, 446. Part LIX, a ¹³C tracer study of the mechanism of formation of azepines from 2-methylquinolines and dimethyl acetylenedicarboxylate, 394. Part LX, reactions of 2-substituted pyridines with acetylenic esters leading to quinolizines and pyrrolo[2,1,5-cd]indolizines, 740. Part LXI, reactions of electrophilic acetylenes with conjugated cyclic enamines, 744.
 - Adduct formation between pyridine-2-thiones and acetylenic carbonyl derivatives, 1493.
 - Allenes. Part XXXII, a general synthesis of allene-diynes from allenic bromides and butadiynyl(trimethyl)silane and the synthesis of two natural allenes, (\pm) -octa-2,3-diene-5,7-diyn-1-ol and (\pm) -undeca-5,6-diene-8,10-diyn-1-ol, 1628.

- A note on three routes to benzyne; decomposition of diphenyliodonium acetate, nitrosation of N-phenylphosphylamidates, and deoxygenation of benzene-diazotoluene-p-sulphonate N'-oxide (cupferron tosylate) by phosphorus trichloride, 1072.
- Aromatic annelation by reaction of aryl radicals with dimethyl acetylenedicarboxylate and related compounds, 1060.
- Base-catalysed intramolecular cycloadditions of allyl 3-phenylprop-2-ynyl ethers and 4-methylpent-4-en-2-ynyl prop-2-ynyl ethers, 1315.
- Effects of 3-substituents upon orientation in the 1,3-dipolar cycloaddition reaction between 3-substituted pyridine N-imides and ethyl propiolate: synthesis of ethyl 4- and 6-substituted pyrazolo [1,5-a]pyridine-3-carboxylates, 406.
- C-Nucleoside studies. Part II, pentofuranosylethynes from 2,3-O-isopropylidene-D-ribose, 1191.
- 4-Phosphoranylidenebutenolide intermediates in the synthesis of 4-ylidenebutenolides and 4-ylidenetetronic acids. Synthesis of alkylidenephthalide constituents of celery odour and models for freelingyne, 635
- Radical-induced cyclisations of *cis*-1,10-dichlorodec-5-ene and 1,10-dichlorodec-5-yne, 410.
- Reaction of benzyne with carbon disulphide: formation and reaction of 1,3-benzodithiol-2-ylidene, 525.
- Reduction of allenes and acetylenes by catalytic and chemical methods: 'molecular queueing' effects in competitive hydrogenation, 1099.
- Studies on heterocyclic compounds. Part XVI, crystal and molecular structures of three products of 1,4-dipolar cycloaddition of dimethyl acetylenedicarboxylate to benzothiazole, 2316.
- Substituted naphthalenes and naphthols from benzynes and dienolate anions, 1377.
- Synthesis of freelingyne, an acetylenic sesquiterpene from *Eremophila freelingii*, 641.
 - of quinoxalinones by the reaction of o-phenylenediamines with dimethyl acetylenedicarboxylate, 401.
- Acid chlorides. Enamine chemistry. Part XX, reactions of αβ-unsaturated acid chlorides. Synthesis of alkyl 2,6-dioxobicyclo[3,3,1]nonane-1-carboxylates, alkyl 2,-
 - 9-dioxobicyclo[3.3.1]nonane-7-carboxylates, and 2,9-dio-xobicyclo[3.3.1]nonane-7-carbonitriles, 1885.
- Acids, and alcohols, the preparation of some polyfluoroalkyl-substituted. Reactions of perfluoroalkylcopper compounds. Part V, 654.
 - fluoropalmitic, preparation of some, and fluorination of brefeldin A, 2523.
 - Action of acids and alkylating agents on 1,4-di-(2-pyridyl)-tetraz-2-enes, 1232.
 - Anodic syntheses. Part XVI, oxidation of phenylenediacetic acids and benzylic-ethers, 2471.
 - Chemistry of terpenes. Part XIX, reaction of (+)-3α,4α-epoxycarane with halogen acids and acetic acid, 1217.

- Acids (contd.)
 - Metal ions and complexes in organic reactions. Part XX, copper-catalysed reactions of aromatic bromo-carboxy-lates with carbanions, giving oxo-acids, isocoumarins, and related products, 1267.
 - Remote anodic oxidation of carboxylic acids in fluorosulphuric acid: a synthesis of lactones and unsaturated cyclic ketones, 948.
 - Synthesis of 3,7-dimethyl-1,9-dioxo-1*H*,9*H*, 10*H*-pyrano-[3,2-*c*: 5,6-*c*']dipyran-10-ylacetic acid and its ethyl ester, 2405.
- Acidines. Synthesis of some acridines and 9-acridones for spectral studies, 650.
- Acridone, octafluoro-, and related compounds, reactions of, 1380.
 - Synthesis of 10-benzoyl-9-acridone and 9-acridone from 2,2'- and 2,3'-disubstituted benzophenones, 1138.
 - of some acridines and 9-acridones for spectral studies, 650.
- 'Acromyrmex fungus'. Microbiological hydroxylation. Part XIX, the action of an ant fungus ('Acromyrmex fungus') on oxygenated androstanes, pregnanes, and cholestanes, 1552.
- Acrylophenones. Carbonyl snd thiocarbonyl compounds. Part XIV, reactions of tetrachloro-o-benzoquinone with 3-(2-furyl)- and 3-(2-thienyl)- acrylophenones, 1052.
- Actinomycins, thermal degradation of, to dioxopiperazines, 1320.
- Actinonin. Studies concerning the antibiotic actinonin. Part I, the constitution of actinonin. A natural hydroxamic acid with antibiotic activity, 819. Part II, total synthesis of actinonin and some structural analogues by the isomaleimide method, 825. Part III, synthesis of structural analogues of actinonin by the anhydride-imide method, 830. Part IV, synthesis of structural analogues of actinonin by the mixed anhydride method, 842. Part V, synthesis of structural analogues of actinonin by the anhydride-ester method, 846. Part VI, synthesis of structural analogues of actinonin by dicyclo-hexylcarbodi-imide coupling reactions, 848. Part VII, mass spectra of actinonin and related compounds, 852. Part VIII, structure-activity relationships in the actinonin series, 857.
- Active methylene compounds. Chemistry of alkali metal tetracarbonylferrates. A simple method for alkylating and arylating carbonyl compounds and active methylene compounds, 1273.
- Acyl chlorides and 2-unsubstituted oxazolines, adducts from: formation and reactions, 1302.
- Acyloin reaction, modified, of Schräpler and Rühlmann, bis(trimelthylsilyloxy)alkenes from; stereochemical considerations, 806.
- Acyloxyoxosulphonium intermediates in the formation of sulphones from sulphoxides, 282.
- Addition of fluorine to olefins by cobalt trifluoride, stereochemistry of, 2237.
 - of hydrogen sulphite ion to purines. Purine studies. Part XV, 2240.
 - of iodine(I) azide to trans-cyclo-octene. trans-Cyclo-alkenes. Part VI, 2267.
 - reactions of heterocyclic compounds. Part LVII, reactions of pyridines with acetylenic esters in the presence of carbanion sources, 438. Part LVIII, reactions of nitrogenous heterocycles with acetylacetylene, 446.

- Part LIX, a ¹³C tracer study of the mechanism of formation of azepines from 2-methylquinolines and dimethyl acetylenedicarboxylate, 394. Part LX, reactions of 2-substituted pyridines with acetylenic esters leading to quinolizines and pyrrolo[2,1,5-cd]-indolizines, 740. Part LXI, reactions of electrophilic acetylenes with conjugated cyclic enamines, 744. Part LXII, a new rearrangement in the quinazoline series, 2322.
- **Adina rubescens**, isolation of 5,7-dihydroxy-2-methyl-chromone and its 7-O-glycosides from, 1776.
- Alangium lamarckii Thw., the monoterpenoid alkaloidal glycoside alangiside from, 1245.
- Alcohols, and acids, the preparation of some polyfluoroalkyl-substituted. Reactions of perfluoroalkylcopper compounds. Part V, 654.
 - primary and secondary, improved methods for the oxidation of, 1614.
 - secondary, a new method for the deoxygenation of, 1574
 - Chemistry of organoborates. Part II, high yield syntheses of trialkylmethanols by the cyanoborate process, 138.
 - Displacement of the hydroxy-group from ferrocenyl-methanol by amines, 1818.
 - Functionalization of methyl groups in isopimaran-8 β -ol, hopan-7 α -ol, and hopan-15 β -ol and derivatives, 710.
 - Isomerism in bicyclic diacetals. Part I, 1,3:2,4- and 1,4:2,3-di-O-methylene-etythritol, 666. Part II, bicyclic methylene diacetals in the galacto, arabino, and ribo series, 675.
 - Studies of enzyme-mediated reactions. Part IV, complementary synthesis of stereospecifically labelled (R)- and (S)- $[\alpha$ - $^3H_1]$ benzyl alcohol derivatives by use of liver alcohol dehydrogenase, 1156. Part V, synthesis of (13S)- and (13R)-[13- $^3H_1]$ scoulerine from stereospecifically labelled (R)- and (S)- $[\alpha$ - $^3H_1]$ benzyl alcohols; stereochemistry of enzymic reactions at saturated benzylic carbon, 1162.
- Synthesis of (\pm) -presqualene alcohol, (\pm) -prephytoene alcohol, and structurally related compounds, 897.
- Aldehydes—see also Carbonyl compounds.
 - a sensitive and specific test for 6-substituted s-triazolo-[4,3-b]-s-tetrazine-3-thiols, 975.
 - Cyclization of ethyl acetoacetate and substituted salicylaldehydes in the presence of ammonium acetate, 2025.
 - Formation of 1,2,4-triazoles from the reactions of N-arylmandelamidrazones with aldehydes and with trialkyl ortho esters, 2280.
 - 4-Phosphoranylidenebutenolide intermediates in the synthesis of 4-ylidenebutenolides and 4-ylidenetetronic acids. Synthesis of alkylidenephthalide constituents of celery odour and models for freelingyne, 635.
 - Reaction of lead tetra-acetate with aldehyde nitrophenylhydrazones, 61.
 - of heterocycles with thiophosgene. Part IV, β,4-dichloro-2-isothiocyanatocinnamaldehyde, a product from 4,7-dichloroquinoline, 922.
 - Solvent and ion-pair effects on the self-condensation of linear aliphatic aldehydes: selective synthesis of substituted acrylaldehyde and glycol nonoesters, 1527.

Aldehydes (contd).

Synthesis of heterocyclic compounds. Part XXXI, triazolium tetrafluoroborates from the cycloaddition of alkoxydiazenium salts to azines, hydrazones, and anils derived from aromatic aldehydes, 2474. Part XXXII, intramolecular 1,3-dipolar cycloadditions of 2-allyloxy- and 2-prop-2-ynyloxy-aromatic aldehyde azines, 2479.

Aldgamycin E. Branched-chain sugars. Part IV, synthesis of derivatives of aldgarose, a component of aldgamycin E, 682.

Aldosterone, improved syntheses of, 2243.

Algar-Flynn-Oyamada (AFO) reaction, substituent effects on the course of oxidation of 2'-hydroxy-α-phenyl-, chalcones, 1671.

Algorithm. A procedure for rapid recognition of the rings of a molecule, 1120.

Alkali metal tetracarbonylferrates, chemistry of. A simple method for alkylating and arylating carbonyl compounds and active methylene compounds, 1273.

Alkaloids, Lobelia, biosynthesis of. Part III, intermediates in the biosynthesis of lobeline; biosynthesis of 8,10-diethyl-lobelidione, 415.

proaporphine and aporphine, studies on. Part V, synthesis of (±)-glaziovine by 8,1'-ring closure of 1-benzylisoquinoline derivatives, 1647. Part VI, synthesis of (±)-glaziovine by spiran ring construction on a cyclopent[ij]isoquinoline; stereochemistry of reduced proaporphines, 1652. Part VII, stereochemistry of reduced proaporphines of Croton sparsiflorus and C. linearis, 1659.

Solanum. Part XVII, the sugar unit of solamargine, 2455. Absolute configuration of ancistrocladisine and ancistrocladidine, 2134.

Alangiside, the monoterpenoid alkaloid glycoside from Alangium lamarchii Thw., 1245.

Biosynthesis. Part XXII, the origin of chelidonine and of other alkaloids derived from the tetrahydroprotoherberine skeleton, 1147.

of aromatic isoprenoids. Part III, mechanism of formation of the furan ring and origin of the 4-methoxy-group in the biosynthesis of furoquinoline alkaloids, 302.

Opium alkaloids. Part XVI, the biosynthesis of 1-benzylisoquinolines in *Papaver somniferum*. Preferred and secondary pathways; stereochemical aspects, 1531.

Phenol oxidation. Part IV, synthesis and novel ringopening of spirocyclic dienones related to the benzylisoquinoline alkaloid cularine, 2492.

Photocyclisation of enamides. Part VI. (Chemical constituents of Rutaceous plants. Part XXIII.) Syntheses of dihydro-derivatives of the benzo[c]-phenanthridine alkaloids avicine and nitidine by enamide photocyclisation, 762. Part VII, a new synthesis of the protoberberine alkaloids, 1720. Part VIII, synthesis of 13-methylberbines; total synthesis of (±)-cavidine, 1791.

Synthesis of 1,12b-didehydrolycoran (α -anhydrodihydrocaranine) and 12b α -lycoran (γ -lycoran) via photocyclisation of an enamide-ketone, 2502.

Alkanna hirsutissima. 5,8-Dihydroxy-2-(4-methylpent-3-enyl)-1,4-naphthoquinone and its 2-[4-methyl-1-(2-methylcrotonoyloxy)pent-3-enyl] analogue (shikonin angelate) from Alkanna hirsutissima, 1334.

Alkenes-see also Olefins.

1,1-diphenyl. Part V, C-1 vs. C-3 alkylation of allylic carbanions; applicability of the principle of least motion, 531.

Bis(trimethylsilyloxy)alkenes from the modified acyloin reaction of Schräpler and Rühlmann; stereochemical considerations, 806.

Oxymetallation. Part VII, peroxymercuration of terminal, medial, and cyclic alkenes without accompanying acyloxymercuration, 195. Part IX, bromodemercuration of peroxymercurials derived from terminal, medial, and cyclic alkenes to give β-bromo-peroxides, 695

Radical-induced cyclisations of *cis*-1,10-dichlorodec-5-ene and 1,10-dichlorodec-5-yne, 410.

Alkoxyl radicals. On the relationship between intramolecular hydrogen abstraction by alkoxyl radicals and deshielding by the corresponding hydroxygroups as indicated by nuclear magnetic resonance, 1275.

Alkylating agents and acids, action on 1,4-di-(2-pyridyl) tetraz-2-enes, 1232.

Alkylation. 1,1-Diphenylalkenes. Part V, C-1 vs. C-3 alkylation of allylic carbanions; applicability of the principle of least motion, 531.

Alkyl group rearrangement, novel: insertion of 1,2,2-trifluoroethylidene into C-H bonds of tetra-alkylsilanes. Organisilicon chemistry. Part XIV, 966.

Alkynes—see Acetylenes.

Allenes. Part XXXII, a general synthesis of allenediynes from allenic bromides and butadiynyl(trimethyl)silane and the synthesis of two natural allenes, (\pm) -octa-2,3-diene-5,7-diyn-1-ol and (\pm) -undeca-5,6-diene-8,10-diyn-1-ol, 1628.

absolute configuration of, conversion of molecular dissymmetry into centrodissymmetry by heterogeneous catalytic hydrogenation, 1090.

heterogeneous catalytic hydrogenation of, over supported palladium: selectivity, stereoselectivity, and regioselectivity, 1081.

photoaddition to p-quinones, 318.

Reduction of allenes and acetylenes by catalytic and chemical methods: 'molecular queueing' effects in competitive hydrogenation, 1099.

Allorazines, a new synthesis of, by the reaction of diethyl azodiformate with 6-anilinouracils, 1907.

Amides, alkylphenylphosphinic; formation of stable, crystalline hydrochlorides, and hydrolysis in acidic solution, 514.

Amidines, fused polycyclic. Part I, imidazo—and pyrimido—[1,2-f]phenanthridines, 1850. Part II, synthesis of dihydroimidazo-fused systems by use of 2-aminoethylammonium toluene-p-sulphonate, 1854.

v-Triazolo[4,5-d]pyrimidines (8-azapurines). Part XVI, preparation of 6-amino-8-azapurines by heating 4-amino-1,2,3-triazole-5-carbonitrile (and its N-alkyl derivatives) with amidines, 345.

Amidrazones. Formation of 1,2,4-triazoles from the reactions of N-arylmandelamidrazones with aldehydes and with trialkyl ortho esters, 2280.

Amines, α -deuteriated tertiary, use of debenzylation of quaternary benzylammonium salts in the synthesis of, 510.

displacement of the hydroxy-group from ferrocenyl-methanol by, 1818.

Amines (contd.)

- Azabenzocycloheptenones. Part XVIII, amines and amino-ketones of the tetrahydro-3-benzazepin-1-one series, 622.
- Benzoquinone derivatives. Part 1, reactions of primary aliphatic amines with embelin (2,5-dihydroxy-3-undecyl-1,4-benzoquinone) and di-O-methylembelin, 327.
- Conversion of 2-chloroallylamines into heterocyclic compounds. Part 1, 2-methylindoles, 1,5,6,7-tetrahydro-3-methylindol-4-ones, and related heterocycles, 1446.
- Phenol oxidation and biosynthesis. Part XXV, new syntheses of bis-(2-arylethyl)amines of biosynthetic importance, 579.
- Polyfluoroalkyl derivatives of nitrogen. Part XLII, reaction of N-bromobistrifluoromethylamine with 1H-pentafluoropropene and some further studies on the thermal rearrangement of NN-bistrifluoromethylvinylamines, 1633.
- Preparation and some reactions of 2,2-diaryl-2*H*-imidazole 1-oxides, 1803.
- Radical phthalimidation of aromatic compounds by photolysis of N-tosyloxyphthalimide: a route to primary aromatic amines, 1069.
- Synthesis of quinoxalinones by the reaction of o-phenylenediamines with dimethyl acetylenedicarboxylate, 401.
- Amino-acids and peptides. Part I, esterification of the carboxy-group of penicillins and cephalosporins by hydrazone oxidation, 2019. Part II, a new method for preparing diazodiphenylmethane and related compounds, 2030.
 - and peptides. Part XXXVIII, use of 4-picolyloxy-carbonylhydrazides as 'handles' to facilitate peptide synthesis. Synthesis of fragments related to porcine gastric inhibitory polypeptide, 1185.
 - effects of ultrasound on some. Chemistry of ultrasound. Part IV, 1675.
 - A new synthesis of α -amino-acids by the reaction of Grignard reagents with ethyl N-trichloroethylidene-carbamate, 2511.
 - Circular dichroism of N-thiobenzoyl-L-α-amino-acids. Part VI, assessment of the resolution of amino-acids as their N-thiobenzoyl derivatives, 2313.
 - Confirmation of the site of nitrosation in tryptophan derivatives by α-chymotrypsin, 2357.
 - Methods of peptide sequencing. Part II, cyclisation of N-2-amino-6-nitrophenyl and N-3-amino-2-pyridyl derivatives of amino-acids and peptides, 1424.
 - On the preparation of L- $[2,3-^3H_2]$ phenylalanine and L- $[2,3-^3H_2]$ tyrosine, 645.
- 2-Aminoethylammonium toluene-p-sulphonate, synthesis of dihydroimidazo-fused systems by use of. Polycyclic fused amidines. Part II, 1854.
- Aminovinyl phenyl ketones and related compounds, photochemical reactions of, 298.
- Ancistrocladisine and Ancistrocladidine, absolute configuration of, 2134.
- Androstanes. A rearrangement of $4\beta,5\beta$ -epoxy- 6α -hydroxy-androstan- 17β -yl acetate, 1107.
 - Formation of oestratrienes from 5,6-epoxyandrostan-7-ols, 1941.
 - D-Homo-steroids. Part IV, acetolysis of D-homo- 5α -androstan- $17\alpha\beta$ -yl tosylate; a novel rearrangement involving the steroid backbone, 916.

- Microbiological hydroxylation. Part XIV, hydroxylation in the terminal rings of dioxygenated 5\alpha-androstanes with the fungi Wojnowicia graminis and Ophiobolus herpotrichus, 55. Part XV, hydroxylation in the terminal rings of mono- and di-oxygenated 5α-androstanes with the fungus Daedalea rufescens, 357. Part XVI, incubation of derivatives (mainly acetals) of 5α-androstane ketones with the fungi Calonectria decora, Aspergillus ochraceus. and Rhizopus nigricans, 1356. Part XVII, C-19 hydroxylation of 17-oxo-5α-androstanes and 17-oxo-3α,5-cyclo-5α-androstanes by the fungus Calonectria decora, 1359. Part XVIII, introduction of 16α-, 9α-, and 3α-hydroxy-groups into dioxygenated 5\alpha-androstanes by the fungus Diaporthe celastrina, 1364. Part XIX, the action of an ant fungus ('Acromyrmex fungus') on oxygenated androstanes, pregnanes, and cholestanes, 1552. Part XX, hydroxylation of dioxygenated 5α -androstanes with the fungi Absidia regnieri and Syncephelastrum racemosum, 2040. Part XXI, hydroxylations of 3halogeno-17-oxo-, 3-halogeno-7-oxo, and 17-halogeno-3-oxo-androstanes by the fungi Calonectria decora, Rhizopus nigricans, and Aspergillus ochraceus,
- Anhydride-ester method, synthesis of structural analogues of actinonin by. Studies concerning the antibiotic actinonin. Part V, 846.
 - -imide method, synthesis of structural analogues of actinonin by. Studies concerning the antibiotic actinonin. Part III, 830.
 - method, mixed, synthesis of structural analogues of actinonin by. Studies concerning the antibiotic actinonin. Part IV, 842.
 - Overcrowded molecules. Part XIII, thermally stable photochromic systems involving (E)-2-isopropylidene-3-(naphthylmethylene)succinic anhydrides and N-phenylimides, 2227.
 - Synthesis of some 1,2,4-triazoles and 1,2,4-triazolines by reaction of oxamidrazone condensation products with acetic anhydride, 1433.
- Anilines. Synthesis of heterocyclic compounds. Part XXX, reactions of o-alkylamino- and o-dialkylamino- anilines with some $\alpha\beta$ -unsaturated carbonyl compounds, 2409.
- Anils, aromatic, oxidation of, with lead tetra-acetate, 2022.
 - Syntheses of heterocyclic compounds. Part XXXI, triazolium tetrafluoroborates from the cycloaddition of alkoxydiazenium salts to azines, hydrazones, and anils derived from aromatic aldehydes, 2474.
- Annelation, aromatic, by reaction of aryl radicals with dimethyl acetylenedicarboxylate and related compounds, 1060.
- Anodic syntheses. Part XVI, oxidation of phenylenediacetic acids and benzylic ethers, 2471.
- Anthracenes, a simple synthesis of, 964.
 - Absolute stereochemistry of the dihydroanthracene-cisand -trans-1,2-diols produced from anthracene by mammals and bacteria, 2506.
 - Reactions of tellurium(IV) halides with anthracene and other organic compounds, 1223.
- Anthraquinone, photohydroxylation of, in concentrated sulphuric acid, 1374.
- Antibiotics, β-lactam, studies on the biosynthesis of. Part II, synthesis, and incorporation into penicillin G, of

Antibiotics (contd.)

(2RS,2'RS,3'R),3'R)- $[3,3'-^3H_2]$ cystine and (2RS,2'RS,-3S,3'S)- $[3,3'-^3H_2]$ cystine, 2517.

- Structural studies on the antibiotic vancomycin: evidence for the presence of modified phenylglycine and β-hydroxytyrosine units, 2108.
- Structures of the aminoglycoside antibiotics 66-40B and 66-40D produced by *Micromonospora inyoensis*, 814
- Studies concerning the antibiotic actinonia. Part I, the constitution of actinonin. A natural hydroxamic acid with antibiotic activity, 819. Part II, total synthesis of actinonin and some structural analogues by the isomaleimide method, 825. Part III, synthesis of structural analogues of actinonin by the anhydride-imide method, 830. Part IV, synthesis of structural analogues of actinonin by the mixed anhydride method, 842. Part V, synthesis of structural analogues of actinonin by the anhydride-ester method, 846. Part VI, synthesis of structural analogues of actinonin by dicyclohexylcarbodi-imide coupling reactions, 848. Part VII, mass spectra of actinonin and related compounds, 852. Part VIII, structure-activity relationships in the actinonin series, 857.
- Antimony. 1-S-(or Se)-Dimethylstibino-derivatives of 1-thio- and 1-seleno-β-D-glucopyranose, 1395.
- Apicophilicity of the benzoyl group in five-co-ordinate phosphoranes, 1221.
- Aporphine and proaporphine alkaloids, studies on. Part V, synthesis of (±)-glaziovine by 8,1'-ring closure of 1-benzylisoquinoline derivatives, 1647. Part VI, synthesis of (±)-glaziovine by spiran ring construction on a cyclopent[ij]isoquinoline; stereochemistry of reduced proaporphines, 1652. Part VII, stereochemistry of reduced proaporphines of Croton sparsiflorus and C. linearis, 1659.
- Aromatic compounds, photochemical reactions of. Part XXIII, photochemical reactions of alkyl vinyl ethers with 2-naphthonitrile, 2221.
 - Aromatic annelation by reaction of aryl radicals with dimethyl acetylenedicarboxylate and related compounds, 1060.
 - Biosynthesis of aromatic isoprenoids. Part III, mechanism of formation of the furan ring and origin of the 4-methoxy-group in the biosynthesis of furo-quinoline alkaloids, 302.
 - N-Bridged heterocycles. Part II, synthesis and aromaticity of 1,3-polymethylene-benzimidazolium salts {[n](1,3)benzimidazolophanium salts}, -benzimidazolones, and -benzimidazolethiones, 219.
 - 1,3-Dipolar character of six-membered aromatic rings. Part X, pyridazine and benzopyridazine betaines, 1506.
 - Electrochemical preparation of bismethylsulphonyl peroxide and its reactions with aromatic hydrocarbons, 953.
 - Intramolecular nitrene insertions into aromatic and heteroaromatic systems. Part III, photochemical decomposition of azido-indanes and azido-1,2-dihydrobenzocyclobutenes, 519.
 - Keten. Part XIV, adducts of diphenylketen with azaarenes, 1001.
 - Metal ions and complexes in organic reactions. Part XX, copper-catalysed reactions of aromatic bromocarboxylates with carbanions, giving oxo-acids, isocoumarins, and related products, 1267.

- Oxidation of aromatic anils with lead tetra-acetate, 2022. of aromatic substrates. Part II, the action of ruthenium tetraoxide on some derivatives of naphthalene and its monoaza-analogues, 707.
 - of some trinuclear aromatic compounds with cerium(IV) ammonium nitrate, 1398.
- Polyfluoroarenes. Part XXI, synthesis, decarbonylation, and dehydration of 2',3',4',5',6'-pentafluoroformanilide; formation of pentafluorophenyl isocyanide, 2451.
- Radical phthalimidation of aromatic compounds by photolysis of N-tosyloxyphthalimide; a route to primary aromatic amines, 1069.
- Reactions of palladium(II) with organic compounds. Part III, reactions of aromatic isolides in basic media, 121.
 - of quinones with aromatic ethers. Part V, triphenylene-1,4-quinones from 2,3-diaryl-1,4-benzoquinones, 568. Part VI, triphenylenols from mono- and dichlorobenzoquinones and veratrole, 811.
- Reduction of aryltrimethylsilanes as a synthetic method. Part II, Birch reduction, 470. Part III, lithium in ethylamine (Benkeser reduction), 475.
- Selective nitration of aromatic substrates: reaction of nitrogen dioxide with arylthallium(III) compounds, 65. rapid transfer-hydrogenation of aromatic nitro-compounds, 1300.
- Steroids. Part X, a convenient synthesis of alkyl aryl ethers, 461.
- Structure of aromatic diazocyanides; synthesis of diazoisocyanides, 2122.
- Syntheses of heterocyclic compounds. Part XXXI, triazolium tetrafluoroborates from the cycloaddition of alkoxydiazenium salts to azines, hydrazones, and anils derived from aromatic aldehydes, 2474. Part XXXII, intramolecular 1,3-dipolar cycloadditions of 2-allyloxy- and 2-prop-2-ynyloxy-aromatic aldehyde azines, 2479.

Arynes—see Acetylenes.

- [A-21-D-Asparagine] sheep insulin, a diastereoisomer of the natural hormone, 2157.
- Aspergillus malleus and Aspergillus sulphureus. Fungal products. Part XIII, xanthomegnin, viomellin, rubrosulphin, and viopurpurin, pigments from Aspergillus sulphureus and Aspergillus melleus, 163.
- Aspergillus ochraceus. Microbioligical hydroxylation. Part XVI, incubation of derivatives (mainly acetals) of 5α-androstane ketones with the fungi Calonectria decora, Aspergillus ochraceus and Rhizopus nigricans, 1356. Part XXI, hydroxylations of 3-halogeno-17-oxo-, 3-halogeno-7-oxo-, and 17-halogeno-3-oxo-androstanes by the fungi Calonectria decora, Rhizopus nigricans, and Aspergillus ochraceus, 2308.
- Aspergillus terreus, new metabolites of: 3-hydroxy-2,5-bis-(p-hydroxyphenyl)penta-2,4-dien-4-olide and derivatives, 1961.
- Aspergillus variecolor. Biosynthesis of fungal metabolites. Part V, structure of variecoxanthones A, B, and C, metabolities of Aspergillus variecolor; conversion of variecoxanthone A into (±)-de-C-prenylepishamixanthone, 543. Part VI, structure and biosynthesis of some minor metabolites from variant strains of Aspergillus variecolor, 549. Part VII, production and biosynthesis of 4,7-dimethoxy-5-methylcoumarin in Aspergillus variecolor, 554.

- Astaxanthin. Carotenoids and related compounds. Part XXXII, synthesis of astaxanthin, phoenicoxanthin, hydroxyechinenone, and the corresponding diosphenols, 2195.
- Atisanes. Ring C functionalised diterpenoids. Part V, preparation and formolysis of (16S)-ent-12β-p-tolyl-sulphonyloxykaurane and the (16S)-ent-13-p-tolylsulphonyloxyatisanes, 861.
- Atlantones, ocimenones, tagetones, and filijolone, simple syntheses of, from isoprene, 1741.
- **Aurones.** X-Ray analysis of (Z)-2-p-methoxyphenylmethylenebenzofuran-3(2H)-one, 1455.
- Autoxidation of (+)-car-3-ene. Chemistry of terpenes. Part XX, 2232.
 - of polysubstituted isoindoles. Part II, products from 1,3-diphenyl- and 1,2,3-triphenyl-isoindoles, 71.
- Avicennol: a new pyranocoumarin from the root-bark of Zanthoxylum avicennae, and its conversion into avicennin, 488.
- Avicine. Photocyclisation of enamides. Part VI. Chemical constituents of Rutaceous plants. Part XXIII. Syntheses of dihydro-derivatives of the benzo[c]phenanthridine alkaloids avicine and nitidine by enamide photocyclisation, 762.
- α -Aza-amino-acid derivatives. Polypeptides. Part XIII, preparation of α-aza-amino-acid (carbazic acid) derivatives and intermediates for the preparation of α-aza-peptides, 1712.
- Aza-arenes. Keten. Part XIV, adducts of diphenylketen with aza-arenes, 1001.
- 1-Azabenzocyclobutenes (benzazetes), 45. Attempted routes to benzazetes, 41.
- Azabenzocycloheptenones. Part XVIII, amines and aminoketones of the tetrahydro-3-benzazepin-1-one series, 622.
- 2-Azabicyclo[3.2.1]oct-6-ene, 2-methyl-3-methylamino-, and its valence isomer, synthesis and reactions of, 2354.
- **Azaphenanthrenes.** Synthesis of di- and tetra-substituted 1,4,5,8-tetra-azaphenanthrenes (pyrazino[2,3-f]quinoxalines), 1229.
- 8-Azapurines v-triazolo [4,5-d]pyrimidines. Patt XVI, preparation of 6-amino-8-azapurines by heating 4-amino-1,2,3-triazole-5-carbonitrile (and its N-alkyl derivatives) with amidines, 345.
- Azepines. Addition reactions of heteroxyclic compounds. Part LIX, a ¹³C tracer study of the mechanism of formation of azepines from 2-methylquinolines and dimethyl acetylenedicarboxylate, 394.
- Azides. trans-Cycloalkenes. Part VI, addition of iodine(1) azide to trans-cyclo-octene, 2267.
 - Intramolecular catalysis. Part II, electrophilic anchimeric assistance by a hydroxy-group in the opening of steroidal epoxides by azide anions, 1663.
 - Reactions of dihydroquinolines and dihydroisoquinolines with arenesulphonyl azides, 420.
 - Synthesis and decomposition of some sulphamoyl azides, 2413.
- **Azidoacetonitrile.** Formimidoyl cyanide and isocyanide from azidoacetonitrile by photolysis, 1743.
- Azidobenzo[b]thiophens. Condensed thiophen ring systems. Part XVIII, thienoazepines and thienobenzoxazoles from 6-azidobenzo[b]thiophens, 1686.
- Azido-compounds. Intramolecular nitrene insertions into aromatic and heteroaromatic systems. Part III, photochemical decomposition of azido-indanes and azido-1,2-dihydrobenzocyclobutenes, 519.

- Azimines as 1,3-dipoles, 26.
- Azines. Syntheses of heterocyclic compounds. Part XXXI, triazolium tetrafluoroborates from the cycloaddition of alkoxydiazenium salts to azines, hydrazones, and anils derived from aromatic aldehydes, 2474. Part XXXII, intramolecular 1,3-dipolar cycloadditions of 2-allyloxy- and 2-prop-2-ynyloxy-aromatic aldehyde azines, 2479. Unsaturated nitrogen compounds containing fluorine. Part IV, thermal reactions of hexafluoroacetone azine with hydrocarbon terminal olefins to give (1-pyrazolin-1-ylio)methanides or pyrazolines, 538. Part V, reactions of hexafluoroacetone azine with open-chain and cyclic hydrocarbon dienes, 1411. Part VI, reactions of hexafluoroacetone azine with 2-methylbut-2-ene, 2,3-dimethylbut-1-ene, and cyclopentene, 1902.
- **Aziridines.** Medicinal nitro-compounds. Part II, search for *ortho*-interactions in tumour-inhibitory 2,4-dinitro-phenylaziridines, 956.
- Azirines. N-Quaternary compounds. Part XL, syntheses of la,6a-dihydroindeno[1,2-b]azirin-6(1H)-ones and isomerisation to isoquinolinium derivatives, 305.
 - Reactive intermediates. Part XXIV, 1*H*-azirine intermediates in the pyrolysis of 1*H*-1,2,3-triazoles, 1.
- Azlactones. Preparation and reactions of some o-dialkylaminoarylmethylene-substituted azlactones (oxazol-5-ones), 1679.
- Azo compounds. A new synthesis of alloxazines by the reaction of diethyl azodiformate with 6-anilinouracils, 1907
- Azo-glycenosides aryl-. Part IV, synthesis and reactions of some 2- and 3-arylazo-derivatives of methyl 2,3-dideoxy-D-pent-2-enofuranoside, 2163. Part V, cycloadditions with methyl 5-O-benzoyl-2,3-dideoxy-3-phenylazo-α- and -β-D-glycero-pent-2-enofuranoside, 2178.
- Azole chemistry, studies in. Part 1, syntheses and reactions of some imidazole 3-oxides, 275.
- Azolium anions and electrophilic reagents, reactions between. Part II, direct thiation of 1,2-disubstituted pyrazolium anions with sulphur, 507.
- Azomethine imines. Extended dipolar cycloadditions, 556. Azopyridines. Heterocyclic polyfluoro-compounds. Part XXII, synthesis of octafluoro-4,4'-azopyridine and tetra-fluoro-4-(pentafluorophenylazo)pyridine, 1419.

В

- Benkeser reduction. Reduction of aryltrimethylsilanes as a synthetic method. Part III, lithium in ethylamine (Benkeser reduction), 475.
- Benz[de]anthracen-3-one; Lewis acid-catalysed cyclisations of 1-anthryl styryl ketone, 1537.
- Benzazepines. Azabenzocycloheptenones. Part XVIII, amines and amino-ketones of the tetrahydro-3-benzazepin-1-one series, 622.
- Benzazetes, Attempted routes to, 41.
 - (1-azabenzocyclobutenes), 45.
- Benzazocinecarboxylic acids, some as potential antiinflammatory agents, 1280.
- Benzenediazotoluene-p-sulphonate N'-oxide. A note on three routes to benzyne: decomposition of diphenyliodonium acetate, nitrosation of N-phenylphosphylamidates, and deoxygenation of benzenediazotoluene-p-sulphonate N'-oxide (cupferron tosylate) by phosphorus trichloride, 1072.

- Benzene, 1,2,4,5-tetracyano-, photo-substitution of, by toluene, 735.
- Benzimidazoles. N-Bridged heterocycles. Part II, synthesis and aromaticity of 1,3-polymethylene-benzimidazolium salts $\{[n](1,3)$ benzimidazolophanium salts $\}$, -benzimidazolones, and -benzimidazolethiones, 219.
- 1 H-Benzo[de]cinnoline and 8-hydroxy-1-naphthonitrile, 419.
- Benzo[c]cinnoline N-imides, 19.
- Benzocyclobutenecarbonitriles. Reaction of 1,2-dihydrobenzocyclobutene-1-carbonitriles with methyl acrylate as an unsymmetric dienophile, 2001.
- Benzocyclobutenes, azido-1,2-dihydro- and azido-indanes, photochemical decomposition of. Intramolecular nitrene insertions into aromatic and heteroaromatic systems. Part III. 519.
- Benzocycloheptisoquinolines. Studies on the syntheses of heterocyclic compounds. Part DXCVII, novel formation of benzo[5,6]cyclohept[1,2,3-ij]isoquinolines from herbinium salts, 1012.
- Benzodiazepines. Steric effects in the reactions of $\alpha\beta$ -unsaturated ketone p-tolylsulphonylhydrazones: a route to 1,2-benzodiazepines via 1,7-ring closure of 1,1-diaryl-3-diazoalkenes, 102.
- [1,4]Benzodioxinopyridazines, 534.
- 1,3-Benzodithiol-2-ylidene, formation and reaction of: reaction of benzyne with carbon disulphide, 525.
- Benzofurans. Overcrowded molecules. Part XII, thermal and photochemical reactions of (2Z,3Z)- and (2Z,3E)-2-benzylidene-2,3-dihydro-3-mesityl(phenyl)methylene-benzofuran, 1995.
- 6H-Benzofuro[3,2-c][1]benzopyranquinones (pterocarpene quinones) from Brya ebenus. Naturally occurring quinones, 1113.
- Benzofurobenzopyrans. Identification of three new pterocarpans (6a,11a-dihydro-6H-benzofuro[3,2-c][1]benzopyrans) from Pisum sativum infected with Fusarium solani f. sp. pisi, 946.
- Benzonitrile N-(phthalimido)imide, a functionalised 1,3-dipole. Preparation of 4,5,8-triphenylpyridazino[4,5 d]-triazine and generation of 3,6-diphenyl-4,5-didehydropyridazine, 1747.
- Benzo[c]phenanthridine alkaloids, avicine and nitidine, syntheses of dihydro-derivatives of, by enamide photocyclisation. Photocyclisation of enamides. Part VI. Chemical constituents of Rutaceous plants. Part XXIII, 762
- Benzophenones, halogeno-, cleavage of, by potassamide in ammonia; new routes to xanthen- and thioxanthen-9-ones, 155.
- Benzopteridinediones. A new synthesis of alloxazines by the reaction of diethyl azodiformate with 6-anilinouracils, 1907.
- Benzopyranones. o-Quinonoid compounds. Part IX, photodecarboxylation of 2-benzopyran-3-one adducts and photoreactions of the derived o-quinodimethanes, 175.
- Benzopyrans. Synthesis and structure of edulans I and II, 1736.
- Benzopyridazines. 1,3-Dipolar character of six-membered aromatic rings. Part X, pyridazine and benzopyridazine betaines, 1506.
- Benzoquinones. Benzoquinone derivatives. Part I, reactions of primary aliphatic amines with embelin (2,5-dihydroxy-3-undecyl-1,4-benzoquinone) and di-O-methylembelin, 327.

- Carbonyl and thiocarbonyl compounds. Part XIV, reactions of tetrachloro-o-benzoquinone with 3-(2-furyl)- and 3-(2-thienyl)-acrylophenones, 1052.
- Reactions of quinones with aromatic ethers. Part V, triphenylene-1,4-quinones from 2,3-diaryl-1,4-benzo-quinones, 568. Part VI, triphenylenols from mono-and di-chlorobenzoquinones and veratrole, 811. Part VII, triphenylene-1,4: 5,8-diquinones from reactions of veratrole or 3,4-dimethoxyphenylbenzoquinones with benzoquinones, 2185.
- Thiele-Winter acetoxylation of quinones. Part VI, methoxy- and hydroxy-(phenyl)-1,4-benzoquinones and (4-substituted phenyl)-1,4-benzoquinones, 309.
- 1*H*-4,1,2-Benzothiadiazines, synthesis of, from substituted *N*-acetyl-*N*-aryl-*N*'-thioaroylhydrazines, 1386.
- Benzothiazaphosph(v)oles. Reduction of nitro- and nitrosocompounds by tervalent phosphorus reagents. Part XV, reactions of certain aryl 2-nitrophenyl sulphides and their 2-azido-analogues leading to evidence for the intermediacy of 2,3-dihydro-1,3,2-benzothiazaphosph(v)oles (thiazaphosphoranes) and to the formation of dihydrodimethylpheno-thiazinones and pyrimido- and pyrido-[1,2-b]indazoles, 2396.
- Benzothiazole. Studies on heterocyclic compounds. Part XVI, crystal and molecular structures of three products of 1,4-dipolar cycloaddition of dimethyl acetylenedicarboxylate to benzothiazole, 2316.
- Benzothienopyrimidines. Pyrmidine derivatives and related compounds. Part XXVI, oxidative and non-oxidative photocyclisations of 5- and 6-phenylthio- and anilino-1,3-dimethyluracils to benzothienopyrimidines and pyrimidoindoles, 503.
- Benzothiophens. Nucleophile-induced cyclisation of 2-diazo-2'-thiocyanatoacetophenone: 2-(cyanohydrazono)-and 2-(triphenylphosphoranylidenehydrazono)-benzo[b]-thiophen-3(2H)-one, 286.
- 1,2,3-Benzotriazines, 31.
- Benzotriazinyl groups. Triazines and related products. Part XV, 2,4-diaminopyrimidines and 2-aminopyrimidin-4(3H)-ones bearing 1,2,3-benzotriazinyl groups as potential dihydrofolic reductase inhibitors, 1023.
- Benzotriazoles, 1- and 2-(NN-disubstituted aminomethyl); an investigation by nuclear magnetic resonance spectroscopy, 1181.
- 1,3,2-Benzoxazaphosph(v)oles. Reduction of nitro- and nitroso-compounds by tervalent phosphorus reagents. Part XII, conversion of aryl 2-nitroaryl ethers into novel 3-aryl-2,3-dihydro-1,3,2-benzoxazaphosph(v)oles (oxazaphosphoranes) and their 2-oxo-derivatives, 2376. Part XIII, ¹H nuclear magnetic resonance studies of 3-aryl-2,3-dihydro-1,3,2-benzoxazaphosph(v)oles and their 2-oxo-analogues, 2386. Part XIV, X-ray crystallographic determination of the structures of 3-(2,6-dimethylphenyl)-2,3-dihydro-2,2,2-trimethoxy-1,3,2-benzoxazaphosph(v)-ole and its 2-hydroxy-2-oxo-analogue, 2392.
- 10-Benzoyl-9-acridone and 9-acridone, synthesis from 2,2'-and 2,3'-disubstituted benzophenones, 1138.
- o-Benzoylbenzanilides, ring-chain tautomerism of some, 2048. Benzoyl cyanide in solution, photolysis of, 2374.
- Benzoyl group in five-co-ordinate phosphoranes, apicophilicity of, 1220.
- Benzvalene, hexakis(trifluoromethyl)-, and derivatives of hexafluorobicyclo[2.2.0]hexa-2,5-diene, cycloaddition reactions of. Valence-bond isomer chemistry. Part VIII, 2010.

- Benzylic carbon. Studies of enzyme-mediated reactions. Part V, synthesis of (13S)- and (13R)-[13- 3 H₁]scoulerine from stereospecifically labelled (R)- and (S)-[α - 3 H₁]benzyl alcohols; stereochemistry of enzymic reactions at saturated benzylic carbon, 1162.
- Benzylisoquinoline alkaloids. Phenol oxidation. Part IV, synthesis and novel ring-opening of spirocyclic dienones related to the benzylisoquinoline alkaloid cularine, 2492. Benzynes—see Acetylenes.
- Berbines. Photocyclisation of enamides. Part VIII, synthesis of 13-methylberbines; total synthesis of (\pm) -cavidine, 1791.
- Berbinium salts. Studies on the syntheses of heterocyclic compounds. Part DXCVII, novel formation of benzo-[5,6]cyclohept[1,2,3-ij]isoquinolines from berbinium salts, 1012.
- Betaines. 1,3-Dipolar character of six-membered aromatic rings. Part X, pyridazine and benzopyridazine betaines, 1506.
 - Rapid intramolecular collapse of betaines derived from 5-phenyldibenzophospholes as compared with those derived from acyclic triarylphosphines; mechanism of the Wittig reaction in protic solvents, 619.
 - Reaction of diazomethane with quaternary nitrogen compounds to form betaines, 1283.
- Beyeranes. Ring c functionalised diterpenoids. Part VI, solvolysis of ent-methyl 12β-p-tolylsulphonyloxybeyeran-19-oate, 1641.
- Bicyclo[3.3.2]decanes, 3,7-disubstituted, a synthetic route to, 803.
- Bicycloheptanes. Anodic oxidation. Part XIII, products from bicyclo[2.2.1]hept-2-ene, bicyclo[2.2.1]hepta-2,5-diene, and tetracyclo[3.2.0.0², 7.0⁴, 6]heptane, 1055.
- Bicyclo[3.2.0]hept-2-en-6-ones, electrophilic bromination of, 1767.
- Bicyclohexadienes. Valence-bond isomer chemistry. Part VIII, cycloaddition reactions of derivatives of hexafluorobicyclo[2.2.0]hexa-2,5-diene, and of hexakis(trifluoromethyl)benzvalene, 2010.
- Bicyclo[3.3.1]nona-3,7-dien-2-ones, some 9-methyl-9-hydroxy-, dehydration of, 80.
- Bicyclononane-carboxylates and -carbonitriles, dioxo-Enamine chemistry. Part XX, reactions of αβ-unsaturated acid chlorides. Synthesis of alkyl 2,6-dioxobicyclo[3.3.1]nonane-1-carboxylates, alkyl 2,9-dioxobicyclo[3.3.1]nonane-7-carboxylates, and 2,9-dioxobicyclo-[3.3.1]nonane-7-carbonitriles, 1885.
- Bicyclo[3.3.1]nonanes, acid-catalysed cyclisations of cyclooctenylidene derivatives to produce, 340.
- Bicyclo[4.2.0]oct-2-en-7-one, 8-chloro-8-methyl-, rearrangements of, 456.
- **Bicyclo-octenones.** 4,8,8-Tribromobicyclo[5.1.0]oct-4-en-3-ones from dibromocarbene adducts of cyclohexa-1,4-dienols, 1043.
- Bilirubin, photo-oxidation of, in hydroxylic solvents, 224.
- Biosynthesis. Part XXI, investigations on the biosynthesis of stylopine in *Chelidonium majus*, 1140. Part XXII, the origin of chelidonine and of other alkaloids derived from the tetrahydroprotoberberine skeleton, 1147.
 - of aromatic isoprenoids. Part III, mechanism of formation of the furan ring and origin of the 4-methoxygroup in the biosynthesis of furoquinoline alkaloids, 302.
 - of 1-benzylisoquinolines in *Papaver somniferum*. Preferred and secondary pathways; stereochemical aspects. Opium alkaloids. Part XVI, 1531.

- of fungal metabolites. Part V, structure of variecoxanthones A, B, and C, metabolites of Aspergillus variecolor; conversion of variecoxanthone A into (±)-de-C-prenylepishamixanthone, 543. Part VI, structures and biosynthesis of some minor metabolites from variant strains of Aspergillus variecolor, 549. Part VII, production and biosynthesis of 4,7-dimethoxy-5-methylcoumarin in Aspergillus variecolor, 554.
- of β-lactam antibiotics, studies on. Part II, synthesis, and incorporation into penicillin G, of (2RS, 2'RS, 3R, 3'R)-[3,3'-3H₂]cystine and (2RS,2'RS, 3S, 3'S)-[3,3'-3H₂]cystine, 2517.
- of Lobelia alkaloids. Part III, intermediates in the biosynthesis of lobeline; biosynthesis of 8,10-diethyllobelidione, 415.
- of nepodin (2-acetyl-3-methylnaphthalene-1,8-diol) in Rumex alpinus L., 689.
- of phenylpropanoid compounds. Part II, incorporation of specifically labelled cinnamic acids into eugenol, 1548.
- of steroids and terpenoids, investigations on the. Part XII, biosynthesis of 3β-hydroxy-triterpenoids and -steroids from (3S)-2,3-epoxy-2,3-dihydrosqualene, 1134.
- of terpenes and steroids. Part X, the sterols of some yeast mutants doubly defective in ergosterol biosynthesis, 88.
- of vitamin B_6 . Incorporation of glycolaldehyde into pyridoxal, 1622.
- terpenoid, studies in. Part XIII, the biosynthetic relationship of the gibberellins in *Gibberella fujikuroi*, 663.
- Natural acetylenes. Part XLVII, biosynthetic experiments with the fungus *Lepista diemii* (Singer). Biogenesis of the C₈ acetylenic cyano-acid diatretyne 2, 424.
- Phenol oxidation and biosynthesis. Part XXV, new syntheses of bis-(2-arylethyl)amines of biosynthetic importance, 579.
- Stereospecific exchange of a β-methylene proton in phenylalanine preceding biosynthetic incorporation into gliotoxin, 383.
- Biphenyls, bromo-, photochemistry of: steric effects and electron transfer, 1607.
 - Photolysis of N-arylsulphonyl-SS-dimethylsulphoximides in aromatic solvents. Photoisomerisation of methylbiphenyls, 1806.
- Birch reduction. Reduction of aryltrimethylsilanes as a synthetic method. Part II, 470.
- Bis(azodicarbonyl) compounds, decomposition and cycloaddition reactions of some, 1046.
- 5,13: 6,12-Bisepithiodibenzo[a,f]cyclodecene-7,14-diones, 5,6,12,13-tetrahydro-, by dimerisation of 2-benzothio-pyrvlium-4-olate. Pyrvlium salts. Part V. 1366.
- pyrylium-4-olate. Pyrylium salts. Part V, 1366. **Boletus elegans.** Constituents of the higher fungi. Part XV, 3-(3,4-dihydroxyphenyl)-2,7,8-trihydroxydibenzofuran-1,4-dione, a precursor of thelephoric acid from the fungus Suillus grevillei (Klotsch) Sing. [Boletus elegans (Schum. per Fries)], 351.
- **Bornan-2-exo-ol.** Formation of carbocations from bornan-2-exo-ol and its derivatives and their reactions with some nucleophiles, 2369.
- Boron trifluoride, a study of the mechanism of D-homoannulation of 17α-hydroxypregnan-20-ones with. D-Homo-steroids. Part V, 1450.

Boron (contd.)

Chemistry of organoborates. Part I, new, high yield ketone syntheses by reaction of trialkylcyanoborates with acylating agents or N-phenylbenzimidoyl chloride, 129. Part II, high yield syntheses of trialkylmethanols by the cyanoborate process, 138. Part III, protonation of trialkylcyanoborates, 142. Part IV, stereochemistry and relative migratory aptitudes of alkyl groups in the cyanoborate process, 145.

Brefeldin A, fluorination of, and preparation of some fluoropalmitic acids, 2523.

Bridged-ring systems. Condensed cyclic and bridged-ring systems. Part III, regioselectivity and stereoselectivity in the acid-catalysed cyclisations of substituted benzyl-cyclohexanols. Stereocontrolled synthesis of some gemcarboxy-methyl-substituted hexahydrofluorene and hexahydro-5,9-methanobenzocyclo-octene derivatives, 2438.

Bridgehead enolisation of ent-17-nor[13,14α-2H₂]kauran-16-one; preparation of ent-[13,14α-2H₂]kaur-16-ene and some derivatives. Terpenoids. Part VI, 378.

Bromination, electrophilic, of bicyclo[3.2.0]hept-2-en-6-ones, 1767.

Isomer ratios from the bromination of allyl chloride in water, methanol, acetic acid, and trifluoroacetic acid, 2238.

Bromine compounds. Absolute configuration of the most potent isomer of the pyrethroid insecticide α-cyano-3-phenoxybenzyl cis-3-(2,2-dibromovinyl)-2,2-di-methylcyclopropanecarboxylate by crystal structure analysis, 1865.

Allenes. Part XXXII, a general synthesis of allenediynes from allenic bromides and butadiynyl(trimethyl)-silane and the synthesis of two natural allenes, (\pm) -octa-2,3-diene-5,7-diyn-1-ol and (\pm) -undeca-5,6-diene-8,10-diyn-1-ol, 1628.

A new regiospecific synthesis of 8-bromocamphor, 251.

Electrocyclic reactions. Part VII, irradiation of 3,5-dibromo-2,6-dimethylhepta-2,5-dien-4-one (αα'-di-bromophorone), 1595.

Intramolecular cyclisation of phenolic oximes. Part II, cyclisations with brominating agents, 2348.

Metal ions and complexes in organic reactions. Part XX, copper-catalysed reactions of aromatic bromocarboxylates with carbanions, giving oxo-acids, isocoumarins, and related products, 1267.

Oxymetallation. Part IX, bromodemercuration of peroxymercurials derived from terminal, medial, and cyclic alkenes to give \(\beta\)-bromo-peroxides, 695.

Photochemistry of bromobiphenyls: steric effects and electron transfer, 1607.

Reaction of diazocyclopropane with steroidal 16-bromo-17-ketones, 2460.

of phenyl-lithium and bromobenzene with carbon disulphide, 160.

Thiele-Winter acetoxylation of quinones. Part VIII, some bromo-derivatives of phenyl-1,4-benzoquinone,

4,8,8-Tribromobicyclo[5.1.0]oct-4-en-3-ones from dibromocarbene adducts of cyclohexa-1,4-dienols,

Brya ebenus, stereocarpenequinones (6H-benzofuro[3,2-c]-[1]benzopyranquinones) from. Naturally occurring quinones. Part XXV, 1113.

Bupleurum falcatum L., saponins isolated from; components of saikosaponin b, 2043.

Butadienes, phenyl-substituted, formation of methyl ethers from photoaddition of methanol to, 1913.

Butenolides. Conversion of a catechol into a but-2-enolide, 2485.

C

¹³C nuclear magnetic resonance spectra of some gibberellins, 1514.

of some methyloestratrienes; application to the mechanism of their formation, 1110.

of some steroidal unsaturated ketones, 1956.

Addition reactions of heterocyclic compounds. Part LIX, a ¹³C tracer study of the mechanism of formation of azepines from 2-methylquinolines and dimethyl acetylenedicarboxylate, 394.

Application of ¹³C nuclear magnetic resonance to the study of gibberellins, 992.

Carbon-13 magnetic resonance spectra of natural rotenoids and their relatives, 1497.

Synthetic presqualene esters, related cyclopropanes and isoprenoids, 913.

of natural pyrethrins and related compounds, 1500.

Determination of the substitution pattern of an isoxazole by ¹³C nuclear magnetic resonance, 2115.

Fusicoccin. Part V, the biosynthesis of fusicoccin from [1-13C]- and [2-13C]-acetate, 1405.

Reactive intermediates. Part XXV, investigation of the pyrolysis of 1,4- and 1,5-diphenyl-1,2,3-triazoles by use of ¹³C-labelled compounds, 8.

¹⁴C. Biosynthesis of vitamin B₆. Incorporation of glycolaldehyde into pyridoxal, 1622.

Phosphorylated sugars. Part XVII, synthesis of 3-deoxy-p-arabino-[1-14C]heptulosonic acid 7-(dihydrogen phosphate), 600.

Calonectria decora. Microbiological hydroxylation. Part XVI, incubation of derivatives (mainly acetals) of 5α-androstane ketones with the fungi Calonectria decora, Aspergillus ochraceus, and Rhizopus nigricans, 1356. Part XVII, C-19 hydroxylation of 17-oxo-5α-androstanes and 17-oxo-3α,5-cyclo-5α-androstanes by the fungus Calonectria decora, 1359. Part XXI, hydroxylations of 3-halogeno-17-oxo-, 3-halogeno-7-oxo-, and 17-halogeno-3-oxo-androstanes by the fungi Calonectria decora, Rhizopus nigricans and Aspergillus ochraceus, 2308.

Calophyllum cordato-oblongum Thw. (Guttiferae), extractives of. Chemical investigation of Ceylonese plants. Part XVI, 2215.

Camphor, 8-bromo-, a new regiospecific synthesis of, 251.

Canarigenin. Steroids and related natural products. Part XCI, synthesis of the cardenolides canarigenin and uzarigenin, 1972.

Canarigenone. Steroids and related natural products. Part XCII, conversion of canarigenone [14-hydroxy-3-oxo-14β-carda-4,20(22)-dienolide] into periplogenin [3β,5,14-trihydroxy-5β,14β-card-20(22)-enolide], 1976.

Caranine, α -anhydrodihydro-, (1,12b-didehydrolycoran) and 12 $b\alpha$ -lycoran (γ -lycoran), synthesis of, via photocyclisation of an enamide-ketone, 2502.

Carbamate, ethyl N-trichloroethylidene-, a new synthesis of α -amino-acids by the reaction of Grignard reagents with, 2511.

Carbamoyl chlorides, ω-alkoxyalkyl- and ω-phenoxyalkyl-, rearrangements and cyclisation of, 1837.

- Carbanions. Addition reactions of heterocyclic compounds. Part LVII, reactions of pyridines with acetylenic esters in the presence of carbanion sources, 438.
 - 1,1-Diphenylalkenes. Part V, C-1 vs. C-3 alkylation of allylic carbanions; applicability of the principle of least motion, 531.
 - Metal ions and complexes in organic reactions. Part XX, copper-catalysed reactions of aromatic bromocarboxylates with carbanions, giving oxo-acids, iso-coumarins, and related products, 1267.
 - Polyfluorocarbanion chemistry. Part II, fluorideinitiated reactions of hexafluoropropene with pentafluoropyridine and tetrafluoropyridine-4-carbonitrile, 1029. Part III, reaction of hexafluoropropene with pentafluorobenzonitrile, 1035. Part IV, some reactions of 2H- and 1H-pentafluoropropene with nucleophiles, 2015.
- Carbazic acid. Polypeptides. Part XIII, preparation of α -aza-amino-acid (carbazic acid) derivatives and intermediates for the preparation of α -aza-peptides, 1712.
- Carbenes. Carbene chemistry. Part IX, some C-H insertion reactions of dichlorocarbene in the gas phase, 1638.
 - Reaction of benzyne with carbon disulphide: formation and reaction of 1,3-benzodithiol-2-ylidene, 525.
 - 4,8,8-Tribromobicyclo[5.1.0]oct-4-en-3-ones from dibromocarbene adducts of cyclohexa-1,4-dienols, 1043.
- Carbocations, stable. Part VIII, fragmentation reactions of ferrocenylalkylium ions, 113. For previous parts see 'Carbonium ions'. Part IX, reactions involving sterically crowded ferrocenylalkylium ions, 116.
 - Formation of carbocations from bornan-2-exo-ol and its derivatives and their reactions with some nucleophiles, 2369

Carbohydrates-see also Sugars.

- Arylazo-glycenosides. Part IV, synthesis and reactions of some 2-and 3-arylazo-derivatives of methyl 2,3-dideoxy-D-pent-2-enofuranoside, 2163. Part V, cyclo-additions with methyl 5-O-benzoyl-2,3-dideoxy-3-phenylazo-α- and -β-D-glycero-pent-2-enofuranoside, 2178.
- Photochemistry of carbohydrate derivatives. Part III, photochemical rearrangements of 2,3- and 3,4-O-o-nitrobenzylideneglycopyranosides, 1695. Part IV, photochemical rearrangement of 4,6-O-o-nitrobenzylideneglycopyranosides, 1700.
- Studies on the synthesis of novel carbohydrates with sulphur in the ring. Part II, analogues of derivatives of unsaturated deoxy-ulopyranosidonic acids via Diels-Alder reactions with methyl cyanodithioformate, 180.
- The allyl ether as a protecting group in carbohydrate chemistry. Part VII, the 2-O-allyl group as a non-participant in 1,2-cis-glycoside synthesis, 361.
- Use of carbohydrate derivatives for studies of phosphorus stereochemistry. Part V, preparation and some reactions of tetrahydro-1,3,2-oxazaphosphorine-2-ones and -2-thiones, 1892.
- Carbon-carbon double bonds, activated, preparative aspects of the cathodic hydrogenation of. Electro-organic reactions. Part IV, 971.
- Carbon disulphide, reaction of benzyne with: formation and reaction of 1,3-benzodithiol-2-ylidene, 525.
- of phenyl-lithium and bromobenzene with, 160.
- Carbonium ions, stable—see Carbocations, stable.

Carbonyl compounds—see also Aldehydes and Ketones.

- Adduct formation between pyridine-2-thiones and acetylenic carbonyl derivatives, 1493.
- Carbonyl and thiocarbonyl compounds. Part XIV, reactions of tetrachloro-o-benzoquinone with 3-(2-furyl)- and 3-(2-thienyl)-acrylophenones, 1052.
- Chemistry of alkali metal tetracarbonylferrates. A simple method for alkylating and arylating carbonyl compounds and active methylene compounds, 1273.
- Synthesis of heterocyclic compounds. Part XXX, reactions of o-alkylamino- and o-dialkylamino-anilines with some $\alpha\beta$ -unsaturated carbonyl compounds, 2409.
- Carboxymethylation of ρ,αββ-tetramethylstyrene by manganese(III) acetate. Reductive cyclization during treatment of the derived γ-aryl-γ-lactone with polyphosphoric acid to give 4-isopropyl-7-methyl-1-tetralone, 1235.
- Carcinogenic compounds. Potentially carcinogenic cyclopenta[a]phenanthrenes. Part X, oxygenated derivatives of the carcinogen 15,16-dihydro-11-methylcyclopenta[a]-phenanthren-17-one of metabolic interest, 265.
- Cardenolides. Steroids and related natural products. Part XCI, synthesis of the cardenolides canarigenin and uzarigenin, 1972.
- Carenes. Chemistry of terpenes. Part XVIII, synthesis of methyl (-)-cis-chrysanthemate and of a methyl (+)-cis-homochrysanthemate from (+)-car-3- and -2-ene, 332. Part XX, autoxidation of (+)-car-3-ene, 2232.
- Carotenoids and related compounds. Part XXX, stereochemistry and synthesis of phytoene, 1457. Part XXXII, synthesis of astaxanthin, phoenicoxanthin, hydroxyechinenone, and the corresponding diosphenols, 2195. Part XXXIII, synthesis of dehydroflexixanthin and deoxyflexixanthin, 2529.
- Catalysis, intramolecular. Part II, electrophilic anchimeric assistance by a hydroxy-group in the opening of steroidal epoxides by azide anions, 1663.
- Catechol. Conversion of a catechol into a but-2-enolide, 2485.
- (±)-Cavidine. Photocyclisation of enamides. Part VIII, synthesis of 13-methylberbines; total synthesis of (±)cavidine, 1791.
- Cedrus species, structure and synthesis of a new ketone from; some new constituents of C. atlantica Manet, 1502.
- Celebixanthone methyl ether and related 1,5,6,7-tetraoxygenated xanthones, synthesis of. Extractives from Guttiferae. Part XXIX, 241.
- Celery. 4-Phosphoranylidenebutenolide intermediates in the synthesis of 4-ylidenebutenolides and 4-ylidenetetronic acids. Synthesis of alkylidenephthalide constituents of celery odour and models for freelingyne, 635.
- Cephalosporins and penicillins, studies related to. Part IV, synthesis of methyl 7-phthalimido-6,7-trans-DL-cepham-4-carboxylate, 2525.
 - Amino-acids and peptides. Part I, esterification of the carboxy-group of penicillins and cephalosporins by hydrazone oxidation, 2019.
- 6,7-trans-DL-Cepham-4-carboxylate, 7-phthalimido, methyl, synthesis of. Studies related to penicillins and cephalosporins. Part IV, 2525.
- Cerium(IV) ammonium nitrate, oxidation of some trinuclear aromatic compounds with, 1398.
- Ceylonese plants, chemical investigation of. Part XII, (+)-3,4',5,7-tetrahydroxy-3'-methoxyflavanone [(+)-dihydroisophamnetin] and 3,5,7-trihydroxy-3',4'-di-

- Cevlonese plants (contd.)
 - methoxyflavone (dillenetin): two new natural products from *Dilleria indica* L., 612. Part XV, extractives of *Kayea stylosa* Thw. (Guttiferae), 1539. Part XVI, extractives of *Calophyllum cordato-oblongum* Thw. (Guttiferae), 2215. Part XVII, isolation and structures of the xanthones in the extractives of *Mesua ferrae* L. (form *M. salicina* Pl. and Tr.) (Guttiferae), 2447.
- Chaetonium coarctatum. 8-Ethylidene-7,8-dihydro-4-methoxypyrano[4,3-b]pyran-2,5-dione (coarctatin), a metabolite of Chaetonium coarctatum, 999.
- Chalcones, 2'-hydroxy-α-phenyl-, oxidation of: substituent effects on the course of the Algar-Flynn-Oyamada (AFO) reaction, 1671.
 - parameters regulating the α and β -cyclisation of, 1437.
- Chelidonine. Biosynthesis. Part XXII, the origin of chelidonine and of other alkaloids derived from the tetrahydroprotoberberine skeleton, 1147.
- Chelidonium majus, investigations on the biosynthesis of stylopine in Biosynthesis. Part XXI, 1140.
- Chirality, central, computer manipulation of, 1124.
- Chloramine T. Transformations of penicillins: reactions with chloramine T, 1208.
- Chlorine compounds. Alkylphenylphosphinic amides: formation of stable, crystalline hydrochlorides, and hydrolysis in acidic solution, 514.
 - Carbene chemistry. Part IX, some C-H insertion reactions of dichlorocarbene in the gas phase, 1638.
 - Carbonyl and thiocarbonyl compounds. Part XIV, reactions of tetrachloro-o-benzoquinone with 3-(2-furyl)- and 3-(2-thienyl)-acrylophenones, 1052.
 - Chemistry of santonene. Part X, products of the action of phosphorus pentachloride on santonin, 726.
 - Condensation between 2-chloro-3*H*-indol-3-one and phenols, 1840.
 - reactions of chloroformylsulphur chloride with 2- and 4-aminopyrimidines, 2-aminothiazole, and 2-amino- Δ^2 -thiazoline, 375.
 - Conversion of 2-chloroallylamines into heterocyclic compounds. Part I, 2-methylindoles, 1,5,6,7-tetrahydro-3-methylindol-4-ones, and related heterocycles, 1446.
 - Isomer ratios from the bromination of allyl chloride in water, methanol, acetic acid, and trifluoroacetic acid, 2238.
 - Mechanism of the reaction between trialkyl phosphates and dialkyl phosphorochloridates: nucleophilic sites in phosphorus(v) esters, 201.
 - Neighbouring hydroxy-group participation in the reductive elimination of chlorine from 5α,6β-dichlorocholestanes with sodium borohydride, 277.
 - Peroxide-diene oxygen transfer reactions induced by titanium tetrachloride, 2065.
 - Radical-induced cyclisations of *cis*-1,10-dichlorodec-5-ene and 1,10-dichlorodec-5-yne, 410.
 - Reactions of heterocycles with thiophosgene. Part IV, β,4-dichloro-2-isothiocyanatocinnamaldehyde, a product from 4,7-dichloroquinoline, 922.
 - Rearrangements and cyclization of ω-alkoxyalkyl- and ω-phenoxyalkyl-carbamoyl chlorides, 1836.
 - Some base-catalysed ring expansion and ring expansionring contraction reactions of ethyl 4-chloromethyl-1,2,3,4-tetrahydro-6-methyl-2-oxopyrimidine-5-carboxylate, 657.
 - Steroids. Part XXXVIII, 5-chloro-5α-cholestane, 2208.

- Chlorotrifluoromethyldisulphane, reactions of, 614.
- Cholecalciferol, 1α,24-dihydroxy-, synthesis of. Synthesis of active forms of vitamin D. Part IX. Studies on steroids. Part XIX, 1421.
- Cholestanes. Microbiological hydroxylation. Part XIX, the action of an ant fungus ('Acromyrmex fungus') on oxygenated androstanes, pregnanes, and cholestanes, 1552.
- Neighbouring hydroxy-group participation in the reductive elimination of chlorine from 5α,6β-dichlorocholestanes with sodium borohydride, 277.
- Steroids. Part XXXVIII, 5-chloro-5α-cholestane, 2208. and Walden inversion. Part LXX, re-examination of the substitution reactions of 5α-cholestan-6α-ol, 2205.
- Synthetic studies of with anolides. Part I, synthesis of 5.6β -epoxy- 4β -hydroxy- 5β -cholest-2-en-1-one and related compounds, 2295.
- Chroman-4-one, 3-hydroxymethylene-, 1706.
- **Chromones.** Isolation of 5,7-dihydroxy-2-methylchromone and its 7-O-glycosides from *Adina rubescens*, 1776.
 - Photochemical reactions. Part V, photoinduced cyclisations of 3-aroylchromones, 1845.
 - Synthesis and reactions of isoprenyl terminal epoxides in the chromone and quinoline series, 150.
- Chromotropic dimers produced from 2-arylphenanthro-[9,10-d]imidazoles, structure of, 2361.
- Chrysanthemates. Chemistry of terpenes. Part XVIII, synthesis of methyl (-)-cis-chrysanthemate and of a methyl (+)-cis-homochrysanthemate from (+)-car-3-and -2-ene, 332.
- α-Chymotrypsin, confirmation of the site of nitrosation in tryptophan derivatives by, 2357.
- Cinnamic acids. Biosynthesis of phenylpropanoid compounds. Part II, incorporation of specifically labelled cinnamic acids into eugenol, 1548.
- Cinnolines. Part XVI, photochemical rearrangement of 2-alkylcinnolinium-4-olates to 3-alkyl-4(3H)-quinazolones, 2035.
- Claisen rearrangement, elaboration of sclareol by, 1009.
- Coarctatin (8-ethylidene-7,8-dihydro-4-methoxypyrano[4,3-b]pyran-2,5-dione), a metabolite of Chaetonium coarctatum, 999
- Cobaloximes, degradation of, to derivatives of imidazo[1,2-a]-pyridine, 386.
- Cobalt porphyrins, condensation of ethyl diazoacetate with, 2076.
 - trifluoride, stereochemistry of addition of fluorine to olefins by, 2237.
- Computer manipulation of central chirality, 1124.
- Procedure for rapid recognition of the rings of a molecule, 1120.
- Condensation between 2-chloro-3H-indol-3-one and phenols, 1840.
 - of ethyl diazoacetate with cobalt porphyrins, 2076.
 - reactions of chloroformylsulphur chloride with 2- and 4-aminopyrimidines, 2-aminothiazole, and 2-amino- Δ^2 -thiazoline, 375.
- Cope rearrangement of some germacrane-type furan sesquiterpenes. Part V, preparation and thermal rearrangement of some cis, trans-germacranolides, 870.
- Copper. Metal ions and complexes in organic reactions. Part XX, copper-catalysed reactions of aromatic bromo-carboxylates with carbanions, giving oxo-acids, isocoumarins, and related products, 1267.

- Copper (contd.)
 - Reactions of perfluoroalkylcopper compounds. Part V, the preparation of some polyfluoroalkyl-substituted acids and alcohols, 654.
- Corticosterone, 18-hydroxydeoxy-(18,21-dihydroxypregn-4-ene-3,20-dione). Synthesis of 18-substituted steroids. Part I, 1860.
 - 1α -hydroxy-, synthesis of, 2371.
 - Synthesis of 11-deoxy-18-hydroxycorticosterone and 18-hydroxycorticosterone 21-acetates, 2252.
- Coumarins and related compounds. Part XXI, a reinvestigation of the reaction between 1-naphthol and 2-formyl-2-phenylacetonitrile, 1869.
 - Biosynthesis of fungal metabolites. Part VII, production and biosynthesis of 4,7-dimethoxy-5-methylcoumarin in Aspergillus variecolor, 554.
- **Croton sparsiflorus** and **C. linearis**. Studies on proaporphine and aporphine alkaloids. Part VII, stereochemistry of reduced proaporphines of *Croton sparsiflorus* and *C. linearis*, 1659.
- Crustacean surface waxes. Part I, the hydrocarbons from the surface of *Ligia oceanica*, 354.
- Crystal and molecular structures of three products of 1,4-dipolar cycloaddition of dimethyl acetylenedicarboxylate to benzothiazole. Studies on heterocyclic compounds. Part XVI, 2316.
- Crystal structure. Absolute configuration of the most potent isomer of the pyrethroid insecticide α-cyano-3-phenoxybenzyl cis-3-(2,2-dibromovinyl)-2,2-dimethyl-cyclopropanecarboxylate by crystal structure analysis, 1865.
- Cularine. Phenol oxidation. Part IV, synthesis and novel ring-opening of spirocyclic dienones related to the benzylisoquinoline alkaloid cularine, 2492.
- Cupferron tosylate. A note on three routes to benzyne: decomposition of diphenyliodonium acetate, nitrosation of N-phenylphosphylamidates, and deoxygenation of benzenediazotoluene-p-sulphonate N'-oxide (cupferron tosylate) by phosphorus trichloride, 1072.
- Curcuma zedoaria. Sesquiterpenoids. Part XLVII, structure, configuration, conformation, and thermal rearrangement of furanodienone, isofuranodienone, curzerenone, epicurzerenone, and pyrocurzerenone, sesquiterpenoids of Curcuma zedoaria, 478.
- Curzerenone, epicurzerenone, pyrocurzerenone, furanodienone, and isofuranodienone, sesquiterpenoids of Curcuma zedoaria, structure, configuration, conformation, and thermal rearrangement of. Sesquiterpenoids. Part XLVII, 478.
- Cyanides—see also Nitriles.
 - Formimidoyl cyanide and isocyanide from azidoacetonitrile by photolysis, 1743.
- Cyanoborates. Chemistry of organoborates. Part I, new, high yield ketone syntheses by reaction of trialkylcyanoborates with acylating agents or N-phenylbenzimidoyl chloride, 129. Part II, high yield syntheses of trialkylmethanols by the cyanoborate process, 138. Part III, protonation of trialkylcyanoborates, 142. Part IV, stereochemistry and relative migratory aptitudes of alkyl groups in the cyanoborate process, 145.
- Cyanohydrazonobenzothiophens. Nucleophile-induced cyclisation of 2-diazo-2'-thiocyanatoacetophenone: 2-(cyanohydrazono)- and 2-(triphenylphosphoranylidenehydrazono)benzo[b]thiophen-3(2H)-one, 286.

- Cyclisation, intramolecular, of phenolic oximes. Part I, cyclisations with manganese(III) tris(acetylacetonate), 2340. Part II, cyclisations with brominating agents, 2348.
 - Lewis acid-catalysed, of 1-anthryl styryl ketone; benz- $\lceil de \rceil$ anthracen-3-one, 1537.
 - nucleophile-induced, of 2-diazo-2'-thiocyanatoaceto-phenone: 2-(cyanohydrazono)- and 2-(triphenylphos-phoranylidenehydrazono)-benzo[b]thiophen-3(2H)-one, 286.
 - of N-2-amino-6-nitrophenyl and N-3-amino-2-pyridyl derivatives of amino-acids and peptides. Methods of peptide sequencing. Part II, 1424.
 - of ethyl acetoacetate and substituted salicylaldehydes in the presence of ammonium acetate, 2025.
 - radical-induced, of cis-1,10-dichlorodec-5-ene and 1,10-dichlorodec-5-yne, 410.
 - reactions. Part III, cyclisation of trans-2,3-epoxy-9-m-methoxyphenyl-2,6-dimethylnon-6-ene, 262.
 - Acid-catalysed cyclisations of cyclo-octenylidene derivatives to produce bicyclo[3.3.1]nonanes, 340.
 - Carboxymethylation of ρ,αββ-tetramethylstyrene by manganese(III) acetate. Reductive cyclization during treatment of the derived γ-aryl-γ-lactone with polyphosphoric acid to give 4-isopropyl-7-methyl-1-tetralone, 1235.
 - Condensed cyclic and bridged-ring systems. Part III, regioselectivity and stereoselectivity in the acid-catalysed cyclisations of substituted benzylcyclohexanols. Stereocontrolled synthesis of some gemcarboxy-methyl-substituted hexahydrofluorene and hexahydro-5,9-methanobenzocyclo-octene derivatives, 2438.
 - Medium-ring 1,5-dienes. Part II, radical and electrophile-induced cyclisation of germacra-1(10),4,7(11)-triene, 2326. Part III, cyclisation of germacra-1(10),-4,7(11)-triene oxides, 2332.
 - Parameters regulating the α and β -cyclisation of chalcones, 1437.
 - Rearrangements and cyclization of ω -alkoxyalkyl- and ω -phenoxyalkyl-carbamoyl chlorides, 1836.
 - Synthesis of indolizines by intramolecular cyclisation of pyridinium allylides [1-(1-pyridinio)prop-2-enides], 575.
- Cycloadditions, base-catalysed intramolecular, of allyl 3-phenylprop-2-ynyl ethers and 4-methylpent-4-en-2-ynyl prop-2-ynyl ethers, 1315.
 - behaviour, rationalisation of, by use of Hückel Frontier Molecular Orbitals, 1810.
 - extended dipolar, 556.
 - intermolecular, of o-quinodimethane, tetra- and hexadehydroyohimbane synthesis by, 737.
 - reactions of derivatives of hexafluorobicyclo[2.2.0]hexa-2,5-diene, and of hexakis(trifluoromethyl)benzvalene. Valence-bond isomer chemistry. Part VIII, 2010.
 - with methyl 5-O-benzoyl-2,3-dideoxy-3-phenylazo-α- and -β-D-glycero-pent-2-enofuranoside. Arylazo-glycenosides. Part V, 2178.
 - Decomposition and cycloaddition reactions of some bis-(azodicarbonyl) compounds, 1046.
 - Effects of 3-substituents upon orientation in the 1,3-dipolar cycloaddition reaction between 3-substituted pyridine N-imides and ethyl propiolate: syntheses of ethyl 4- and 6-substituted pyrazolo[1,5-a]pyridine-3-carboxylates, 406.

- Cycloadditions (contd.)
 - Heterocycles by cycloaddition. Part I, cycloaddition-extrusion-ring expansion reactions of five-membered mesoionic compounds with diphenylcyclopropenone and related compounds: preparation of six-membered heterocycles, 633.
 - Studies on heterocyclic compounds. Part XVI, crystal and molecular structures of three products of 1,4-dipolar cycloaddition of dimethyl acetylenedicarboxylate to benzothiazole, 2316.
 - Syntheses of heterocyclic compounds. Part XXXI, triazolium tetrafluoroborates from the cycloaddition of alkoxydiazenium salts to azines, hydrazones, and anils derived from aromatic aldehydes, 2474. Part XXXII, intramolecular 1,3-dipolar cycloadditions of 2-allyloxy- and 2-prop-2-ynyloxy-aromatic aldehyde azines, 2479.
- trans-Cycloalkenes. Part V, 1-methyl-trans-cyclo-octene, 2264. Part VI, addition of iodine(I) azide to transcyclo-octene, 2267.
 - Preparation of medium-sized ring trans-cycloalkene derivatives from halogenocyclopropane intermediates by silver perchlorate-promoted solvolysis, 2422.
- 3α ,5-Cyclo- 5α -androst-6-en-17-one, epoxidation of, 323.
- Cyclobutanes and Cyclobutenes, formation of. Further rearrangements of cyclopropyl epoxides, 2364.
- Cyclobutene, perfluoro-, an ESCA study of the fluoride-ion-induced trimerization product from, 647.
- Cyclohexadienols. 4,8,8-Tribromobicyclo[5.1.0]oct-4-en-3ones from dibromocarbene adducts of cyclohexa-1,4dienols, 1043.
 - p-hydroxy-, oxidation of ring a model phenols to. Experiments on the synthesis of tetracycline. Part XIII, 1610.
 - 1,3-dicarboxylates, stereoisomeric diethyl 6-amino-, synthesis and properties of, 1959.
- Cyclohexanols, 3-amino-, reduction of enaminones in the preparation of; a novel preparation of tetronic acid, 588.
 - Condensed cyclic and bridged-ring systems. Part III, regioselectivity and stereoselectivity in the acid-catalysed cyclisations of substituted benzylcyclohexanols. Stereocontrolled synthesis of some gem-carboxymethyl-substituted hexahydrofluorene and hexahydrof,9-methanobenzocyclo-octene derivatives, 2438.
- **Cyclonerotriol** [6-(3-hydroxy-2,3-dimethylcyclopentyl)-2-methylhept-2-ene-1,6-diol], a new sesquiterpenoid metabolite of *Fusarium culmorum*, 1586.
- trans-Cyclo-octenes. trans-Cycloalkenes. Part V, 1-methyl-trans-cyclo-octene, 2264. Part VI, addition of iodine(I) azide to trans-cyclo-octene, 2267.
- **Cyclo-octenylidene** derivatives, acid-catalysed cyclisations of, to produce bicyclo[3.3.1]nonanes, 340.
- Cyclopentadecanones. Bicyclic analogues of exaltone (cyclopentadecanone) and muscone (3-methylcyclopentadecanone), 1172.
- Cyclopentadienones. Organophosphorus intermediates. Part VI, base-catalysed reaction of methyl phosphinate with tetraphenylcyclopentadienone, 1876.
- Cyclopentanedithiocarboxylic acid, 2-oxo-, and 3-methyl-5-oxo-1-phenyl- Δ^2 -pyrazoline-4-dithiocarboxylic acid, some reactions of, 1277.
- Cyclopenta[a]phenanthrenes, potentially carcinogenic. Part X, oxygenated derivatives of the carcinogen 15,16-dihydro-11-methylcyclopenta[a]phenanthren-17-one of metabolic interest, 265.

Cyclopentenes. Electrocyclic reactions. Part VI, thermal reactions of 1,5-diphenylpentadienide ion and the anions derived from *cis-* and *trans-3*,4-diphenylcyclopentene, 765.

- Unsaturated nitrogen compounds containing fluorine. Part VI, reactions of hexafluoroacetone azine with 2-methylbut-2-ene, 2,3-dimethylbut-2-ene, 2,3-dimethylbut-1-ene, and cyclopentene, 1902.
- 1H-Cyclopropa[a] naphthalene, 1a,2,3,7b-tetrahydro-1-phenyl-, mode of cyclopropane ring opening of: a correction, 1934.
- Cyclopropanes. Absolute configuration of the most potent isomer of the pyrethroid insecticide α-cyano-3-phenoxybenzyl cis-3-(2,2-dibromovinyl)-2,2-dimethylcyclopropanecarboxylate by crystal structure analysis, 1865.
 - Anodic oxidation. Part XV, electrochemical functionalisation of phenylcyclopropane and 2-isobutenyl-1,1-dimethylcyclopropane in methanol, 1955.
 - Carbon-13 magnetic resonance spectra. Synthetic presqualene esters, related cyclopropanes, and isoprenoids, 913.
 - Mode of cyclopropane ring opening of 1a,2,3,7b-tetra-hydro-1-phenyl-1*H*-cyclopropa[*a*]naphthalene: a correction, 1934.
 - Preparation of medium-sized ring *trans*-cycloalkene derivatives from halogenocyclopropane intermediates by silver perchlorate-promoted solvolysis, 2422.
- Cyclopropenone, diphenyl-, reaction of N-aryl- and imidoylsulphimides with; synthesis of 4-pyrimidones, 1969.
 - Heterocycles by cycloaddition. Part I, cycloaddition-extrusion-ring expansion reactions of five-membered mesoionic compounds with diphenylcyclopropenone and related compounds: preparation of six-membered heterocycles, 632.
- Cyclopropylcarbinyl-oxocarbonium ions. Part VII, orientational effects, 1872.
- Cyclopropyl epoxides, further rearrangements of. Formation of cyclobutanes and cyclobutenes, 2364.
- Cyclopropyl(oxy)methylium ions. Cyclopropylcarbinyloxocarbonium ions. Part VII, orientational effects, 1872.
- Cystine. Studies on the biosynthesis of β-lactam antibiotics. Part II, synthesis, and incorporation into penicillin G, of (2RS, 2'RS, 3R, 3'R)-[3,3'-3H₂] cystine and (2RS, 2'RS, 3S, 3'S)-[3,3'-3H₂] cystine, 2517.
- Cytidine and cytosine, reactions of, with O-substituted hydroxylamines, 2417.
- Cytosine and cytidine, reactions of, with O-substituted hydroxylamines, 2417.
 - Kinetics and mechanism of reaction of hydroxylamine with cytosine and its derivatives, 370.

D

- Daedalea rufescens. Microbiological hydroxylation. Part XV, hydroxylation in the terminal rings of monoand di-oxygenated 5α -androstanes with the fungus Daedalea rufescens, 357.
- **σ-Damascone** and **β-Damascenone**. Synthesis of σ-damascone [trans-1-(2,6,6,-trimethylcyclohex-3-enyl) but-2-en-1-one] and β-damascenone [trans-1-(2,6,6-trimethylcyclohexa-1,3-dienyl)but-2-en-1-one], 1727.

Daucic acid, structure of, 2069.

- **Deacylation.** Synthesis of oligoribonucleotides. Part XI, preparation of ribonucleoside 2'-acetal 3'-esters by selective deacylation, 934.
- Debenzylation of quaternary benzylammonium salts, use of, in the synthesis of α -deuteriated tertiary amines, 510.
- 1-Deoxy-D-galactitol, monobutylidene acetals of, 1323.
- **Deoxygenation** of secondary alcohols, a new method for, 1574.
 - of some 3-oxo-steroids by chlorotrimethylsilane and zinc, 809.
- Depsidones. Structure of the lichen depsidone gangaleoidin, 1986.
 - of the lichen depsidone pannarin, 1979.
 - of the lichen depsidone variolaric acid, 1992.
- Desaurins. αα'-Dicyano-(1,3-dithiacyclobutane-2,4-diylidene)diacetamides (desaurins) from thiazine derivatives, 1417.
- Desmosterol and fucosterol, synthesis of allenic analogues of. Studies on steroids. Part XXIX, 2302.
- **Deuteriation.** ¹³C nuclear magnetic resonance spectra of some methyloestratrienes; application to the mechanism of their formation, 1110.
- **Deuterium.** Methyl transfer: the mass spectra of reserpine derivatives, 932.
 - On stereochemical preference in the S_E2' reaction, 2140. Preparation and properties of β -oxo-thionesters, 1603.
 - Studies of enzyme-mediated reactions. Part V, synthesis of (13S)- and (13R)-[13- 3H_1] scoulerine from stereospecifically labelled (R)- and (S)-[α - 3H_1] benzyl alcohols; stereochemistry of enzymic reactions at saturated benzylic carbon, 1162.
 - Terpenoids. Part VI, preparation of ent-[13,14 α - $^{2}H_{2}$]-kaur-16-ene and some derivatives; bridgehead enolisation of ent-17-nor[13,14 α - $^{2}H_{2}$]kauran-16-one, 378.
 - Use of debenzylation of quaternary benzylammonium salts in the synthesis of α -deuteriated tertiary amines, 510.
- Dianions. Chemical transformation of the dimeric dianion of 1,1-diphenylethylene, 1474.
- **Diaporthe celestrina.** Microbiological hydroxylation. Part XVIII, introduction of 16α -, 9α -, and 3α -hydroxygroups into dioxygenated 5α -androstanes by the fungus Diaporthe celestrina, 1364.
- Diatretyne 2. Natural acetylenes. Part XLVII, biosynthetic experiments with the fungus *Lepista diemii* (Singer). Biogenesis of the C₈ acetylenic cyano-acid diatretyne 2, 424.
- Diazabicyclohexadienes. Photochemistry of halogenocarbon compounds. Part II, valence isomers from fluorinated pyridazines, 1130.
- Diazadiborocyclohexane. Chemistry of organoborates. Part III, protonation of trialkylcyanoborates, 142.
- Diazenium salts. Syntheses of heterocyclic compounds. Part XXXI, triazolium tetrafluoroborates from the cycloaddition of alkoxydiazenium salts to azines, hydrazones, and anils derived from aromatic aldehydes, 2474.
- Diazepines. Part XX, the properties of 2,3-dihydro-1,4-diazepirium perchlorate, 1260.
 - Some base-catalysed ring expansion and ring expansion-ring contraction reactions of ethyl 4-chloromethyl-1,2,3,4-tetrahydro-6-methyl-2-oxopyrimidine-5-carbo-xylate, 657.
- Diazo-compounds. Amino-acids and peptides. Part II, a new method for preparing diazodiphenylmethane and related compounds, 2030.

- Condensation of ethyl diazoacetate with cobalt porphyrins, 2076.
- Decomposition products of pyrazolines formed from 3-alkylthioinden-1-ones and diazomethane, 572.
- Nucleophile-induced cyclisation of 2-diazo-2'-thiocyana-toacetophenone: 2-(cyanohydrazono)- and 2-(triphenylphosphoranylidenehydrazono)-benzo[b]thiophen-3(2H)-one, 286.
- Reaction of diazocyclopropane with steroidal 16-bromo-17-ketones, 2460.
 - of diazomethane with quaternary nitrogen compounds to form betaines, 1283.
- Steric effects in the reactions of αβ-unsaturated ketone p-tolylsuphonylhydrazones: a route to 1,2-benzo-diazepines via 1,7-ring closure of 1,1-diaryl-3-diazo-alkenes, 102.
- Structure of aromatic diazocyanides; synthesis of diazoisocyanides, 2122.
- Diazonium salts. Reaction of 3-methylindole with a diazonium salt, 1555.
- Dibenzofuran-1,4-dione, 3-(3,4-dihydroxyphenyl)-2,7,8-trihydroxy-, a precursor of thelephoric acid from the fungus Suillus grevillei (Klotsch) Sing. [Boletus elegans (Schum. per Fries)]. Constituents of the higher fungi. Part XV, 351.
- Dibenzophospholes, 5-phenyl-, rapid intramolecular collapse of betaines derived from, as compared with those derived from acyclic triaxylphosphines; mechanism of the Wittig reaction in protic solvents, 619.
- Dibenzoylmethanes, iodination of with iodine-peracetic acid, 1285.
- Dibenzylideneacetone. Electrocyclic reactions. Part VIII, some reactions of trans,trans- and cis,trans-2-bromo-1,5-diphenylpenta-1,4-dien-3-one (α-bromodibenzylideneacetone), 2210.
- Dicarbonyl compounds, reactions of some. Part III, oxidation of some β -diketones with alkaline hydrogen peroxide, 1347.
- αα'-Dicyano-(1,3-dithiacyclobutane-2,4-diylidene)diacetamides (desaurins) from thiazine derivatives, 1417.
- Dicyclohexylcarbodi-imide coupling reactions, synthesis of structural analogues of actinonin by. Studies concerning the antibiotic actinonin. Part VI, 848.
- Diels-Alder reactions. A cis-perhydroindanone synthesis utilising an intramolecular Diels-Alder reaction, 1559.
 - Studies on the synthesis of novel carbohydrates with sulphur in the ring. Part II, analogues of derivatives of unsaturated deoxy-ulopyranosidonic acids *via* Diels-Alder reactions with methyl cyanodithioformate, 180.
- trans-[14]-Diene, tet a, and tet b, the tetra-aza-macrocyclic ligands, a convenient synthesis of, 591.
- Dienes. Medium-ring 1,5-dienes. Part II, the radical and electrophile-induced cyclisation of germacra-1(10),4,-7(11)- triene, 2326. Part III, cyclisation of germacra-1(10),4,7(11)-triene oxides, 2332. Part IV, reactions of germacra-1(10),4,7(11)-triene with singlet oxygen and with the triphenyl phosphite-ozone adduct, 2336.
 - Unsaturated nitrogen compounds containing fluorine. Part V, reactions of hexafluoroacetone azine with open-chain and cyclic hydrocarbon dienes, 1411.
- Dienolate anions and benzynes, substituted naphthalenes and naphthols from, 1377.
- Dienones. Phenol oxidation. Part IV, synthesis and novel ring-opening of spirocyclic dienones related to the benzylisoquinoline alkaloid cularine, 2492.

- Dillenia indica L., two new natural products from: (+)-3,4',5,7-tetrahydroxy-3'-methoxyflavanone [(+)-dihydroisorhamnetin] and 3,5,7-trihydroxy-3',4'-dimethoxyflavone (dillenetin). Chemical investigation of Ceylonese plants. Part XII, 612.
- Dimerisation of thiopyrylium-3-olates, derivatives of 3,11-dithiatricyclo[5.3.1.1^{2,6}]dodecane by. Pyrylium salts. Part VI, 2099.
- Dimroth rearrangement. Part XVIII, syntheses and rearrangement of 4-iminoquinazolines and related systems, 2182.
- Diols. Absolute stereochemistry of the dihydroanthracenecis- and -trans-1,2-diols produced from anthracene by mammals and bacteria, 2506.
- Dioscorea prazeri, structures of three new steroidal sapogenins from, 1560.
- Diosphenols. Carotenoids and related compounds. Part XXXII, synthesis of astaxanthin, phoenicoxanthin, hydroxyechinenone, and the corresponding diosphenols, 2195.
- Dioxans. Reactions of unsaturated 1,3-dioxan derivatives. Part VI, addition of 2-(2-furyl)-1,3-dioxan and its derivatives to maleic anhydride, 606.
- 1,3,2-Dioxaphosphorinan, 4-methyl-, axial preference of a 2-anilino-substituent in, 1828.
- Dioxa-thia- and- selena-pentalenes. Studies of heterocyclic compounds. Part XVIII, protonation of 1,6-dioxa-6a-thia- and 1,6-dioxa-6a-selena-pentalenes: formation of 1,2-oxathiolium and 1,2-oxaselenolium cations, 2097.
- Dioxazines. Cyclic products from sulphonamides and formaldehyde, 772.
- Dioxopiperazines, thermal degradation of actinomycins to, 1320.
- 1,3-Dipolar character of six-membered aromatic rings. Part X, pyridazine and benzopyridazine betaines, 1506. 1,3-Dipoles, azimines as, 26.
- functionalised, application to the synthesis of fused heterocycles, 1326.
- (1,3-Dithiacyclobutane-2,4-diylidene) diacetamides, αα'-dicyano-, (desaurins), from thiazine derivatives, 1417.
- Dithiatricyclododecanes. Pyrylium salts. Part VI, derivatives of 3,11-dithiatricyclo[5.3.1.13,6]dodecane by dimerisation of thiopyrylium-3-olates, 2099.
- Dithiin. Reaction of phenyl-lithium and bromobenzene with carbon disulphide, 160.
- **Dyes,** quinonoid. Condensation between 2-chloro-3*H*-indol-3-one and phenols, 1840.

E

- Echinenone. Carotenoids and related compounds. Part XXXII, synthesis of astaxanthin, phoenicoxanthin, hydroxyechinenone, and the corresponding diosphenols, 2195
- Edulans I and II, synthesis and structure of, 1736.
- Electrochemistry. Anodic oxidation. Part XIV, products from the electrochemical functionalisation of olefins in methanol, 1947. Part XV, electrochemical functionalisation of phenylcyclopropane and 2-isobutenyl-1,1-dimethylcyclopropane in methanol, 1955.
 - Electrochemical fluorination. Part I, electrochemical fluorination of alkyl-substituted pyridines, 1263.
 - preparation of bismethylsulphonyl peroxide and its reactions with aromatic hydrocarbons, 953.

- Electro-organic reactions. Part IV, preparative aspects of the cathodic hydrogenation of activated carbon-carbon double bonds, 971.
- Electrocyclic reactions. Part VI, thermal reactions of 1,5-diphenylpentadienide ion and the anions derived from cis- and trans-3,4-diphenylclopentene, 765. Part VII, irradiation of 3,5-dibromo-2,6-dimethylhepta-2,5-dien-4-one (αα'-dibromophorone), 1595. Part VIII, some reactions of trans,trans- and cis,trans-2-bromo-1,5-diphenylpenta-1,4-dien-3-one (α-bromodibenzylideneacetone), 2210.
- Electron transfer reactions. Chemical transformation of the dimeric dianion of 1,1-diphenylethylene, 1474.
- Electrophilic bromination of bicyclo[3.2.0]hept-2-en-6-ones,
 - reagents and azolium anions, reactions between. Part II, direct thiation of 1,2-disubstituted pyrazolium anions with sulphur, 507.
- Ellipticines. An improved synthesis of 6*H*-pyrido[4,3-b]-carbazole derivatives, 289.
- Embelin. Benzoquinone derivatives. Part I, reactions of primary aliphatic amines with embelin (2,5-dihydroxy-3-undecyl-1,4-benzoquinone) and di-O-methylembelin, 327.
- Enamides, a simple synthesis from ketoximes, 1237.
 - Photocyclisation of enamides. Part VI. Chemical constituents of Rutaceous plants. Part XXIII. Syntheses of dihydro-derivatives of the benzo[c]phenanthridine alkaloids avicine and nitidine by enamide photocyclisation, 762. Part VII, a new synthesis of the protoberberine alkaloids, 1720. Part VIII, synthesis of 13-methylberbines; total synthesis of (±)-cavidine, 1791.
 - Synthesis of 1,12b-didehydrolycoran (α-anhydrodihydrocaranine) and 12bα-lycoran (γ-lycoran) via photocyclisation of an enamide-ketone, 2502.
- Enamines. Addition reactions of heterocyclic compounds. Part LXI, reactions of electrophilic acetylenes with conjugated cyclic enamines, 744.
 - Enamine chemistry. Part XX, reactions of αβ-unsaturated acid chlorides. Synthesis of alkyl 2,6-dioxobicyclo[3.3.1]nonane-1-carboxylates, alkyl 2,9-dioxobicyclo[3.3.1]nonane-7-carboxylates, and 2,9-dioxobicyclo[3.3.1]nonane-7-carbonitriles, 1885.
- Enaminones, reduction of, in the preparation of 3-aminocyclohexanols; a novel preparation of tetronic acid, 588.
- Enzymes. Studies of enzyme-mediated reactions. Part IV, complementary syntheses of stereospecifically labelled (R)- and (S)-[α - 3H_1]benzyl alcohol derivatives by use of liver alcohol dehydrogenase, 1156. Part V, synthesis of (13S)- and (13R)-[13- 3H_1] scoulerine from stereospecifically labelled (R)- and (S)-[α - 3H_1] benzyl alcohols; stereochemistry of enzymic reactions at saturated benzylic carbon, 1162.
 - Triazines and related products. Part XV, 2,4-diaminopyrimidines and 2-aminopyrimidin-4(3H)-ones bearing 1,2,3-benzotriazinyl groups as potential dihydrofolic reductase inhibitors, 1023.
- Epicurzerenone, pyrocurzerenone, curzerenone, furanodienone and isofuranodienone, sesquiterpenoids of *Curcuma zedoaria*, structure, configuration, conformation and thermal rearrangement of. Sesquiterpenoids. Part XLVII, 478.
- Epoxidation of 3α ,5-cyclo- 5α -androst-6-en-17-one, 323.

- **Epoxides**, aliphatic and alicyclic, conversion into trithio-carbonates. Dithiols. Part XXVI, 748.
 - cyclopropyl, further rearrangements of. Formation of cyclobutanes and cyclobutenes, 2364.
 - stereospecific conversion of, into olefins, 1216.
 - synthesis of oxazolines from, 1200.
 - Intramolecular catalysis. Part II, electrophilic anchimeric assistance by a hydroxy-group in the opening of steroidal epoxides by azide anions, 1663.
 - Synthesis and reactions of isoprenyl terminal epoxides in the chromone and quinoline series, 150.
- (+)-3α,4α-Epoxycarane, reaction with halogen acids and acetic acid. Chemistry of terpenes. Part XIX, 1217.
- trans-2,3-Epoxy-9-m-methoxyphenyl-2,6-dimethylnon-6-
- ene, cyclisation of. Cyclisation reactions. Part III, 262. 16α,17α-Εροχγρτεgn-8-en-11-ones, reaction with Lewis acids: 18-norpregna-8,11,13-trienes, 1288.
- (3R)- and (3S)-2,3-Epoxysqualene, an approach to the synthesis of, 888.
- **Eremophila freelingii**, synthesis of freelingyne, an acetylenic sesquiterpene from, 641.
- Ergosterol. Biosynthesis of terpenes and steroids. Part X, the sterols of some yeast mutants doubly defective in ergosterol biosynthesis, 88.
- Erythrostominone bisdeoxy-, synthesis of a methyl ether of. Pigments of Gnomonia erythrostoma. Part III, 1936.
- Esters, synthetic presqualene, related cyclopropanes, and isoprenoids. Carbon-13 magnetic resonance spectra, 913.
 - Preparation of the 'fixed conformation esters' 4,5-dihydrofuro- and 4,5-dihydrothieno-[2,3-c]pyran-7-one, 523.
- Ethers, alkyl aryl, a convenient synthesis of. Steroids. Part X, 461.
 - aromatic, reactions of quinones with. Part V, triphenylene-1,4-quinones from 2,3-diaryl-1,4-benzoquinones, 568. Part VI, triphenylenols from mono- and dichlorobenzoquinones and veratrole, 811. Part VII, triphenylene-1,4:5,8-diquinones from reactions of veratrole or 3,4-dimethoxyphenylbenzoquinones with benzoquinones, 2185.
 - Anodic syntheses. Part XVI, oxidation of phenylenediacetic acids and benzylic ethers, 2471.
 - Base-catalysed intramolecular cycloadditions of allyl 3-phenylprop-2-ynyl ethers and 4-methylpent-4-en-2-ynyl prop-2-ynyl ethers, 1315.
 - Formation of methyl ethers from photoaddition of methanol to phenyl-substituted butadienes, 1913.
 - Pigments of Gnomonia erythrostoma. Part III, synthesis of a methyl ether of bisdeoxyerythrostominone, 1936.
 - Reduction of nitro- and nitroso- compounds by tervalent phosphorus reagents. Part XII, conversion of aryl 2-nitroaryl ethers into novel 3-aryl-2,3-dihydro-1,3,2-benzoxazaphosph(v)oles (oxaphosphoranes) and their 2-oxo-derivatives, 2376.
 - The allyl ether as a protecting group in carbohydrate chemistry. Part VII, the 2-O-allyl group as a non-participant in 1,2-cis-glycoside synthesis, 361.
- Ethylenes. Chemical transformation of the dimeric dianion of 1,1-diphenylethylene, 1474.
- Eugenol, incorporation of specifically labelled cinnamic acids into. Biosynthesis of phenylpropanoid compounds. Part II, 1548.
- Exaltone (cyclopentadecanone) and muscone (3-methyl-cyclopentadecanone), bicyclic analogues of, 1172.

Extrusion. Heterocycles by cycloaddition. Part I, cycloaddition-extrusion-ring expansion reactions of five-membered mesoionic compounds with diphenylcyclo-propenone and related compounds: preparation of six-membered heterocycles, 632.

F

- Ferrocenes. Displacement of the hydroxy-group from ferrocenylmethanol by amines, 1818.
 - Stable carbocations. Part VIII, fragmentation reactions of ferrocenylalkylium ions, 113. Part IX, reactions involving sterically crowded ferrocenylalkylium ions, 116.
- Filifolone, atlantones, ocimenones, and tagetones, simple syntheses of, from isoprene, 1741.
- Flavanones. Chemical investigation of Ceylonese plants. Part XII, (+)-3,4',5,7-tetrahydroxy-3'-methoxyflavanone [(+)-dihydroisorhamnetin] and 3,5,7-trihydroxy-3',4'-dimethoxyflavone (dillenetin): two new natural products from *Dillenia indica* L., 612.
- Flavones. Application of a lanthanide shift reagent, Eu(fod)₃ to the elucidation of the structures of flavones and related compounds, 1563.
 - Chemical investigation of Ceylonese plants. Part XII, (+)-3,4',5,7-tetrahydroxy-3'-methoxyflavanone [(+)-dihydroisorhamnetin] and 3,5,7-trihydroxy-3',4'-dimethoxyflavone (dillenetin): two new natural products from *Dillenia indica* L., 612.
- Flexixanthins. Carotenoids and related compounds. Part XXXIII, synthesis of dehydroflexixanthin and deoxyflexixanthin, 2529.
- Fluorenes. Condensed cyclic and bridged-ring systems. Part III, regioselectivity and stereoselectivity in the acid-catalysed cyclisations of substituted benzylcyclohexanols. Stereocontrolled synthesis of some gemcarboxy-methyl-substituted hexahydrofluorene and hexahydro-5,9-methanobenzocyclo-octene derivatives, 2438.
- Fluorination, electrochemical. Part I, electrochemical fluorination of alkyl-substituted pyridines, 1263.
- Fluorine compounds. An ESCA study of the fluoride-ioninduced trimerization product from perfluorocyclobutene. 647.
 - Fluorinated acetylenes. Part VI, some thermal and photochemical reactions of *NN*-histrifluoromethylamino-substituted acetylenes, 1074.
 - Heterocyclic polyfluoro-compounds. Part XXII, synthesis of octafluoro-4,4'-azopyridine and tetrafluoro-4-(pentafluorophenylazo)pyridine, 1419.
 - Highly fluorinated heterocycles. Part XIII, fluorination of 1-methylpyrrole and some reactions of derived compounds, 781.
 - Nitroxide chemistry. Part VIII, abstraction of allylic hydrogen from isobutene by bistrifluoromethyl nitroxide, 2033.
 - Organosilicon chemistry. Part XIV, insertion of 1,2,2trifluoroethylidene into C-H bonds of tetra-alkylsilanes: a novel alkyl group rearrangement, 966.
 - Polyfluoroalkyl derivatives of nitrogen. Part XLII, reaction of N-bromobistrifluoromethylanine with 1H-pentafluoropropene and some further studies on the thermal rearrangement of NN-biotrifluoromethylvinylamines, 1633.

Fluorine (contd.)

- Polyfluoroarenes. Part XXI, synthesis, decarbonylation, and dehydration of 2',3',4',5',6'-pentafluoroformanilide: formation of pentafluorophenyl isocyanide, 2451.
- Polyfluorocarbanion chemistry. Part II, fluoride-initiated reactions of hexafluoropropene with pentafluoropyridine and tetrafluoropyridine-4-carbonitrile, 1029. Part III, reaction of hexafluoropropene with pentafluorobenzonitrile, 1035. Part IV, some reactions of 2H- and 1H-pentafluoropropene with nucleophiles, 2015.
- Preparation of some fluoropalmitic acids and fluorination of brefeldin A, 2523.
- Purine studies. Part XIV, trifluoroacetyl and formyl derivatives of 4,5-diamino-6-methyl-2-methylthio-pyrimidine, their ethylation products, and derived purines, 485.
- Reactions of octafluoracridone and related compounds, 1380.
 - of perfluoroalkylcopper compounds. Part V, the preparation of some polyfluoroalkyl-substituted acids and alcohols, 654.
- Stereochemistry of addition of fluorine to olefins by cobalt trifluoride, 2237.
- Synthesis of fluorinated branched-chain sugars, 2457.
- Unsaturated nitrogen compounds containing fluorine. Part IV, thermal reactions of hexafluoroacetone azine with hydrocarbon terminal olefins to give (1-pyrazolin-1-ylio)methanides or pyrazolines, 538. Part V, reactions of hexafluoroacetone azine with open-chain and cyclic hydrocarbon dienes, 1411. Part VI, reactions of hexafluoroacetone azine with 2-methylbut-2-ene, 2,3-dimethylbut-2-ene, 2,3-dimethylbut-1-ene, and cyclopentene, 1902.
- Valence-bond isomer chemistry. Part VII, photochemical interconversion of the perfluoroxylenes, 2005. Part VIII, cycloaddition reactions of derivatives of hexafluorobicyclo[2.2.0]hexa-2,5-diene, and of hexakis(trifluoromethyl)benzvalene, 2010.
- Formes senex, crystalline chemical components of, and structure of senexdiolic acid and related compounds, 451. Formaldehyde and sulphonamides, cyclic products from, 772.
- Formanilide, 2',3',4',5',6'-pentafluoro-, synthesis, decarbonylation, and dehydration of: formation of pentafluoro-phenyl isocyanide. Polyfluoroarenes. Part XXI, 2451.
- Formimidoyl cyanide and isocyanide from azidoacetonitrile by photolysis, 1743.
- Formolysis and preparation of (16s)-ent-12β-p-tolysulphonyloxykaurane and the (16S)-ent-13-p-tolylsulphonyloxyatisanes. Ring c functionalised diterpenoids. Part V, 861.
- Freelingyne, an acetylenic sesquiterpene from *Eremophila* freelingii, synthesis of, 641.
 - Synthesis of alkylidenephthalide constituents of celery odour and models for freelingyne. 4-Phosphoranylidenebutenolide intermediates in the synthesis of 4-ylidenebutenolides and 4-ylidenetetronic acids, 635.
- Free radicals—see also Carbenes and Nitroxides.
 - Free-radical reactions of halogenated bridged polycyclic compounds. Part XVII, reaction of 5-alkyl-1,2,3,4,7,7-hexachloronorborna-2,5-dienes and 5-alkenyl-1,2,-3,4,7,7-hexachloronorborn-2-enes with N-bronosuccinimide, 698.

- Frontier Molecular Orbitals. Rationalisation of cycloaddition behaviour by use of Hückel Frontier Molecular Orbitals, 1810.
- Fucosterol and desmosterol, synthesis of allenic analogues of. Studies on steroids. Part XXIX, 2302.
- Fungi. Biosynthesis of fungal metabolites. Part V, structure of variecoxanthones A, B, and C, metabolites of Aspergillus variecolor; conversion of variecoxanthone A into (±)-de-C-prenylepishamixanthone, 543. Part VI, structures and biosynthesis of some minor metabolities from variant strains of Aspergillus variecolor, 549. Part VII, production and biosynthesis of 4,7-dimethoxy-5-methylcoumarin in Aspergillus variecolor, 554.
 - Constituents of the higher fungi. Part XV, 3-(3,4-dihydroxyphenyl)-2,7,8-trihydroxydibenzofuran-1,4-dione, a precursor of thelephoric acid from the fungus Suillus grevillei (Klotsch) Sing. [Boletus elegans (Schum. per Fries)], 351.
 - Demethoxyviridin and demethoxyviridiol: new fungal metabolites, 943.
 - Fungal products. Part XIII, xanthomegnin, viomellin, rubrosulphin, and viopurpurin, pigments from Aspergillus sulphureus and Aspergillus melleus, 163. Part XIV, metabolic pathways from ent-kaurenoic acid to the fungal gibberellins in mutant B1-41a of Gibberella fujikuroi, 721.
 - Microbiological hydroxylation. Part XIX, the action of an ant fungus ('Acromyrmex fungus') on oxygenated androstanes, pregnanes, and cholestanes, 1552. Part XX, hydroxylation of dioxygenated 5α-androstanes with the fungi Absidia regnieri and Syncephelastrum racemosum, 2040. Part XXI, hydroxylations of 3-halogeno-17-oxo-, 3-halogeno-7-oxo-, and 17-halogeno-3-oxo-androstanes by the fungi Calonectria decora, Rhizopus nigricans and Aspergillus ochraceus, 2308.
 - Natural acetylenes. Part XLVIII, absolute configurations of a C₇ diynol, a C₉ diynetriol, and a C₉ dihydroxydiynone from fungal cultures, 687.
- Furanodienone. Sesquiterpenoids. Part XLVII, structure, configuration, conformation, and thermal rearrangement of furanodienone, isofuranodienone, curzerenone, epicurzerenone, and pyrocurzerenone, sesquiterpenoids of Curcuma zedoaria, 478.
- Furan ring. Biosynthesis of aromatic isoprenoids. Part III, mechanism of formation of the furan ring and origin of the 4-methoxy-group in the biosynthesis of furoquinoline alkaloids, 302.
- Furopyranones. Preparation of the 'fixed conformation esters' 4,5-dihydrofuro- and 4,5-dihydrothieno-[2,3-c]-pyran-7-one, 523.
- Furopyridinones. Photochemical behaviour of some furoand pyrrolo-[3,2-b]pyridin-2-ones, 458.
- Furoquinoline alkaloids, mechanism of formation of the furan ring and origin of the 4-methoxy-group in the biosynthesis of. Biosynthesis of aromatic isoprenoids. Part III, 302.
- Furylacrylophenones. Carbonyl and thiocarbonyl compounds. Part XIV, reactions of tetrachloro-o-benzo-quinone with 3-(2-furyl)- and 3-(2-thienyl)-acrylophenones, 1052.
- **Fusarium culmorum.** Cyclonerotriol [6-(3-hydroxy-2,3-dimethylcyclopentyl)-2-methylhept-2-ene-1,6-diol], a new sesquiterpenoid metabolite of *Fusarium culmorum*, 1586.

- Fusarium solani f. sp. pisi. Identification of three new pterocarpans (6a,11a-dihydro-6H-benzofuro[3,2-c][1]benzopyrans) from Pisum sativum infected with Fusarium solani f. sp. pisi, 946.
- Fusicoccin. Part IV, the structure of fusicoccin J., 877. Part V, the biosynthesis of fusicoccin from [1-13C]- and $[2^{-13}C]$ -acetate, 1405.

G

- Gallic acid and pyrogallol, syntheses of, 1400.
- Gangaleoidin. Structure of the lichen depsidone gangaleoidin, 1986.
- Gas chromatography. Methods of peptide sequencing. Part I, conversion of oligopeptides into cyclic dipeptides: a gas chromatographic-mass spectrometric study, 1297.
- Gentamycin C_{1a}. Syntheses of derivatives of 2,6-diamino-2,3,4,6-tetradeoxy-D-erythro-hexose (purpurosamine C), a component of gentamycin C_{10} , 979.
- Germacrane-type furan sesquiterpenes, Cope rearrangement of some. Part V, preparation and thermal rearrangement of some cis, trans-germacranolides, 870.
- Germacratriene. Medium-ring 1,5-dienes. Part II, the radical and electrophile-induced cyclisation of germacra-1(10),4,7(11)-triene, 2326. Part III, cyclisation of germacra-1(10),4,7(11)-triene oxides, 2332. Part IV, reactions of germacra-1(10),4,7(11)-triene with singlet oxygen and with the triphenyl phosphite-ozone adduct, 2336.
- Gibberella fujikuroi, elucidation of the structure of gibberellin A₄₀ from, 996.
 - Fungal products. Part XIV, metabolic pathways from ent-kaurenoic acid to the fungal gibberellins in mutant B1-41a of Gibberella fujikuroi, 721.
 - Studies in terpenoid biosynthesis. Part XIII, the biosynthetic relationship of the gibberellins in Gibberella fujikuroi, 663.
- Gibberellic acid, synthesis of compounds related to. Part IV, construction of a tetracyclic system containing functional elements of rings A,C, and D, 2149.
- Gibberellins, application of ¹³C nuclear magnetic resonance to the study of, 992.
 - the ¹³C muclear magnetic resonance spectra of some, 1514. Partial synthesis of gibberellin A_{37} from gibberellin A_{13} ,
- (\pm) -Glaziovine. Studies on proaporphine and aporphine alkaloids. Part V, synthesis of (±)-glaziovine by 8,1'ring closure of 1-benzylisoquinoline derivatives, 1647. Part VI, synthesis of (±)-glaziovine by spiran ring construction on a cyclopent[ij]isoquinoline; stereochemistry of reduced proaporphines, 1652.
- Gliotoxin. Stereospecific exchange of a \beta-methylene proton in phenylalanine preceding biosynthetic incorporation into gliotoxin, 383.
- Glycerides. Synthesis of 1,2-di-O-hexadecanoyl-3-O-(\beta-Dgalactopyranosyl)-L-glycerol (a 'galactosyl diglyceride') and 1,2-di-O-octadecanoyl-3-O-(6-O-octadecanoyl-β-D-galactopyranosyl)-L-glycerol, 364.
- 3-O-[6-O-(α -D-galactopyranosyl)- β -D-galactopyraofnosyl]-1,2-di-O-stearoyl-L-glycerol, diglyceride', 1521. Glycolaldehyde. Biosynthesis of vitamin B_{ϵ} .
- Incorporation of glycolaldehyde into pyridoxal, 1622.

- Glycol monoesters. Solvent and ion-pair effects on the selfcondensation of linear aliphatic aldehydes: selective synthesis of substituted acrylaldehydes and glycol morroesters, 1527.
- Gnomonia erythrostomia, pigments of. Part III, synthesis of a methyl ether of bisdeoxyerythrostominone, 1936.
- Grignard reagents. Alkyl metal asymmetric reduction. Part VIII, stereoselectivity of the reduction of alkyl phenyl ketones by optically active aliphatic Grignard reagents, 1795.
 - A new synthesis of α-amino-acids by the reaction of Grignard reagents with ethyl N-trichloroethylidenecarbamate, 2511.
- Guara glabra (Meliaceae), a new skeletal class of triterpenoids from. Tetranortriterpenoids and related substances. Part XVII, 491.
- Guttiferae, extractives from. Part XXIX, synthesis of celebixanthone methyl ether and related 1,5,6,7tetraoxygenated xanthones, 241.
 - Chemical investigation of Ceylonese plants. Part XV, extractives of Kayea stylosa Thw. (Guttiferae), 1539. Part XVI, extractives of Calophyllum cordato-oblongum Thw. (Guttiferae), 2215. Part XVII, isolation and structures of the xanthones in the extractives of Mesua ferrea L. (form M. salicina Pl. and Tr.) (Guttiferae), **2447.**

H

- Halide ions. Mechanism and stereochemistry of nucleophilic substitutions in alkoxysulphonium salts. Part II, competitive attack at sulphur and carbon in the reaction of alkoxydiarylsulphonium salts with halide ions, 404.
- Halogen compounds. Chemistry of terpenes. Part XIX, reaction of (+)-3 α ,4 α -epoxycarane with halogen acids and acetic acid, 1217.
 - Cleavage of halogenobenzophenones by potassamide in ammonia; new routes to xanthen- and thioxanthen-9-ones, 155.
 - Free-radical reactions of halogenated bridged polycyclic compounds. Part XVII, reaction of 5-alkyl-1,2,3,-4,7,7-hexachloronorborna-2,5-dienes and 5-alkenyl-1,2,3,4,7,7-hexachloronorborn-2-enes with N-bromosuccinimide, 698.
 - Heterocyclic syntheses from o-halogeno-acids. Part II, thienopyridinones and thienopyranones from 3bromothiophen-2- and 4-bromothiophen-3-carboxylic acids, 1390.
 - Microbiological hydroxylation. Part XXI, hydroxylations of 3-halogeno-17-oxo-, 3-halogeno-7-oxo-, and 17-halogeno-3-oxo- androstanes by the fungi Calonectria decora, Rhizopus nigricans and Aspergillus ochraceus, 2308.
 - Organophosphorus chemistry. Part XVII, reaction of hexafluoropropene and some fluorochloro-olefins with phosphines: competition between radical and ionic reactions, 702.
 - Photochemistry of halogenocarbon compounds. Part 1, rearrangement of pyridazines to pyrazines, 396. Part II, valence isomers from fluorinated pyridazines, 1130.
 - Preparation of medium-sized ring trans-cycloalkene derivatives from halogenocyclopropane intermediates by silver perchlorate-promoted solvolysis, 2422.

- Halogen compounds (contd.)
 - Reactions of chlorotrifluoromethyldisulphane, 614.
 - of tellurium(IV) halides with anthracene and other organic compounds, 1223.
- Heptadienones. Electrocyclic reactions. Part VII, irradiation of 3,5-dibromo-2,6-dimethylhepta-2,5-dien-4-one (αα'-dibromophorone), 1595.
- Heterocycles, N-bridged. Part I, synthesis and chemistry of NN'-polymethylene-o-phenylenediamines, 212. Part II, synthesis and aromaticity of 1,3-polymethylene-benzimidazolium salts $\{[n](1,3)$ benzimidazolophanium salts $\}$, -benzimidazolones, and -benzimidazolethiones, 219.
 - by cycloaddition. Part I, cycloaddition-extrusion-ring expansion reactions of five-membered mesoionic compounds with diphenylcyclopropenone and related compounds: preparation of six-membered heterocycles. 632.
 - highly fluorinated. Part XIII, fluorination of 1-methylpyrrole and some reactions of derived compounds, 781.
 - Addition reactions of heterocyclic compounds. Part LVII, reactions of pyridines with acetylenic esters in the presence of carbarion sources, 438. Part LVIII, reactions of nitrogenous heterocycles with acetylacetylene, 446. Part LIX. a ¹³C tracer study of the mechanism of formation of azepines from 2-methylquinolines and dimethyl acetylenedicarboxylate, 394. Part LX, reactions of 2-substituted pyridines with acetylenic esters leading to quinolizines and pyrrolo[2,1,5-cd]indolizines, 740. Part LXI, reactions of electrophilic acetylenes with conjugated cyclic enamines, 744. Part LXII, a new rearrangement in the quinazoline series, 2322.
 - Application of functionalised 1,3-dipoles to the synthesis of fused heterocycles, 1326.
 - Conversion of 2-chloroallylamines into heterocyclic compounds. Part I, 2-methylindoles, 1,5,6,7-tetrahydro-3-methylindol-4-ones, and related heterocycles, 1446.
 - Heterocyclic compounds from urea derivatives. Part XXII, thiobenzoylated carbonohydriazides and their cyclisation, 1781. Part XXIII, thiobenzoylated thiocarbonohydrazides and their cyclisation, 1787.
 - Heterocyclic polyfluoro-compounds. Part XXII, synthesis of octafluoro-4,4'-azopyridine and tetrafluoro-4-(pentafluorophenylazo)pyridine, 1419.
 - syntheses from o-halogeno-acids. Part II, thieno-pyridinones and thienopyranones from 3-bromothio-phen-2- and 4-bromothiophen-3-carboxylic acids, 1390.
 - Intramolecular nitrene insertions into aromatic and heteroaromatic systems. Part III, photochemical decomposition of azido-indanes and azido-1,2-dihydrobenzocyclobutenes, 519.
 - Photolysis of sulphur-containing nitrones. Support for a methylene oxaziridine radical intermediate and formation of new heterocycles, 1925.
 - Reactions of heterocycles with thiophosgene. Part IV, β,4-dichloro-2-isothiocyanatocinnamaldehyde, a product from 4,7-dichloroquinoline, 922. Part V, 7-chloro-1,2-dihydro-4-methoxy-2-thioxoquinoline-3-carbaldehyde, a product from 7-chloro-4-methoxyquinoline, 2271.

- Studies of heterocyclic compounds. Part XVII, synthesis of 1,6-dioxa-6a-thia- and 1,6-dioxa-6a-selena-pentalenes, 775. Part XVIII, protonation of 1,6-dioxa-6a-thia- and 1,6-dioxa-6a-selena-pentalenes: formation of 1,2-oxathiolium and 1,2-oxaselenolium cations, 2097.
 - on heterocyclic compounds. Part XVI, crystal and molecular structures of three products of 1,4-dipolar cycloaddition of dimethyl acetylenedicarboxylate to benzothiazole, 2316.
 - on the syntheses of heterocyclic compounds. Part CDXXXIV, a novel total synthesis of olivacine (1,5-dimethyl-6*H*-pyrido[4,3-*b*]carbazole), 2102.
 - Part DLXXXIX, a simple route to pyridocarbazoles, 413. Part DXCVII, novel formation of benzo[5,6]cyclohept[1,2,3-ij]isoquinolines from herbinium salts, 1012. Part DCXX, total synthesis of (±)-orientalidine and a positional isomer, 1822. Part DCXXII, total synthesis of (±)-mappicine [7-(1-hydroxypropyl)-8-methylindolizino[1,2-b]-quinolin-9(11H)-one], 1825. Part DCXXIX, a ready synthesis of indeno[2,1-a][3]benzazepines, 2028.
- Synthesis of heterocyclic compounds. Part XXX, reactions of o-alkylamino- and o-dialkylamino- anilines with some αβ-unsaturated carbonyl compounds, 2409. Part XXXI, triazolium tetrafluoro-borates from the cycloaddition of alkoxydiazenium salts to azines, hydrazones, and anils derived from aromatic aldehydes, 2474. Part XXXII, intramolecular 1,3-dipolar cycloadditions of 2-allyloxy- and 2-prop-2-ynyloxy-aromatic aldehyde azines, 2479.
- Hexafluoropropene. Polyfluorocarbanion chemistry. Part II, fluoride-initiated reactions of hexafluoropropene with pentafluoropyridine and tetrafluoropyridine-4-carbonitrile, 1029. Part III, reaction of hexafluoropropene with pentafluorobenzonitrile, 1035.
- Hexatrienes. Photocyclisation of some 1,6-diarylhexa-1,3,5-trienes, 76.
- D-Homoannulation. D-Homo-steroids. Part V, a study of the mechanism of D-homoannulation of 17α-hydroxy-pregnan-20-ones with boron trifluoride, 1450.
- **Homochrysanthemate.** Chemistry of terpenes. Part XVIII, synthesis of methyl (-)-cis-chrysanthemate and of a methyl (+)-cis-homochrysanthemate from (+)-car-3-and -2-ene, 332.
- Hopan- 7α -ol, hopan- 15β -ol, isopimaran- 8β -ol and derivatives, functionalization of methyl groups in, 710.
- **Hormones.** [A-21-D-Asparagine] sheep insulin, a diastereoisomer of the natural hormone, 2157.
- Hückel Frontier Molecular Orbitals, rationalisation of cycloaddition behaviour by use of, 1810.
- Humulones, some aspects of the oxidation of deoxyhumulones to, 96.
- Hydrazides, 4-picolyloxycarbonyl-, use of as 'handles' to facilitate peptide synthesis. Synthesis of fragments related to porcine gastric inhibitory polypeptide, 1185.
 - Heterocyclic compounds from urea derivatives. Part XXII, thiobenzoylated carbonohydrazides and their cyclisation, 1781. Part XXIII, thiobenzoylated thiocarbonohydrazides and their cyclisation, 1787.
- Hydrazines. Structure and transformation of products of the reactions of 2,2"-thiodi-isobutyrophenone with hydrazine, 254.

Hydrazines (contd.)

Synthesis of 1*H*-4,1,2-benzothiadiazines from substituted *N*-acetyl-*N*-aryl-*N*'-thioaroylhydrazines, 1386.

Hydrazones. Reaction of lead tetra-acetate with aldehyde nitrophenylhydrazones, 61.

Structural criteria for hydrazone photochromism in solution, 2036.

Syntheses of heterocyclic compounds. Part XXXI, triazolium tetrafluoroborates from the cycloaddition of alkoxydiazenium salts to azines, hydrazones, and anils derived from aromatic aldehydes, 2474.

Hydrocarbons. Crustacean surface waxes. Part I, the hydrocarbons from the surface of Ligia oceanica, 354.

Electrochemical preparation of bismethylsulphonyl peroxide and its reactions with aromatic hydrocarbons, 953.

Unsaturated nitrogen compounds containing fluorine. Part V, reactions of hexafluoroacetone azine with open-chain and cyclic hydrocarbon dienes, 1411.

Hydrogen abstraction, intramolecular, by alkoxyl radicals and deshielding by the corresponding hydroxy-groups, on the relationship between, as indicated by nuclear magnetic resonance, 1275.

Hydrogen, allylic, abstraction of, from isobutene by bistrifluoromethyl nitroxide. Nitroxide chemistry. Part VIII, 2033.

Hydrogenation, heterogeneous catalytic, of allenes over supported palladium: selectivity, stereoselectivity, and regioselectivity, 1081.

Absolute configuration of allenes, conversion of molecular dissymmetry into centrodissymmetry by heterogeneous catalytic hydrogenation, 1090.

Reduction of allenes and acetylenes by catalytic and chemical methods: 'molecular queuing' effects in competitive hydrogenation, 1099.

Selective rapid transfer-hydrogenation of aromatic nitro-compounds, 1300.

Hydrogen sulphite ion, addition of, to purines. Purine studies. Part XV, 2240.

Hydroxamic acid. Studies concerning the antibiotic actinonin. Part I, the constitution of actinonin. A natural hydroxamic acid with antibiotic activity, 819.

Hydroxyimino-ketones. Preparation and some reactions of 2,2-diaryl-2*H*-imidazole 1-oxides, 1803.

Hydroxylamines, O-substituted, reactions of cytosine and cytidine with, 2417.

Kinetics and mechanism of reaction of hydroxylamine with cytosine and its derivatives, 370.

Hydroxylation, microbiological. Part XIV, hydroxylation in the terminal rings of dioxygenated 5α-androstanes with the fungi Wojnowicia graminis and Ophiobolus herpotrichus, 55. Part XV, hydroxylation in the terminal rings of mono- and di-oxygenated 5α-androstenes with the fungus Daedelea rufescens, 357. Part XVI, incubation of derivatives (mainly acetals) of 5α-androstane ketones with the fungi Calonectria decora, Aspergillus ochraceus, and Rhizopus nigricans, 1356. Part XVII, C-19 hydroxylation of 17-oxo-5α-androstanes and 17-oxo-3α,5-cyclo-5α-androstanes by the fungus Calonectria decora, 1359. Part XVIII, introduction of 16α-, 9α-, and 3α-hydroxy-groups into dioxygenated 5a-androstenes by the fungus Diaporthe celestrina, 1364. Part XIX, the action of an ant fungus (' Acromyrmex fungus ') on oxygenated androstanes, pregnanes, and cholestanes, 1552. Part XX, hydroxylation of dioxygenated 5α-androstenes with the fungi Absidia regnieri and Synecephelastrum racenosum, 2040. Part XXI, hydroxylations of 3-halogeno-17-oxo-, 3-halogeno-7-oxo-, and 17-halogeno-3-oxo-androstanes by the fungi Calonectria decora, Rhizopus nigricans and Aspergillus ochraceus, 2308.

of 17-norkauran-16-one and ent- 17-norkauran-16-one with the fungus Rhizopus nigricans, 1202.

Hydroxylic solvents. Isomer ratios from the bromination of allyl chloride in water, methanol, acetic acid, and trifluoroacetic acid, 2238.

I

Imidazo-compounds. Polycyclic fused amidines. Part II, synthesis of dihydroimidazo-fused systems by use of 2-aminoethylammonium toluene -p- sulphonate, 1854.

Imidazole-4,5-dicarboxylate, dimethyl, reaction with styrene oxide, 798.

Imidazole 3-oxides, syntheses and reactions of some. Studies in azole chemistry. Part I, 275.

Imidazoles, 1-aryloxymethyl- and 1-arylthiomethyl-, synthesis of, 1670.

Preparation and some reactions of 2,2-diaryl-2*H*-imidazole 1-oxides, 1803.

Imidazolinium compounds. Reaction of an asymmetric imidazolinium compound with nucleophiles, 894.

Imidazophenanthridines. Polycyclic fused amidines. Part I, imidazo- and pyrimido-[1,2-f]phenanthridines, 1850.

Imidazo[1,2-a]pyridine, degradation of cobaloximes to derivatives of, 386.

Imidazopyridines. A general synthesis of 4-substituted 1-(β-D-ribofuranosyl)imidazo[4,5-c]pyridines, 125.

Imides. Benzo[c]cinnoline N-imides, 19.

Effects of 3-substituents upon orientation in the 1,3-dipolar cycloaddition reaction between 3-substituted pyridine N-imides and ethyl propiolate: syntheses of ethyl 4- and 6-substituted pyrazolo[1,5-a]pyridine-3-carboxylates, 406.

Overcrowded molecules. Part XIII, thermally stable photochromic systems involving (E)-2-isopropylidene-3-(naphthylmethylene)succinic anhydrides and N-phenylimides, 2227.

Imidoylsulphimides. Photolysis and thermolysis of N-(N-arylimidoyl)sulphimides, 1964.

Reaction of N-aryl- and imidoyl-sulphinides with diphenylcyclopropenone; synthesis of 4-pyrimidones, 1969.

Imines. Extended dipolar cycloadditions, 556.

Indanes. A cis- perhydroindanone synthesis utilising an intramolecular Diels-Alder reaction, 1559.

Intramolecular nitrene insertions into aromatic and heteroaromatic systems. Part III, photochemical decomposition of azido-indanes and azido-1,2-dihydro, benzocyclobutenes, 519.

Overcrowded molecules. Part XI, a doubly 'forbidden' symmetry-allowed pericyclic reaction: the thermal rearrangement of (E)-2-benzylidene-(Z)-1-mesityl-(phenyl)methyleneindane into (Z)-2-benzyl-1-mesityl-(phenyl)methyleneindene, 1545.

Indazoles. Synthesis and reactions of 12-aryl-1,2,3,4-tetrahydro-6*H*-indazolo[2,1-*a*]benzotriazolium hydro-xide inner salts and 8,9,10,11-tetrahydro-7,10,10-trimethyl-8-oxo-5*H*-indazolo[1,2-*a*]benzotriazolium hydroxide inner salt, 629.

- Indazoles (contd.)
 - of 3-alkyl-1-aryl-6,7-dihydro-6,6-dimethylindazol-4(5H)-ones, 2,3-diaryl-4,5,6,7-tetrahydroindazoles, and related compounds, 2435.
- Indazolobenzotriazolium hydroxide inner salts. Synthesis and reactions of 12-aryl-1,2,3,4-tetrahydro-6*H*-indazolo-[2,1-a]benzotriazolium hydroxide inner salts and 8,9,10,-11-tetrahydro-7,10,10-trimethyl-8-oxo-5*H*-indazolo-[1,2-a]benzotriazolium hydroxide inner salt, 629.
- Indenes. Decomposition products of pyrazolines formed from 3-alkylthioinden-1-ones and diazomethane, 572.
 - Preparation and reactions of some o-dialkylaminoarylmethylene-substituted azlactones (oxazol-5-ones), 1679.
 - o-Quinonoid compounds. Part VIII, photodecarbonylation of 1,3-diphenylinden-2-one adducts; 1,5-sigmatropic shifts in sterically stabilised o-quinodimethanes, 171.
- Indenoazirinones. N-Quaternary compounds. Part XL, synthesis of la,6a-dihydroindeno[1,2-b]azirin-6(1H)-ones and isomerisation to isoquinolinium derivatives, 305.
- Indenobenzazepines. Studies on the syntheses of heterocyclic compounds. Part DCXXIX, a ready synthesis of indeno[2,1-a][3]benzazepines, 2028.
- **Indoles.** Condensation between 2-chloro-3*H*-indol-3-one and phenols, 1840.
 - Conversion of 2-chloroallylamines into heterocyclic compounds. Part I, 2-methylindoles, 1,5,6,7-tetrahydro-3-methylindol-4-ones, and related heterocycles, 1446.
 - Pyrimidine derivatives and related compounds. Part XXVI, oxidative and non-oxidative photocyclisations of 5- and 6-phenylthio- and anilino-1,3-dimethyluracils to benzothienopyrimidines and pyrimidoindoles, 503. Reaction of 3-methylindole with a diazonium salt, 1555.
- Indolizines. Synthesis of indolizines by intramolecular cyclisation of pyridinium allylides [1-(1-pyridinio)prop-2-enides], 575.
- Indolizinoquinolinones. Studies on the syntheses of heterocyclic compounds. Part DCXXII, total synthesis of (±)-mappicine [7-(1-hydroxypropyl)-8-methylindolizino-[1,2-b]quinolin-9(11H)-one], 1825.
- Insulin. [A-21-D-Asparagine] sheep insulin, a diastereoisomer of the natural hormone, 2157.
 - A synthetic human insulin analogue modified at position B²². [Lys²²-B]human insulin, 464.
- Intermediates, reactive. Part XXIV, 1H-azirine intermediates in the pyrolysis of 1H-1,2,3-triazoles, 1. Part XXV, investigation of the pyrolysis of 1,4- and 1,5-diphenyl-1,2,3-triazoles by use of ¹³C-labelled compounds, 8. Part XXVI, flash vacuum pyrolysis of phenyl-substituted 1,2,4-triazoles; a new synthesis of isoindoles, 12.
- Intramolecular catalysis. Part II, electrophilic anchimeric assistance by a hydroxy-group in the opening of steroidal epoxides by azide anions, 1663.
 - cyclisation of phenolic oximes. Part I, cyclisations with manganese(III) tris(acetylacetonate), 2340. Part II, cyclisations with brominating agents, 2348.
- **Iodination** of dibenzoylmethanes with iodine-peracetic acid, 1285.
- Iodine compounds. A note on three routes to benzyne: decomposition of diphenyliodonium acetate, nitrosation of N-phenylphosphylamidates, and deoxygenation of benzenediazotoluene-p-sulphonate N'oxide (cupferron tosylate) by phosphorus trichloride, 1072.

- trans-Cycloalkenes. Part VI, addition of iodine(1) azide to trans-cyclo-octene, 2267.
- Reactions of palladium(II) with organic compounds. Part III, reactions of aromatic iodides in basic media, 121.
 - of perfluoroalkylcopper compounds. Part V, preparation of some polyfluoroalkyl-substituted acids and alcohols, 654.
- Iridium. Reactions involving transition metals. Part VIII, decomposition of hydroperoxides catalysed by iridium(I) and by rhodium(I) complexes, 209.
- Iron. Chemistry of alkali metal tetracarbonylferrates. A simple method for alkylating and arylating carbonyl compounds and active methylene compounds, 1273.
 - Displacement of the hydroxy-group from ferrocenylmethanol by amines, 1818.
 - Stable carbocations. Part VIII, fragmentation reactions of ferrocenylalkylium ions, 113. Part IX, reactions involving sterically crowded ferrocenylalkylium ions, 116.
- Irradiation of 3,5-dibromo-2,6-dimethylhepta-2,5-dien-4one (αα'-dibromophorone). Electrocyclic reactions. Part VII, 1595.
- Isobenzofuran-4,7-quinone and isoindole-4,7-quinone, syntheses of, 1339.
- Isobutene. Nitroxide chemistry. Part VIII, abstraction of allylic hydrogen from isobutene by bistrifluoromethyl nitroxide, 2033.
- Isocoumarins. Metal ions and complexes in organic reactions. Part XX, copper-catalysed reactions of aromatic bromo-carboxylates with carbanions, giving oxo-acids, isocoumarins, and related products, 1267.
- **Isocyanates.** Reaction of chlorosulphonyl isocyanate with ethyl 4,6-di-O-acetyl-2,3-dideoxy-α-D-erythro-hex-2-enopyranoside: a reinvestigation, 626.
- Isocyanides. Formimidoyl cyanide and isocyanide from azidoacetonitrile by photolysis, 1743.
 - Polyfluoroarenes. Part XXI, synthesis; decarbonylation, and dehydration of 2',3',4',5',6'-pentafluoroformanilide: formation of pentafluorophenyl isocyanide, 2451.
- Isofuranodienone, furanodienone, curzerenone, epicurzerenone, and pyrocurzerenone, sesquiterpenoids of *Curcuma zedoaria*, structure, configuration, conformation, and thermal rearrangement of. Sesquiterpenoids. Part XLVII, 478.
- Isoguanine, 3-(β-D-ribofuranosyl)-. Bicyclic nucleosides related to pyrimidine nucleosides. Part III, 1257.
- Isoindole-4,7-quinone and isobenzofuran-4,7-quinone, syntheses of, 1339.
- Isoindoles, polysubstituted, autoxidation of. Part II, products from 1,3-diphenyl- and 1,2,3-triphenyl-isoindoles, 71.
 - Reactive intermediates. Part XXVI, flash vacuum pyrolysis of phenyl-substituted 1,2,4-triazoles; a new synthesis of isoindoles, 12.
- Isomaleimide method, total synthesis of actinonin and some structural analogues by. Studies concerning the antibiotic actinonin. Part II, 825.
- Isomerisation of 1,2,3,4,5,8-hexahydroisoquinolines to hexahydroisoquinolines containing a 1,3-diene system, 58
 - Photolysis of N-arylsulphonyl-SS-dimethylsulphoximides in aromatic solvents. Photoisomerisation of methylbiphenyls, 1806.

Isomerisation (contd.)

N-Quaternary compounds. Part XL, syntheses of la,-6a-dihydroindeno[1,2-b]azirin-6(1H)-ones and isomerisation to isoquinolinium derivatives, 305.

Isomerism in bicyclic diacetals. Part I, 1,3:2,4- and 1,4:2,3-di-O-methylene-erythritol, 666. Part II, bicyclic methylene diacetals in the galacto, arabino, and ribo series, 675.

of 1- and 2-(NN-disubstituted aminomethyl)benzotriazoles; an investigation by nuclear magnetic resonance spectroscopy, 1181.

Valence-bond isomer chemistry. Part VII, photochemical interconversion of the perfluoroxylenes, 2005. Part VIII, cycloaddition reactions of derivatives of hexafluorobicyclo[2.2.0]hexa-2,5-diene, and of hexakis-(trifluoromethyl)benzvalene, 2010.

Isopimaran-8β-ol, hopan-7α-ol, and hopan-15β-ol and derivatives, functionalization of methyl groups in, 710.

Isoprene, simple syntheses of the atlantones, the ocimenones, the tagetones, and filifolone from, 1741.

Isoprenoids, aromatic, biosynthesis of. Part III, mechanism of formation of the furan ring and origin of the 4-methoxy-group in the biosynthesis of furoquinoline alkaloids, 302.

Carbon-13 magnetic resonance spectra. Synthetic presqualene esters, related cyclopropanes, and isoprenoids, 913.

Isoprenyl terminal epoxides in the chromone and quinoline series, synthesis and reactions of, 150.

Isoquinolines, hexahydro-, synthesis of, 1465.

Absolute configuration of ancistrocladisine and ancistrocladidine, 2134.

Isomerisation of 1,2,3,4,5,8-hexahydroisoquinolines to hexahydroisoquinolines containing a 1,3-diene system, 58.

Opium alkaloids. Part XVI, the biosynthesis of 1-benzylisoquinolines in *Papaver somniferum*. Preferred and secondary pathways; stereochemical aspects, 1531.

Oxidation of aromatic substrates. Part II, the action of ruthenium tetraoxide on some derivatives of naphthalene and its monoazo-analogues, 707.

Reactions of dihydroquinolines and dihydroisoquinolines with arenesulphonyl azides, 420.

Studies on proaporphine and aporphine alkaloids. Part V, synthesis of (±)-glaziovine by 8,1'-ring closure of 1-benzylisoquinoline derivatives, 1647. Part VI, synthesis of (±)-glaziovine by spiran ring construction on a cyclopent[ij]isoquinoline; stereochemistry of reduced proaporphines, 1652.

Isoquinolinium compounds. N-Quaternary compounds. Part XL, syntheses of la,6a-dihydroindeno[1,2-b]azirin-6(1H)-ones and isomerisation to isoquinolinium derivatives, 305.

Isorhamnetin. Chemical investigation of Ceylonese plants. Part XII, (+)-3,4',5,7-tetrahydroxy-3'-methoxyflavanone [(+)-dihydroisorhamnetin] and 3,5,7-trihydroxy-3',4'-dimethoxyflavone (dillenetin); two new natural products from *Dillenia indica* L., 612.

2-Isothiocyanatocinnamaldehyde, β,4-dichloro-, a product from 4,7-dichloroquinoline. Reactions of heterocycles with thiophosgene. Part IV, 922.

Isoxazoles. Determination of the substitution pattern of an isoxazole by ¹³C nuclear magnetic resonance, 2115.

Isoxazolines and pyridine oxides, synthesis of, from 4-(2-oxoalkylidene)pyrans, 1342.

Isoxazolopyridines. Synthesis and reactivity of 3-methylisoxazolo[4,5-c]pyridines, 2190.

Isoxazolopyridinones. Synthesis of isoxazolo[3,4-b]pyridin-3(1H)-one and isoxazolo[5,4-b]pyridin-3(2H)-one, 693.

K

Kauranes. Ring C functionalised diterpenoids. Part V, preparation and formolysis of (16S)-ent-12β-p-tolyl-sulphonyloxykaurane and the (16S)-ent-13-p-tolyl-sulphonyloxyatisanes, 861.

Terpenoids. Part VI, preparation of ent-[13,14 α - 2 H $_2$] kaur-16-ene and some derivatives; bridgehead enolisation of ent-17-nor[13,14 α - 2 H $_2$) kauran-16-one, 378.

ent-Kaurenoic acid, metabolic pathways from, to the fungal gibberellins in mutant B1-41a of Gibberella fujikuroi. Fungal products. Part XIV, 721.

Kayea stylosa Thw. (Guttiferae), extractives of. Chemical investigation of Ceylonese plants. Part XV, 1539.

Ketens, monoalkyl-, an improved method for the preparation of, 1600.

Keten. Part XIII, reactions of dimethylketen with some N-alkyl nitrones, 498. Part XIV, adducts of diphenylketen with aza-arenes, 1001.

Ketones—see also Carbonyl compounds.

Alkyl metal asymmetric reduction. Part VIII, stereoselectivity of the reduction of alkyl phenyl ketones by optically active aliphatic Grignard reagents, 1795.

Azabenzocycloheptenones. Part XVIII, amines and amino-ketones of the tetrahydro-3-benzazepin-1-one series, 622.

Bicyclic analogues of exaltone (cyclopentadecanone) and muscone (3-methylcyclopentadecanone), 1172.

Chemistry of organoborates. Part I, new, high yield ketone syntheses by reaction of trialkylcyanoborates with acylating agents or N-phenylbenzimidoyl chloride, 129. Part III, protonation of trialkylcyanoborates, 142. Part IV, stereochemistry and relative migratory aptitudes of alkyl groups in the cyanoborate process, 145.

¹³C nuclear magnetic resonance spectra of some steroidal unsaturated ketones, 1956.

Correlation of circular dichroism and conformation in $\gamma\delta$ - and $\delta\epsilon$ -unsaturated ketones, 1015.

Lewis acid-catalysed cyclisations of 1-anthryl styryl ketone; benz[de]anthracen-3-one, 1537.

Photochemical reactions of β-aminovinyl phenyl ketones and related compounds, 298.

Preparation and some reactions of 2,2-diaryl-2*H*-imidazole 1-oxides, 1803.

Quinone methides derived from Uhle's ketone, 2257.

Reaction of diazocyclopropane with steroidal 16-bromo-17-ketones, 2460.

of some dicarbonyl compounds. Part III, oxidation of some β -diketones with alkaline hydrogen peroxide, 1347.

Remote anodic oxidation of carboxylic acids in fluorosulphuric acid: a synthesis of lactones and unsaturated cyclic ketones, 948.

Spectroscopic properties of axially and equatorially substituted β-trimethylstannyl ketones and compounds with related chromophores, 1020.

Ketones (contd.)

Steric effects in the reactions of αβ-unsaturated ketone p-tolylsulphonylhydrazones: a route to 1,2-benzo-diazepines via 1,7-ring closure of 1,1-diaryl-3-diazoalkenes, 102.

Structure and synthesis of a new ketone from *Cadrus* species; some new constituents of C. *atlantica* Manet, 1502.

Synthesis of δ -demascone [trans-1-(2,6,6-trimethylcyclohex-3-enyl) but-2-en-1-one] and β -damascenone [trans-1-(2,6,6-trimethylcyclohexa-1,3-dienyl)but-2-en-1-one], 1727.

of 1,12b-didehydrolycoran (α-anhydrodohydrocaranine) and 12bα-lycoran (γ-lycoran) via photocyclisation of an enamide-ketone, 2502.

Ketoximes, simple synthesis of enamides from, 1237.

Khaya anthotheca heartwood, structures of three new meliacins isolated from, 1758.

Meliacins (linionoids): minor constituents of Khaya anthotheca: reduction of the meliacins with zinc-copper couple, 2118.

Kinetics and mechanism of reaction of hydroxylamine with cytosine and its derivatives, 370.

L

Lactams, studies on. Part XLII, a stereoselective synthesis of some α -amido- β -lactams, 1880.

Conversion of secopenicillanic acid derivatives into β-lactam sulphimides and oxazolines, 1077.

Studies related to penicillins and cephalosporins. Part IV, synthesis of methyl 7-phthalimido-6,7-trans-DL-cepham-4-carboxylate, 2525.

Lactones, two new 23-hydroxy-steroidal, withanolides Q and R, 2136.

Carboxymethylation of p, $\alpha\beta\beta$ -tetramethylstyrene by manganese(III) acetate. Reductive cyclization during treatment of the derived γ -aryl- γ -lactone with polyphosphoric acid to give 4-isopropyl-7-methyl-1-tetralone, 1235.

Remote anodic oxidation of carboxylic acids in fluorosulphuric acid: a synthesis of lactones and unsaturated cyclic ketones, 948.

Stereochemistry of 2,4- and 2,3-disubstituted- γ -butyrolactones, 1480.

Structure of lithocarpic lactone, a new triterpenoid from two *Lithocarpus* species of Hong Kong, 617.

Studies on the biosynthesis of β -lactam antibiotics. Part II, synthesis, and incorporation into penicillin G, of (2RS,2'RS, 3R, 3'R)-[3,3'- 3H_2] cystine and (2RS,2'RS,3S,3'S)-[3,3'- 3H_2] cystine, 2517.

Lanthanide shift reagent, Eu(fod)₃, application of, to th elucidation of the structures of flavones and related compounds, 1563.

Lead tetra-acetate, reaction with aldehyde nitrophenylhydrazones, 61.

Neighbouring-groups effects in the oxidation of olefins by mercury(II), thallium(III), and lead(IV) acetates, 2465

Oxidation of oct-1-ene and trans-oct-4-ene by lead(IV), thallium(III), and mercury(II) acetates, 231.

Least motion, applicability of the principle of; C-1 vs. C-3 alkylation of allylic carbanions. 1,1-Diphenylalkenes. Part V, 531. Lepista diemii (Singer). Natural acetylenes. Part XLVII, biosynthetic experiments with the fungus Lepista diemii (Singer). Biogenesis of the C₈ acetylenic cyano-acid diatretyne 2, 424.

Lewis acid- catalysed cyclisations of 1-anthryl styryl ketone; benz[de]anthracen-3-one, 1537.

Lewis acids. 18-Norpregna-8,11,13-trienes: reaction of 16α,17α-epoxypregn-8-en-11-ones with Lewis acids, 1288. Lichens. Structure of the lichen depsidone gangaleoidin, 1986.

of the lichen depsidone pannarin, 1979.

of the lichen depsidone variolaric acid, 1992.

Ligands. A convenient synthesis of the tetra-aza-macrocyclic ligands *trans*-[14]-diene, tet a, and tet b, 591.

Ligia oceanica, hydrocarbons from the surface of. Crustacean surface waxes. Part 1, 354.

Limonoids (meliacins), chemistry of. Structure of melianin A, a new protomeliacin from Melia azedarach, 1352.

: minor constituents of *Khaya anthotheca*: reduction of the meliacins with zinc-copper couple, 2118.

Lithium. Reaction of phenyl-lithium and bromobenzene with carbon disulphide, 160.

Lithocarpus species. Structure of lithocarpic lactone, a new triterpenoid from two *Lithocarpus* species of Hong Kong, 617.

Lobeline. Biosynthesis of Lobelia alkaloids. Part III, intermediates in the biosynthesis of lobeline; biosynthesis of 8,10-diethyl-lobelidione, 415.

Lycorans. Synthesis of 1,12b-didehydrolycoran (α -anhydrodihydrocaranine) and 12b α -lycoran (γ -lycoran) via photocyclization of an enamide-ketone, 2502.

M

Macrocycles. A convenient synthesis of the tetra-azamacrocyclic ligands trans-[14]-diene, tet a and tet b, 591. Synthesis of ten isomers of a macrocyclic polyether, tetramethyldibenzo-18-crown-6, and their complexes with salts of alkali metals, 245.

Maleic anhydride, addition of 2-(2-furyl)-1,3-dioxan and its derivatives to. Reactions of unsaturated 1,3-dioxan derivatives. Part VI, 606.

Manganese(III) tris(acetylacetonate), cyclisations with. Intramolecular cyclisation of phenolic oximes. Part I, 2340.

Manganese. Carboxymethylation of $p,\alpha\beta\beta$ -tetramethylstyrene by manganese(III) acetate. Reductive cyclization during treatment of the derived γ -aryl- γ -lactone with polyphosphoric acid to give 4-isopropyl-7-methyl-1-tetralone, 1235.

(±)-Mappicine. Studies on the syntheses of heterocyclic compounds. Part DCXXII, total synthesis of (±)-mappicine [7-(1-hydroxypropyl)-8-methylindolizino[1,2-b]quinolin-9(11H)-one], 1825.

Meisenheimer-Jackson complexes in a non-polar solvent, formation of, 1557.

Melia azedarach. Chemistry of the meliacins (limonoids). Structure of melianin A, a new protomeliacin from Melia azedarach, 1352.

Meliacins (limonoids), chemistry of. Structure of melianin A, a new protomeliacin from Melia azedarach, 1352.

(limonoids): minor constituents of *Khaya anthotheca*: reduction of the meliacins with zinc-copper couple, 2118.

- Meliacins (contd.)
 - Structures of three new meliacins isolated from *Khaya* anthotheca heartwood, 1758.
- Mercury. Neighbouring-group effects in the oxidation of olefins by mercury(II), thallium(III), and lead(IV) acetates, 2465.
 - Oxidation of oct-1-ene and trans-oct-4-ene by lead(IV), thallium(III), and mercury(II) acetates, 231.
 - Oxymetallation. Part VII, peroxymercuration of terminal, medial, and cyclic alkenes without accompanying acyloxymercuration, 195. Part IX, bromodemercuration of peroxymercurials derived from terminal, medial, and cyclic alkenes to give β-bromoperoxides, 695.
- Mesoionic compounds. Heterocycles by cycloaddition. Part I, cycloaddition-extrusion-ring expansion reactions of five-membered mesoionic compounds with diphenyl-cyclopropenone and related compounds: preparation of six-membered heterocycles, 632.
- Mesua ferrea L. Chemical investigation of Ceylonese plants. Part XVII, isolation and structures of the xanthones in the extractives of Mesua ferrea L. (form M. salicina Pl. and Tr.) (Guttiferae), 2447.
- Metabolic pathways from *ent*-kaurenoic acid to the fungal gibberellins in mutant B1-41a of *Gibberella fujikuroi*. Fungal products. Part XIV, 721.
- Metabolites, new fungal: demethoxyviridin and demethoxyviridiol, 943.
 - new, of Aspergillus terreus: 3-hydroxy-2,5-bis-(p-hydroxy-phenyl)penta-2,4-dien-4-olide and derivatives, 1961.
 - Biosynthesis of fungal metabolites. Part V, structure of variecoxanthones A, B, and C, metabolites of Aspergittus variecolor; conversion of variecoxanthone A into (±)-de-C-prenylepishamixanthone, 543. Part VI, structures and biosynthesis of some minor metabolites from variant strains of Aspergillus variecolor, 549. Part VII, production and biosynthesis of 4,7-dimethoxy-5-methylcoumarin in Aspergillus variecolor, 554.
 - Cyclonerotriol [6-(3-hydroxy-2,3-dimethylcyclopentyl)-2-methylhept-2-ene-1,6-diol], a new sesquiterpenoid metabolite of Fusarium culmorum, 1586.
 - 8-Ethylidene-7,8-dihydro-4-methoxypyrano[4,3-b]pyran-2,5-dione (coarctatin), a metabolite of *Chaetomium coarctatum*, 999.
- Metals. Alkyl metal asymmetric reduction. Part VIII, stereoselectivity of the reduction of alkyl phenyl ketones by optically active aliphatic Grignard reagents, 1795.
 - Metal ions and complexes in organic reactions. Part XX, copper-catalysed reactions of aromatic bromo-carboxylates with carbanions, giving oxo-acids, isocoumarins and related products, 1267.
- Methanides. Unsaturated nitrogen compounds containing fluorine. Part IV, thermal reactions of hexafluoroacetone azine with hydrocarbon terminal olefins to give (1-pyrazolin-1-ylio)methanides or pyrazolines, 538.
- Methanobenzocyclo-octenes. Condensed cyclic and bridgedring systems. Part III, regioselectivity and stereoselectivity in the acid-catalysed cyclisations of substituted benzylcyclohexanols. Stereocontrolled synthesis of some gem-carboxy-methyl-substituted hexahydrofluorene and hexahydro-5,9-methanobenzocyclo-octene derivatives, 2438.
- Methanol. Formation of methyl ethers from photoaddition of methanol to phenyl-substituted butadienes, 1913.

- Methyl acrylate as an unsymmetric dienophile, reaction of 1,2-dihydrobenzocyclobutene-1-carbonitriles with, 2001.
- Methyl chloroformate. Determination of the stereochemistry of the product of rearrangement of penicillin G with methyl chloroformate by total synthesis, 2086.
- **J-Methylene-erythritol**, 1,3: 2,4- and 1,4: 2,3-di-. Isomerism in bicyclic diacetals. Part I, 666.
- Methyleneoxaziridine radicals. Photolysis of sulphurcontaining nitrones. Support for a methyleneoxaziridine radical intermediate and formation of new heterocycles, 1925.
- **β-Methylene proton** in phenylalanine, stereospecific exchange of, preceding biosynthetic incorporation into gliotoxin, 383.
- **2-Methylenetrimethylene.** Synthesis of 3-alkylidene-2,2,4,4-tetramethylthietan 1,1-dioxides, possible precursors of 2-methylenetrimethylene, 2513.
- Methyl groups in isopimaran-8 β -ol, hopan-7 α -ol, and hopan-15 β -ol and derivatives, functionalization of, 710.
- Methyl iodide, reaction of diol thiocarbonates with: a synthesis of 6-deoxy-sugars, 1773.
- Methyl transfer: the mass spectra of reserpine derivatives, 932.
- (3RS,5S)-[5-3H₁] Mevalonic acid, an improved route to. 429.
- Microbiological hydroxylation. Part XIV, hydroxylation in the terminal rings of dioxygenated 5α-androstanes with the fungi Wojnowicia graminis and Ophiobolus herpotrichus, 55. Part XV, hydroxylation in the terminal rings of mono- and di-oxygenated 5α-androstanes with the fungus Daedalea rufescens, 357. Part XVI, incubation of derivatives (mainly acetals) of 5α-androstane ketones with the fungi Calonectria decora, Aspergillus ochraceus, and Rhizopus nigricans, 1356. Part XVII, C-19 hydroxylation of 17-oxo-5αandrostanes and 17-oxo-3α,5-cyclo-5α-androstanes by the fungus Calonectria decora, 1359. Part XVIII, introduction of 16α-, 9α-, and 3α-hydroxy-groups into dioxygenated 5α-androstanes by the fungus Diaporthe celastrina, 1364. Part XIX, the action of an ant fungus (' Acromyrmex fungus ') on oxygenated androstanes, pregnanes, and cholestanes, 1552. Part XX, hydroxylation of dioxygenated 5\alpha-androstanes with the fungi Absidia regnieri and Syncephelestrum racemosum, 2040. Part XXI, hydroxylations of 3-halogeno-17-oxo-, 3-halogeno-7-oxo-, and 17-halogeno-3-oxoandrostanes by the fungi Calonectria decora, Rhizopus nigricans and Aspergillus ochraceus, 2308.
 - of 17-norkauran-16-one and ent-17-norkauran-16-one with the fungus Rhizopus nigricans, 1202.
- Micromonospora inyoensis, structures of the aminoglycoside antibiotics 66-40B and 66-40D produced by, 814.
- 'Molecular queueing' effects in competitive hydrogenation: reduction of allenes and acetylenes by catalytic and chemical methods, 1099.
- Molecules. Procedure for a rapid reognition of the rings of a molecule, 1120.
- Muscone (3-methylcyclopentadecanone) and exaltone (cyclopentadecanone), bicyclic analogues of, 1172.

 \mathbf{N}

Naphthalenes. Biosynthesis of nepodin (2-acetyl-3-methyl-naphthalene-1,8-diol) in Rumex alpinus L., 689.

- Naphthalenes (contd.)
 - Oxidation of aromatic substrates. Part II, the action of ruthenium tetraoxide on some derivatives of naphthalene and its monoaza-analogues, 707.
 - Substituted naphthalenes and naphthols from benzynes and dienolate anions, 1377.
- Naphthofurans. Base-catalysed intramolecular cycloadditions of allyl 3-phenylprop-2-ynyl ethers and 4methylpent-4-en-2-ynyl prop-2-ynyl ethers, 1315.
- Naphthols. Coumarins and related compounds. Part XXI, a reinvestigation of the reaction between 1-naphthol and 2-formyl-2-phenylacetonitrile, 1869.
 - Substituted naphthalenes and naphthols from benzynes and dienolate anions, 1377.
- Naphthoquinones, amino-, oxidative dimerisation of. Persulphate oxidations. Part XI, 1115.
 - 5,8-Dihydroxy-2-(4-methylpent-3-enyl)-1,4-naphthoquinone and its 2-[4-methyl-1-(2-methylcrotonoyloxy)pent-3-enyl] analogue (shikonin angelate) from Alkanna hirsutissima, 1334.
- Neighbouring-group effects in the oxidation of olefins by mercury(II), thallium(III), and lead(IV) acetates, 2465.
 - participation in the displacement of oxygen by sulphur at nitrogen, evidence for. A thermal reaction of 2-(thiolan-2-yl)oxaziridines and related compounds, 1929.
 - Neighbouring hydroxy-group participation in the reductive elimination of chlorine from 5α , 6β -dichlorocholestanes with sodium borohydride, 277.
- Nepodin (2-acetyl-3-methylnaphthalene-1,8-diol), bio synthesis of, in *Rumex alpinus L.*, 689.
- Nitidine. Photocyclisation of enamides. Part VI. Chemical constituents of Rutaceous plants. Part XXIII. Syntheses of dihydro-derivatives of the benzo[c]phenanthridine alkaloids avicine and nitidine by enamide photocyclisation, 762.
- Nitration, selective, of aromatic substrates: reaction of nitrogen dioxide with arylthallium(III) compounds, 65.
- Nitrenes. Intramolecular nitrene insertions into aromatic and heteroaromatic systems. Part III, photochemical decomposition of azido-indanes and azido-1,2-dihydro-benzocyclobutenes, 519.
- Nitriles-see also Cyanides.
 - 1H-Benzo[de]cinnoline and 8-hydroxy-1-naphthonitrile, 419.
 - Coumarins and related compounds. Part XXI, a reinvestigation of the reaction between 1-naphthol and 2-formyl-2-phenylacetonitrile, 1869.
 - Formimidoyl cyanide and isocyanide from azidoacetonitrile by photolysis, 1743.
 - Photochemical reactions of aromatic compounds. Part XXIII, photochemical reactions of alkyl vinyl ethers with 2-naphthonitrile, 2221.
 - Photo-substitution of 1,2,4,5-tetracyanobenzene by toluene, 735.
 - Polyfluorocarbanion chemistry. Part II, fluorideinitiated reactions of hexafluoropropene with pentafluoropyridine and tetrafluoropyridine-4-carbonitrile, 1029. Part III, reaction of hexafluoropropene with pentafluorobenzonitrile, 1035.
- Nitrites. Reaction of acidified nitrite solutions with peptide derivatives: evidence for nitrosamine and thionitrite formation from ¹⁵N n.m.r. studies, 2261.
- Nitro-compounds, aromatic, selective rapid transfer-hydrogenation of, 1300.

medicinal. Part II, search for ortho-interactions in tumour-inhibitory 2,4-dinitrophenylaziridines, 956.

- Reduction of nitro- and nitroso-compounds by tervalent phosphorus reagents. Part XII, conversion of aryl 2-nitroaryl ethers into novel 3-aryl-2,3-dihydro-1,3,2benzoxazaphosph(v)oles (oxazaphosphoranes) and their 2-oxo-derivatives, 2376. Part XIII, ¹H nuclear magnetic resonance studies of 3-aryl-2,3-dihydro-1,3,2benzoxazaphosph(v)oles and their 2-oxo-analogues, 2386. Part XIV, X-ray crystallographic determination of the structures of 3-(2,6-dimethylphenyl)-2,3dihydro-2,2,2-trimethoxy-1,3,2-benzoxazaphosph(v)ole and its 2-hydroxy-2-oxo-analogue, 2392. Part XV, reactions of certain aryl 2-nitrophenyl sulphides and their 2-azido-analogues leading to evidence for the intermediacy of 2,3-dihydro-1,3,2-benzothiazaphosph-(v)oles (thiazaphosphoranes) and to the formation of dihydrodimethylpheno-thiazinones and pyrimido- and pyrido-[1,2-b]indazoles, 2396.
- Nitrogen compounds. A thermal reaction of 2-(thiolan-2-yl)oxaziridines and related compounds. Evidence for neighbouring group participation in the displacement of oxygen by sulphur at nitrogen, 1929.
 - Polyfluoroalkyl derivatives of nitrogen. Part XLII, reaction of N-bromobistrifluoromethylamine with 1H-pentafluoropropene and some further studies on the thermal rearrangement of NN-bistrifluoromethylvinylamines, 1633.
 - Reaction of diazomethane with quaternary nitrogen compounds to form betaines, 1283.
 - Unsaturated nitrogen compounds containing fluorine. Part IV, thermal reactions of hexafluoroacetone azine with hydrocarbon terminal olefins to give (1-pyrazolin-1-ylio)methanides or pyrazolines, 538. Part V, reactions of hexafluoroacetone azine with open-chain and cyclic hydrocarbon dienes, 1411. Part VI, reactions of hexafluoroacetone azine with 2-methylbut-2-ene, 2,3-dimethylbut-2-ene, 2,3-dimethylbut-1-ene, and cyclopentene, 1902.
 - dioxide, reaction with arylthallium(III) compounds: selective nitration of aromatic substrates, 65.
- Nitrones, some N-alkyl, reactions of dimethylketen with. Keten. Part XIII, 498.
 - A new rearrangement of ketonic nitrones; a convenient alternative to the Beckmann rearrangement, 1764.
 - Photolysis of sulphur-containing nitrones. Support for a methyleneoxaziridine radical intermediate and formation of new heterocycles, 1925.
 - Preparation of sulphur-containing nitrones from sulphides. Thermal elimination reactions of nitrones, 1920.
- Nitrophenylhydrazones, aldehyde, reaction of lead tetraacetate with, 61.
- Nitrosamide decomposition. A new method for selective degradation of amino-sugar-containing compounds, 1428.
- Nitrosamine and thionitrite formation, evidence for, from ¹⁵N n.m.r. studies: reaction of acidified nitrite solutions with peptide derivatives, 2261.
- Nitrosation in tryptophan derivatives by α-chymotrypsin, confirmation of the site of, 2357.
 - A note on three routes to benzyne: decomposition of diphenyliodonium acetate, nitrosation of N-phenylphosphylamidates, and deoxygenation of benzene-diazotoluene-p-sulphonate N'-oxide (cupferron tosylate) by phosphorus trichloride, 1072.

- Nitroso-compounds. Reaction of acidified nitrite solutions with peptide derivatives: evidence for nitrosamine and thionitrite formation from ¹⁵N N.m.r. studies, 2261.
 - of 6-amino-1,3-dimethyl-5-nitrosouracil with thiols, 1857.
 - Reduction of nitro- and nitroso-compounds by tervalent phosphorus reagents. Part XII, conversion of aryl 2-nitroaryl ethers into novel 3-aryl-2,3-dihydro-1,3,2benzoxazaphosph(v)oles (oxazaphosphoranes) and their 2-oxo-derivatives, 2376. Part XIII, ¹H nuclear magnetic resonance studies of 3-aryl-2,3dihydro-1,3,2-benzoxazaphosph(v)oles and their 2oxo-analogues, 2386. Part XIV, X-ray crystallographic determination of the structures of 3-(2,6dimethylphenyl)-2,3-dihydro-2,2,2-trimethoxy-1,3,2benzoxazaphosph(v)ole and its 2-hydroxy-2-oxoanalogue, 2392. Part XV, reactions of certain aryl 2-nitrophenyl sulphides and their 2-azido-analogues leading to evidence for the intermediacy of 2,3dihydro-1,3,2-benzothiazaphosph(v)oles (thiazaphosphoranes) and to the formation of dihydrodimethylpheno-thiazinones and pyrimido- and pyrido-[1,2-b]indazoles, 2396.
- Nitroxides. Nitroxide chemistry. Part VIII, abstraction of allylic hydrogen from isobutene by bistrifluoromethyl nitroxide, 2033.
 - Nitroxide radicals. Part XVII, transannular interactions in [2.2]paracyclophenyl nitroxides, 1753.
- 18-Norandrosta-8,11,13-trienes. Part IV, 7-hydroxy-derivatives, 336.
- Norbornadienes. Photochemical transformations of the [4+2] dimeric adduct of 2-benzoylnorborna-2,5-diene and its derivatives, 730.
- Norbornenes. Free-radical reactions of halogenated bridged polycyclic compounds. Part XVII, reaction of 5-alkyl-1,2,3,4,7,7-hexachloronorborna-2,5-dienes and 5-alkenyl-1,2,3,4,7,7-hexachloronorborn-2-enes with N-bromosuccinimide, 698.
- Norkauranones. Microbiological hydroxylation of 17norkauran-16-one and ent-17-norkauran-16-one with the fungus Rhizopus nigricans, 1202.
 - Terpenoids. Part VI, preparation of ent-[13,14 α - 2 H $_{2}$] kaur-16-ene and some derivatives; bridgehead enolisation of ent-17-nor[13,14 α - 2 H $_{2}$]kauran-16-one, 378.
- 18-Norpregna-8,11,13-trienes: reaction of 16α,17α-epoxy-pregn-8-en-11-ones with Lewis acids, 1288.
- Nucleosides and Nucleotides. A general synthesis of 4-substituted 1-(β -D-ribofuranosyl)imidazo[4,5-c]pyridines, 125.
 - Bicyclic nucleosides related to pyrimidine nucleosides. Part III, 3-(β-D-ribofuranosyl)isoguanine, 1257.
 - Experiments on the synthesis of pyrazine nucleosides, 1888. C-Nucleoside studies. Part II, pentofuranosylethynes from 2,3-O-isopropylidene-D-ribose, 1191.
 - Pyrrolopyrimidine nucleosides. Part X, synthesis of certain 4,5-disubstituted 7-(β-D-ribofuranosyl)pyrrolo [2,3-d]pyrimidines related to toyocamycin and sangivamycin, 1248. Part XI, influence of amino-groups at C-4 and C-6 or an amino-group at C-6 on the reactivity of a 5-cyano-group in pyrrolo[2,3-d]pyrimidine nucleosides, 1253.
 - Studies on 7-(3,5-dideoxy-2-C-methoxycarbonyl-β-L-pentofuranosyl)theophyllines. Configuration at the branch point and biological activity, 2138.

- Synthesis of oligoribonucleotides. Part XI, preparation of ribonucleoside 2'-acetal 3'-esters by selective deacylation, 934.
- Unconventional nucleotide analogues. Part XIII, (2S,4S)-2-hydroxymethyl- and 2-carboxy-4-(purin-9-yl)pyrrolidines, 1617. Part XIV, (2S,4S)-2-hydroxymethyl- and 2-carboxy-4-(pyrimidin-1-yl)pyrrolidines, 1798.

- 180. Mechanism of the reaction between trialkyl phosphates and dialkyl phosphorochloridates: nucleophilic sites in phosphorus(v) esters, 201.
- Ocimenones, tagetones, atlantones and filifolone, simple syntheses of, from isoprene, 1741.
- Octadienes. Complexing of terpenes with transition metals. Part V, reactions of 3,7-dimethylocta-1,6-diene and of 7-methoxy-3,7-dimethyloct-1-ene with rhodium(III) and thallium(III), 2092.
- Octenes. Complexing of terpenes with transition metals. Part V, reactions of 3,7-dimethylocta-1,6-diene and of 7-methoxy-3,7-dimethyloct-1-ene with rhodium(III) and thallium(III), 2092.
 - Oxidation of oct-1-ene and trans-oct-4-ene by lead(IV), thallium(III), and mercury(II) acetates, 231.
- Oestratrienes, formation of, from 5,6-epoxyandrostan-7-ols, 1941.
 - some methyl-, ¹⁸C nuclear magnetic resonance spectra of; application to the mechanism of their formation, 1110.
- Olefins—see also Allenes, Cycloalkenes, and Ethylenes. stereospecific conversion of epoxides into, 1216.
 - Anodic oxidation. Part XIV, products from the electrochemical functionalisation of olefins in methanol,
 - Neighbouring-group effects in the oxidation of olefins by mercury(II), thallium(III), and lead(IV) acetates, 2465
 - Organophosphorus chemistry. Part XVII, reaction of hexafluoropropene and some fluorochloro-olefins with phosphines: competition between radical and ionic reactions, 702.
- Olefins. Photochemical reactions of 1,2,4-dithiazole-3-thione and 1,2-dithiole-3-thione with olefins, 270.
 - Polyfluoroalkyl derivatives of nitrogen. Part XLII, reaction of N-bromobistrifluoromethylamine with 1H-pentafluoropropene and some further studies on the thermal rearrangement of NN-bistrifluoromethylvinylamines, 1633.
 - Polyfluorocarbanion chemistry. Part IV, some reactions of 2*H* and 1*H*-pentafluoropropene with nucleophiles, 2015.
 - Stereochemistry of addition of fluorine to olefins by cobalt trifluoride, 2237.
 - Unsaturated nitrogen compounds containing fluorine. Part IV, thermal reactions of hexafluoroacetone azine with hydrocarbon terminal olefins to give (1-pyrazolin-1-ylio)methanides or pyrazolines, 538. Part VI, reactions of hexafluoroacetone azine with 2-methylbut-2-ene, 2,3-dimethylbut-1-ene, and cyclopentene, 1902.
- Olivacine. Studies on the syntheses of heterocyclic compounds. Part CDXXXIV, a novel total synthesis of olivacine (1,5-dimethyl-6*H*-pyrido[4,3-*b*]carbazole), 2102.

- Ophiobolus herpotrichus. Microbiological hydroxylation. Part XIV, hydroxylation in the terminal rings of dioxygenated 5α-androstanes with the fungi Wojnowicia graminis and Ophiobolus herpotrichus, 55.
- Opium alkaloids. Part XVI, the biosynthesis of 1-benzylisoquinolines in *Papaver somniferum*. Preferred and secondary pathways; stereochemical aspects, 1531.
- Organometallic compounds. 1-S- (or Se)-Dimethylstibinoderivatives of 1-thio- and 1-seleno-β-D-glucopyranose, 1395.
 - Oxymetallation. Part VII, peroxymercuration of terminal, medial and cyclic alkenes without accompanying acyloxymercuration, 195. Part IX, bromodemercuration of peroxymercurials derived from terminal, medial, and cyclic alkenes to give β -bromoperoxides, 695.
 - Reactions of palladium(II) with organic compounds. Part III, reactions of aromatic iodides in basic media, 121.
 - of perfluoroalkylcopper compounds. Part V, the preparation of some polyfluoroalkyl-substituted acids and alcohols, 654.
 - Selective nitration of aromatic substrates: reaction of nitrogen dioxide with arylthallium(III) compounds, 65.
 - Stable carbocations. Part VIII, fragmentation reactions of ferrocenylalkylium ions, 113. Part IX, reactions involving sterically crowded ferrocenylalkylium ions, 116.
- (±)-Orientalidine and a positional isomer, total synthesis of. Studies on the syntheses of heterocyclic compounds. Part DCXX, 1822.
- Oroselol. Structures of two dimers formed from oroselol with acids, 204.
- Ortho esters. Formation of 1,2,4-triazoles from the reactions of N-arylmandelamidrazones with aldehydes and with trialkyl ortho esters, 2280.
- Overcrowded molecules. Part XI, a doubly 'forbidden' symmetry-allowed pericyclic reaction: the thermal rearrangement of (E)-2-benzylidene-(Z)-1-mesityl-(phenyl)methyleneindane into (Z)-2-benzyl-1-mesityl-(phenyl)methyleneindene, 1545. Part XII, thermal and photochemical reactions of (2Z, 3Z)- and (2Z, 3E)-2-benzylidene-2,3-dihydro-3-mesityl(phenyl)methylene-benzofuran, 1995. Part XIII, thermally stable photochromic systems involving (E)-2-isopropylidene-3-(naphthylmethylene)succinic anhydrides and N-phenylimides,
- 4-Oxa-1-azabicyclo[3.2.0]heptane-6-carboxylate, ethyl 2,2-dimethyl-7-oxo-, a penam analogue, formation and reactions of, 1517.
- 4-Oxa-2,6-diazabicyclo[3.2.0]hept-2-en-7-ones from methyl 6α and 6β -phenoxyacetamidopenicillanates, 1932.
- 2-0xa-4,7-diazabicyclo[3.2.0]hept-3-en-6-ones, reactions with thiols. Studies related to penicillins. Part XV, 432.
- 4-Oxa-2,6-diazabicyclo[3.2.0]hept-2-en-6-yl}-3-methylbut-2-enoate, methyl 2-{(1S, 5R)-3-benzyl-7-oxo-, preparation of. Studies related to penicillins. Part XVI, 883.
- Oxadiazines. Cyclic products from sulphonamides and formaldehyde, 772.
- Oxamidrazone. Synthesis of some 1,2,4-triazoles and 1,2,4-triazolines by reaction of oxamidrazone condensation products with acetic anhydride, 1433.
- 1,2-Oxaselenolium and 1,2-oxathiolium cations, formation of: protonation of 1,6-dioxa-6a-thia- and 1,6-dioxa-6a-selena-pentalenes. Studies of heterocyclic compounds. Part XVIII, 2097.

- 8-Oxa-4-thia-1-azabicyclo[4.3.0]non-2-ene-3-carboxylate 4-oxide, (4S, 6S)-5,5,9,9-tetramethyl-7-oxo-, reaction with acetyl chloride. Studies related to dihydro-1,4-thiazines. Part VII, 716.
- 1,2-Oxathiolium and 1,2-oxaselenolium cations, formation of: protonation of 1,6-dioxa-6a-thia- and 1,6-dioxa-6a-selena-pentalenes. Studies of heterocyclic compounds. Part XVIII, 2097.
- Oxazaphosphoranes. Reduction of nitro- and nitroso-compounds by tervalent phosphorus reagents. Part XII, conversion of aryl 2-nitroaryl ethers into novel 3-aryl-2,3-dihydro-1,3,2-benzoxazaphosph(v)oles (oxazaphosphoranes) and their 2-oxo-derivatives, 2376. Part XIII,

 1H nuclear magnetic resonance studies of 3-aryl-2,3-dihydro-1,3,2-benzoxazaphosph(v)oles and their 2-oxo-analogues, 2386. Part XIV, X-ray crystallographic determination of the structures of 3-(2,6-dimethylphenyl)-2,3-dihydro-2,2,2-trimethoxy-1,3,2-benzoxazaphosph(v)-ole and its 2-hydroxy-2-oxo-analogue, 2392.
- Oxaziridines. A thermal reaction of 2-(thiolan-2-yl)oxaziridines and related compounds. Evidence for neighbouring group participation in the displacement of oxygen by sulphur at nitrogen, 1929.
- Oxazolidinones. Stereospecific syntheses of (Z)- and (E)-4-bromomethylene-5,5-dimethyl-3-phenyloxazolidin-2-one, 1525.
- Oxazolines from epoxides, synthesis of, 1200.
 - 2-unsubstituted, and acyl chlorides, adducts from: formation and reactions, 1302.
 - Conversion of secopenicillanic acid derivatives into β-lactam sulphimides and oxazolines, 1077.
- Oxazolones. Preparation and reactions of some o-dialkylaminoarylmethylene-substituted azlactones (oxazol-5ones), 1679.
- Oxidation, anodic. Part XIII, products from bicyclo-[2.2.1]hept-2-ene, bicyclo[2.2.1]hepta-2,5-diene, and tetracyclo[3.2.0.0^{2,7}.0^{4,6}]heptane, 1055. Part XIV, products from the electrochemical functionalisation of olefins in methanol, 1947. Part XV, electrochemical functionalisation of phenylcyclopropane and 2-iso-butenyl-1,1-dimethylcyclopropane in methanol, 1955.
 - of aromatic anils with lead tetra-acetate, 2022.
 - of aromatic substrates. Part II, the action of ruthenium tetraoxide on some derivatives of naphthalene and its monoaza-analogues, 707.
 - of deoxyhumulones to humulones, some aspects of, 96.
 - of 2'-hydroxy-α-phenylchalcones: substituent effects on the course of the Algar-Flynn-Oyamada (AFO) reaction, 1671.
 - of oct-1-ene and trans-oct-4-ene by lead(IV), thallium(III), and mercury(II) acetates, 231
 - of olefins by mercury(II), thallium(III), and lead(IV) acetates, neighbouring-group effects in, 2465.
 - of phenylenediacetic acids and benzylic ethers. Anodic syntheses. Part XVI, 2471.
 - of primary and secondary alcohols, improved methods for, 1614.
 - of ring a model phenols to p-hydroxycyclohexadienones. Experiments on the synthesis of tetracycline. Part XIII, 1610.
 - of some β -diketones with alkaline hydrogen peroxide. Reactions of some dicarbonyl compounds. Part III, 1347.
 - of some substituted stilbenes. Reactions of palladium(II) with organic compounds. Part IV, 1230.

- Oxidation (contd.)
 - of some trinuclear aromatic compounds with cerium(IV) ammonium nitrate, 1398.
 - remote anodic, of carboxylic acids in fluorosulphuric acid: a synthesis of lactones and unsaturated cyclic ketones, 948.
 - Amino-acids and peptides. Part I, esterification of the carboxy-group of penicillins and cephalosporins by hydrazone oxidation, 2019.
 - Functionalization of methyl groups in isopimaran-8 β -ol, hopan-7 α -ol, and hopan-15 β -ol and derivatives, 710.
 - Persulphate oxidations. Part XI, oxidative dimerisation of aminonaphthoquinones, 1115.
 - Phenol oxidation. Part IV, synthesis and novel ringopening of spirocyclic dienones related to the benzylisoquinoline alkaloid cularine, 2492.
 - and biosynthesis. Part XXV, new syntheses of bis-(2-arylethyl)amines of biosynthetic importance, 579.
- Photo-oxidation of bilirubin in hydroxylic solvents, 224.
- N-Oxides and related compounds. Part L, reactions of pyridinium and sulphonium ylides with pyrylium salts, 2489.
 - Preparation and some reactions of 2,2-diaryl-2*H*-imidazole 1-oxides, 1803.
 - Synthesis of pyridine oxides and isoxazolines from 4-(2-oxoalkylidene)pyrans, 1342.
- S-Oxides, S-acylthiol, and related compounds, synthesis and chemistry of, 1568.
- Oximes, phenolic, intramolecular cyclisation of. Part I, cyclisations with manganese(III) tris(acetylacetonate), 2340. Part II, cyclisations with brominating agents, 2348.
 - Degradation of cobaloximes to derivatives of imidazo-[1,2-a]pyridine, 386.
 - Structures of D-arabinose and D-glucose oximes, 1682.
- Oxofurobenzopyranones. Structures of two dimers formed from oroselol with acids, 204.
- Oxopregnanes. A new and convenient synthesis of the 17a,21-diacetoxy-20-oxopregnane side-chain, 1242.
- Oxygen. A thermal reaction of 2-(thiolan-2-yl)oxaziridines and related compounds. Evidence for neighbouring group participation in the displacement of oxygen by sulphur at nitrogen, 1929.
 - Medium-ring 1,5-dienes. Part IV, reactions of germacra-1(10),4,7(11)-triene with singlet oxygen and with the triphenyl phosphite-ozone adduct, 2336.
 - New reactions of triplet oxygen which avoid the spin barrier, 2055.
 - Peroxide-diene oxygen transfer reactions induced by titanium tetrachloride, 2065.
- Oxymetallation. Part VII, peroxymercuration of terminal, medial and cyclic alkenes without accompanying acyloxymercuration, 195. Part IX, bromodemercuration of peroxymercurials derived from terminal, medial, and cyclic alkenes to give β-bromo-peroxides, 695.
- Ozone. Medium-ring 1,5-dienes. Part IV, reactions of germacra-1(10),4,7(11)-triene with singlet oxygen and with the triphenyl phosphite-ozone adduct, 2336.

P

Palladium. Novel synthesis of β -substituted β -diphenylmethylstyrenes from β -substituted β -methylstyrenes in the presence of palladium(II) acetate, 988.

- Reactions of palladium(II) with organic compounds. Part III, reactions of aromatic iodides in basic media, 121. Part IV, oxidation of some substituted stilbenes, 1230.
- Pannarin. Structure of the lichen depsidone pannarin, 1979.
 Papaver somniferum. Opium alkaloids. Part XVI, the biosynthesis of 1-benzylisoquinolines in Papaver somniferum. Preferred and secondary pathways; stereochemical aspects, 1531.
- [2.2]Paracyclophane. Nitroxide radicals. Part XVII, transannular interactions in [2.2]paracyclophanyl nitroxides, 1753.
- **Penam.** Formation and reactions of ethyl 2,2-dimethyl-7-oxo-4-oxa-1-azabicyclo[3.2.0]heptane-6-carboxylate, a penam analogue, 1517.
- Penicillanic acids. Chemistry of penicillanic acids. Part III, a route to 1,2-secopenicillins, 562.
- Penicillins and cephalosporins, studies related to. Part IV, synthesis of methyl 7-phthalimido-6,7-trans-DLcepham-4-carboxylate, 2525.
 - studies related to. Part XV, reactions of 2-oxa-4,7-diazabicyclo[3.2.0]hept-3-en-6-ones with thiols, 432. Part XVI, preparation of methyl 2-{(1S, 5R)-3-benzyl-7-oxo-4-oxa-2,6-diazabicyclo[3.2.0]hept-2-en-6-yl}-3-methylbut-2-enoate, 883.
 - transformations of: novel ring-opening reactions of a penicillin-derived sulphimide, 1212.
 - reactions with chloramine T, 1208.
 - Amino-acids and peptides. Part I, esterification of the carboxy-group of penicillins and cephalosporins by hydrazone oxidation, 2019.
 - Determination of the stereochemistry of the product of rearrangement of penicillin G with methyl chloroformate by total synthesis, 2086.
 - Formation of enantiomeric 4-oxa-2,6-diazabicyclo[3.2.0] hept-2-en-7-ones from methyl 6α- and 6β-phenoxy-acetamidopenicillanates, 1932.
 - Studies on the biosynthesis of β-lactam antibiotics. Part II, synthesis, and incorporation into penicillin G, of (2RS, 2'RS, 3R, 3'R)-[3,3'-3H₂]cystine and (2RS, 2'RS, 3S, 3'S)-[3,3'-3H₂]cystine, 2517.
- Pentadienes. Electrocyclic reactions. Part VI, thermal reactions of 1,5-diphenylpentadienide ion and the anions derived from cis- and trans-3,4-diphenylcyclopentene, 765. Part VIII, some reactions of trans,trans- and cis,trans-2-bromo-1,5-diphenylpenta-1,4-dien-3-one (α-bromo-dibenzylideneacetone), 2210.
- **Pentalenes.** Studies of heterocyclic compounds. Part XVII, synthesis of 1,6-dioxa-6a-thia- and 1,6-dioxa-6a-selena-pentalenes, 775.
- Peptides and amino-acids. Part I, esterification of the carboxy-group of penicillins and cephalosporins by hydrazone oxidation, 2019.
 - Part XXXVIII, use of 4-picolyloxycarbonylhydrazides as 'handles' to facilitate peptide synthesis. Synthesis of fragments related to porcine gastric inhibitory polypeptide, 1185.
 - poly-. Part XIII, preparation of α -aza-amino-acid (carbazic acid) derivatives and intermediates for the preparation of α -aza-peptides, 1712.
 - Methods of peptide sequencing. Part I, conversion of oligopeptides into cyclic dipeptides: a gas chromatographic-mass spectrometric study, 1297. Part II, cyclisation of N-2-amino-6-nitrophenyl and N-3-amino-2-pyridyl derivatives of amino-acids and peptides, 1424.

- Peptides (contd.)
 - Reaction of acidified nitrite solutions with peptide derivatives: evidence for nitrosamine and thionitrite formation from ¹⁵N n.m.r. studies, 2261.
 - Structural studies on the antibiotic vancomycin: evidence for the presence of modified phenylglycine and β-hydroxytyrosine units, 2108.
 - Synthesis of [1-(L- and [1-(D-2-hydroxy-3-mercapto-propanoic acid)-8-lysine]-vasopressin, 1691.
 - Thermal degradation of actinomycins to dioxopiperazines, 1320.
- Periplogenin. Steroids and related natural products. Part XCII, conversion of canarigenone [14-hydroxy-3-oxo-14β-carda-4,20(22)-dienolide] into periplogenin[3β,5,14-tri-hydroxy-5β,14β-card-20(22)-enolide], 1976.
- Peroxide-diene oxygen transfer reactions induced by titanium tetrachloride, 2065.
- Peroxides. Electrochemical preparation of bismethylsulphonyl peroxide and its reactions with aromatic hydrocarbons, 953.
 - Oxymetallation. Part IX, bromodemercuration of peroxymercurials derived from terminal, medial, and cyclic alkenes to give β-bromo-peroxides, 695.
 - Reactions involving transition metals. Part VIII, decomposition of hydroperoxides catalysed by iridium-(1) and by rhodium(1) complexes, 209.
- Phenanthrenes. Polycyclic systems. Part XVI, synthesis of 1-isopropyl-2,8-dimethylphenanthrene, 2052.
- Phenanthro[9,10-d]imidazoles, 2-aryl-, structure of the chromotropic dimers produced from, 2361.
- Phenols, condensation between 2-chloro-3H-indol-3-one and,
 - Experiments on the synthesis of tetracycline. Part XIII, oxidation of ring a model phenols to p-hydroxycyclohexadienones, 1610.
 - Phenol oxidation. Part IV, synthesis and novel ringopening of spirocyclic dienones related to the benzylisoquinoline alkaloid cularine, 2492.
 - and biosynthesis. Part XXV, new syntheses of bis-(2-arylethyl)amines of biosynthetic importance, 579.
 - Simple method for the removal of phenolic hydroxygroups, 169.
- Phenylalanine. On the preparation of L-[2,3-3H₂]phenylalanine and L-[2,3-3H₂]tyrosine, 645.
 - Stereospecific exchange of a β -methylene proton in phenylalanine preceding biosynthetic incorporation into gliotoxin, 383.
- Phenyl-lithium and bromobenzene, reaction with carbon disulphide, 160.
- Phenylpropanoid compounds, biosynthesis of. Part II, incorporation of specifically labelled cinnamic acids into eugenol, 1548.
- Phoenicoxanthin. Carotenoids and related compounds. Part XXXII, synthesis of astaxanthin, phoenicoxanthin, hydroxyechinenone, and the corresponding diosphenols, 2195.
- Phorones. Electrocyclic reactions. Part VII, irradiation of 3,5-dibromo-2,6-dimethylhepta-2,5-dien-4-one (αα'dibromophorone) 1595.
- Phosphorus compounds. Alkylphenylphosphinic amides: formation of stable, crystalline hydrochlorides, and hydrolysis in acidic solution, 514.
 - A note on three routes to benzyne: decomposition of diphenyliodonium acetate, nitrosation of N-phenylphosphylamidates, and deoxygenation of benzene-

- diazotoluene-p-sulphonate N'-oxide (cupferron tosylate) by phosphorus trichloride, 1072.
- Apicophilicity of the benzoyl group in five-co-ordinate phosphoranes, 1221.
- Axial preference of a 2-anilino-substituent in 4-methyl-1,3,2-dioxaphosphorinan, 1828.
- Carboxymethylation of ρ,αββ-tetramethylstyrene by manganese(III) acetate. Reductive cyclization during treatment of the derived γ-aryl-γ-lactone with polyphosphoric acid to give 4-isopropyl-3-methyl-1-tetralone, 1235.
- Chemistry of santonene. Part X, products of the action of phosphorus pentachloride on santonin, 726.
- Mechanism of the reaction between trialkyl phosphates and dialkyl phosphorochloridates: nucleophilic sites in phosphorus(v) esters, 201.
- Medium-ring 1,5-dienes. Part IV, reactions of germacra-1(10),4,7(11)-triene with singlet oxygen and with the triphenyl phosphite-ozone adduct, 2336.
- Nucleophile-induced cyclisation of 2-diazo-2'-thiocyanato-acetophenone: 2-(cyanohydrazono)- and 2-(triphenylphosphoranylidenehydrazono)-benzo[b]thiophen-3(2H)-one, 286.
- Organophosphorus chemistry. Part XVII, reaction of hexafluoropropene and some fluorochloro-olefins with phosphines: competition between radical and ionic reactions, 702.
 - intermediates. Part VI, base-catalysed reaction of methyl phosphinate with tetraphenylcyclopenta-dienone, 1876.
- 4-Phosphoranylidenebutenolide intermediates in the synthesis of 4-ylidenebutenolides and 4-ylidenetetronic acids. Synthesis of alkylidenephthalide constituents of celery odour and models for freelingyne, 635.
- Phosphorylated sugars. Part XV, syntheses of 3-deoxy-D-erythro- and 3-deoxy-D-threo-hexulosonic acid 6-(dihydrogen phosphates), 593. Part XVI, synthesis of 3-deoxy-D-glycero-hex-3-en-2-ulofuranos-(2,5)onic acid 6-(dihydrogen phosphate), 598. Part XVII, synthesis of 3-deoxy-D-arabino-[1-14C]heptulosonic acid 7-(dihydrogen phosphate), 600. Part XVIII, synthesis of D-glycero-D-gulo-heptose 4-(dihydrogen phosphate), 603. Part XIX, synthesis of 3-deoxy-D-glycero-pent-2-ulosonic acid 5-(dihydrogen phosphate), 604.
- Rapid intramolecular collapse of betaines derived from 5-phenyldibenzophospholes as compared with those derived from acyclic triarylphosphines, mechanism of the Wittig reaction in protic solvents, 619.
- Reaction of trifluoroacetic acid with chlorodiphenylphosphine, 963.
 - of $1\lambda^5\sigma^4$, 2,4-triazoline-3,5-dione decomposition products with organophosphorus nucleophiles, 1309.
- Reduction of nitro- and nitroso-compounds by tervalent phosphorus reagents. Part XII, conversion of aryl 2-nitroaryl ethers into novel 3-aryl-2,3-dihydro-1,3,2-benzoxazaphosph(v)oles (oxazaphosphoranes) and their 2-oxo-derivatives, 2376. Part XIII, ¹H nuclear magnetic resonance studies of 3-aryl-2,3-dihydro-1,3,2-benzoxazaphosph(v)oles and their 2-oxo-analogues, 2386. Part XIV, X-ray crystallographic determination of the structures of 3-(2,6-dimethylphenyl)-2,3-dihydro-2,2,2-trimethoxy-1,3,2-benzoxazaphosph(v)ole and its 2-hydroxy-2-oxo-analogue, 2392. Part XV, reactions of certain aryl

- Phosphorus (contd.)
 - 2-nitrophenyl sulphides and their 2-azido-analogues leading to evidence for the intermediacy of 2,3-dihydro-1,3,2-benzothiazaphosph(v)oles (thiazaphosphoranes) and to the formation of dihydrodimethylpheno-thiazinones and pyrimido- and pyrido-[1,2-b]indazoles, 2396.
 - Synthesis of freelingyne, an acetylenic sesquiterpene from Ereniophila freelingii, 641.
 - Use of carbohydrate derivatives for studies of phosphorus stereochemistry. Part V, preparation and some reactions of tetrahydro-1,3,2-oxazaphosphorine-2-ones and -2-thiones, 1892.
- Photochemistry of bromobiphenyls: steric effects and electron transfer, 1607.
 - of carbohydrate derivatives. Part III, photochemical rearrangements of 2,3- and 3,4-O-o-nitrobenzylideneglycopyranosides, 1695. Part IV, photochemical rearrangement of 4,6-O-o-nitrobenzylideneglycopyranosides, 1700.
 - of halogenocarbon compounds. Part I, rearrangement of pyridazines to pyrazines, 396. Part II, valence isomers from fluorinated pyridazines, 1130.
 - Cinnolines. Part XVI, photochemical rearrangement of 2-alkylcinnolinium-4-olates to 3-alkyl-4(3H)-quin-azolones, 2035.
 - Electrocyclic reactions. Part VII, irradiation of 3,5-dibromo-2,6-dimethylhepta-2,5-dien-4-one ($\alpha\alpha'$ -dibromophorone), 1595.
 - Fluorinated acetylenes. Part VI, some thermal and photochemical reactions of NN-bistrifluoromethylamino-substituted acetylenes, 1074.
 - Formation of methyl ethers from photoaddition of methanol to phenyl-substituted butadienes, 1913.
 - Formimidoyl cyanide and isocyanide from azidoacetonitrile by photolysis, 1743.
 - Intramolecular nitrene insertions into aromatic and heteroaromatic systems. Part III, photochemical decomposition of azido-indanes and azido-1,2-dihydrobenzocyclobutenes, 519.
 - New reactions of triplet oxygen which avoid the spin barrier, 2055.
 - Overcrowded molecules. Part XII, thermal and photochemical reactions of (2Z, 3Z)- and (2Z, 3E)-2-benzylidene-2,3-dihydro-3-mesityl(phenyl)methylene-benzofuran, 1995. Part XIII, thermally stable photochromic systems involving (E)-2-isopropylidene-3-(naphthylmethylene)succinic anhydrides and N-phenylimides, 2227.
 - Photoaddition of allenes to p-quinones, 318.
 - of the charge-transfer complexes of 7,7,8,8-tetracyanoquinodimethane-toluene systems, 93.
 - Photochemical behaviour of some furo- and pyrrolo- [3,2-b]pyridin-2-ones, 458.
 - reactions. Part V, photoinduced cyclisations of 3-aroylchromones, 1845.
 - reactions of β-aminovinyl phenyl ketones and related compounds, 298.
 - reactions of aromatic compounds. Part XXIII, photochemical reactions of alkyl vinyl ethers with 2naphthonitrile, 2221.
 - reactions of 1,2,4-dithiazole-3-thione and 1,2-dithiole-3-thione with olefins, 270.
 - transformations of the [4 + 2] dimeric adduct of 2-benzoylnorborna-2,5-diene and its derivatives, 730.

- Photocyclisation of enamides. Part VI. Chemical constituents of Rutaceous plants. Part XXIII. Syntheses of dihydro-derivatives of the benzo[c]-phenanthridine alkaloids avicine and nitidine by enamide photocyclisation, 762. Part VII, a new synthesis of the protoberberine alkaloids, 1720. Part VIII, synthesis of 13-methylberbines; total synthesis of (±)-cavidine, 1791.
- of some 1,6-diarylhexa-1,3,5-trienes, 76.
- Photodecomposition of acetoins, 1590.
- Photohydroxylation of anthraquinone in concentrated sulphuric acid, 1374.
- Photolysis and thermolysis of N-(N-arylimidoyl)sulphimides, 1964.
 - of N-arylsulphonyl-SS-dimethylsulphoximides in aromatic solvents. Photoisomerisation of methylbiphenyls, 1806.
 - of benzoyl cyanide in solution, 2374.
 - of sulphur-containing nitrones. Support for a methyleneoxaziridine radical intermediate and formation of new heterocycles, 1925.
- Photo-oxidation of bilirubin in hydroxylic solvents, 224. Photo-substitution of 1,2,4,5-tetracyanobenzene by toluene, 735.
- Pyrimidine derivatives and related compounds. Part XXVI, oxidative and non-oxidative photocyclisations of 5- and 6-phenylthio- and anilino-1,3-dimethyluracils to benzothienopyrimidines and pyrimidoindoles, 503.
- o-Quinonoid compounds. Part VIII, photodecarbonylation of 1,3-diphenylinden-2-one adducts; 1,5-sigmatropic shifts in sterically stabilised o-quinodimethanes, 171. Part IX, photodecarboxylation of 2-benopyran-3-one adducts and photoreactions of the derived o-quinodimethanes, 175.
- Radical phthalimidation of aromatic compounds by photolysis of *N*-tosyloxyphthalimide: a route to primary aromatic amines, 1069.
- Synthesis of 1,12b-didehydrolycoran (α -anhydrodihydrocaranine) and 12b α -lycoran (γ -lycoran) via photocyclisation of an enamide-ketone, 2502.
- Type II photoelimination of thiobenzoic acid O-esters; photolysis of optically active O-2-phenylbutylthiobenzoate, 1725.
- Valence-bond isomer chemistry. Part VII, photochemical interconversion of the perfluoroxylenes, 2005.
- Photochromism. Structural criteria for hydrazone photochromism in solution, 2036.
- Phthalides. 4-Phosphoranylidenebutenolide intermediates in the synthesis of 4-ylidenebutenolides and 4-ylidenetetronic acids. Synthesis of alkylidenephthalide constituents of celery odour and models for freelingyne, 635.
- Phthalimides. Radical phthalimidation of aromatic compounds by photolysis of N-tosyloxyphthalimide: a route to primary aromatic amines, 1069.
- **Physalis minima** (Solanaceae), steroidal constituents of, 1370.
- Phytoene, stereochemistry and synthesis of. Carotenoids and related compounds. Part XXX, 1457.
- Pigments of Gnomonia erythrostoma. Part III, synthesis of a methyl ether of bisdeoxyerythrostominone, 1936.
 - Structures of the red sandalwood pigments santalins A and B, 186.
- Piperazine-2,5-diones, 4-acetyl-3-benzylidene-, 349.

- **Pisum sativum.** Identification of three new pterocarpans (6a,11a-dihydro-6H-benzofuro[3,2-c][1]benzopyrans) from Pisum sativum infected with Fusarium solani f. sp. pisi, 946.
- Pneumococcus Type XXII capsular polysaccharide, some structural features of, 985.
- Polycycles. Free-radical reactions of halogenated bridged polycyclic compounds. Part XVII, reaction of 5-alkyl-1,2,3,4,7,7-hexachloronorborna-2,5-dienes and 5-alkenyl-1,2,3,4,7,7-hexachloronorborn-2-enes with N-bromosuccinimide, 698.
 - Polycyclic fused amidines. Part I, imidazo- and pyrimido-[1,2-f]phenanthridines, 1850. Part II, synthesis of dihydroimidazo-fused systems by use of 2-aminoethylammonium toluene-p-sulphonate, 1854. systems. Part XVI, synthesis of 1-isopropyl-2,8-dimethylphenanthrene, 2052.
- Porcine gastric inhibitory polypeptide, synthesis of fragments related to. Use of 4-picolyloxycarbonylhydrazides as 'handles' to facilitate peptide synthesis. Aminoacids and peptides. Part XXXVIII, 1185.
- Porphyrins, cobalt, condensation of ethyl diazoacetate with, 2076.
 - Concerning meso-tetraphenylporphyrin purification, 1401.
- Potassamide. Cleavage of halogenobenzophenones by potassamide in ammonia; new routes to xanthen- and thioxanthen-9-ones, 155.
- Pregnanes. D-Homo-steroids. Part V, a study of the mechanism of D-homoannulation of 17α-hydroxypregnan-20-ones with boron trifluoride, 1450.
 - Marine steroids. Part II, a synthesis of 3β , 6α -dihydroxy- 5α -pregn-9(11)-en-20-one, 1751.
 - Microbiological hydroxylation. Part XIX, the action of an ant fungus ('Acromyrmex fungus') on oxygenated androstanes, pregnanes, and cholestanes, 1552.
 - Synthesis of 18-substituted steroids. Part I, 18,21-dihydroxypregn-4-ene-3,20-dione (18-hydroxydeoxycorticosterone), 1860.
- (±)-Prephytoene alcohol, (±)-presqualene alcohol, and structurally related compounds, synthesis of, 897.
- (±)-Presqualene alcohol, (±)-prephytoene alcohol, and structurally related compounds, synthesis of, 897.
- Presqualene esters, synthetic, related cyclopropanes, and isoprenoids. Carbon-13 magnetic resonance spectra, 913.
- Proaporphine and aporphine alkaloids, studies on. Part V, synthesis of (±)-glaziovine by 8,1'-ring closure of 1-benzylisoquinoline derivatives, 1647. Part VI, synthesis of (±)-glaziovine by spiran ring construction on a cyclopent[ci] isoquinoline; stereochemistry of reduced proaporphines, 1652. Part VII, stereochemistry of reduced proaporphines of Croton sparsiflorus and C. linearis, 1659.
- Protecting groups. The allyl ether as a protecting group in carbohydrate chemistry. Part VII, the 2-O-allyl group as a non-participant in 1,2-cis-glycoside synthesis, 361.
- Protoberberine alkaloids, a new synthesis of. Photocyclisation of enamides. Part VII, 1720.
 - Biosynthesis. Part XXII, the origin of chelidonine and of other alkaloids derived from the tetrahydroprotoberberine skeleton, 1147.
- Pterocarpans. Identification of three new pterocarpans (6a,11a-dihydro-6H-benzofuro[3,2-c][1]benzopyrans) from Pisum sativum infected with Fusarium solari f. sp. pisi, 946.
- Pterocarpenequinones (6H-benzofuro[3,2-c][1]benzopyran-quinones) from Brya ebenus. Naturally occurring quinones. Part XXV, 1113.

- N-(Pthalimido)imide. Benzonitrile N-(phthalimido) imide' a functionalised 1,3-dipole. Preparation of 4,5,8-triphenylpyridazino[4,5-d]triazine and generation of 3,6diphenyl-4,5-didehydropyridazine, 1747.
- Purines. Purine studies. Part XIV, trifluoroacetyl and formyl derivatives of 4,5-diamino-6-methyl-2-methyl-thiopyrimidine, their ethylation products, and derived purines, 485. Part XV, addition of hydrogen sulphite ion to purines, 2240.
- Purpurosamine C. Syntheses of derivatives of 2,6-diamino-2,3,4,6-tetradeoxy-D-erythro-hexose (purpurosamine C), a component of gentamycin C_{1a}, 979.
- Pyranocoumarins. Avicennol: a new pyranocoumarin from the root bark of *Zanthoxylum avicennae*, and its conversion into avicennin, 488.
- 1H,9H,10H-Pyrano[3,2-c: 5,6-c']dipyran-10-ylacetic acid, 3,7-dimethyl-1,9-dioxo-, and its ethyl ester, synthesis of, 2405.
- **Pyranones.** Preparation of the 'fixed conformation esters' 4,5-dihydrofuro- and 4,5-dihydrothieno-[2,3-c]pyran-7-one, 523.
- Pyranopyrandione. 8-Ethylidene-7,8-dihydro-4-methoxypyrano[4,3-b]pyran-2,5-dione (coarctatin), a metabolite of Chaetonium coarctatum, 999.
- Pyranopyranthiones. Synthesis of pyrano[3,2-c]pyranthiones; characteristic shifts in the ¹H nuclear magnetic resonance spectra of thiones, 1335.
- Pyrans. Synthesis of pyridine oxides and isoxazolines from 4-(2-oxoalkylidene)pyrans, 1342.
- Pyrazines. Experiments on the synthesis of pyrazine nucleosides, 1888.
 - Photochemistry of halogenocarbon compounds. Part I, rearrangement of pyridazines to pyrazines, 396. Part II, valence isomers from fluorinated pyridazines, 1130.
- Pyrazino[2,3-f]quinoxalines (di-and tetra-substituted 1,4,5,8-tetra-azaphenanthrenes), synthesis of, 1229.
- Δ²-Pyrazoline-4-dithiocarboxylic acid, 3-methyl-5-oxo-1phenyl-, and 2-oxocyclopentanedithiocarboxylic acid, some reactions of, 1277.
- Pyrazolines. Decomposition products of pyrazolines formed from 3-alkylthioinden-1-ones and diazomethane, 572.
 - Unsaturated nitrogen compounds containing fluorine. Part IV, thermal reactions of hexafluoroacetone azine with hydrocarbon terminal olefins to give (1-pyrazolin-1-ylio)methanides or pyrazolines, 538.
- Pyrazolium anions, 1,2-disubstituted, direct thiation of, with sulphur. Reactions between azolium anions and electrophilic reagents. Part II, 507.
- Pyrazolo[1,5-a]pyridine-3-carboxylates, ethyl 4- and 6-substituted, syntheses of: effects of 3-substituents upon orientation in the 1,3-dipolar cycloaddition reaction between 3-substituted pyridine N-imides and ethyl proiolate, 406.
- Pyrethrins. Carbon-13 nuclear magnetic resonance spectra of the natural pyrethrins and related compounds, 1500.
- Pyrethroids. Absolute configuration of the most potent isomer of the pyrethroid insecticide α-cyano-3-phenoxybenzyl cis-3-(2,2-dibromovinyl)-2,2-dimethylcyclo-propanecarboxylate by crystal structure analysis, 1865.
- Pyridazines. [1,4]-Benzodioxinopyridazines, 534.
- Benzonitrile N-(phthalimido)imide. a functionalised 1,3-dipole. Preparation of 4,5,8-triphenylpyridazino[4,5-d]triazine and generation of 3,6-diphenyl-4,5-didehydropyridazine, 1747.

- Pyridazines (contd.)
 - 1,3-Dipolar character of six-membered aromatic rings. Part X, pyridazine and benzopyridazine betaines, 1506.
 - Photochemistry of halogenocarbon compounds. Part I, rearrangement of pyridazines to pyrazines, 396. Part II, valence isomers from fluorinated pyridazines, 1130.
- Pyridazinotriazines. Benzonitrile N-(phthalimido)imide, a functionalised 1,3-dipole. Preparation of 4,5,8-triphenylpyridazino[4,5-d]triazine and generation of 3,6-diphenyl-4,5-didehydropyridazine, 1747.
- Pyridines, 1,4-dihydro-, a new synthesis of, 926.
 - Addition reactions of heterocyclic compounds. Part LVII, reactions of pyridines with acetylenic esters in the presence of carbanion sources, 438. Part LX, reactions of 2-substituted pyridines with acetylenic esters leading to quinolizines and pyrrolo[2,1,5-cd] indolizines, 740.
 - Effects of 3-substituents upon orientation in the 1,3-dipolar cycloaddition reaction between 3-substituted pyridine N-imides and ethyl propiolate: syntheses of ethyl 4- and 6-substituted pyrazolo[1,5-a]pyridine-3-carboxylates, 406.
 - Electrochemical fluorination. Part I, electrochemical fluorination of alkyl-substituted pyridines, 1263.
 - Heterocyclic polyfluoro-compounds. Part XXII, synthesis of octafluoro-4,4'-azopyridine and tetrafluoro-4-(pentafluorophenylazo)pyridine, 1419.
 - Polyfluorocarbanion chemistry. Part II, fluorideinitiated reactions of hexafluoropropene with pentafluoropyridine and tetrafluoropyridine-4-carbonitrile, 1029.
 - Reduction of 3,5-disubstituted pyridines to dihydropyridines, 929.
 - Synthesis of pyridine oxides and isoxazolines from 4-(2-oxoalkylidene)pyrans, 1342.
- Pyridine-2-thiones and acetylenic carbonyl derivatives, adduct formation between, 1493.
- **Pyridinium allylides** [1-(1-pyridinio)prop-2-enides], synthesis of indolizines by intramolecular cyclisation of, 575.
 - ylides. N-Oxides and related compounds. Part L, reactions of pyridinium and sulphonium ylides with pyrylium salts, 2489.
- Pyridocarbazoles. An improved synthesis of 6H-pyrido-[4,3-b]carbazole derivatives, 289.
 - Studies on the syntheses of heterocyclic compounds. Part CDXXXIV, a novel total synthesis of olivacine (1,5-dimethyl-6*H*-pyrido[4,3-*b*]carbazole), 2102. Part DLXXXIX, a simple route to pyridocarbazoles, 413.
- Pyridoindazoles. Reduction of nitro- and nitroso- compounds by tervalent phosphorus reagents. Part XV, reactions of certain aryl 2-nitrophenyl sulphides and their 2-azido-analogues leading to evidence for the intermediacy of 2,3-dihydro-1,3,2-benzothiazaphosph(v)oles (thiazaphosphoranes) and to the formation of dihydro-dimethylphenothiazinones and pyrimido- and pyrido-[1,2-b]indazoles, 2396.
- Pyridoxal, incorporation of glycolaldehyde into. Biosynthesis of vitamin B_6 , 1622.
- Pyridyltetrazenes. Action of acids and alkylating agents on 1,4-di-(2-pyridyl)tetraz-2-enes, 1232.
- Pyrimidines—see also Uracils.
 - Bicyclic nucleosides related to pyrimidine nucleosides. Part III, 3-(β-D-ribofuranosyl)isoguanine, 1257.

- Condensation reactions of chloroformylsulphur chloride with 2- and 4-aminopyrimidines, 2-aminothiazole, and 2-amino- Δ^2 -thiazoline, 375.
- Purine studies. Part XIV, trifluoroacetyl and formyl derivatives of 4,5-diamino-6-methyl-2-methylthio-pyrimidine, their ethylation products, and derived purines, 485.
- Pyrimidine derivatives and related compounds. Part XXVI, oxidative and non-oxidative photocyclisations of 5- and 6-phenylthio- and anilino-1,3-dimethyluracils to benzothienopyrimidines and pyrimidoindoles, 503.
- Some base-catalysed ring expansion and ring expansionring contraction reactions of ethyl 4-chloromethyl-1,2,3,4-tetrahydro-6-methyl-2-oxopyrimidine-5-carboxylate, 657.
- Triazines and related products. Part XV, 2,4-diamino-pyrimidines and 2-aminopyrimidin-4(3H)-ones bearing 1,2,3-benzotriazinyl groups as potential dihydrofolic reductase inhibitors, 1023.
- Unconventional nucleotide analogues. Part XIV, (2S, 4S)-2-hydroxymethyl- and 2-carboxy-4-(pyrimidin-1-yl)pyrrolidines, 1798.
- Pyrimido-indazoles. Reduction of nitro- and nitroso-compounds by tervalent phosphorus reagents. Part XV, reactions of certain aryl 2-nitrophenyl sulphides and their 2-azido-analogues leading to evidence for the intermediacy of 2,3-dihydro-1,3,2-benzothiazaphosph(v)oles (thiazaphosphoranes) and to the formation of dihydrodimethylpheno-thiazinones and pyrimido- and pyrido-[1,2-b]-indazoles, 2396.
- Pyrimidoindoles. Pyrimidine derivatives and related compounds. Part XXVI, oxidative and non-oxidative photocyclisations of 5- and 6-phenylthio- and anilino-1,3-dimethyluracils to benzothienopyrimidines and pyrimidoindoles, 503.
- **Pyrimidones.** Reaction of *N*-aryl- and imidoyl-sulphimides with diphenylcyclopropenone; synthesis of 4-pyrimidones, 1969.
- **Pyrimidophenanthridines.** Polycyclic fused amidines. Part I, imidazo- and pyrimido-[1,2-f]phenanthridines, 1850.
- Pyrocurzerenone, epicurzerenone, curzerenone, furanodienone, and isofuranodienone, sesquiterpenoids of Curcuma zedoaria, structure, configuration, conformation, and thermal rearrangement of. Sesquiterpenoids. Part XLVII, 478.
- Pyrogallol and gallic acid, syntheses of, 1400.
- Pyrroles. Highly fluorinated heterocycles. Part XIII, fluorination of 1-methylpyrrole and some reactions of derived compounds, 781.
 - 1H-Pyrrolo[2,3-b]pyridines. Part III, a novel synthetic route from 1-substituted 2-aminopyrroles, 1910.
 - Some base-catalysed ring expansion and ring expansion-ring contraction reactions of ethyl 4-chloromethyl-1,2,3,4-tetrahydro-6-methyl-2-oxopyrimidine-5-carboxylate, 657.
- Pyrrolidines. Unconventional nucleotide analogues. Part XIV, (2S,4S)-2-hydroxymethyl- and 2-carboxy-4-(pyrimidin-1-yl)pyrrolidines, 1798. Part XIII, (2S,4S)-2-hydroxymethyl- and 2-carboxy-4-(pyrin-9-yl)pyrrolidines, 1617.
- Pyrroloindolizines. Addition reactions of heterocyclic compounds. Part LX, reactions of 2-substituted pyridines with acetylenic esters leading to quinolizines and pyrrolo-[2,1,5-cd]indolizines, 740.

- **Pyrrolopyridines.** 1*H*-Pyrrolo[2,3-*b*]pyridines. Part III, a novel synthetic route from 1-substituted 2-aminopyrroles, 1910
- **Pyrrolopyridinones.** Photochemical behaviour of some furo- and pyrrolo-[3,2-b]pyridin-2-ones, 458.
- Pyrrolopyrimidines. Pyrrolopyrimidine nucleosides. Part X, synthesis of certain 4,5-disubstituted 7-(β-D-ribofuranosyl)pyrrolo[2,3-d]pyrimidines related to toyocamycin and sangivamycin, 1248. Part XI, influence of amino-groups at C-4 and C-6 or an amino-group at C-6 on the reactivity of a 5-cyano-group in pyrrolo[2,3-d] pyrimidine nucleosides, 1253.
- Pyrylium salts. Part V, 5,6,12,13-tetrahydro-5,13:6,12-bisepithiodibenzo[a,f]cyclodecene-7,14-diones by dimerisation of 2-benzothiopyrylium-4-olate, 1366. Part VI, derivatives of 3,11-dithiatricyclo[5.3.1.1^{2,6}]dodecane by dimerisation of thiopyrylium-3-olates, 2099.

reactions of pyridinium and sulphonium ylides with. N-Oxides and related compounds. Part L, 2489.

Q

- N-Quaternary compounds. Part XL, syntheses of 1a,6a-dihydroindeno[1,2-b]azirin-6(1H)-ones and isomerisation to isoquinolinium derivatives, 305.
- Quaternary salts. Use of debenzylation of quaternary benzylammonium salts in the synthesis of α -deuteriated tertiary amines, 510.
- Quinate synthetase, 3-dehydro-, observations on, and stereochemistry of the 3-dehydroquinate dehydratase reaction. Shikimate pathway. Part IV, 52.
- Quinazolines. Part XXI, synthesis of cis-2-amino-8a-carboxymethyl-3,4,4a,5,6,7,8,8a-octahydroquinazoline and related compounds. Conversion of perhydroquinazolin-2-ones into 2-amino-3,4,4a,5,6,7,8,8a-octahydroquinazolines, 1470.
 - Addition reactions of heterocyclic compounds. Part LXII, a new rearrangement in the quinazoline series,
 - Dimroth rearrangement. Part XVIII, syntheses and rearrangement of 4-iminoquinazolines and related systems, 2182.
- Quinazolones. Cinnolines. Part XVI, photochemical rearrangement of 2-alkylcinnolinium-4-olates to 3-alkyl-4(3H)-quinazolones, 2035.
- o-Quinodimethane, tetra- and hexa-dehydroyohimbane synthesis by an intermolecular cycloaddition of, 737
- Quinolines. Addition reactions of heterocyclic compounds. Part LIX, a ¹³C tracer study of the mechanism of formation of azepines from 2-methylquinolines and dimethyl acetylenedicarboxylate, 394.
 - Oxidation of aromatic substrates. Part II, the action of ruthenium tetraoxide on some derivatives of naphthalene and its monoaza-analogues, 707.
 - Reactions of dihydroquinolines and dihydroisoquinolines with arenesulphonyl azides, 420.
 - of heterocycles with thiophosgene. Part IV, β,4-dichloro-2-isothiocyanatocinnamaldehyde, a product from 4,7-dichloroquinoline, 922. Part V, 7-chloro-1,2-dihydro-4-methoxy-2-thioxoquinoline-3-carbal-dehyde, a product from 7-chloro-4-methoxyquinoline, 2271.

- Synthesis and reactions of isoprenyl terminal epoxides in the chromone and quinoline series, 150.
- Quinolizines. Addition reactions of heterocyclic compounds. Part LX, reactions of 2-substituted pyridines with acetylenic esters leading to quinolizines and pyrrolo-[2,1,5-cd]indolizines, 740.
- Quinone methides derived from Uhle's ketone, 2257.
- Quinones, naturally occurring. Part XXV, pterocarpenequinones (6*H*-benzofuro[3,2-*c*][1]benzopyranquinones) from *Brya ebenus*, 1113.
 - Photoaddition of allenes to p-quinones, 318.
 - Reactions of quinones with aromatic ethers. Part V, triphenylene-1,4-quinones from 2,3-diaryl-1,4-benzo-quinones, 568. Part VI, triphenylenols from mono-and di-chlorobenzoquinones and veratrole, 811. Part VII, triphenylene-1,4:5,8:-diquinones from reactions of veratrole or 3,4-dimethoxyphenylbenzoquinones with benzoquinones, 2185.
 - Syntheses of isobenzofuran-4,7-quinone and isoindole-4,7-quinone, 1339.
 - Thiele-Winter acetoxylation of. Part VI, methoxy- and hydroxy-(phenyl)-1,4-benzoquinones and (4-substituted phenyl)-1,4-benzoquinones, 309. Part VII, some bromo-derivatives of phenyl-1,4-benzoquinone, 314.
- o-Quinonoid compounds. Part VIII, photodecarbonylation of 1,3-diphenylinden-2-one adducts; 1,5-sigmatropic shifts in sterically stabilised o-quinodimethanes, 171. Part IX, photodecarboxylation of 2-benzopyran-3-one adducts and photoreactions of the derived o-quinodimethanes, 175.
- Quinoxalinones, synthesis of, by reaction of o-phenylenediamines with dimethyl acetylenedicarboxylate, 401.

R

- Radical phthalimidation of aromatic compounds by photolysis of N-tosyloxyphthalimide: a route to primary aromatic amines, 1069.
 - Aromatic annelation by reaction of aryl radicals with dimethyl acetylenedicarboxylate and related compounds, 1060.
 - Reaction of phenyl radicals with dialkyl azodiformates: formation of, and nuclear magnetic resonance studies of conformational restrictions in, tetra-alkyl 1,4-diphenyltetra-azane-1,2,3,4-tetracarboxylates, 1065.
- Rearrangements and cyclization of ω -alkoxyalkyl- and ω -phenoxyalkyl-carbamoyl chlorides, 1836.

backbone, of steroidal 5-enes, 2284.

- Reduction of aryltrimethylsilanes as a synthetic method. Part II, Birch reduction, 470. Part III, lithium in ethylamine (Benkeser reduction), 475.
 - of 3,5-disubstituted pyridines to dihydropyridines, 929.
 - of nitro- and nitroso-compounds by tervalent phosphorus reagents. Part XII, conversion of aryl 2-nitroaryl ethers into novel 3-aryl-2,3-dihydro-1,3,2-benzoxazaphosph(v)oles (oxaphosphoranes) and their 2-oxo-derivatives, 2376. Part XIII, ¹H nuclear magnetic resonance studies of 3-aryl-2,3-dihydro-1,3,2-benzoxazaphosph(v)oles and their 2-oxo-analogues, 2386. Part XIV, X-ray crystallographic determination of the structures of 3-(2,6-dimethylphenyl)-2,3-dihydro-2,2,2-trimethoxy-1,3,2-benzoxazaphosph(v)ole and its 2-hydroxy-2-oxo-analogue, 2392. Part XV, reactions of certain aryl 2-nitrophenyl sulphides and their 2-azido-

Reduction (contd.)

analogues leading to evidence for the intermediacy of 2,3-dihydro-1,3,2-benzothiazaphosph(v)oles (thiazaphosphoranes) and to the formation of dihydrodimethylpheno-thiazinones and pyrimido- and pyrido-[1,2-b]indazoles, 2396.

Alkyl metal asymmetric reduction. Part VIII, stereoselectivity of the reduction of alkyl phenyl ketones by optically active aliphatic Grignard reagents, 1795.

Electro-organic reactions. Part IV, preparative aspects of the cathodic hydrogenation of activated carbon-carbon double bonds, 971.

Meliacins (limonoids): minor constituents of *Khaya* anthotheca: reduction of the meliacins with zinc-copper couple, 2118.

Neighbouring hydroxy-group participation in the reductive elimination of chlorine from 5α,6β-dichlorocholestanes with sodium borohydride, 277.

Regioselectivity, stereoselectivity, and selectivity: heterogeneous catalytic hydrogenation of allenes over supported palladium, 1081.

Reserpine derivatives, the mass spectra of: methyl transfer, 932.

Rhizopus nigricans, the fungus, microbiological hydroxylation of 17-norkauran-16-one and ent-17-norkauran-16-one with, 1202.

Microbiological hydroxylation. Part XVI, incubation of derivatives (mainly acetals) of 5α-androstane ketones with the fungi Calonectria decora, Aspergillus ochraceus, and Rhizopus nigricans, 1356. Part XXI, hydroxylations of 3-halogeno-17-oxo-, 3-halogeno-7-oxo-, and 17-halogeno-3-oxo-androstanes by the fungi Calonectria decora, Rhizopus nigricans and Aspergillus ochraceus, 2308

Rhodium. Complexing of terpenes with transition metals. Part V, reactions of 3,7-dimethylocta-1,6-diene and of 7-methoxy-3,7-dimethyloct-1-ene with rhodium(III) and thallium(III), 2092.

Reactions involving transition metals. Part VIII, decomposition of hydroperoxides catalysed by iridium(I) and by rhodium(I) complexes, 209.

Ring expansion and ring expansion-ring contraction reactions, some base-catalysed, of ethyl 4-chloromethyl-1,2,3,4-tetrahydro-6-methyl-2-oxopyrimidine-5-carboxylate, 657.

Heterocycles by cycloaddition. Part I, cycloaddition-extrusion-ring expansion reactions of five-membered mesoionic compounds with diphenylcyclopropenone and related compounds: preparation of six-membered heterocycles, 632.

Rotenoids. Carbon-13 magnetic resonance spectra of natural rotenoids and their relatives, 1497.

Rubrosulphin, viopurpurin, xanthomegnin, and viomellin, pigments from Aspergillus sulphureus and Aspergillus melleus. Fungal products. Part XIII, 163.

Rumex alpinus L., biosynthesis of nepodin (2-acetyl-3-methylnaphthalene-1,8-diol) in, 689.

Rutaceous plants. Photocyclisation of enamides. Part VI. Chemical constituents of Rutaceous plants. Part XXIII. Syntheses of dihydro-derivatives of the benzo[c]phenanthridine alkaloids avicine and nitidine by enamide photocyclisation, 762.

Ruthenium tetraoxide, action of, on some derivatives of naphthalene and its monoaza-analogues. Oxidation of aromatic substrates. Part II, 707.

Saikosaponin b, components of; saponins isolated from Bupleurum falcatum L., 2043.

S

Sandalwood. Structures of the red sandalwood pigments santalins A and B, 186.

Sangivamycin. Pyrrolopyrimidine nucleosides. Part X, synthesis of certain 4,5-disubstituted 7-(β-D-ribofuranosyl)pyrrolo[2,3-d]pyrimidines related to toyocamycin and sangivamycin, 1248.

Santalins A and B, structures of the red sandalwood pigments, 186.

Santonene, chemistry of. Part X, products of the action of phosphorus pentachloride on santonin, 726.

Sapogenins. Structures of three new steroidal sapogenins from *Dioscorea prazeri*, 1560.

Saponins isolated from Bupleurum falcatum L.; components of saikosaponin b, 2043.

Sclareol, elaboration of, by Claisen rearrangement, 1009.

Scoulerine. Studies of enzyme-mediated reactions. Part V, synthesis of (13S)- and (13R)-[13- 3 H₁] scoulerine from stereospecifically labelled (R)- and (S)-[α - 3 H₁]benzyl alcohols; stereochemistry of enzymic reactions at saturated benzylic carbon, 1162.

Secopenicillanic acid derivatives, conversion of, into β -lactam sulphimides and oxazolines, 1077.

Secopenicillins. Chemistry of penicillanic acids. Part III, a route to 1,2-secopenicillins, 562.

Selenium. 1-S- (or Se)-Dimethylstibino-derivatives of 1-thio- and 1-seleno-β-D-glucopyranose, 1395.

Studies of heterocyclic compounds. Part XVII, synthesis of 1,6-dioxa-6a-thia- and 1,6-dioxa-6a-selena-pentalenes, 775. Part XVIII, protonation of 1,6-dioxa-6a-thia- and 1,6-dioxa-6a-selena-pentalenes: formation of 1,2-oxathiolium and 1,2-oxaselenolium cations, 2097.

Semicarbazides thiazol-2-yl-, rearrangements in a series of, 1040

Senexdiolic acid and related compounds, structure of, and crystalline chemical components of *Fomes senex*, 451.

Shale, rearranged sterenes in: occurrence and simulated formation, 1833.

Shikimate pathway. Part IV, stereochemistry of the 3-dehydroquinate dehydratase reaction and observations on 3-dehydroquinate synthetase, 52.

Shikonin angelate. 5,8-Dihydroxy-2-(4-methylpent-3-en-yl)-1,4-naphthoquinone and its 2-[4-methyl-1-(2-methyl-crotonoyloxy)pent-3-enyl] analogue (shikonin angelate) from *Alkanna hirsutissima*, 1334.

Silicon. Allenes. Part XXXII, a general synthesis of allenediynes from allenic bromides and butadiynyl (trimethyl)silane and the synthesis of two natural allenes, (±)-octa-2,3-diene-5,7-diyn-1-ol and (±)-undeca-5,6-diene-8,10-diyn-1-ol, 1628.

Bis(trimethylsilyloxy)alkenes from the modified acyloin reaction of Schräpler and Rühlmann; stereochemical considerations, 806.

Deoxygenation of some 3-oxo-steroids by chlorotrimethylsilane and zinc, 809.

Organosilicon chemistry. Part XIV, insertion of 1,2,2-trifluoroethylidene into C-H bonds of tetra-alkylsilanes: a novel alkyl group rearrangement, 966.

Reduction of aryltrimethylsilanes as a synthetic method. Part II, Birch reduction, 470. Part III, lithium in ethylamine (Benkeser reduction), 475.

- Silver perchlorate-promoted solvolysis, preparation of medium-sized ring *trans*-cycloalkene derivatives from halogenocyclopropane intermediates by, 2422.
- Solamargine, sugar unit of. Solanum alkaloids. Part XVII, 2455.
- Solanum alkaloids. Part XVII, the sugar unit of solamargine, 2455.
 - An ESCA study of the fluoride-ion-induced trimerization product from perfluorocyclobutene, 647.
 - Synthesis of some acridines and 9-acridones for spectral studies, 650.
 - circular dichroism. Circular dichroism of N-thiobenzoyl-L-α-amino-acids. Part VI, assessment of the resolution of amino-acids as their N-thiobenzoyl derivatives, 2313.
 - Correlation of circular dichroism and conformation in $\gamma\delta$ and $\delta\epsilon$ unsaturated ketones, 1015.
 - Spectroscopic properties of axially and equatorially substituted β -trimethylstannyl ketones and compounds with related chromophores, 1020.
 - mass. Methods of peptide sequencing. Part I, conversion of oligopeptides into cyclic dipeptides: a gas chromatographic-mass spectrometric study, 1297.
 - Methyl transfer: the mass spectra of reserpine derivatives, 932.
 - Studies concerning the antibiotic actinonin. Part VII, mass spectra of actinonin and related compounds, 852.
 - nuclear magnetic resonance. Application of ¹³C nuclear magnetic resonance to the study of gibberellins, 992.
 - Carbon-13 magnetic resonance spectra. Synthetic presqualene esters, related cyclopropanes and isoprenoids, 913.
 - Carbon-13 nuclear magnetic resonance spectra of natural pyrethrins and related compounds, 1500.
 - Carbon-13 magnetic resonance spectra of natural rotenoids and their relatives, 1497.
 - ¹³C nuclear magnetic resonance spectra of some gibberellins, 1515.
 - ¹³C nuclear magnetic resonance spectra of some methyloestratrienes; application to the mechanism of their formation, 1110.
 - ¹³C nuclear magnetic resonance spectra of some steroidal unsaturated ketones, 1956.
 - Determination of the substitution pattern of an isoxazole by ¹³C nuclear magnetic resonance, 2115.
 - Isomerism of 1- and 2-(NN-disubstituted aminomethyl)benzotriazoles; an investigation by nuclear magnetic resonance spectroscopy, 1181.
 - On the relationship between intramolecular hydrogen abstraction by alkoxyl radicals and deshielding by the corresponding hydroxy-groups as indicated by nuclear magnetic resonance, 1275.
 - Reaction of acidified nitrite solutions with peptide derivatives: evidence for nitrosamine and thionitrite formation from ¹⁵N N.m.r. studies, 2261.
 - Reaction of phenyl radicals with dialkyl azodiformates: formation of, and nuclear magnetic resonance studies of conformational restrictions in, tetra-alkyl 1,4-diphenyltetra-azane-1,2,3,4-tetracarboxylates, 1065.
 - Reduction of nitro- and nitroso- compounds by tervalent phosphorus reagents. Part XIII, ¹H nuclear magnetic resonance studies of 3-aryl-2,3-dihydro-1,3,2-benzoxazaphosph(V)oles and their 2-oxo-analogues, 2386.

- Synthesis of pyrano[3,2-c]pyranthiones; characteristic shifts in the ¹H nuclear magnetic resonance spectra of thiones, 1335.
- Spin barrier. New reactions of triplet oxygen which avoid the spin barrier, 2055.
- Spiro-azetidinones and Spiro-oxazolidinones. Keten. Part XIII, reactions of dimethylketen with some N-alkyl nitrones, 498.
- Sprinson's catalyst. Phosphorylated sugars. Part XV, syntheses of 3-deoxy-D-erythro- and 3-deoxy-D-threo-hexulosonic acid 6-(dihydrogen phosphates), 593. Part XVI, synthesis of 3-deoxy-D-glycero-hex-3-en-2-ulofura-nos(2,5)onic acid 6-(dihydrogen phosphate), 598. Part XVII, synthesis of 3-deoxy-D-arabino-[1-14C]heptulosonic acid 7-(dihydrogen phosphate), 600. Part XIX, synthesis of 3-deoxy-D-glycero-pent-2-ulosonic acid 5-(dihydrogen phosphate), 604.
- Squalene, (3S)-2,3-epoxy-2,3-dihydro-, biosynthesis of 3β-hydroxy-triterpenoids and steroids from. Investigations on the biosynthesis of steroids and terpenoids. Part XII, 1134.
- Sterenes, rearranged, in a shale: occurrence and simulated formation, 1833.
- Stereochemistry, absolute, of the dihydroanthracene-cisand trans-1,2-diols produced from anthracene by mammals and bacteria, 2506.
 - and mechanism of nucleophilic substitutions in alkoxysulphonium salts. Part II, competitive attack at sulphur and carbon in the reaction of alkoxydiarylsulphonium salts with halide ions, 404.
 - and relative migratory aptitudes of alkyl groups in the cyanoborate process. Chemistry of organoborates. Part IV, 145.
 - of addition of fluorine to olefins by cobalt trifluoride,
 - of 2,4- and 2,3-disubstituted-y-butyrolactones, 1480
 - and synthesis of phytoene. Carotenoids and related compounds. Part XXX, 1457.
 - Absolute configuration of allenes, conversion of molecular dissymmetry into centrodissymmetry by heterogeneous catalytic hydrogenation, 1090.
 - Absolute configuration of ancistrocladisine and ancistrocladidine, 2134.
 - of the most potent isomer of the pyrethroid insecticide α-cyano-3-phenoxybenzyl cis-3-(2,2-dibromovinyl)-2,2-dimethylcyclopropanecarboxylate by crystal structure analysis, 1865.
 - Axial preference of a 2-anilino- substituent in 4-methyl-1,3,2-dioxaphosphorinan, 1828.
 - Bis(trimethylsilyloxy)alkenes from the modified acyloin reaction of Schräpler and Rühlmann; stereochemical considerations, 806.
 - Condensed cyclic and bridged-ring systems. Part III, regioselectivity and stereoselectivity in the acid-catalysed cyclisations of substituted benzylcyclohexanols. Stereocontrolled synthesis of some gemcarboxy-methyl-substituted hexahydrofluorene and hexahydro-5,9-methano-benzocyclo-octene derivatives, 2438.
 - Conformational aspects of some 5β -methyl-19-nor-steroids, 2104.
 - Correlation of circular dichroism and conformation in γδ- and δε-unsaturated ketones, 1015.
 - Cyclopropylcarbinyl-oxocarbonium ions. Part VII, orientational effects, 1872.

Stereochemistry (contd.)

- Determination of the stereochemistry of the product of rearrangement of penicillin G with methyl chloroformate by total synthesis, 2086.
- Formation of vinyl sulphides via successive sigmatropic rearrangements of an allylic sulphonium ylide, 2129.
- Heterogeneous catalytic hydrogenation of allenes over supported palladium: selectivity, stereoselectivity, and regioselectivity, 1081.
- Natural acetylenes. Part XLVIII, absolute configurations of a C₇ diynol, a C₉ diynetriol, and a C₉ dihydroxydiynone from fungal cultures, 687.
- On stereochemical preference in the $S_{\mathbb{E}}2'$ reaction, 2140.
- Opium alkaloids. Part XVI, the biosynthesis of 1-benzylisoquinolines in *Papaver somniferum*. Preferred and secondary pathways; stereochemical aspects, 1531.
- Preparation of the 'fixed conformation esters' 4,5-dihydrofuro- and 4,5-dihydrothieno-[2,3-c]pyran-7-one, 523.
- Reduction of allenes and acetylenes by catalytic and chemical methods: 'molecular queuing' effects in competitive hydrogenation, 1099.
- Sesquiterpenoids. Part XLVII, structure, configuration, conformation, and thermal rearrangement of furanodienone, isofuranodienone, curzerenone, epicurzerenone, and pyrocurzerenone, sesquiterpenoids of *Curcuma zedoaria*, 478.
- Shikimate pathway. Part IV, stereochemistry of the 3dehydroquinate dehydratase reaction and observations on 3-dehydroquinate synthetase, 52.
- Spectroscopic properties of axially and equatorially substituted β -trimethylstannyl ketones and compounds with related chromophones, 1020.
- Stable carbocations. Part IX, reactions involving sterically crowded ferrocenylalkylium ions, 116.
- Steric effects in the reactions of αβ-unsaturated ketone p-tolysulphonylhydrazones: a route to 1,2-benzo-diazepines via 1,7-ring closure of 1,1-diaryl-3-diazo-alkenes, 102.
- Studies of enzyme-mediated reactions. Part V, synthesis of (13S)- and (13R)-[13- 3 H₁]scoulerine from stereospecifically labelled (R)- and (S)-[α - 3 H₁]benzyl alcohols; stereochemistry of enzymic reactions at saturated benzylic carbon, 1162.
 - on proaporphine and aporphine alkaloids. Part VI, synthesis of (±)-glaziovine by spiran ring construction on a cyclopent[ij]isoquinoline; stereochemistry of reduced proaporphines, 1652. Part VII, stereochemistry of reduced proaporphines of Croton sparsiflorus and C. linearis, 1659.
- Synthesis and properties of the stereoisomeric diethyl 6-aminocyclohexane-1,3-dicarboxylates, 1959.
 - of oxazolines from epoxides, 1200.
 - of (±)-presqualene alcohol, (±)-prephytoene alcohol, and structurally related compounds, 897.
- Use of carbohydrate derivatives for studies of phosphorus stereochemistry. Part V, preparation and some reactions of tetrahydro-1,3,2-oxazaphosphorine-2-ones and -2-thiones, 1892.
- Stereoselective synthesis of some α -amido- β -lactams. Studies on lactams. Part XLII, 1880.
- Stereoselectivity. Alkyl metal asymmetric reduction. Part VIII, stereoselectivity of the reduction of alkyl

- phenyl ketones by optically active aliphatic Grignard reagents, 1795.
- Stereospecific conversion of epoxides into olefins, 1216.
 - exchange of a β -methylene proton in phenylalanine preceding biosynthetic incorporation into gliotoxin, 383.
- syntheses of (Z)- and (E)-4-bromomethylene-5,5-dimethyl-3-phenyloxazolidin-2-one, 1525.
- Steroids. Part X, a convenient synthesis of alkyl aryl ethers, 461.
 - Part XXXVIII, 5-chloro-5α-cholestane, 2208.
 - and related natural products. Part XCI, synthesis of the cardenolides canarigenin and uzarigenin, 1972. Part XCII, conversion of canarigenone [14-hydroxy-3-oxo-14β-carda-4,20(22)-dienolide] into periplogenin [3β,5,14-trihydroxy-5β,14β-card-20(22)-enolide], 1976.
 - and related studies. Part XXXIII, some steroidal tetrazoles, 1404.
 - and terpenes, biosynthesis of. Part X, the sterols of some yeast mutants doubly defective in ergosterol biosynthesis, 88.
 - and terpenoids, investigations on the biosynthesis of. Part XII, biosynthesis of 3β-hydroxy-triterpenoids and -steroids from (3S)-2,3-epoxy-2,3-dihydrosqualene, 1134.
 - and Walden inversion. Part LXX, re-examination of the substitution reactions of 5α -cholestan- 6α -ol, 2205.
 - marine. Part II, a synthesis of 3β , 6α -dihydroxy- 5α -pregn-9(11)-en-20-one, 1751.
 - studies on. Part XXIX, synthesis of allenic analogues of fucosterol and desmosterol, 2302.
 - A rearrangement of 4β , 5β -epoxy- 6α -hydroxyandrostan- 17β -yl acetate, 1107.
 - Backbone rearrangements of steroidal 5-enes, 2284.
 - ¹³C nuclear magnetic resonance spectra of some methyloestratrienes; application to the mechanism of their formation, 1110.
 - steroidal unsaturated ketones, 1956.
 - Conformational aspects of some 5β -methyl-19-nor-steroids, 2104.
 - Deoxygenation of some 3-oxo-steroids by chlorotrimethylsilane and zinc, 809.
 - Epoxidation of 3α ,5-cyclo- 5α -androst-6-en-17-one, 323.
 - Formation of oestratrienes from 5,6-epoxyandrostan-7-ols, 1941.
 - D-Homo-steroids. Part IV, acetolysis of D-homo-5α-androstan-17αβ-yl tosylate: a novel rearrangement involving the steroid backbone, 916. Part V, a study of the mechanism of D-homoannulation of 17α-hydroxypregnan-20-ones with boron trifluoride, 1450.
 - Improved syntheses of aldosterone, 2243.
 - Intramolecular catalysis. Part II, electrophilic anchimeric assistance by a hydroxy-group in the opening of steroidal epozides by azide anions, 1663.
 - Microbiological hydroxylation. Part XIX, the action of an ant fungus ('Acromyrmex fungus') on oxygenated androstanes, pregnanes, and cholestanes, 1552. Part XX, hydroxylation of dioxygenated 5α-androstanes with the fungi Absidia regnieri and Syncephelastrum racemosum, 2040. Part XXI, hydroxylations of 3-halegeno-17-oxo-, 3-halogeno-7-oxo-, and 17-halogeno-3-oxo-androstanes by the fungi Calonectria decora, Rhizopus nigricans and Aspergillus ochraceus, 2308.

- Steroids (contd.)
 - New reactions of triplet oxygen which avoid the spin barrier, 2055.
 - 18-Norandrosta-8,11,13-trienes. Part IV, 7-hydroxyderivatives, 336.
 - Peroxide-diene oxygen transfer reactions induced by titanium tetrachloride, 2065.
 - Reaction of diazocyclopropane with steroidal 16-bromo-17-ketones, 2460.
 - Rearranged sterenes in a shale-occurrence and simulated formation, 1833.
 - Steroidal constituents of *Physalis minima* (Solanaceae), 1370.
 - Structures of three new steroidal sapogenins from Dioscorea prazeri, 1560.
 - Synthesis of 17β-(2-amino-oxazol-4-yl)-steroids, 1999.
 - of 11-deoxy-18-hydroxycorticosterone and 18-hydroxycorticosterone 21-acetates, 2252.
 - of 9,11-disubstituted 19-nor-steroids, 792.
 - of 1\alpha-hydroxycorticosterone, 2371.
 - of 18-substituted steroids. Part I, 18,21-dihydroxypregn-4-ene-3,20-dione(18-hydroxydeoxycorticosterone), 1860.
 - Withanolides Q and R, two new 23-hydroxy-steroidal lactones, 2136.
- Stilbenes, oxidation of some substituted. Reactions of palladium(II) with organic compounds. Part IV, 1230.
- Streptamines. Structures of the aminoglycoside antibiotics 66-40B and 66-40D produced by *Micromonospora* invoensis, 814.
- Stylopine in *Chelidonium najus*, investigations on the biosynthesis of. Biosynthesis. Part XXI, 1140.
- Styrene oxide, reaction of dimethyl imidazole-4,5-dicarboxylate with, 798.
 - p,αββ-tetramethyl-, carboxymethylation of, by manganese(III) acetate. Reductive cyclization during treatment of the derived γ-aryl-γ-lactone with polyphosphoric acid to give 4-isopropyl-7-methyl-1-tetralone, 1235.
 - Novel synthesis of β -substituted β -diphenylmethylstyrenes from β -substituted β -methylstyrenes in the presence of palladium(II) acetate, 988.

Sugars-see also Carbohydrates.

- branched-chain. Part IV, synthesis of derivatives of aldgarose, a component of aldgamycin E, 682. Part V, identification and synthesis of vinelose, 1292. fluorinated branched-chain, synthesis of, 2457.
- phosphorylated. Part XV, syntheses of 3-deoxy-D-erythro- and 3-deoxy-D-threo-hexulosonic acid 6-(dihydrogen phosphates), 593. Part XVI, synthesis of 3-deoxy-D-glycero-hex-3-en-2-ulofuranos(2,5)onic acid 6-(dihydrogen phosphate), 598. Part XVII, synthesis of 3-deoxy-D-arabino-[1-14C]heptulosonic acid 7-(dihydrogen phosphate), 600. Part XVIII, synthesis of D-glycero-D-gulo-heptose 4-(dihydrogen phosphate), 603. Part XIX, synthesis of 3-deoxy-D-glycero-pent-2-ulosonic acid 5-(dihydrogen phosphate), 604.
- Cyclopropylcarbinyl-oxocarbonium ions. Part VII, orientational effects, 1872.
- 1-S-(or Se)-Dimethylstibino-derivatives of 1-thio- and 1-seleno- β -D-glucopyranose, 1395.
- Fusicoccin. Part IV, the structure of fuscoccin J., 877. Isolation of 5,7-dihydroxy-2-methylchromone and its 7-O-glycosides from Adina rubescens, 1776.

- Monobutylidene acetals of 1-deoxy-D-galactitol, 1323.
- Nitrosoamide decomposition. A new method for selective degradation of amino-sugar-containing compounds, 1428.
- C-Nucleoside studies. Part II, pentofuranosylethynes from 2,3-O-isopropylidene-D-ribose, 1191.
- Reaction of chlorosulphonyl isocyanate with ethyl 4,6-di-O-acetyl-2,3-dideoxy-α-p-erythro-hex-2-enopyranoside: a reinvestigation, 626.
 - of diol thiocarbonates with methyl iodide: a synthesis of 6-deoxy-sugars, 1773.
- Solarum alkaloids. Part XVII, the sugar unit of solamargine, 2455.
- Some structural features of Pneumococcus Type XXII capsular polysaccharide, 985.
- Structure of doucic acid, 2069.
 - of D-arabinose and D-glucose oximes, 1682.
- Syntheses of derivatives of 2,6-diamino-2,3,4,6-tetra-deoxy-D-exythro-hexose (purpurosamine C), a component of gentamycin C_{1a} , 979.
 - of 1,2-di-O-hexadecanoyl-3-O-(β-D-galactopyranosyl)-L-glycerol (a 'galactosyl diglyceride') and 1,2-di-Ooctadecanoyl-3-O-(6-O-octadecanoyl-β-D-galactopyranosyl)-L-glycerol, 364.
 - of 3-O-[6-O-(α-D-galactopyranosyl)-β-D-galactopyranosyl]-1,2-di-O-stearoyl-L-glycerol, a 'digalactosyldiglyceride', 1521.
 - of 3-O-{6-O-[6-O-(α-D-galactopyranosyl)-α-D-galactopyranosyl]-β-D-galactopyranosyl}-1,2-di-O-stearoyl-L-glycerol, a 'trigalactosyl diglyceride', 1779.
 - of methyl gentosaminide, methyl 3-deoxy-3-methylamino-arabinopyranoside, and related amino-sugars, 785.
- Suillus grevillei. Constituents of the higher fungi. Part XV, 3-(3,4-dihydroxyphenyl)-2,7,8-trihydroxydibenzofuran-1,4-dione, a precursor of thelephoric acid from the fungus Suillus grevillei (Klotsch) Sing. [Boletus elegans (Schum. per Fries)], 351.
- Sulphimides. Conversion of secopenicillanic acid derivatives into β-lactam sulphimides and oxazolines, 1077.
- Sulphonamides and formaldehyde, cyclic products from, 772. Synthesis of NN-diaryltoluene-4-sulphonamides, 2445.
- Sulphonium salts. Mechanism and stereochemistry of nucleophilic substitutions in alkoxysulphonium salts. Part II, competitive attack at sulphur and carbon in the reaction of alkoxydiarylsulphonium salts with halide ions, 404.
 - ylides. N-Oxides and related compounds. Part L, reactions of pyridinium and sulphonium ylides with pyrylium salts, 2489.
- Sulphonyl compounds. Reaction of chlorosulphonyl isocyanate with ethyl 4,6-di-O-acetyl-2,3-dideoxy-α-D-erythro-hex-2-enopyranoside: a reinvestigation, 626.
 - of dihydroquinolines and dihydroisoquinolines with arenesulphonyl azides, 420.
- Sulphoximides, N-arylsulphonyl-SS-dimethyl-, photolysis of, in aromatic solvents. Photoisomerisation of methylbiphenyls, 1806.
- Sulphur compounds—see also Thia- and Thio-compounds. Acyloxyoxosulphonium intermediates in the formation of sulphones from sulphoxides, 282.
 - A thermal reaction of 2-(thiolan-2-yl)oxaziridines and related compounds. Evidence for neighbouring group participation in the displacement of oxygen by sulphur at nitrogen, 1929.

- Sulphur (contd.)
 - N-Bridged heterocycles. Part II, synthesis and aromaticity of 1,3-polymethylene-benzimidazolium salts {[n](1,3)benzimidazolophanium salts}, -benzimidazolones, and -benzimidazolethiones, 219.
 - Condensation reactions of chloroformylsulphur chloride with 2- and 4-aminopyrimidines, 2-aminothiazole, and 2-amino- Δ^2 -thiazoline, 375.
 - Decomposition products of pyrazolines formed from 3-alkylthioinden-1-ones and diazomethane, 572.
 - 1-S-(or Se)-Dimethylstibino-derivatives of 1-thio- and 1-seleno-β-D-glucopyranose, 1395.
 - Electrochemical preparation of bismethylsulphonyl peroxide and its reactions with aromatic hydrocarbons, 953.
 - Formation of vinyl sulphides via successive sigmatropic rearrangements of an allylic sulphonium ylide, 2129.
 - Heterocyclic compounds from urea derivatives. Part XXII, thiobenzoylated carbonohydrazides and their cyclisation, 1781. Part XXIII, thiobenzoylated thiocarbonohydrazides and their cyclisation, 1787.
 - Persulphate oxidations. Part XI, oxidative dimerisation of aminonaphthoquinones, 1115.
 - Photochemical reactions of 1,2,4-dithiazole-3-thione and 1,2-dithiole-3-thione with olefins, 270.
 - Photolysis and thermolysis of N-(N-arylimidoyl)sulphimides, 1964.
 - of sulphur-containing nitrones. Support for a methyleneoxaziridine radical intermediate and formation of new heterocycles, 1925.
 - Preparation and properties of β-oxo-thionesters, 1603. of sulphur-containing nitrones from sulphides. Thermal elimination reactions of nitrones, 1920.
 - Purine studies. Part XIV, trifluoroacetyl and formyl derivatives of 4,5-diamino-6-methyl-2-methylthio-pyrimidine, their ethylation products, and derived purines, 485.
 - Pyrimidine derivatives and related compounds. Part XXVI, oxidative and non-oxidative photocyclisations of 5- and 6-phenylthio- and anilino-1,3-dimethyluracils to benzothienopyrimidines and pyrimidoindoles, 503.
 - Pyrylium salts. Part VI, derivatives of 3,11-dithiatricyclo[5.3.1.1^{2,6}]dodecane by dimerisation of thiopyrylium-3-olates, 2099.
 - Reaction of N-aryl- and imidoyl- sulphimides with diphenylcyclopropenone; synthesis of 4-pyrimidones, 1969.
 - between azolium anions and electrophilic reagents. Part II, direct thiation of 1,2-disubstituted pyrazolium anions with sulphur, 507.
 - of chlorotrifluoromethyldisulphane, 614.
 - Reduction of nitro- and nitroso-compounds by tervalent phosphorus reagents. Part XV, reactions of certain aryl 2-nitrophenyl sulphides and their 2-azido-analogues leading to evidence for the intermediacy of 2,3-dihydro-1,3,2-benzothiazaphosph(v)oles (thiazaphosphoranes) and to the formation of dihydrodimethylpheno-thiazinones and pyrimido- and pyrido- [1,2-b]indazoles, 2396.
 - Ring c functionalised diterpenoids. Part V, preparation and formolysis of (16S)-ent-12β-p-tolylsulphonyloxykaurane and the (16S)-ent-13-p-tolylsulphonyloxyatisanes, 861.

Structure and transformation of products of the reactions of 2,2"-thiodi-isobutyropherone with hydrazine, 254.

- Studies of heterocyclic compounds. Part XVII, synthesis of 1,6-dioxa-6a-thia- and 1,6-dioxa-6a-selenapentalenes, 775. Part XVIII, protonation of 1,6-dioxa-6a-thia- and 1,6-dioxa-6a-selena-pentalenes: formation of 1,2-oxathiolium and 1,2-oxaselenolium cations, 2097.
 - on the synthesis of novel carbohydrates with sulphur in the ring. Part II, analogues of derivatives of unsaturated deoxy-ulopyranosidonic acids via Diels— Alder reactions with methyl cyanodithioformate, 180.
- 6-Substituted s-triazolo[4,3-b]-s-tetrazine-3-thiols: a sensitive and specific test for aldehydes, 975.
- Synthesis and chemistry of S-acylthiol S-oxides and related compounds, 1568.
 - and decomposition of some sulphamoyl azides, 2413.
 - of a dithieno[2,3-b: 3',2'-e][1,4]thiazine and of di-3-thienylamine, 1234.
 - of 1-aryloxymethyl- and 1-arylthiomethyl-imidazoles, 1670.
 - of 1*H*-4,1,2-benzothiadiazines from substituted *N*-acetyl-*N*-aryl-*N'*-thioaroylhydrazines, 1386.
- Use of carbohydrate derivatives for studies of phosphorus stereochemistry. Part V, preparation and some reactions of tetrahydro-1,3,2-oxazaphosphorine-2-ones and -2-thiones, 1892.
- Syncephelastrum racemosum. Microbiological hydroxylation. Part XX, hydroxylation of dioxygenated 5α-androstanes with the fungi Absidia regnieri and Syncephelastrum racemosum, 2040.

T

- Tagetones, atlantones, ocimenones, and filijolone, simple syntheses of, from isoprene, 1741.
- Tautomerism, ring-chain, of some o-benzoylbenzanilides, 2048.
- Tellurium. Reactions of tellurium(IV) halides with anthracene and other organic compounds, 1223.
- **Terpenes** and steroids, biosynthesis of. Part X, the sterols of some yeast mutants doubly defective in ergosterol biosynthesis, 88.
 - chemistry of. Part XVIII, synthesis of methyl (-)-cis-chrysanthemate and of a methyl (+)-cis-homo-chrysanthemate from (+)-car-3- and -2-ene, 332. Part XIX, reaction of (+)-3α,4α-epoxycarane with halogen acids and acetic acids, 1217. Part XX, autoxidation of (+)-car-3-ene, 2232.
 - Alangiside, the monoterpenoid alkaloid glycoside from Alangium lamarchii Thw., 1245.
 - Complexing of terpenes with transition metals. Part V, reactions of 3,7-dimethylocta-1,6-diene and of 7-methoxy-3,7-dimethyloct-1-ene with rhodium(III) and thallium(III), 2092.
 - Cope rearrangement of some germacrane-type furan sesquiterpenes. Part V, preparation and thermal rearrangement of some *cis,trans-germacranolides*, 870.
 - Crystalline chemical components of Fomes senex and structure of senexdiolic acid and related compounds, 451.
 - Cyclonerotriol [6-(3-hydroxy-2,3-dimethylcyclopentyl)-2-methylhept-2-ene-1,6-diol], a new sesquiterpenoid metabolite of Fusarium culmorum, 1586.

Terpenes (contd.)

Functionalization of methyl groups in isopimaran-8 β -ol, hopan-7 α -ol, and hopan-15 β -ol and derivatives, 710.

- Investigations on the biosynthesis of steroids and terpenoids. Part XII, biosynthesis of 3β-hydroxy-triterpenoids and -steroids from (3S)-2,3-epoxy-2,3-dihydrosqualene, 1134.
- 4-Phosphoranylidenebutenolide intermediates in the synthesis of 4-ylidenebutenolides and 4-ylidenetetronic acids. Synthesis of alkylidenephthalide constituents of celery odour and models for freelingyne, 635.
- Ring c functionalised diterpenoids. Part V, preparation and formolysis of (16S)-ent-12β-p-tolysulphonyloxy-kaurane and the (16S)-ent-13-p-tolysulphonyloxyatisanes, 861. Part VI, solvolysis of ent-methyl 12β-p-tolysulphonyloxybeyeren-19-oate, 1641.
- Sesquiterpenoids. Part XLVII, structure, configuration, conformation, and thermal rearrangement of furano-dienone, isofuranodienone, curzerenone, epicurzerenone, and pyrocurzerenone, sesquiterpenoids of Curcuma zedoaria, 478.
- Simple synthesis of the atlantones, the ocimenones, the tagetones, and filifolone from isoprene, 1741.
- Structure of lithocarpic lactone, a new triterpenoid from two *Lithocarpus* species of Hong Kong, 617.
- Studies in terpenoid biosynthesis. Part XIII, the biosynthetic relationship of the gibberellins in *Gibberella fujikuroi*, 663.
- Synthesis of freelingyne, an acetylenic sesquiterpene from *Eremophila freelingii*, 641.
- Terpenoids. Part VI, preparation of ent-[13,14 α - 2 H $_2$] kaur-16-ene and some derivatives; bridgehead enolisation of ent-17-nor[13,14 α - 2 H $_2$]kauran-16-one, 378.
- Tetranortriterpenoids and related substances. Part XVII, a new skeletal class of triterpenoids from *Guarea glabra* (Meliaceae), 491.
- Tetra-aza-macrocyclic ligands trans-[14]-diene, tet a and tet b, convenient synthesis of, 591.
- 7,7,8,8-Tetracyanoquinodimethane-toluene systems, photoaddition of the charge-transfer complexes of, 93.
- Tetracycline, experiments on the synthesis of. Part XIII, oxidation of ring a model phenols to p-hydroxycyclohexadienones, 1610.
- Tetracycloheptanes. Anodic oxidation. Part XIII, products from bicyclo[2.2.1]hept-2-ene, bicyclo[2.2.1]hepta-2,5-diene, and tetracyclo[3.2.0.0.2,7.O4,6]heptane, 1055.
- Tetralones. Carboxymethylation of $p,\alpha\beta\beta$ -tetramethylstyrene by manganese(III) acetate. Reductive cyclization during treatment of the derived γ -aryl- γ -lactone with polyphosphoric acid to give 4-isopropyl-7-methyl-1-tetralone, 1235.
- Tetrazenes. Action of acids and alkylating agents on 1,4-di-(2-pyridyl) tetraz-2-enes, 1232.
- Tetrazoles. Steroids and related studies. Part XXXIII, some steroidal tetrazoles, 1404.
- Tetronic acid, a novel preparation of; reduction of enaminones in the preparation of 3-aminocyclohexanols, 588.
- Tet a, Tet b and trans-[14]-diene, the tetra-aza-macrocyclic ligands, a convenient synthesis of, 591.
- Thallium. Complexing of terpenes with transition metals. Part V, reactions of 3,7-dimethylocta-1,6-diene and of 7-methoxy-3,7-dimethyloct-1-ene with rhodium(III) and thallium(III), 2092.
 - Neighbouring-group effects in the oxidation of olefins by mercury(II), thallium(III), and lead(IV) acetates, 2465.

- Oxidation of oct-1-ene and trans-oct-4-ene by lead(IV), thallium(III), and mercury(II) acetates, 231.
- Selective nitration of aromatic substrates: reaction of nitrogen dioxide with arylthallium(III) compounds, 65.
- Thelephoric acid. Constituents of the higher fungi. Part XV, 3-(3,4-dihydroxyphenyl)-2,7,8-trihydroxydibenzofuran-1,4-dione, a precursor of thelephoric acid from the fungus Suillus grevillei (Klotsch) Sing. [Boletus elegans (Schum. per Fries)], 351.
- Theophyllines, 7-(3,5-dideoxy-2-C-methoxycarbonyl-β-L-pentofuranosyl)-, studies on Configuration at the branch point and biological activity, 2138.
- Thermolytic and similar reactions. A thermal reaction of 2-(thiolan-2-yl)oxaziridines and related compounds. Evidence for neighbouring group participation in the displacement of oxygen by sulphur at nitrogen, 1929.
 - Electrocyclic reactions. Part VI, thermal reactions of 1,5-diphenylpentadienide ion and the anions derived from cis- and trans-3,4-diphenylcyclopentene, 765.
 - Fluorinated acetylenes. Part VI, some thermal and photochemical reactions of *NN*-bistrifluoromethylamino-substituted acetylenes, 1074.
 - Overcrowded molecules. Part XI, a doubly 'forbidden' symmetry-allowed pericyclic reaction: the thermal rearrangement of (E)-2-benzylidene-(Z)-1-mesityl-(phenyl)methyleneindene into (Z)-2-benzyl-1-mesityl-(phenyl)methyleneindene, 1545. Part XII, thermal and photochemical reactions of (2Z,3Z)- and (2Z,3E)-2-benzylidene-2,3-dihydro-3-mesityl(phenyl)methylene-benzofuran, 1995.
 - Photolysis and thermolysis of N-(N-arylimidoyl)sulphimides, 1964.
 - Polyfluoroalkyl derivatives of nitrogen. Part XLII, reaction of N-bromobistrifluoromethylanine with 1H-pentafluoropropene and some further studies on the thermal rearrangement of NN-bistrifluoromethylvinylamines, 1633.
 - Preparation of sulphur-containing nitrones from sulphides. Thermal elimination reactions of nitrones, 1920.
 - Reactive intermediates. Part XXIV, 1*H*-azirine intermediates in the pyrolysis of 1*H*-1,2,3-triazoles, 1. Part XXV, investigation of the pyrolysis of 1,4- and 1,5-diphenyl-1,2,3-triazoles by use of ¹³C-labelled compounds, 8. Part XXVI, flash vacuum pyrolysis of phenyl-substituted 1,2,4-triazoles; a new synthesis of isoindoles, 12.
 - Thermal degradation of actinomycins to dioxopiperazines, 1320.

Thia- see also Sulphur.

- Thiazines. αα'-Dicyano-(1,3-dithiacyclobutane-2,4-diylidene)diacetamides (desaurins) from thiazine derivatives, 1417.
 - Studies related to dihydro-1,4-thiazines. Part VII, reaction of methyl (4S,6S)-5,5,9,9-tetramethyl-7-oxo-8-oxa-4-thia-1-azabicyclo[4.3.0]non-2-ene-3-carboxylate 4-oxide with acetyl chloride, 716.
- Thiazoles. Condensation reactions of chloroformylsulphur chloride with 2- and 4-aminopyrimidines, 2-aminothiazole, and 2-amino- Δ^2 -thiazoline, 375.
 - Rearrangements in a series of thiazol-2-ylsemicarbazides, 1041.
- Thiele-Winter acetoxylation of quinones. Part VI, methoxy- and hydroxy-(phenyl)-1,4-benzoquinones and (4-substituted phenyl)-1,4-benzoquinones, 309. Part VII, some bromo-derivatives of phenyl-1,4-benzoquinone, 314

- Thienoazepines and thienobenzoxazoles from 6-azidobenzo-[b]thiophens. Condensed thiophen ring systems. Part XVIII, 1686.
- Thienobenzoxazoles and thienoazepines from 6-azidobenzo-[b]thiophens. Condensed thiophen ring systems. Part XVIII, 1686.
- Thieno-[2,3-c]pyran-7-one, 4,5-dihydrofuro- and 4,5-dihydrothieno-, the 'fixed conformation esters', preparation of, 523.
- Thienopyranones and Thienopyridinones from 3-bromothiophen-2- and 4-bromothiophen-3-carboxylic acids. Heterocyclic syntheses from o-halogeno-acids. Part II, 1390.
- **Thienothiazines.** Synthesis of a dithoeno[2,3-b:3',2'-e]-[1,4]thiazine and of di-3-thienylamine, 1234.
- Thienylacrylophenones. Carbonyl and thiocarbonyl compounds. Part XIV, reactions of tetrachloro-o-benzo-quinone with 3-(2-furyl)- and 3-(2-thienyl)-acrylophenones, 1052.
- Thienylamine. Synthesis of a dithieno[2,3-b:3',2'-e][1,4]-thiazine and of di-3-thienylamine, 1234.
- Thietan dioxides. Synthesis of 3-alkylidene-2,2,4,4-tetramethylthietan 1,1-dioxides, possible precursors of 2-methylenetrimethylene, 2513.
- Thio- see also Sulphur.
- Thiobenzoic acid O-esters, type II photoelimination of; photolysis of optically active O-2-phenylbutyl thiobenzoate, 1725.
- Thiocarbonates, diol, reaction with methyl iodide: a synthesis of 6-deoxy-sugars, 1773.
 - Dithiols. Part XXVI, conversion of aliphatic and alicyclic epoxides into trithiocarbonates, 748. Part XXVII, conversion of aliphatic and alicyclic carbonates and thiocarbonates into trithiocarbonates, 754.
- Thiocarbonyl and carbonyl compounds. Part XIV, reactions of tetrachloro-o-benzoquinone with 3-(2-furyl)-and 3-(2-thienyl)-acrylophenones, 1052.
- Thiocarboxylic acids. Some reactions of 2-oxocyclopent-anedithiocarboxylic acid and 3-methyl-5-oxo-1-phenyl- Δ^2 -pyrazoline-4-dithiocarboxylic acid, 1277.
- 2,2"-Thiodi-isobutyrophenone, reactions with hydrazine, studies and transformation of products of, 254.
- Thiols, reaction of 6-amino-1,3-dimethyl-5-nitrosouracil with, 1857.
 - of 2-oxa-4,7-diazabicyclo[3.2.0]hept-3-en-6-ones with. Studies related to penicillins. Part XV, 432.
 - Dithiols. Part XXVI, conversion of aliphatic and alicyclic epoxides into trithiocarbonates, 748. Part XXVII, conversion of aliphatic and alicyclic carbonates and thiocarbonates into trithiocarbonates, 754.
- **Thiones.** Synthesis of pyrano[3,2-c]pyranthiones; characteristic shifts in the ¹H nuclear magnetic resonance spectra of thiones, 1335.
- Thionitrites. Reaction of acidified nitrite solutions with peptide derivatives: evidence for nitrosamine and thionitrite formation from ¹⁵N N.m.r. studies, 2261.
- Thiophens. Condensed thiophen ring systems. Part XVIII, thienoazepines and thienobenzoxazoles from 6-azidobenzo[b]thiophens, 1686.
 - Heterocyclic syntheses from o-halogeno-acids. Part II, thienopyridinones and thienopyranones from 3-bromothiophen-2- and 4-bromothiophen-3-carboxylic acids, 1390.
 - Preparation and reactions of 2,5-dimethoxythiophen, 2483.

- Thiophosgene, reactions of heterocycles with. Part IV, β,4-dichloro-2-isothiocyanatocinnamaldehyde, a product from 4,7-dichloroquinoline, 922. Part V, 7-chloro-1,2-dihydro-4-methoxy-2-thioxoquinoline-3-carbaldehyde, a product from 7-chloro-4-methoxyquinoline, 2271.
- Thiopyrylium-4-olate, 2-benzo-, 5,6,12,13-tetrahydro-5,13:
 6,12-bisepithiodibenzo[a,f]cyclodecene-7,14-diones by dimerisation of. Pyrylium salts. Part V, 1366.
- **Thioxanthenones.** Cleavage of halogenobenzophenones by potassamide in ammonia; new routes to xanthen- and thioxanthen-9-ones, 155.
- Tin. Spectroscopic properties of axially and equatorially substituted β-trimethylstannyl ketones and compounds with related chromophores, 1020.
- Titanium tetrachloride, peroxide-diene oxygen transfer reactions induced by, 2065.
- **Toluene,** photo-substitution of 1,2,4,5-tetracyanobenzene by, 735.
 - p-sulphonate, 2-aminoethylammonium, synthesis of dihydroimidazo-fused systems by use of. Polycyclic fused amidines. Part II, 1854.
- p-Tolylsulphonylhydrazones. Steric effects in the reactions of αβ-unsaturated ketone p-tolylsulphonylhydrazones: a route to 1,2-benzodiazepines via 1,7-ring closure of 1,1-diaryl-3-diazoalkenes, 102.
- Tosylates. Ring c functionalised diterpenoids. Part VI, solvolysis of *ent*-methyl 12β-p-tolylsulphonyloxybeyeran-19-oate, 1641.
- **Toyocamycin.** Pyrrolopyrimidine nucleosides. Part X, synthesis of certain 4,5-disubstituted 7-(β-D-ribofuranosyl)-pyrrolo[2,3-d]pyrimidines related to toyocamycin and sangivamycin, 1248.
- Transannular interactions in [2.2]paracyclophanyl nitroxides. Nitroxide radicals. Part XVII, 1753.
- Transition metals, complexing of terpenes with. Part V, reactions of 3,7-dimethylocta-1,6-diene and of 7-methoxy-3,7-dimethyloct-1-ene with rhodium(III) and thallium(III), 2092.
 - reactions involving. Part VIII, decomposition of hydroperoxides catalysed by iridium(I) and by rhodium(I) complexes, 209.
- **Triazapentalenes.** Synthesis and reactions of 12-aryl-1,2,3,4-tetrahydro-6*H*-indazolo[2,1-*a*]benzotriazolium hydroxide inner salts and 8,9,10,11-tetrahydro-7,10,10-trimethyl-8-oxo-5*H*-indazolo[1,2-*a*]benzotriazolium hydroxide inner salt, 629.
- Triazines and related products. Part XV, 2,4-diaminopyrimidines and 2-aminopyrimidin-4(3H)-ones bearing 1,2,3-benzotriazinyl groups as potential dihydrofolic reductase inhibitors, 1023.
 - Cyclic products from sulphonamides and formaldehyde, 772.
- **Triazoles.** Formation of 1,2,4-triazoles from the reactions of N-arylmandelamidrazones with aldehydes and with trialkyl ortho esters, 2280.
 - Reactive intermediates. Part XXIV, 1*H*-azirine intermediates in the pyrolysis of 1*H*-1,2,3-triazoles, 1. Part XXV, investigation of the pyrolysis of 1,4- and 1,5-diphenyl-1,2,3-triazoles by use of ¹³C-labelled compounds, 8. Part XXVI, flash vacuum pyrolysis of phenyl-substituted 1,2,4-triazoles; a new synthesis of isoindoles, 12.
 - Synthesis of some 1,2,4-triazoles and 1,2,4-triazolines by reaction of oxamidrazone condensation products with acetic anhydride, 1433.

- Triazolinediones. Reactions of $1\lambda^5\sigma^4$, 2,4-triazoline-3,5-dione decomposition products with organophosphorus nucleophiles, 1309.
- Triazolines. Synthesis of some 1,2,4-triazoles and 1,2,4-triazolines by reaction of oxamidrazone condensation products with acetic anhydride, 1433.
- Triazolium salts. Synthesis of heterocyclic compounds. Part XXXI, triazolium tetrafluoroborates from the cycloaddition of alkoxydiazenium salts to azines, hydrazones, and anils derived from aromatic aldehydes, 2474.
- v-Triazolo[4,5-d]pyrimidines (8-azapurines). Part XVI, preparation of 6-amino-8-azapurines by heating 4-amino-1,2-3-triazole-5-carbonitrile (and its N-alkyl derivatives) with amidines, 345.
- s-Triazolo[4,3-b]-s-tetrazine-3-thiols, 6-substituted; sensitive and specific test for aldehydes, 975.
- (1R,2R,5S,6S)-Tricyclo[4.3.1.1^{2,5}]undecane, synthesis and acid-catalysed rearrangement of, 789.
- Trifluoroacetic acid, reaction with chlorodiphenylphosphine, 963.
- Trimerization product, fluoride-ion-induced, from perfluorocyclobutene, an ESCA study of, 647.
- Triphenylenols from mono- and di-chlorobenzoquinones and veratrole. Reactions of quinones with aromatic ethers. Part VI, 811.
- Triphenylmethylium cation. New reactions of triplet oxygen which avoid the spin barrier, 2055.
- Tris-(p-bromophenyl)ammoniumyl cation radical. New reactions of triplet oxygen which avoid the spin barrier, 2055.
- **Tritium.** An improved route to (3RS,5S)- $[5-^3H_1]$]mevalonic acid, 429.
 - Biosynthesis of aromatic isoprenoids. Part III, mechanism of formation of the furan ring and origin of the 4-methoxy-group in the biosynthesis of furoquinoline alkaloids, 302.
 - On the preparation of L-[2,3-3H₂]phenylalanine and L-[2,3-3H₂]tyrosine, 645.
 - Studies of enzyme-mediated reactions. Part IV, complementary syntheses of stereospecifically labelled (R)- and (S)-[α - 3H_1]benzyl alcohol derivatives by use of liver alcohol dehydrogenase, 1156. Part V, synthesis of (13S)- and (13R)-[13- 3H_1]scoulerine from stereospecifically labelled (R)- and (S)-[α - 3H_1]benzyl alcohols; stereochemistry of enzymic reactions at saturated benzylic carbon, 1162.
 - on the biosynthesis of β -lactam antibiotics. Part II, synthesis, and incorporation into penicillin G, of (2RS,2'RS,3R,3'R)-[3,3'- $^3H^2$]cystine and (2RS,2'RS,3S,3'S)-[3,3'- 3H_2]cystine, 2517.
- Tryptophans. Confirmation of the site of nitrosation in tryptophan derivatives by α -chymotrypsin, 2357.
- Tyrosine. On the preparation of $L-[2,3-^3H_2]$ phenylalanine and $L-[2,3-^3H_2]$ tyrosine, 645.

U

Uhlé's ketone, quinone methides derived from, 2257.

Ultrasound, chemistry of. Part IV, effects of ultrasound on some amino-acids, 1675.

Uracils. A new synthesis of alloxazines by the reaction of diethyl azodiformate with 6-anilinouracils, 1907.

Reaction of 6-amino-1,3-dimethyl-5-nitrosouracil with thiols, 1857.

Urea derivatives, heterocyclic compounds from. Part XXII, thiobenzoylated carbonohydrazides and their cyclisation, 1781. Part XXIII, thiobenzoylated thiocarbonohydrazides and their cyclisation, 1787.

Uzarigenin. Steroids and related natural products. Part XCI, synthesis of the cardenolides canarigenin and uzarigenin, 1972.

V

- Valence isomers from fluorinated pyridazines. Photochemistry of halogenocarbon compounds. Part II, 1130.
- Vancomycin, the antibiotic, structural studies on: evidence for the presence of modified phenylglycine and β -hydroxytyrosine units, 2108.
- Variecoxanthones. Biosynthesis of fungal metabolites. Part V, structure of variecoxanthones A, B, and C. metabolites of Aspergillus variecolor; conversion of variecoxanthone A into (±)-de-C-prenylepishamixanthone, 543.
- Variolaric acid. Structure of the lichen depsidone variolaric acid. 1992.
- Vasopressin, [1-(L- and [1-(D-2-hydroxy-3-mercaptopropanoic acid)-8-lysine]-, synthesis of, 1691.
- Veratrole. Reactions of quinones and aromatic ethers. Part VI, triphenylenols from mono- and di-chlorobenzo-quinones and veratrole, 811. Part VII, triphenylene-1,4:5,8-diquinones from reactions of veratrole or 3,4-dimethoxyphenylbenzoquinones with benzoquinones, 2185.
- Vinelose. Branched-chain sugars. Part V, identification and synthesis of vinelose, 1292.
- Vinyl ethers, alkyl, photochemical reactions of, with 2-naphthonitrile. Photochemical reactions of aromatic compounds. Part XXIII, 2221.
 - sulphides, formation of, via successive sigmatropic rearrangements of an allylic sulphonium ylide, 2129.
- Viomellin, rubrosulphin, viopurpurin, and xanthomegnin, pigments from Aspergillus sulphureus and Aspergillus melleus. Fungal products. Part XIII, 163.
- Viopurpurin, xanthomegnin, viomellin, and rubrosulphin, pigments from Aspergillus sulphureus and Aspergillus melleus. Fungal products. Part XIII, 163.
- Viridin and Viridiol. Demethoxyviridin and demethoxyviridiol: new fungal metabolites, 943.
- Vitamins. Biosynthesis of vitamin B₆. Incorporation of glycolaldehyde into pyridoxal, 1622.
 - Synthesis and biological activity of 2α -hydroxyvitamin D_3 , 1104.
 - of active forms of vitamin D. Part IX. Studies on steroids. Part XIX. Synthesis of $1\alpha,24$ -dihydroxy-cholecalciferol, 1421.

W

- Walden inversion and steroids. Part LXX, re-examination of the substitution reactions of 5α -cholestan- 6α -ol, 2205.
- Waxes. Crustacean surface waxes. Part I, the hydrocarbons from the surface of *Ligia oceanica*, 354.
- Withanolides Q and R, two new 23-hydroxy-steroidal lactones, 2136.

Withanolides (contd.)

synthetic studies of. Part 1, synthesis of 5,6β-epoxy-4β-hydroxy-5β-cholest-2-en-1-one and related compounds, 2295.

Wittig reaction. Rapid intramolecular collapse of betaines derived from 5-phenylibenzophospholes as compared with those derived from acyclic triarylphosphines; mechanism of the Wittig reaction in protic solvents, 619.

Wojnowicia graminis. Microbiological hydroxylation. Part XIV, hydroxylation in the terminal rings of dioxygenated 5α-androstanes with the fungi Wojnowicia graminis and Ophiobolus herpotrichus, 55.

\mathbf{X}

Xanthomegnin, viomellin, rubrosulphin, and viopurpurin, pigments from Aspergillus sulphureus and Aspergillus melleus. Fungal products. Part XIII, 163.

Xanthones. Biosynthesis of fungal metabolites. Part V, structure of variecoxanthones A,B, and C, metabolites of Aspergillus variecolor; conversion of variecoxanthone A into (±)-de-C-presylepismanicoxanthone, 543. Part VI, structures and biosynthesis of some minor metabolites from variant strains of Aspergillus variecolor, 549.

Chemical investigation of Ceylonese plants. Part XVII, isolation and structures of the xanthones in the extractives of *Mesua ferrea L*. (form *M. salicina Pl.* and Tr.) (Guttiferae), 2447.

Cleavage of halogenobenzophenones by potassamide in ammonia; new routes to xanthen- and thioxanthen-9-ones, 155.

Extractives from Guttiferae. Part XXIX, synthesis of celebixanthone methyl ether and related 1,5,6,7-tetraoxygenated xanthones, 241.

X-Ray analysis of (Z)-2-p-methoxyphenylmethylenebenzofuran-3(2H)-one, 1455.

crystallographic dermination of the structures of 3-(2,6-dimethylphenyl)-2,3-dihydro-2,2,2-trimethoxy-1,3,2-benzoxazaphosph(v)ole and its 2-hydroxy-2-oxo-analogue. Reduction of nitro- and nitroso-compounds by tervalent phosphorus reagents. Part XIV, 2392.

Xylenes. Valence-bond isomer chemistry. Part VII, photochemical interconversion of the perfluoroxylenes, 2005

Y

Yeast, mutants doubly defective in ergosterol biosynthesis, sterols of some. Biosynthesis of terpenes and steroids. Part X, 88.

4-Ylidenebutenolides and 4-Ylidenetetronic acids, 4-phosphoranylidenelebutenolide intermediates in the synthesis of. Synthesis of alkylidenephthalide constituents of celery odour and models for freelingyne, 635.

Ylides. Formation of vinyl sulphides via successive sigmatropic rearrangements of an allylic sulphonium vlide, 2129.

N-Oxides and related compounds. Part L, reactions of pyridinium and sulphomium ylides with pyrylium salts, 2489.

Yohimbane, tetra- and hexa-dehydro-, synthesis by an intermolecular cycloaddition of o-quinodimethane, 737.

Methyl transfer: the mass spectra of reserpine derivatives, 932.

Z

Zanthoxylum avicennae. Avicennol: a new pyranococoumarin from the root-bark of Zanthoxyum avicennae, and its conversion into avicennin, 488.

Zinc and chlorotrimethylsilane, deoxygenation of some 3-oxo-steroids by, 809.