INDEX OF SUBJECTS, 1972

- Acenaphthenes, some new polynitro-, synthesis of. Studies on nitroaromatic compounds. Part III, 166.
- Acetals. Experiments on the synthesis of tetracycline. Part XI, oxidation of ketone acetals and ethers by hydride transfer, 542. Part XII, extension of the acetal photocyclisation process, 1103.
 - Highly condensed polycyclic systems. Part IV, action of concentrated sulphuric acid on 1,2,4,5-tetrachloro-3,3-ethylenedioxytetracyclo[3,2,0,0^{2,7},0^{4,6}]heptane: a novel rearrangement of a quadricyclanone acetal, 1778.
- Acetanilides. Substituted 3-anilinoindoles and anilinoacetanilides from the reaction of glyoxal with N-alkylanilines: crystal structure of 5-chloro-3-(4-chloro-Nmethylanilino)-1-methylindole, 2001.
- Acetolysis. Acetolytic cleavage of the epimeric 2- and 6-methoxy-5α-cholestanes involving a 1,2-hydride shift to C-2, 2319.
- Acetoxylation, Thiele-Winter, of quinones. Part IV, quinones containing one or more t-butyl groups, 2286.
- Acetylation, alkylation, and protonation of corroles and 21,24-dioxacorroles, 143.
 - Friedel-Crafts, of 3-methylfluoranthene, 2739.
 - Friedel-Crafts acylations of aromatic hydrocarbons. Part XIV, monoacetylation and monobenzoylation of 2,7-dimethylnaphthalene, 1442. Part XV, acetylation of 2-methylnaphthalene, 1781.
- Acetylenes, natural. Part XXXIV, synthesis of C₁₁ enediyn-ene alcohols, aldehydes, acids, and esters, 552. Part XXXV, polyacetylenic acid and benzenoid metabolites from cultures of the fungus *Lepista diemii* Singer, 2032.
 - reactions of phosphines with. Part XVI, formation of β-alkoxyphosphonium ylides and vinyl ethers via methanolysis of vinylphosphonium salts, 2830.
 - Acylarylnitrosamines. Part V, decompositions of N-nitrosobenzanilides in carbon tetrachloride and benzene: the formation of carboxylic acids, anhydrides, and arynes, 1296.
 - Addition of secondary amines to diacetylenic ketones, 805.
 - Addition reactions of heterocyclic compounds. Part XLVII, formation of benzazepines from indoles with dimethyl acetylenedicarboxylate in acetonitrile, 968. Part XLVIII, reactions of indoles with dimethyl acetylenedicarboxylate in the presence and absence of solvents, 1569. Part XLIX, reactions of benzimidazoles possessing an activated 2-methylene group with acetylenic esters, 1577. Part L, reactions of 1-alkylbenzotriazoles and benzo[c]cinnolines with dimethyl acetylenedicarboxylate, 2182. Part LI, cyclobuta[b]pyridines from reactions of dimethyl acetylenedicarboxylate with 1-alkyl-1,4-dihydropyridines and the cycloelimination of amide and carboxy-groups, 2918.
 - Aryne chemistry. Part XXX, approaches to the syn-

- thesis of 9-alkyl- and 9,10-dialkyl-1,2,3,4,5,6,7,8-octa-fluoro-9,10-dihydro-9,10- σ -benzenoanthracenes (9-alkyl- and 9,10-dialkyl-1,2,3,4,5,6,7,8-octafluorotriptycenes), 2372. Part XXXI, reactions of arynes with $\alpha\beta$ -unsaturated aldehydes, 2903.
- Base-catalysed prototropic isomerization. Part VI, the isomerization of acetylenic hydrocarbons, 1653.
- Diels-Alder reactions of polyfluorocyclohexa-1,3-dienes. Part VI, reactions of dodecafluorotricyclo[5,2,2,0^{2,6}]-undeca-2,5,8-triene with ethylene and alkynes. A synthesis of polyfluorotricyclo[6,2,2,0^{2,7}]dodeca-2,4,6,9-tetraenes and 2,3-disubstituted hexafluoronaphthalenes, 1830.
- Polycyclic biphenylenes. Part IV, biphenylenes derived from 9,10-phenanthryne, 634.
- Reaction between 3*H*-pyrrolizines and acetylenedicarboxylic esters. Part I, preparation of 3-(alkoxycarbonylmethylene)-3*H*-pyrrolizines, 840. Part II, preparation of derivatives of cycl[4,2,2]azine (azepino-[2,1,7-cd]pyrrolizine), 844. Part III, photochemical reaction, 2517.
- Reaction of carbonium ions in sulphuric acid with acetylene and substituted acetylenes, 2100.
- Reactions of some isoindoles with acetylenic esters, 904.
- Reactive intermediates. Part XIX, the lithium salt of 1-(benzotriazol-1-yl)-4-p-tolylsulphonyltetrazene: a new benzyne precursor, 1315.
- Simple, convenient, and direct conversion of anilines and anilides into arynes, 2563.
- Syntheses of long-chain acids. Part IX, docosa-3,9,15-and -5,11,17-triynoic acids and eicosa-5,11,14-triynoic acid, 255.
- The dithiole series. Part V, reactions of 1,2-dithiole-3-thiones and 1,3-dithiolan-2-thiones with acetylenic esters and with benzyne, 41.
- Acid chlorides. Enamine chemistry. Part XIV, reaction of $\alpha\beta$ -unsaturated acid chlorides with tertiary enamino-ketones and -esters, 1038. Part XVI, reaction of $\alpha\beta$ -unsaturated acid chlorides with 1,4-dimorpholinocyclohexa-1,3-diene. Synthesis of 7-morpholino- and 4,7-dimorpholino-indan-1-ones, 1639.
- Acids, carboxylic, a study of the Koch syntheses of, 2096. indene-3-acetic, structure of. Part II, Reformatsky reactions of 6-benzyloxy-, 5,6-dimethoxy-, and 6-methoxy-indan-1-ones, 941.
 - long-chain, syntheses of. Part IX, docosa-3,9,15- and -5,11,17-triynoic acids and eicosa-5,11,14-triynoic acid, 255.
 - Acylarylnitrosamines. Part V, decompositions of N-nitrosobenzanilides in carbon tetrachloride and benzene: the formation of carboxylic acids, anhydrides and arynes, 1296.
 - Allenes. Part XXII, synthesis and absolute configuration of laballenic and lamenallenic acids, 2197.
 - Biosynthesis of the 3,4-dihydroxy-2,2-dimethyl-5-phenyl-valeric acid residue of neoantimycin, 1235.

Acids (contd.)

Diterpenoids. Part XVIII, synthesis and stereochemistry of 1,2,3,4,4a,9a-hexahydro-1β,4aα-dimethylfluoro-ene-1α,9-dicarboxylic acids, 320.

Electrochemical reduction of fluorinated aromatic carboxylic acids, 184.

Mass spectra of the trimethylsilyl derivatives of glycerophosphoric acids. Inter- and intra-molecular rearrangements of siliconium ions, 1074.

Natural acetylenes. Part XXXIV, synthesis of C_{11} enediyn-ene alcohols, aldehydes, acids, and esters, 552.

Oxidation products of hop bitter acids. Part VI, fivemembered ring products from the oxidation of colupulone, 1599.

Persulphate oxidations. Part VIII, oxidation of arylthio-, arylsulphonyl-, and arylamino-acetic acids, 2857. Synthesis of pyrrolidine-2,4-diones (tetramic acids) and some derivatives, 2121.

Synthesis of some 4-pyridylpyruvic acids as potential lactate dehydrogenase inhibitors, 2506.

The use of a nitro-group to ensure intermolecular acylation by p-nitrohydrocinnamic acid and p-nitro- γ -phenylbutyric acid, 62.

Transformations of penicillin. Part II, NN'-di-isopropylhydrazine, a new reagent for protection of carboxylic acids, 929.

Aconane. A laboratory model for the atisane --> aconane conversion, 1490.

Acoric acid. Total synthesis of (\pm) -ethyl acorate $\{(\pm)$ -ethyl(3RS)-3-[(1SR,4SR)-1-isobutyryl-4-methyl-3-oxocyclohexyl]butyrate $\}$ and (\pm) -epiacoric acid. An application of the generation and alkylation of a specific enolate, 1186.

Acridines, azido-: potential nucleic acid mutagens, 161. Carcinogenic nitrogen compounds. Part LXXVIII, some indeno[1,7-bc]benz[a]indeno[7,1-hi]-, and benz-[c]indeno[7,1-hi]-acridines, 1261. Part LXXIX, a route to new condensed acridines containing a cyclopent[kl]acridine nucleus, 1263.

Acrylaldehyde. v-Triazolines. Part II, synthesis and reactions of 5-amino-4-aminomethyl-1-aryl-v-triazolines, 769.

Acrylonitrile. Novel analgesics and molecular rearrangements in the morphine-thebaine group. Part XXVI, some reactions of the thebaine-2-chloroacrylonitrile adduct, 878.

Acylations. Friedel-Crafts acylations of aromatic hydrocarbons. Part XIII, syntheses of methyl-substituted naphthalenes. Some anomalous Gattermann formylation reactions, 892. Part XIV, monoacetylation and monobenzoylation of 2,7-dimethylnaphthalene, 1442. Part XV, acetylation of 2-methylnaphthalene, 1781.

The use of a nitro-group to ensure intermolecular acylation by *p*-nitrohydrocinnamic acid and *p*-nitro-γ-phenylbutyric acid, 62.

Adamantanes, substituted, the π -route to, 2697.

A comparison of decomposition and solvolysis reactions of 1-adamantyl chloroglyoxylate and 1-adamantyl chloroformate, 2162.

Carboxylation of 2-methyladamantan-2-ol and 2-(1-adamantyl)ethanol: evidence for the intermolecular nature of hydride transfer reactions in rearrangements involving adamantyl cations, 2707.

Configurations of the 5-methyladamantan-2-ols and the 2,5-dimethyladamantan-2-ols, 2648.

1,3-Elimination with rearrangement during ester pyrolysis. A simple route to protoadamantene and 2,4-didehydroadamantane, 2533.

Hydride transfer reactions of substituted adamantyl cations, 2701.

Preparation of the 5-methyladamantan-2-ols and the 2,5-dimethyladamantan-2-ols, 2644.

Reaction of carbonium ions in sulphuric acid with acetylene and substituted acetylenes, 2100.

Addition reactions of heterocyclic compounds. Part XLVII, formation of benzazepines from indoles with dimethyl acetylenedicarboxylate in acetonitrile; crystal structure of dimethyl 2,3-dihydro-2-indol-3-ylbenz[b]-azepine-3,4-dicarboxylate, 968. Part XLVIII, reactions of indoles with dimethyl acetylenedicarboxylate in the presence and absence of solvents, 1569. Part XLIX, reactions of benzimidazoles possessing an activated 2-methylene group with acetylenic esters, 1577. Part L, reactions of 1-alkylbenzotriazoles and benzo[c]cinnolines with dimethyl acetylenedicarboxylate, 2182. Part LI, cyclobuta[b]pyridines from reactions of dimethyl acetylenedicarboxylate with 1-alkyl-1,4-dihydropyridines and the cycloelimination of amide and carboxy-groups, 2918.

reactions of N-tributylstannyldiphenylmethyleneamine, 130.

Aeroplysinin-1, an antibacterial bromo-compound from the sponge *Verongia aerophoba*, 16.

Aerothionin and homoaerothionin: two tetrabromo-spirocyclohexadienylisoxazoles from *Verongia* sponges, 18.

Aeruginosin A, in vitro and in vivo conversion of 5-methylphenazinium-1-carboxylate into. Pigments of Pseudomonas species. Part IV, 103.

Alanines. Studies of enzyme-mediated reactions. Part I, syntheses of deuterium- or tritium-labelled (3S)- and (3R)-phenylalanines: stereochemical course of the elimination catalysed by L-phenylalanine ammonialyase, 2355.

Alboleersin and luteoleersin, structures of; the identity of luteoleersin with cochlioquinone A, 2837.

Alcohols. Natural acetylenes. Part XXXIV, synthesis of C_{11} ene-diyn-ene alcohols, aldehydes, acids, and esters, 552.

Reaction of allyl and benzyl alcohols, and their toluene-p-sulphonates, with furan, 1617.

Studies of organophosphorochloridates. Part VI, reactions of steroid phosphorochloridates with amines and some alcohols, 1171.

Aldehydes—see also Carbonyl compounds.

Aryne chemistry. Part XXXI, reactions of arynes with $\alpha\beta$ -unsaturated aldehydes, 2903.

3-Heteraglutaraldehydes. Part II, tetrahydrothiophen-3,4-diol 1,1-dioxides and the chemistry of their oxidation product, 3-thiaglutaraldehyde 3,3-dioxide, and its derivatives, 1335. Part III, the 1,2-dithian-4,5diols and tetrahydrothiophen-3,4-diols and their oxidation by periodate, 2795.

Natural acetylenes. Part XXXIV, synthesis of C_{11} enediyn-ene alcohols, aldehydes, acids, and esters, 552.

Some cyano-amides and dicyano-glutaconimides derived from pyridine aldehydes, 2946.

Alkali metals. A one-step alternative to the Grignard reaction, 1655.

Alkaloids, lycopodium, a synthetic approach to. Bridged ring systems. Part XVI, 860.

- Alkaloids (contd.)
 - lythraceous. Part VI, the structures of lythrancine-I,
 -II, -III, and -IV and lythrancepine-I, -II, and -III,
 2141.
 - of Cyphomendra betacea Sendt., 2017.
 - of Daphnandra species. Part XI, some dibenzo-p-dioxin-type biscoclaurine alkaloids from an unnamed species. The structure of micranthine, 2884.
 - pyrrolizidine. The biosynthesis of senecic acid, 671.
 - the *Senecio*. Structure and absolute configuration of isoline, 2339.

 - Alkaloid biosynthesis. Part XVI, colchicine: origin of the tropolone ring and studies with the C₆-C₃-C₆-C₁ system, 1730. Part XVII, structure and chemistry of androcymbine, 1736. [Part LXXVII of Substances from plants of the sub-family Wurmbaeoideae and their derivatives; Part II of 1-Phenethylisoquinoline alkaloids]. Part XVIII, biosynthesis of colchicine from the 1-phenethylisoquinoline system, 1741. (Part XIX—see Biosynthesis.)
 - Alkaloid studies. Part LXVI, reactions of some Aspidosperma alkaloids with m-chloroperbenzoic acid. Removal of the angular ethyl group of aspidospermine, 849.
 - Bisjatrorrhizine, a new dimeric protoberberine alkaloid from *Jatrorrhiza palmata* [Lam.] Miers, 327.
 - Carcinogenic nitrogen compounds. Part LXXVII, a novel synthesis of β -carbolines, 531.
 - Mass spectrometry of bisbenzylisoquinoline alkaloids. Part I, alkaloids derived from coclaurine units joined tail-to-tail, 592. Part II, alkaloids derived from one coclaurine and one isococlaurine unit, 597. Part III, alkaloids derived from coclaurine units joined head-to-tail, 599.
 - New synthesis of ellipticine, 2264.
 - Pyrrolizidine and seco-pyrrolizidine alkaloids of *Crotalaria* laburnifolia L. subspecies eldomae, 1602.
 - Quinoline alkaloids. Part XII, alkaloids and couarmins of *Orixa japonica* Thunb. Identification of a new quinoline alkaloid, orixinone, 2116.
 - Reactions of harmaline (4,9-dihydro-7-methoxy-1-methyl-3H-pyrido[3,4-b]indole) and its derivatives. Part I, reactions of harmaline with methyl acrylate, 731. Part II, reinvestigation of acetylharmaline, 736.
 - Studies on the syntheses of heterocyclic compounds. Part CDLXII, total photolytic syntheses of aporphine $[(\pm)-N$ -methyl-laurotetanine, (\pm) -cassythicine, and (\pm) -pukateine], proaporphine $[(\pm)$ -orientalinone], and morphinandienone $[(\pm)$ -pallidine and (\pm) -salutaridine] alkaloids, 1435. Part CDLXXV, total syntheses of (-)-O-methylandrocymbine, (-)-kreysigine, and alkaloid CC-10-methyl ether, 2160.
 - Synthesis of (\pm) -homoeburnamenine, (\pm) -21-epi-homoeburnamenine, (\pm) -eburnamine, and (\pm) -21-epi-eburnamine, 2776.
 - of δ-lycorane derived from the alkaloid caranine, 588.
 - Total synthesis of (-)-discretine (2,10,11-trimethoxy- $13a\alpha$ -berbin-3-ol), 2834.
 - of the alkaloids rhoeadine and alpinigenine, 2986.
- Alkanes. Perfluoroalkyl derivatives of sulphur. Part X, reaction of polyfluoromonoiodoalkanes with dimethyl sulphide to give methyl polyfluoroalkyl sulphides, 155. Part XIII, reaction of polyfluoromonoiodoalkanes with

- diethyl disulphide and of pentafluoroiodobenzene with bis(trifluoromethyl) disulphide, 2180.
- Peroxide-initiated addition of 1,1-dibromotetrafluoroethane to ethylene, propene, and 2-methylpropene, 1146. Alkenes—see Olefins.
- Alkoxide ions, reaction with some chlorine-substituted norbornadienes, 1237.
- Alkylation, acetylation, and protonation of corroles and 21,24-dioxacorroles, 143.
 - C-3 and C-1, of Hagemann's ester (ethyl 2-methyl-4-oxocyclohex-2-enecarboxylate) with alkyl halides and Michael acceptors. Cyclohexenone derivatives. Part VI, 1836.
 - by thallium(I) ethoxide. Reactions of condensed N-heteroaromatic molecules. Part I, 2292.
 - of 1,1-diphenylpropene carbanions. The principle of least motion. 1,1-Diphenylalkenes. Part II, 1292.
 - Marine sterols with a new pattern of side-chain alkylation from the sponge Aplysina (=Verongia) aerophoba, 2132.
 - Substitution reactions of benzo[b]thiophen derivatives. Part V, t-butylation of benzo[b]thiophen and nitration of 3-t-butylbenzo[b]thiophen-2-carboxylic acid, 414.
- Alkynes—see Acetylenes.
- Allenes. Part XXII, synthesis and absolute configuration of laballenic and lamenallenic acids, 2197.
 - polyhalogeno-. Part IX, reaction of tetrafluoroallene with bistrifluoromethyl nitroxide and with perfluoro-(2,4-dimethyl-3-oxa-2,4-diazapentane), 2336.
 - Allene cycloadditions. Part III, synthesis of alkylidenecyclobutenes, 1365.
- Alloxazines, 5,10-dihydro. Studies in the flavin series. Part XVII, 1564.
- Alpinigenine. Total synthesis of the alkaloids rhoeadine and alpinigenine, 2986.
- Aluminium chloride-catalysed reactions of 1-alkyl-3,5-di-tbutylbenzenes with phosphorus trichloride. Migration of a t-butyl group to the phosphorus atom, 559.
- Amides, cyano- and dicyano-glutaconimides, derived from pyridine aldehydes, 2946.
 - phosphinic, the preparation of phosphinic chlorides from, 1184.
 - Persulphate oxidations. Part VI, oxidation of biphenyl-2-carboxamides, 2847. Part VII, oxidation of obenzyl- and o-benzoyl-benzamides, 2853.
- Amines and imines, heterocyclic. Part XII, imino-derivatives of piperazine, 1009. Part XIII, 3,6-dihydrazinopyridazine and the nature of the reaction between 3,6-dimethoxypyridazine and hydrazine, 1483. Part XIV, products from 2,5-di-iminopyrrolidine (succinimidine) and hydrazine, 2346. Part XV, reactions of hydrazines with 1,3-di-iminoisoindoline and related compounds, 2320.
 - and isatin, the reaction between 124.
 - steroid. Part V, 20-pyrrolidin-1-ylpregnane derivatives, 1420.
 - Addition of secondary amines to diacetylenic ketones, 805.
 - Amine oxidation. Part VI, metal-ion induced dehydrative cyclisation, reduction and reductive fragmentation of arylethyldimethylamine N-oxides, 229.
 - and the chemistry of quinone imines. Part I, 3-methoxy-4-t-butylaniline, 396. Part II, 2,5-dimethoxy-4-t-butylaniline, 408. Part III, 2,4-dimethoxy-5-t-butylaniline, 813.

Amines (contd.)

- Amino-acids and peptides. Part XXXV, the effect of solvent on the rates of racemisation and coupling of some acylamino-acid p-nitrophenyl esters; the base strengths of some amines in organic solvents and related investigations, 1194.
- Carcinogenic nitrogen compounds. Part LXXV, Skraup reactions with some polycyclic amines, and two cases of anti-Marckwald orientation, 263.
- Chemistry of ortho-benzoquinones. Part VI, reaction of primary aromatic amines with alkyl substituted 1,2benzoquinones: displacement of alkyl groups in the 4- and 5-positions, 1024.
- Metal ions and complexes in organic reactions. Part XIV, syntheses of NN'-bisdiarylphenylenediamines, 2391.
- Polyfluoroalkyl derivatives of nitrogen. Part XXXVI, photochemical reaction of N-bromo- and N-chlorobistrifluoromethylamine with cis- or trans-but-2-ene, and the synthesis of 1,2-di(bistrifluoromethylamino)difluoroethylene and 2-bromo-1,2-difluoro-NN-bistrifluoromethylvinylamine, 1877. Part XXXVII, reaction of N-bromobistrifluoromethylamine with propene under ionic and free-radical conditions, 1880.
- Pyridazines. Part IV, reaction of alkoxydichloropyridazines and dialkoxychloropyridazines with amines,
- Rearrangements of diphenylamine derivatives. Part III, the Reilly-Hickinbottom rearrangement, 2579.
- Studies of organophosphorochloridates. Part VI, reactions of steroid phosphorochloridates with amines and some alcohols, 1171.
 - on the reaction of benzoyl peroxide with NN-disubstituted aromatic amines and related compounds. Part VI, some attempts to effect o-hydroxylation in the strychnine series, 1429.
- Transannular cyclisation of cyclo-olefinic N-chloroamines. Synthesis of azabicyclic compounds, 2205. v-Triazolines. Part II, synthesis and reactions of 5-
- amino-4-aminomethyl-1-aryl-v-triazolines, 769. Amino-acids and peptides. Part XXVIII, determination of
- racemization in peptide synthesis by nuclear magnetic resonance spectroscopy, 1015.
 - and peptides. Part XXXV, effect of solvent on the rates of racemisation and coupling of some acylamino-acid p-nitrophenyl esters; the base strengths of some amines in organic solvents, and related investigations, 1194. Part XXXVI, synthesis of analogues of bradykinin by the picolyl ester method, 1867.
 - and peptides, nitro-heteroaromatic derivatives of. Part III, application of ultraviolet-visible absorption and circular dichroism to N-(3-nitro-2-pyridyl)amino-acids, 1179. Part IV, a circular dichroic method for the selective determination of cysteinyl residues, 1182.
 - Azabenzocycloheptenones. Part XIV, cyclisation of amino-acid derivatives to tetrahydro-1-benzazepin-5ones and tetrahydroquinolin-4-ones, 1803.
 - Cyclisation of a-acylamino-acids in the presence of perchloric acid to give 5-oxo-Δ2-oxazolinium perchlorates,
 - Polypeptides. Part XVIII, syntheses of poly-(β-aspartic acid) and poly-(y-glutamic acid) and their benzyl esters, 605.
 - Studies related to penicillins and cephalosporins. Part I, the preparation of 4-alkylthio-β-lactams in which the

- ring nitrogen atom is part of an α-amino-acid ester system, 2326.
- Synthesis of trans-4,5-didehydro-DL-lysine (2,6-diaminohex-4-enoic acid) and of 4-oxo-L-lysine (2,6-diamino-4oxohexanoic acid), 1825.
- Ammonia. Mechanism of metal-ammonia reduction of camphor, 999.
 - Reduction by dissolving metals. Part XVIII, metalammonia reductions of some bicyclo[2,2,2]octene derivatives: structural effects on double bond reduction and nitrile cleavage, 1546.
 - Studies of enzyme-mediated reactions. Part I, syntheses of deuterium- or tritium-labelled (3S)- and (3R)phenylalanines: stereochemical course of the elimination catalysed by L-phenylalanine ammonia-lyase. 2355. Part II, stereochemistry of the elimination of ammonia from L-tyrosine catalysed by the enzyme from maize, 2364.
- Ammonium salts. Synthesis of N-(4-arylmethylene- Δ^2 oxazolin-5-ylidene)ammonium salts and their conversion into 5-imino- Δ^2 -oxazolines and 1,3-diazafulvenes, 1140.
- Analgesics, novel, and molecular rearrangements in the morphine-thebaine group. Part XXIII, adducts of thebaine with divinyl sulphone and with methyl vinyl sulphone, 870. Part XXIV, 15,16-didehydro-6,14-endoetheno-6,7,8,14-tetrahydro-thebaines and -oripavines, 872. Part XXV, substitution of the piperidine ring in derivatives of 6,14-endo-ethenotetrahydrothebaine, 875. Part XXVI, some reactions of the thebaine-2-chloroacrylonitrile adduct, 878. Part XXVII, 7-alkylidene-7\alpha-vinyl-6, 14-endo-etheno-6, 7, 8, 14-tetrahydrotheand baines, 881.
- Androcymbine. Alkaloid biosynthesis. Part XVII. Substances from plants of the sub-family Wurmbaeoideae and their derivatives. Part LXXVII. 1-Phenethylisoquinoline alkaloids. Part II. Structure and chemistry of androcymbine, 1736.
 - Studies on the syntheses of heterocyclic compounds. Part CDLXXV, total syntheses of (-)-O-methylandrocymbine, (-)-kreysigine, and alkaloid CC-10 methyl ether, 2160.
- Androstanes. Configuration of 1α-methyl-5α-androstan-3ones, 1219.
 - Hydroxy-steroids. Part XVIII, reactions of 17β-chloro-16α,17α-epoxy-5α-androstane and the preparation of 17β-iodo-16α, 17α-epoxy-5α-androstane, 486.
 - Microbiological hydroxylation of steroids. Part IV. the pattern of dihydroxylation of mono-oxygenated 5aandrostanes with cultures of the fungus Calonectria decora, 2081. Part V, the pattern of hydroxylation of dioxygenated 5\alpha-androstanes with cultures of the fungus Calonectria decora, 2759. Part VI, hydroxylation of simple mono- and di-oxygenated 5x-androstanes and of 3-oxoestranes with the fungus Aspergillus ochraceus. 2930.
 - Studies in the steroid group. Part LXXXII, the preparation of nine mono- and eight di-oxoandrostanes, 5α -estran-17-one, and 5α -pregnane-2,20-dione, 492. Part LXXXIII, 1-, 2-, 3-, 4-, 6-, 12-, 15-, and 16monohydroxy-5α-androstanes and their derivatives, 499. Part LXXXIV, preparation and reactions of 15oxygenated androstanes, 2765.
- Androstenes. An unusual oxidation of some 5\(\alpha\)-hydroxyandrost-2-enes, 590.
 - Base-catalysed epoxidation of androst-4-en-6-ones, 2051.

- Anhydrides. Acylarylnitrosamines. Part V, decompositions of N-nitrosobenzanilides in carbon tetrachloride and benzene: the formation of carboxylic acids, anhydrides, and arynes, 1296.
 - Overcrowded molecules. Part VII, thermal and photochemical reactions of photochromic (E)- and (Z)-benzylidene(diphenylmethylene)succinic anhydrides and imides, 1321.
- Anilides, N-(2-methyl-4,6-diphenyl-1-pyridinio)-, photochemistry of, 1020.
 - Simple, convenient, and direct conversion of anilines and anilides into arynes, 2563.
- Aniline, 2,4-dimethoxy-5-t-butyl-. Amine oxidation and the chemistry of quinone imines. Part III, 813.
- Anilines. Light-induced reactions of α -N-alkylanilinoketones: formation of di-indolylmethanes, 1210.
 - Organometallic derivatives. Part IV, the lithiation of ferrocenylmethyl phenyl sulphone and the cleavage of carbon-sulphur bonds by aniline, 2502.
 - Simple, convenient, and direct conversion of anilines and anilides into arynes, 2563.
 - Substituted 3-anilinoindoles and anilinoacetanilides from the reaction of glyoxal with N-alkylanilines: crystal structure of 5-chloro-3-(4-chloro-N-methylanilino)-1-methylindole, 2001.
- Anisole, radical-initiated oxidation of Reactions of lead(IV). Part XXII, 562.
- Annulene. Unsaturated macrocyclic compounds. Part LXXXVIII, monodehydro[24]annulene, 355.
- Antheridiol, experiments towards a synthesis of: a synthesis of biologically active material, 2811.
- Anthracenes. New metabolic products of Asperigillus flavus. Part II, asperflavin, anhydroasperflavin, and 5,7-dihydroxy-4-methylphthalide, 2406.
- Anthraquinones in the crinoids Heterometra savignii (J. Müller) and Lamprometra klunzingeri (Hartlaub). Naturally occurring quinones. Part XXI, 1291.
 - Biosynthesis of phenols. Part XXIV, conversion of the anthraquinone questin into the benzophenone, sulochrin, in cultures of Aspergillus terreus, 240.
 - Chemistry of fungi. Part VIII, constituents of *Valsaria* rubricosa and the identification of papulosin with valsarin, 1464.
 - Structure of hallachrome: 7-hydroxy-8-methoxy-6-methyl-1,2-anthraquinone, 1614.
 - Synthesis of valsarin and 5,7-dichloroemodin, 1466.
- Antibiotics. Flavipucine [3'-isovaleryl-6-methylpyridine-3-spiro-2'-oxiran-2(1H),4(3H)-dione], an antibiotic from Aspergillus flavipes, 2071.
 - Flavofungin: a mixture of 13,15,17,19,21,23,25,27-octahydroxy-31-isopropyl-14-methyl- and 13,15,17,19,21,23,25,27-octahydroxy-14-methyl-31-s-butyl-hentria-conta-2,4,6,8,10,28-hexaen-31-olide, 1848.
 - Structure of an amino-sugar from the antibiotic vancomycin, 443.
 - Viomycin. Part I, the structure of the guanidine-containing unit, 820. Part II, the structure of the chromophore, 827.
- Aplysina (=Verongia) aerophoba. Marine sterols with a new pattern of side-chain alkylation from the sponge Aplysina (=Verongia) aerophoba, 2132.
- Apoverbenone (6,6-dimethylnorpin-3-en-2-one), reduction of. Electrochemical reactions. Part XI, 2529.

(6,6-dimethylnorpin-3-en-2-one). An investigation into its preparation by dehydrobromination of a sterically hindered bromoketone, 50.

- Argidae. Sequential polypeptides. Part VII, the synthesis of poly-(L-glutaminyl-L-alanine), a model of the silks produced by sawfiles of the family Argidae, 2923.
- Aromatic compounds, polyfluoro-. Part LIV, copperassisted nucleophilic displacement reactions of pentafluorohalogenobenzenes, 763.
 - Aryl thalliation as a route to substituted 1,4-benzoquinones, 1629.
 - Concurrent chlorination and carboxylation of aromatic hydrocarbons with thallium(III) chloride tetrahydrate in carbon tetrachloride, 2268.
 - Cytotoxic compounds. Part XV, reactions of the methanesulphonates of 1-arylthiopropan-2-ols and of 2-(2,4-dinitrophenylthio)propan-1-ol with nucleophiles, 2067.
 - 1,3-Dipolar character of six-membered aromatic rings. Part III, 2-methyl-3-oxidoisoquinolinium. A novel route to benzotropones, 2054.
 - Electrochemical reduction of fluorinated aromatic carboxylic acids, 184.
 - Friedel-Crafts acylations of aromatic hydrocarbons. Part XIII, syntheses of methyl-substituted naphthalenes. Some anomalous Gattermann formylation reactions, 892. Part XIV, monoacetylation and monobenzoylation of 2,7-dimethylnaphthalene, 1442. Part XV, acetylation of 2-methylnaphthalene, 1781.
 - Homolytic aromatic substitution of heterocyclic compounds. Part V, the phenylation of benzo[b]thiophen and benzo[b]furan, 556.
 - substitution of halogenobenzenes by arylthio- and arylsulphonyl radicals, 2817.
 - Natural acetylenes. Part XXXV, polyacetylenic acid and benzenoid metabolites from cultures of the fungus *Lepista dienii* Singer, 2032.
 - Nitro-heteroaromatic derivatives of amino-acids and peptides. Part III, application of ultraviolet-visible absorption and circular dichroism to N-(3-nitro-2-pyridyl) amino-acids, 1179. Part IV, a circular dichroic method for the selective determination of cysteinyl residues, 1182.
 - Novel aromatic systems. Part IX, synthesis and substitutions of dibenzo[b,f]azepin-2-one, 539. Part X, some aspects of the chemistry of 2,3-dihydroxybenzocycloheptenes, 722.
 - redox reactions of diazonium fluoroborates. The formation of copper salt-azo-compound complexes: water-induced free radical aromatic arylation, 2555.
 - Polyhalogeno-aromatic compounds. Part XXII, some reactions of tetrachloro-4-methylsulphonylpyridine and related compounds, 133. Part XXIII, synthesis and reactions of heptachloro-3-lithio-4,4'-bipyridyl, 995. Part XXIV, reaction of chloropyridyllithium compounds with nitriles as a route to triazanaphthalenes, 2190.
 - Reaction of aromatic nitroso-compounds with enamines. Part I, the reaction of nitrosobenzene with 1-morpholin-1-ylcyclohexene, 2521.
 - of arenesulphonyl azides with indole and with 1-methylindole, 2411.
 - of biphenyl, diphenylmethane, and bibenzyl with acetyl hypoiodite, 180.

Aromatic (contd.)

of condensed N-heteroaromatic molecules. Part I, alkylation by thallium(I) ethoxide, 2292.

with asymmetric diarylethylenes. Part XV, dimerisation of 1,1-bis-p-alkoxyphenylethylenes, 2839.

- Studies of heteroaromaticity. Part LIX, further investigations of the cycloaddition reactions of tropone with azo-dienophiles and the photochemical behaviour of the adducts, 783.
 - on nitroaromatic compounds. Part III, synthesis of some new polynitroacenaphthenes, 166.
- Sulphines. Part IV, reactions of aromatic sulphines with diazoalkanes, 2490.
- Synthesis of 22 π -electron macrocycles. Sapphyrins and related compounds, 2111.
- Aromatization of some $2\alpha,3\alpha$ -epoxy- 5α -hydroxy-steroids,
 - of some 4,5-epoxy-3-hydroxysteroids, 1889.
 - of some 3-substituted 5α , 6α -epoxysteroids, 1981.
 - of spirocyclohexadienyl dimers, further studies on. Internuclear cyclisation. Part XXVII, 105.
- Artemisyl, lavandulyl, and sentolinyl structures, cyclopropane cleavage of chrysanthemic acid relatives to: acid-catalysed and biosynthetic experiments, 642.

Arvnes—see Acetylenes.

- Asperentin, its methyl ethers, and 5'-hydroxyasperentin. New metabolic products of Aspergillus flavus. Part I, 2400.
- **Asperflavin**, anhydroasperflavin, and 5,7-dihydroxy-4-methylphthalide. New metabolic products of *Aspergillus flavus*. Part II, 2406.
- **Aspergillus flavipes.** Flavipucine [3'-isovaleryl-6-methylpyridine-3-spiro-2'-oxiran-2(1H),4(3H)-dione], an antibiotic from Aspergillus flavipes, 2071.
 - flavus, new metabolic products of. Part I, asperentin, its methyl ethers, and 5'-hydroxyasperentin, 2400. Part II, asperflavin, anhydroasperflavin, and 5,7-dihydroxy-4-methylphthalide, 2406.
 - ochraceus. Microbiological hydroxylation of steroids. Part VI, hydroxylation of simple mono- and dioxygenated 5α-androstanes and of 3-oxoestranes with the fungus Aspergillus ochraceus, 2930.
 - terreus. Biosynthesis of phenols. Part XXIV, conversion of the anthraquinone questin into the benzophenone, sulochrin, in cultures of Aspergillus terreus, 240.
- **Aspergin.** New metabolic products of *Aspergillus flavus*. Part II, asperflavin, anhydroasperflavin, and 5,7-dihydroxy-4-methylphthalide, 2406.
- Aspidosperma alkaloids, reactions of some, with m-chloroperbenzoic acid. Removal of the angular ethyl groups of aspidospermine. Alkaloid studies. Part LXVI, 849.
- Atisane → aconane conversion, a laboratory model for, 1490.
- Atisanone. Terpenoids. Part V, rearrangement of ent-kaurane 15β,16β-epoxide to ent-(16R)-atisan-15-one, 1274.
 Aurones [2-substituted benzylidenebenzofuran-3(2H)-ones],
- Autoxidation of 3,3'-dimethyl-2,2'-bi-indolyl, 418.

stereochemistry of, 2128.

Aza-analogues of pteridine. Part V, 5-alkylaminopyrimido-[5,4-e]-as-triazines from 5-alkyl or 5-unsubstituted analogues via 5,6-adducts with amines, 237. Part VI, some 3-alkyl-5(and 7)-aminopyrimido[5,4-e]-as-triazines and related compounds, 2316. Azabenzocycloalkanes, 1-oxo- and 1-hydroxy-, synthesis of, 213.

- Azabenzocycloheptenones. Part XIV, cyclisation of aminoacid derivatives to tetrahydro-1-benzazepin-5-ones and tetrahydroquinolin-4-ones, 1803. Part XV, synthesis of benzazatropones and a quinoline aldehyde by the dehydrogenation of certain tetrahydro-1-benzazepine derivatives, 2012.
- **Azabicyclic** compounds, synthesis of. Transannular cyclisation of cyclo-olefinic *N*-chloro-amines, **2205**.
- **Azacaronates.** Photochemical synthesis of alkyl 2,2-dimethyl-3-(2-methylpropenyl)aziridine-1-carboxylates and 3,3-dimethylaziridine-1,2-dicarboxylates from alkyl azidoformates, 344.
- Azachrysanthemates. Photochemical synthesis of alkyl 2,2-dimethyl-3-(2-methylpropenyl)aziridine-1-carboxylates and 3,3-dimethylaziridine-1,2-dicarboxylates from alkyl azidoformates, 344.
- Azadirachtin, structure of; the functional groups, 2445.
- Azaindenes. v-Triazolo[4,5-d]pyrimidines (8-azapurines). Part VIII, synthesis, from 1,2,3-triazoles, of 1- and 2-methyl derivatives of 5,7-disubstituted v-triazolo[4,5-d]-pyrimidines (7- and 8-methyl 2,6-disubstituted 8-azapurines), 449. Part IX, some nucleophilic addition reactions, 457. Part X, new routes to v-triazolo[4,5-d]-pyrimidines via 4-dimethylaminomethyleneamino-1,2,3-triazole-5-carbonitriles, 461. Part XI, preparation of 2-benzyl-v-triazolo[4,5-d]pyrimidine (8-benzyl-8-azapurine), 468.
- Azapurines. v-Triazolo[4,5-d]pyrimidines (8-azapurines). Part VIII, synthesis, from 1,2,3-triazoles, of 1- and 2-methyl derivatives of 5,7-disubstituted v-triazolo[4,5-d]-pyrimidines (7- and 8-methyl 2,6-disubstituted 8-azapurines), 449. Part IX, some nucleophilic addition reactions, 457. Part X, new routes to v-triazolo[4,5-d]-pyrimidines via 4-dimethylaminomethyleneamino-1,2,3-triazole-5-carbonitriles, 461. Part XI, preparation of 2-benzyl-v-triazolo[4,5-d]pyrimidine (8-benzyl-8-azapurine), 468.
- **1-Azapyrene.** Carcinogenic nitrogen compounds. Part LXXIII, cyclisation of 12-(o-chloroaryl)benz[a]acridines: a route to condensed acridines derived from naphtho-[2,1,8-def]quinoline (1-azapyrene), 234.
- **Azepines.** Heterocyclic rearrangements. Part VI, structure and stereochemistry of a sulphur-bridged tetrahydroazepine and derived sulphoxides, by X-ray crystallography and nuclear magnetic resonance spectroscopy, 357.
- **Azepinopyrrolizine.** Reaction between 3*H*-pyrrolizines and acetylenedicarboxylic esters. Part II, preparation of derivatives of cycl[4,2,2]azine (azepino[2,1,7-cd]pyrrolizine), 844.
- Azides. Reaction of 1,2,3,4-tetrahydro-2,5-dimethyl-5*H*-pyrido[4,3-*b*]indole with arenesulphonyl azides, 1003. Reactions of arenesulphonyl azides with indole and with 1-methylindole, 2411.
 - of some 1,3-disubstituted indoles and of 3-methylindole with arylsulphonyl azides, 1626.
 - Studies in azide chemistry. Part V, synthesis of 4-azido-2,3,5,6-tetrafluoro-, 4-azido-3-chloro-2,5,6-trifluoro-, and 4-azido-3,5-dichloro-2,6-difluoro-pyridine, and some thermal reactions of the tetrafluoro-compound, 2964.
 - v-Triazolines. Part II, synthesis and reactions of 5-amino-4-aminomethyl-1-aryl-v-triazolines, 769.

- Azidoformates. Photochemical synthesis of alkyl 2,2-dimethyl-3-(2-methylpropenyl)aziridine-1-carboxylates and 3,3-dimethylaziridine-1,2-dicarboxylates from alkyl azidoformates, 344.
- Azines. Unsaturated nitrogen compounds containing fluorine. Part II, the reactions of hexafluoroacetone azine with cis- and trans-but-2-ene and cyclohexene, 1059.
- **Aziridines**, 2-aroyl-, one-step synthesis of 3,5-dihydro-2H-pyrrolo[3,4-d]oxazoles by reaction of p-nitrosophenols with, 1459.
 - Photochemical synthesis of alkyl 2,2-dimethyl-3-(2-methylpropenyl)aziridine-1-carboxylates and 3,3-dimethylaziridine-1,2-dicarboxylates from alkyl azidoformates, 344.
- Azirines. Studies on heterocyclic chemistry. Part XIII, cleavage of 5-benzylamino-oxazoles, photoproducts of N-benzyl-2H-azirine-2-carboxamides, by dialkyl phosphite, 1456.
- Azocine derivatives. Part I, synthesis of 1-benzazocin-6one derivatives by direct cyclisation, 885. Part II, synthesis of benzazocine derivatives by ring-expansion of dihydrobenzazepines with dibromocarbene, 889.
- **Azo-compounds.** Model studies for azo dye carcinogenesis, 447.
 - Studies of heteroaromaticity. Part LIX, further investigations of the cycloaddition reactions of tropone with azo-dienophiles and the photochemical behaviour of the adducts, 783.
- Azo-glycenosides, aryl-. Part I, synthesis and reactions of some 2- and 3-arylazo-derivatives of methyl 4,6-O-benzylidene-2,3-dideoxy-D-hex-2-enopyranosides, 2596. Part II, additions of dienes and dimethylsulphoxonium methylide to some 2- and 3-arylazo-derivatives of methyl 4,6-O-benzylidene-2,3-dideoxy-D-hex-2-enopyranosides, 2611.
- Azomethines. Ambident oxidative ring closure of semicarbazones, 1918.
 - Cycloaddition reactions of cumulenes. Part III, diketen as an allene-like system in the reaction with an azomethine oxide, 222.

 \mathbf{B}

- Benzacridines. Carcinogenic nitrogen compounds. Part LXXIII, cyclisation of 12-(o-chloroaryl)benz[a]acridines: a route to new condensed acridines derived from naphtho-[2,1,8-def]quinoline (1-azapyrene), 234.
- Benzamides. Chemistry of nitro-compounds. Part II, scope and mechanism of the base-catalysed transformations of some NN-disubstituted o-nitrobenzamides, 97.
- Benzanilides, formation from pyrylium salts and 2-phenyl- Δ^2 -oxazolin-5-one, 1142.
 - Formation of N-methylbenzanilide in the decomposition of 2-(N-methyl-N-phenylcarbamoyl)benzenediazonium fluoroborate in acetic acid, 1170.
 - Internuclear cyclisation. Part XXX, the photolysis of 2-iodo-2'-, -3'-, and -4'-methoxy-N-alkylbenzanilides in benzene, 1150.
- Benzazatropones. Azabenzocycloheptenones. Part XV, synthesis of benzazatropones and a quinoline aldehyde by the dehydrogenation of certain tetrahydro-1-benzazepine derivatives, 2012.
- Benzazepines. Addition reactions of heterocyclic compounds. Part LXVII, formation of benzazepines from

- indoles with dimethyl acetylenedicarboxylate in acetonitrile; crystal structure of dimethyl 2,3-di-hydro-2-indol-3-ylbenz[b]azepine-3,4-dicarboxylate, 968.
- Azabenzocycloheptenones. Part XIV, cyclisation of amino-acid derivatives to tetrahydro-1-benzazepin-5-ones and tetrahydroquinolin-4-ones, 1803. Part XV, synthesis of benzazatropones and a quinoline aldehyde by the dehydrogenation of certain tetrahydro-1-benzazepine derivatives, 2012.
- Azocine derivatives. Part II, synthesis of benzazocine derivatives by ring-expansion of dihydrobenzazepines with dibromocarbene, 889.
- Benzazocines. Azocine derivatives. Part I, synthesis of 1-benzazocin-6-one derivatives by direct cyclisation, 885. Part II, synthesis of benzazocine derivatives by ring-expansion of dihydrobenzazepines with dibromocarbene, 889.
- Benzenes, halogeno-, homolytic substitution of, by arylthioand arylsulphonyl radicals, 2817.
 - Aluminium chloride-catalysed reactions of 1-alkyl-3,5-dit-butylbenzenes with phosphorus trichloride. Migration of a t-butyl group to the phosphorus atom, 559.
 - Aromatic polyfluoro-compounds. Part LIV, copperassisted nucleophilic displacement reactions of penta-fluorohalogenobenzenes, 763.
 - Internuclear cyclisation. Part XXXII, dienol-benzene and related rearrangements of some spirocyclohexadiene-lactams, 1162.
 - Reactions of lead(IV). Part XXIII, reactions of lead tetrabenzoate with some benzenoid compounds, and comparison with those of dibenzoyl peroxide, 570. Part XXIV, reactions with some benzenoid compounds, in the presence of monomethyl oxalate, 578.
 - Reactivity of vinyl sulphonic esters. Part IX, cyclisation of aryloxyvinyl p-bromobenzenesulphonates to benzo-[b]furans, 216.
- Benzenesulphonates. Reactivity of vinyl sulphonic esters. Part XI, behaviour of aminovinyl p-bromobenzenesulphonates, 1136.
- Benzenoanthracenes. Aryne chemistry. Part XXX, approaches to the synthesis of 9-alkyl- and 9,10-dialkyl-1,2,3,4,5,6,7,8-octafluoro-9,10-dihydro-9,10-o-benzeno-anthracenes (9-alkyl- and 9,10-dialkyl-1,2,3,4,5,6,7,8-octafluorotriptycenes), 2372.
- Benzils. Polyfluoroaryl organometallic compounds. Part XV, synthesis and rearrangement of polyhalogenoaryl α -diketones, 2464. Part XVI, reactions of organolithium compounds with halogenated benzils, 2469.
 - Triazines and related products. Part X, a re-examination of the reaction between benzil and diaminoguanidine nitrate, 1221.
- Benzimidazoles. Addition reactions of heterocyclic compounds. Part XLIX, reactions of benzimidazoles possessing an activated 2-methylene group with acetylenic esters, 1577.
- Benzindazoles. Reactive intermediates. Part XVI, dihydrobenz[cd]indazoles and attempted routes to benz-[cd]indazole, 68. Part XVII, conversion of peri-substituted azidonaphthalenes into naphthoxazoles, 1,2-dihydrobenz[cd]indazoles, and perimidines, 72.
- Benzindenoacridines. Carcinogenic nitrogen compounds. Part LXXVIII, some indeno[1,7-bc]-, benz[a]indeno[7,1-hi]-, and benz[c]indeno[7,1-hi]-acridines, 1261.

- Benzindoles. 1,3,4,5-Tetrahydrobenz[cd]indoles and related compounds. Part I, a new synthesis of 3,4-dihydrobenz[cd]indol-5(1H)-one (Uhle's ketone), 1121. Part II, 1926.
- Benzisothiazoles. 1,2-Benzisothiazoles. Part III, 3-substituted derivatives, 3006.
 - Chemistry of 2,1-benzisothiazoles. Part V, Diels-Alder reactions of 2,1-benzisothiazoles, 935.
- Benzo[c]cinnolines. Addition reactions of heterocyclic compounds. Part L, reactions of 1-alkylbenzotriazoles and benzo[c]cinnolines with dimethyl acetylenedicarboxylate, 2182.
- Benzocyclobutene, 1,2-dihydro-, ('benzocyclobutene'): lithiation, and the preparation of some 3-substituted derivatives, 2481.
- Benzocycloheptenes. Novel aromatic systems. Part X, some aspects of the chemistry of 2,3-dihydroxybenzocycloheptenes, 722.
- Benzocyclo-octenes. Part III, reactions of 5,10-dibromobenzocyclo-octene, 717.
- Benzodioxoles. Carbonyl and thiocarbonyl compounds. Part XIII, 2-aroyl-1,3-benzodioxoles of potential pesticidal activity and their cleavage with hydrazines, 1095.
- Benzofuran-3(2H)-ones. Stereochemistry of aurones [2-substituted benzylidenebenzofuran-3(2H)-ones], 2128.
- Benzofurans. Homolytic aromatic substitution of heterocyclic compounds. Part V, the phenylation of benzo-[b]thiophen and benzo[b]furan, 556.
 - Isomerism of semicarbazones of 6-hydroxy-4,7-dimethoxyand 6-hydroxy-4-methoxy-benzofuran-5-yl methyl ketone and derivatives, 616.
 - Overcrowded molecules. Part VIII, addition of diphenylketen to (Z)-2-benzylidene-3-diphenylmethylene-2,3-dihydro-5-methylbenzofuran, 1839.
 - Preparation and thermal rearrangement of a benzofurannitrene adduct, 225.
 - Reactivity of vinyl sulphonic esters. Part IX, cyclisation of aryloxyvinyl p-bromobenzenesulphonates to benzo-[b]furans, 216.
- Benzofurazan 1-oxides, reactions of, with enamines, 965.
- **Benzoic** acids, o-(arylthio)- and o-(arylsulphonyl)-, oxidation of. Persulphate oxidations. Part V, 2842.
- Benzoin, deoxy-, and bibenzyl, preparation and photochemistry of some chlorine-substituted derivatives of, 1277.
- Benzoins. 3,4,5-Triarylpyrazoles, 1193.
- Benzonitrile oxide. 2-Isoxazoline derivatives. Part V, regio- and stereo-selectivity in the cycloaddition of benzonitrile oxide to some cycloalkene and 2-isoxazoline derivatives, 1711.
- Benzophenones, 3-amino-, cyclisation involving. Oxidative coupling. Part IX, 683.
 - Biosynthesis of phenols. Part XXIV, conversion of the anthraquinone questin into the benzophenone, sulochrin, in cultures of Aspergillus terreus, 240.
 - Oxidative coupling. Part X, cyclisations of 2-aminobenzophenones, 2524.
- Benzopyranoindoles and Benzopyranoquinolines. Carcinogenic nitrogen compounds. Part LXXX, [1]benzopyrano[4,3-b]indoles and 6H-[1]benzopyrano[4,3-b]quinolines, 1266.
- Benzopyrenes. 220 MHz Nuclear magnetic resonance analysis and selective deuteriodeprotonation of benzo-[a]pyrene and 6-methylbenzo[a]pyrene, 1253.

Synthesis and properties of 6-substituted benzo[a]pyrene derivatives, 710.

- Benzopyrimidinones. Reduction of some fused (benzo[d]-and pyrido[3,2-d]-) pyrimidinones, 353.
- Benzopyrones. Part VIII, mono- and di-tetrazol-5-ylchromones. The infrared cyano-absorption of some 4oxochromencarbonitriles, 779.
- Benzoquinones, benzyl-, mechanism of oxidation of 2benzylphenol to. Applications of high-potential quinones. Part VIII, 2294.
 - Aryl thalliation as a route to substituted 1,4-benzoquinones, 1629.
 - Chemistry of *ortho*-benzoquinones. Part VI, reaction of primary aromatic amines with alkyl substituted 1,2-benzoquinones: the displacement of alkyl groups in the 4- and 5-positions, 1024.
 - Light-induced and related reactions of quinones. Part IX, t-butyl-1,4-benzoquinones, 372.
 - Stereochemistry of the 2:1 [4 + 2] adducts of tetrachlorocyclopentadienone acetals with cyclohepta-1,3,5triene, tropone, cyclohexa-1,4-diene, and p-benzoquinone, 195.
 - Synthesis of dihydrofurobenzodioxins by reaction of tetrachloro-1,2-benzoquinone with some 2,3-diphenyl-furans, 532.
- Benzothiazine dioxides, a novel synthesis of. Preparation and reactivity of N-phenyl- and N-methyl-o-diazo-acetylbenzenesulphonamide, 2351.
- Benzothiazol-2-ylhydrazones, substituted, reactions with bromine: a route to s-triazolo[3,4-b][1,3]benzothiazoles, 1519
- [1]Benzothieno[3,2-c]cinnolines, synthesis and some reactions of. Condensed thiophen ring systems. Part IX, 2030.
- 10H-[1]Benzothieno[3,2-b]indoles, new routes to; intramolecular cyclisation of azido- and nitro-substituted 2-arylbenzo[b]thiophens. Condensed thiophen ring systems. Part VIII, 2023.
- Benzothiophens. Condensed thiophen ring systems. Part VIII, intramolecular cyclisation of azido- and nitrosubstituted 2-arylbenzo[b]thiophens; new routes to 10H-[1]benzothieno[3,2-b]indoles, 2023.
 - Homolytic aromatic substitution of heterocyclic compounds. Part V, the phenylation of benzo[b]thiophen and benzo[b]furan, 556.
 - Reactivity of vinyl sulphonic esters. Part X, effect of the substituents on the cyclisation of arylthiovinyl sulphonates to benzo[b]thiophens, 218. Part XII, cyclisation of arylsulphonylvinyl sulphonates to benzo[b]thiophen 1,1-dioxides. A novel 1,2-sulphonyl shift, 1355.
 - Some reactions of 7-chloro-3-methylbenzo[b]thiophen, 1404.
 - of 7-hydroxy- and 7-mercapto-3-methylbenzo[b]thiophen, 2593.
 - Substitution reactions of benzo[b]thiophen derivatives. Part IV, nitration of 3-bromo-2-methylbenzo[b]thiophen and 2,3-dimethylbenzo[b]thiophen, 265. Part V, t-butylation of benzo[b]thiophen and nitration of 3-t-butylbenzo[b]thiophen-2-carboxylic acid, 414.
 - Synthesis of the sulphur analogue of psilocin and some related compounds, 3011.
- **Benzotriazoles.** Addition reactions of heterocyclic compounds. Part L, reactions of 1-alkylbenzotriazoles and benzo[c]cinnolines with dimethyl acetylenedicarboxylate, 2182.

Benzotriazoles (contd.)

- Reactive intermediates. Part XIX, the lithium salt of l-(benzotriazol-l-yl)-4-p-tolylsulphonyltetrazene: a new benzyne precursor, 1315.
- 1H-1,2,3-Benzotriphosphole, 2,3-dihydro-1,2,3-triphenyl, and related compounds, further studies in the chemistry of. Part I, 1631. Part II, 2548.
- Benzotropones. 1,3-Dipolar character of six-membered aromatic rings. Part III, 2-methyl-3-oxidoisoquinolinium. A novel route to benzotropones, 2054.
- Benzotropylium perchlorates, preparation and properties of some, 1746.
- 4H-1,3,4-Benzoxadiazines, a new synthesis of, 2915.
- Benzoxazepines. Organolithium chemistry of N-heterocycles. Part IV, formation of 1,2,4,5-tetrahydro-4,4-diphenyl-2,5-methano-3,1-benzoxazepines from quinolines, 1176.
- Benzoxazepinones. 4,5-Dihydro-1-benzoxepin-3(2H)-one, N-substituted 2,3-dihydro-1,5-benzoxazepin-4(5H)-ones, and related compounds, 2425.
- Benzoxepinones. 4,5-Dihydro-1-benzoxepin-3(2H)-one, N-substituted 2,3-dihydro-1,5-benzoxazepin-4(5H)-ones, and related compounds, 2425.
- Benzoylation. Friedel-Crafts acylations of aromatic hydrocarbons. Part XIV, monoacetylation and monobenzoylation of 2,7-dimethylnaphthalene, 1442.
- Benzoyl peroxide, studies on the reaction of, with NN-disubstituted aromatic amines and related compounds. Part VI, some attempts to effect o-hydroxylation in the strychnine series, 1429.
- Benzynes—see Acetylenes.
- Berbinol. Total synthesis of (-)-discretine (2,10,11-trimethoxy-13aα-berbin-3-ol), 2834.
- Bibenzyl and deoxybenzoin, preparation and photochemistry of some chlorine-substituted derivatives of, 1277.
 - Chemical constituents of the Combretaceae. Part II, substituted phenanthrenes and 9,10-dihydrophenanthrenes and a substituted bibenzyl from the heartwood of Combretum molle, 206. Part III, substituted phenanthrenes, 9,10-dihydrophenanthrenes, and bibenzyls from the heartwood of Combretum psidioides, 2941
- Bicyclo[2,2,1]heptanes, polyfluoro-. Part V, syntheses using bridgehead carbanions generated by removal of bridgehead hydrogen with aqueous bases, 937.
- Bicyclo[2,2,0]hexa-2,5-diene, hexafluoro-, some addition and nucleophilic substitution reactions of. Valence-bond isomer chemistry. Part III, 2170.
- Bicyclo[3,3,1]nona-3,7-diene-2,6-diones, photochemical rearrangement of, 1030.
- Bicyclo-octenes. Reduction by dissolving metals. Part XVIII, metal-ammonia reductions of some bicyclo-[2,2,2]octene derivatives: structural effects on double bond reduction and nitrile cleavage, 1546.
- Biguanides. Synthesis, properties, and electron impact fragmentation of fluorinated 1-arylbiguanides, 278.
- **Bi-indolyls.** Autoxidation of 3,3'-dimethyl-2,2'-bi-indolyl, 418.
- Bile pigments and porphyrins from brominated pyrromethenes, 1471.
 - Photodecomposition of bilirubin and other bile pigments, 288.
- **Bilirubin** and other bile pigments, the photodecomposition of, 288.

- Biosynthesis. Part XIX, concerning the biosynthesis of (-)-camphor and (-)-borneol in Salvia officinalis, 2743. (Previous parts—see Biosynthesis, alkaloid.)
 - alkaloid. Part XVI, colchicine: origin of the tropolone ring and studies with the C₆-C₃-C₆-C₁ system, 1730. Part XVII. Substances from plants of the sub-family Wurmbaeoideae and their derivatives. Part LXXVII. 1-Phenethylisoquinoline alkaloids. Part II. Structure and chemistry of androcymbine, 1736. Part XVIII, biosynthesis of colchicine from the 1-phenethylisoquinoline system, 1741. (Part XIX—see Biosynthesis.)
 - of 3α-hydroxylated steroidal sapogenins. Part I. Studies on biochemical transformation of plant steroids. Part IV, 957.
 - of mycophenolic acid, 2639.
 - of phenols. Part XXIV, conversion of the anthraquinone questin into the benzophenone, sulochrin, in cultures of Aspergillus terreus, 240.
 - of pteridines. Part VI, studies of the mechanism of riboflavin biosynthesis, 1051.
 - of pyocyanin and the pigments Ps. aureofaciens. Pigments of Pseudomonas species. Part V, 622.
 - of senecic acid. Pyrrolizidine alkaloids, 671.
 - of steroids and terpenoids, investigations on. Part VI, the sterols of yeast, 513. Part VIII, the synthesis and metabolism in Saccharomyces cerevisiae of ergosta-7,22,24(28)-trien-3β-ol, 1231.
 - of the 3,4-dihydroxy-2,2-dimethyl-5-phenylvaleric acid residue of neoantimycin, 1235.
 - of unnatural morphine derivatives in *Papaver somniferum*, 1642.
 - Specific enzyme inhibitors in vitamin biosynthesis. Part I, the synthesis of 8-substituted pyrido[2,3-d]-pyrimidines, 1041.
 - Studies in terpenoid biosynthesis. Part VII, the biosynthesis of helicobasidin, 586. Part VIII, formation of the trichothecane nucleus, 1425. Part IX, the sequence of oxidation on ring B in kaurene-gibberellin biosynthesis, 1892.
 - Terpene biosynthesis. Part IV, biosynthesis of (+)-pulegone in *Mentha pulegium* L., 1532. Part V, interconversions of some monoterpenes in higher plants and their possible role as precursors of carotenoids, 1764. Part VI, monoterpenes and carotenoids from tissue cultures of *Tanacetum Vulgare* L., 1769.
- Biphenyl-2-carboxamides, some N-methyl-, oxidation with persulphate. Internuclear cyclisation. Part XXIX, 118.
 Biphenylenes, polycyclic. Part IV, biphenylenes derived from 9,10-phenanthryne, 634.
- Biphenyls, polychlorinated, mass spectra of, 686.
- some oo'-bridged oo'-dichloro-, optical stabilities of, 2717. Photodehydrocyclizations in stilbene-like compounds. Part V, photochemistry of 2,2'-distyrylbiphenyl, 2074.
- **Bipyridyls.** Bipyridylium quaternary salts and related compounds. Part IV, pyridones derived from paraquat and diquat, 138.
 - Polyhalogenoaromatic compounds. Part XXIII, synthesis and reactions of heptachloro-3-lithio-4,4'-bi-pyridyl, 995.
- Biscoclaurine alkaloids, some dibenzo-p-dioxin-type, from an unnamed species. The structure of micranthine. Alkaloids of *Daphnandra* species. Part XI, 2884.
- **Bisjatrorrhizine**, a new dimeric protoberberine alkaloid from *Jatrorrhiza palmata* [Lam.] Miers, 327.

- (-)-Borneol. Biosynthesis. Part XIX, concerning the biosynthesis of (-)-camphor and (-)-borneol in Salvia officinalis, 2743.
- Bradykinin, solid-phase synthesis of some highly active aliphatic analogues of, 1862.
 - Amino-acids and peptides. Part XXXVI, synthesis of analogues of bradykinin by the picolyl ester method, 1867.
- Bridged benzo-heterocycles, studies of. Part II, cyclo-addition reactions of epoxy-bridged cyclic olefins with tropone and tropolone, and photochemical behaviour of the adducts, 1951. Part III, cycloadditions of 1,4-epoxy-1,4-dihydronaphthalene to some dipolar compounds and dienes, 2750.
 - ring systems. Part XVI, a synthetic approach to lycopodium alkaloids, 860.
- Bromination. Brominative cleavage of α-ketols, 1875. Direct monobromination of imidazole and N-methylimidazole, 2567.
- Bromine. compounds. Apoverbenone (6,6-dimethylnorpin-3-en-2-one). An investigation into its preparation by dehydrobromination of a sterically hindered bromoketone, 50.
 - Aerothionin and homoaerothionin: two tetrabromospirocyclohexadienylisoxazoles from *Verongia* sponges, 18.
 - Aeroplysinin-1, an antibacterial bromo-compound from the sponge *Verongia aerophoba*, 16.
 - Benzocyclo-octenes. Part III, reactions of 5,10-dibromobenzocyclo-octene, 717.
 - Characterisation of 1,6- and 1,8-dibromopyrenes, 1622. Equilibration of 24,25-dibromides of lanosterol and deriv-
 - atives, 1584.
 - Porphyrins and bile pigments from brominated pyrromethenes, 1471.
 - Reactions of bromine and lead tetra-acetate with 2-(substituted hydrazino)-5-phenyl-1,3,4-oxadiazoles: routes to 3-aryl-6-phenyl-1,2,4-triazolo[3,4-b][1,3,4]-oxadiazoles, 269.
 - of substituted benzothiazol-2-ylhydrazones with bromine: a route to s-triazolo[3,4-b][1,3]benzothiazoles, 1519.
 - of thiocoumarin with phenylmagnesium bromide and with bromine, 817.
 - Reactivity of vinyl sulphonic esters. Part IX, cyclisation of aryloxyvinyl p-bromobenzenesulphonates to benzo[b]furans, 216.
 - Rearrangement of the dihydrobromide of octahydro-3,7-dimethoxy-1,5-diphenyl-1,5-diazocine, 1209.
 - Regiospecific syntheses of modified steroid hormones. Part IV, 4-bromo-oestrone and -17β-oestradiol, 2302.
 - Stereochemistry of phosphine-induced debromination reactions, 1249.
 - Substitution reactions of benzo[b]thiophen derivatives. Part IV, nitration of 3-bromo-2-methylbenzo[b]thiophen and 2,3-dimethylbenzo[b]thiophen, 265.
 - Synthesis and reactions of 10-bromo-7,8,9,10-tetrahydrophenanthridines, 2119.
- **N-Bromosuccinimide.** Triterpenoids. Part VIII, allylic oxidation by *N*-bromosuccinimide, 1856.
- Butadienes. Organohalogen compounds. Part I, the preparation of 1,4-dibromo-2,3-dimethylbuta-1,3-diene and 1-bromo-4-chloro-2,3-dimethylbuta-1,3-diene, 1399. Part II, reactions of 2,3-dimethylbuta-1,3-diene with chlorine and with iodine monochloride, 1986.

Butene. Unsaturated nitrogen compounds containing fluorine. Part II, the reactions of hexafluoroacetone azine with cis- or trans-but-2-ene and cyclohexene, 1059.

 \mathbf{c}

- ¹³C Fourier studies. The configurational dependence of the carbon-13 chemical shifts in santonin derivatives, 299.
- 14C. Biosynthesis of the 3,4-dihydroxy-2,2-dimethyl-5-phenylvaleric acid residue of neoantimycin, 1235.

 Synthesis of [A-14Clerrosterol and [A-14Clerroscaleiferol]]
 - Synthesis of [4-14C]ergosterol and [4-14C]ergocalciferol, 2980.
- Calonectria decora. Microbiological hydroxylation of steroids. Part IV, the pattern of dihydroxylation of mono-oxygenated 5α-androstanes with cultures of the fungus Calonectria decora, 2081. Part V, the pattern of hydroxylation of dioxygenated 5α-androstanes with cultures of the fungus Calonectria decora, 2759.
- Calonectria nivalis. Calonectrin and 15-deacetylcalonectrin new trichothecanes from Calonectria nivalis, 2576.
- Calophyllum calaba L. and Calophyllum bracteatum Thw. (Guttiferae), extractives of. Chemical investigation of Ceylonese plants. Part I, 1935.
- Camphor, mechanism of metal-ammonia reduction of, 999.
- (—)-Camphor. Biosynthesis. Part XIX, concerning the biosynthesis of (—)-camphor and (—)-borneol in Salvia officinalis, 2743.
- Caranine, the alkaloid, synthesis of δ-lycorane derived from, 588.
- Carbanions, 1,1-diphenylpropene, alkylation of. The principle of least motion. 1,1-Diphenylalkenes. Part II, 1292.
 - Chemistry of nitro-compounds. Part III, the intramolecular nucleophilic displacement of aromatic nitrogroups by carbanions, 835.
 - Polyfluorobicyclo[2,2,1]heptanes. Part V, syntheses using bridgehead carbanions generated by removal of bridgehead hydrogen with aqueous bases, 937.
- Carbazoles. Carcinogenic nitrogen compounds. Part LXXIV, Skraup and Combes—Beyer reactions with 3-aminocarbazoles; a new route to pyrido[3,2'-b]carbazoles, 260.
- Carbenes, nitrophenyl. Part II, the generation and reactions of 4-nitrophenylcarbene. Nature of the reactions of 4-nitrobenzyl derivatives with sodium hydroxide, 2103.
 - Azocine derivatives. Part II, synthesis of benzazocine derivatives by ring-expansion of dihydrobenzazepines with dibromocarbene, 889.
 - Reaction of diphenylmethylene with non-conjugated dienes, 507.
 - of 1,2,3-thiadiazoles and 1,2,3-selenadiazoles with nonacarbonyldi-iron, 2165.
- Carbohydrates—see also Sugars.
 - the photochemistry of ketones derived from. Part III, type II reactions of some pyranosid-2- and -3-ulose derivatives, 1670.
 - Arylazo-glycenosides. Part I, synthesis and reactions of some 2- and 3-arylazo-derivatives of methyl 4,6-O-benzylidene-2,3-dideoxy-D-hex-2-enopyranosides, 2596. Part II, additions of dienes and dimethylsulphoxonium methylide to some 2- and 3-arylazo-derivatives of methyl 4,6-O-benzylidene-2,3-dideoxy-D-hex-2-enopyranosides, 2611.

Carbohydrates (contd.)

Deamination of methyl 4-amino-4,6-dideoxy-2,3-O-iso-propylidene-α-L-talo- and -manno-pyranosides with nitrous acid, 315.

Modifications of lincomycin involving the carbohydrate portion. Part I, the 2-O-methyl and 2-deoxy-analogues, 3025. Part II, analogues with D-gluco- and D-ido-stereochemistry, 3031.

Nitrogen-containing carbohydrate derivatives. Part XXVII, synthesis and reactions of 3-cyano-3-deoxyglycose derivatives, 658. Part XXIX, derivatives of 2,6-diamino-2,3,4,6-tetradeoxy-D-threo-hexose (epipurpurosamine C), 2619.

The allyl ether as a protecting group in carbohydrate chemistry. Part III, the but-2-enyl ether group, 1535.

β-Carbolines, a novel synthesis of. Carcinogenic nitrogen compounds. Part LXXVII, 531.

Carbonates. Use of a poly(allyl carbonate) for the preparation of active, water-insoluble derivatives of enzymes, 2568.

Carbonium ions, reaction with acetylene and substituted acetylenes in sulphuric acid, 2100.

Carbonyl compounds—see also Aldehydes and Ketones.

and thiocarbonyl compounds. Part XIII, 2-aroyl-1,3-benzodioxoles of potential pesticidal activity and their cleavage with hydrazines, 1095.

reactions with tervalent phosphorus reagents. Part III, the formation of olefins by deoxygenation of carbonyl compounds with diphenylphosphine oxide, 1113.

synthesis of, via transamination of Schiff bases, 1652.

A one-step alternative to the Grignard reaction, 1655.

Condensation of β -dicarbonyl compounds with halogenopyridinecarboxylic acids. A convenient synthesis of some naphthyridine derivatives, 705.

Electrophilic substitution at phosphorus: reactions of diphenylphosphinyl systems with carbonyl compounds, 2377.

Synthesis and reactions of 3,3-dimethylallyl derivatives of acetylacetone and other poly- β -carbonyl compounds, 692.

Carbonyl sulphide, reactions of some N-(4-hydroxybenzyl)piperidines and -pyrrolidines with. Studies in the dithiocarbamate series. Part V, 2660.

Carbostyril. Friedel-Crafts cyclisations. Part III, synthesis of derivatives of 2(1H)-quinolone (carbostyril) by aluminium chloride-catalysed cycloeliminations of cinnamanilide and related compounds, 1648.

Carboxylation and concurrent chlorination of aromatic hydrocarbons with thallium(III) chloride tetrahydrate in carbon tetrachloride, 2268.

of 2-methyladmantan-2-ol and 2-(1-adamantyl)ethanol: evidence for the intermolecular nature of hydride transfer reactions in rearrangements involving adamantyl cations, 2707.

Carcinogenic compounds. Carcinogenic nitrogen compounds. Part LXXIII, cyclisation of 12-(o-chloroaryl)benz[a]acridines: a route to new condensed acridines derived from naphtho[2,1,8-def]quinoline (1-azapyrene), 234. Part LXXIV, Skraup and Combes-Beyer reactions with 3-aminocarbazoles; a new route to pyrido[3,2'-b]carbazoles, 260. Part LXXV, Skraup reactions with some polycyclic amines, and two cases of anti-Marckwald orientation, 263. Part LXXVI, penta-and hexa-cyclic indenoindoles, 527. Part LXXVIII, a novel synthesis of β-carbolines, 531. Part LXXVIII,

some indeno[1,7-bc]-, benz[a]indeno[7,1-hi]-, and benz-[c]indeno[7,1-hi]-acridines, 1261. Part LXXIX, a route to new condensed acridines containing a cyclopent[hl]acridine nucleus, 1263. Part LXXX, [1]-benzopyrano[4,3-b]indoles and 6H-[1]benzopyrano[4,3-b]quinolines, 1266. Part LXXXI, steric control in heterocyclic cyclisations with 6-substituted chrysenes, 1932. Part LXXXII, polycyclic indoles by means of the Möhlau-Bischler synthesis, 2573.

Model studies for azo dye carcinogenesis, 447.

Carotenoids. Terpene biosynthesis. Part V, interconversions of some monoterpenes in higher plants and their possible role as precursors of carotenoids, 1764. Part VI, monoterpenes and carotenoids from tissue cultures of Tanacetum vulgare L., 1769.

(±)-Cassythicine, total photolytic synthesis of. Studies on the syntheses of heterocyclic compounds. Part CDLXII, 1435.

Catechol. Sequential polypeptides. Part V, use of monoesters of catechol in the synthesis of sequential polypeptides with amino- or carboxy-side-chains, 2236.

Cephalosporins and penicillins, studies related to. Part I, the preparation of 4-alkylthio- β -lactams in which the ring nitrogen atom is part of an α -amino-acid ester system, 2326. Part II, an approach to the synthesis of β -lactam antibiotics, 2332.

Ceylonese plants, chemical investigation of. Part I, extractives of Calophyllum calaba L. and Calophyllum bracteatum Thw. (Guttiferae), 1935.

Chaetomium cochliodes and Chaetomium globosum. Sporidesmins. Part XIII. Ovine III-thrift in Nova Scotia. Part III. The characterisation of chetomin, a toxic metabolite of Chaetomium cochliodes and Chaetomium globosum, 472.

Chalcones, β-methyl-, reactions of, in non-aqueous acidic media. Pyrylium salt formation from aromatic ketones. Part I, 809.

Chetomin, a toxic metabolite of Chaetomium cochliodes and Chaetomium globosum, characterisation of. Sporidesmins. Part XIII. Ovine III-thrift in Nova Scotia. Part III, 472.

Chloral. Citric acid chloralide, 611.

Chlorin, octaethyl-, octa-alkylporphins, and metalloporphins, N-methylation and electrophilic substitution reactions of, 1789.

Chlorination, nuclear, of alkylpyrazines, 2004.

Concurrent chlorination and carboxylation of aromatic hydrocarbons with thallium(III) chloride tetrahydrate in carbon tetrachloride, 2268.

Chlorine compounds. Chloro-derivatives of indazolo[2,3-a]-[3,1]benzoxazin-5-one and indazolo[2,1-a]indazole-6,12-dione, 2498.

Citric acid chloralide, 611.

Mass spectra of polychlorinated biphenyls, 686.

Preparation and photochemistry of some chlorinesubstituted derivatives of deoxybenzoin and bibenzyl, 1277.

and properties of some benzotropylium perchlorates, 1746.

of phosphinic chlorides from phosphinic amides, 1184.

Pyridazines. Part III, reaction of di- and tri-chlorodialkylaminopyridazines with nucleophiles, 2323. Part IV, reaction of alkoxydichloropyridazines and dialkoxychloropyridazines with amines, 2735.

- Chlorine (contd.)
 - Ring transformations involving chloroheterocycles. Part I, reaction of chloronaphthyridines with hydrazine hydrate, 1106. Part II, reaction of 4-chloro-1,8-naphthyridines and 4-chloroquinolines with substituted hydrazines, 1109. Part III, reaction of 4-chloroquinazolines with hydrazines, 1842.
 - Studies of organophosphorochloridates. Part V, some derivatives of 2,4-dichlorophenyl and pentachlorophenyl phosphorodichloridates, 583. Part VI, reactions of steroid phosphorochloridates with amines and some alcohols, 1171.
 - Transannular cyclisation of cyclo-olefinic N-chloroamines. Synthesis of azabicyclic compounds, 2205.
- m-Chloroperbenzoic acid, reactions of some Aspidosperma alkaloids with. Alkaloid studies. Part LXVI, 849.
- Cholestadieno-oxathins. Studies on conformation and reactivity. Part XI, photochemical oxidation, ozonolysis, and rearrangement of 5',6'-dihydrocholesta-3,5-dieno-[3,4-b][1,4]oxathiin, 663.
- Cholestanes. Acetolytic cleavage of the epimeric 2- and 6-methoxy-5α-cholestanes involving a 1,2-hydride shift to C-2, 2319.
 - Hydrogenolyses of 3-hydroxycholest-4-enes by mixed hydrides, 2010.
 - Mass spectrometry in structural and stereochemical problems. Part CCXX, synthesis and mass spectra of 5α -cholest-8(9)- and 8(14)-en-7-ones, 2771.
 - Nitro-steroids. Part VI, structure of 5α -cholestano-[2,3-c]furazan 2'-oxide, and the preparation of 6-nitro- 5α -cholestan-7-ones, 655.
 - Steroids and related studies. Part XIX, products of the Schmidt reaction with cholest-4-ene-3,6-dione, 993.
 - Structure of 'cholestane-3,4,6-trione,' 1358.
- **Chromans.** Stereochemistry of cyclopropyl ketones from the reaction of dimethylsulphoxonium methylide with 3-benzylidenechroman-4-ones, 1554.
 - some new 2,2-dimethyl-, from phloroacetophenone; synthetic approaches to the deoxyhumulones, 25.
 - Synthesis of cis-disalicylide and of flavones containing a chromeno[4,3-b]chromen nucleus, 2007.
- Chromones. Benzopyrones. Part VIII, mono- and ditetrazol-5-ylchromones. The infrared cyano-absorption of some 4-oxochromencarbonitriles, 779.
- Chrysanthemic acid relatives to santolinyl, artemisyl, and lavandulyl structures, cyclopropane cleavage of: acid-catalysed and biosynthetic experiments, 642.
- Chrysenes, 6-substituted, steric control in heterocyclic cyclisations with. Carcinogenic nitrogen compounds. Part LXXXI, 1932.
- Cinnamanilide and related compounds, synthesis of derivatives of 2(1H)-quinolone (carbostyril) by aluminium chloride-catalysed cycloeliminations of. Friedel-Crafts cyclisations. Part III, 1648.
- Cinnamic acid, (Z)- α -benzoylamino-o-benzyloxy[β - 2 H]-, stereospecific hydrogenation of, 203.
 - and esters, β -benzylthio-, and β -benzylsulphonyl-, reactions of, 2630.
 - trans-o-fluoro-, thermal cyclisation to coumarins. An apparent similarity between mass spectral and thermal fragmentations, 2911.
- Citric acid chloralide, 611.
- Cobalt and nickel 1,19-dimethylcorrin and 1,19-dimethyl-4,5-dihydrocorrin perchlorates. Synthesis of corrins. Part I, 2681.

- Fluorinations with potassium tetrafluorocobaltate(III). Part II, fluorination of ketones, 2277.
- Cochlioquinone A, the identity of luteoleersin with; structures of alboleersin and luteoleersin, 2837.
- Coclaurine. Mass spectrometry of bisbenzylisoquinoline alkaloids. Part I, alkaloids derived from coclaurine units joined tail-to-tail, 592. Part II, alkaloids derived from one coclaurine and one isococlaurine unit, 597. Part III, alkaloids derived from coclaurine units joined head-to-tail, 599.
- Colchicine. Alkaloid biosynthesis. Part XVI, colchicine: origin of the tropolone ring and studies with the C₆-C₃-C₆-C₁ system, 1730. Part XVIII, biosynthesis of colchicine from the 1-phenethylisoquinoline system, 1741.
- Colupulone, five-membered ring products from the oxidation of. Oxidation products of hop bitter acids. Part VI, 1599.
- Combes-Beyer and Skraup reactions with 3-aminocarbazoles; a new route to pyrido[3,2'-b]carbazoles. Carcinogenic nitrogen compounds. Part LXXIV, 260.
- Combretaceae, chemical constituents of. Part II, substituted phenanthrenes and 9,10-dihydrophenanthrenes and a substituted bibenzyl from the heartwood of Combretum molle, 206. Part III, substituted phenanthrenes, 9,10-dihydrophenanthrenes, and bibenzyls from the heartwood of Combretum psidioides, 2941.
- Computer. Analysis of structural characteristics of chemical compounds in a large computer-based file. Part III, statistical association of fragment incidence, 2428.
- Conocarpin. Metabolites of Proteaceae. Part V, reflexin and conocarpic acid from *Leucospermum reflexum* Buek *ex* Meisner, and the phenol-dienone rearrangement of reflexin and conocarpin, 2450. Part VI, stereochemistry of reflexin and conocarpin, 2457.
- **Copper.** Aromatic polyfluoro-compounds. Part LIV, copper-assisted nucleophilic displacement reactions of pentafluorohalogenobenzenes, 763.
 - Novel redox reactions of diazonium fluoroborates. The formation of copper salt-azo-compound complexes: water-induced free radical aromatic arylation, 2555.
 - Reactions of organocopper compounds. Part I, 639.
- Corrins, synthesis of. Part I, nickel and cobalt 1,19-dimethylcorrin and 1,19-dimethyl-4,5-dihydrocorrin perchlorates, 2681.
- Corroles and 21,24-dioxacorroles, protonation, alkylation, and acetylation of, 143.
 - and related systems, sulphur extrusion reactions applied to the synthesis of, 1124.
- Coumarins, 4-hydroxy-, structure of the molecular ions of.

 Mass spectrometry of tautomeric compounds. Part
 IV, 1924.
 - thermal cyclisation of *trans-o-*fluorocinnamic acids to. An apparent similarity between mass spectral and thermal fragmentations, 2911.
 - Extractives of Mammea americana L. Part III, identification of new coumarin relatives of mammea B/BA, B/BB, and B/BC having 5,6-annulation and higher oxidation levels, 2241. Part IV, identification of new 7,8-annulated relatives of the coumarins mammea A/AA, A/AB, B/AA, and B/AB, and new members of the 6-acyl family B/AA, B/AB, and B/AC, 2248. Part V, the insecticidal compounds, 2255.
 - Quinoline alkaloids. Part XII, alkaloids and coumarins of *Orixa japonica* Thunb. Identification of a new quinoline alkaloid, orixinone, 2116.

Crotalaria laburnifolia L., subspecies eldomae, pyrrolizidine and seco-pyrrolizidine alkaloids of, 1602.

- Crystal structure of 5-chloro-3-(4-chloro-N-methylanilino)-1-methylindole, 2001.
 - of dimethyl 2,3-dihydro-2-indol-3-ylbenz[b]azepine-3,4-dicarboxylate. Addition reactions of heterocyclic compounds. Part XLVII, 968.
- Cubebanes. Synthesis of cubebane-type sesquiterpenoids and the stereochemistry of cubebol, 1721.
- Cumulenes, cycloaddition reactions of. Part III, diketen as an allene-like system in the reaction with an azomethine oxide, 222.
- **Cyclazine.** Reaction between 3*H*-pyrrolizines and acetylenedicarboxylic esters. Part II, preparation of derivatives of cycl[4,2,2]azine (azepino[2,1,7-cd]pyrrolizine), 844.
- Cyclisation and preparation of some 3-aza-1,5-diketones, 2878.
 - direct, synthesis of 1-benzazocin-6-one derivatives by. Azocine derivatives. Part I, 885.
 - Friedel-Crafts. Part III, synthesis of derivatives of 2(1H)-quinolone (carbostyril) by aluminium chloride-catalysed cycloeliminations of cinnamanilide and related compounds, 1648.
 - heterocyclic, with 6-substituted chrysenes, steric control in. Carcinogenic nitrogen compounds. Part LXXXI, 1932.
 - internuclear. Part XXVII, further studies on the aromatisation of spirocyclohexadienyl dimers, 105. Part XXVIII, free radical reactions of some spirocyclohexadiene lactams, 113. Part XXIX, oxidation of some N-methylbiphenyl-2-carboxamides with persulphate, 118. Part XXX, photolysis of 2-iodo-2'-, -3'-, and -4'-methoxy-N-alkylbenzanilides in benzene, 1150. Part XXXI, cyclisation of 2-(N-alkyl-N-phenylcarbamoyl)phenyl radicals: formation of cyclohexadienones and cyclohexadienyl iodides by scavenging of the spiro-γ-lactam intermediate, 1155. Part XXXII, dienol-benzene and related rearrangements of some spirocyclohexadiene-lactams, 1162.
 - intramolecular, of azido- and nitro-substituted 2-arylbenzo[b]thiophens; new routes to 10H-[1]benzothieno-[3,2-b]indoles. Condensed thiophen ring systems. Part VIII, 2023.
 - involving 3-aminobenzophenones. Oxidative coupling. Part IX, 683.
 - of α -acylamino-acids in the presence of perchloric acid to give 5-oxo- Δ^2 -oxazolinium perchlorates, 909.
 - of amino-acid derivatives to tetrahydro-1-benzazepin-5ones and tetrahydroquinolin-4-ones. Azabenzocycloheptenones. Part XIV, 1803.
 - of 2-aminobenzophenones. Oxidative coupling. Part X, 2524.
 - of 1-arylmethylenesemicarbazides. Anodic oxidation of organic nitrogen compounds. Part I, 1718.
 - transannular, of cyclo-olefinic N-chloro-amines. Synthesis of azabicyclic compounds, 2205.
 - Amine oxidation. Part VI, metal-ion induced dehydrative cyclisation, reduction, and reductive fragmentation of arylethyldimethylamine N-oxides, 228.
 - Reactivity of vinyl sulphonic esters. Part IX, cyclisation of aryloxyvinyl p-bromobenzenesulphonates to benzo-[b]furans, 216. Part X, effect of the substituents on the cyclisation of arylthiovinyl sulphonates to benzo-[b]thiophens, 218. Part XI, behaviour of aminovinyl

- p-bromobenzene sulphonates, 1136. Part XII, cyclisation of arylsulphonylvinyl sulphonates to benzo[b]-thiophen 1,1-dioxides. A novel 1,2-sulphonyl shift, 1355.
- Stereochemistry of cyclic ether formation. Part I, stereoselective intramolecular cyclisation of aliphatic disecondary 1,4-diols and their sulphonate esters to tetrahydrofurans, 2460.
- Cycloaddition of benzonitrile oxide to some cycloalkene and 2-isoxazoline derivatives, regio- and stereo-selectivity in. 2-Isoxazoline derivatives. Part V, 1711.
 - of 1,4-epoxy-1,4-dihydronaphthalene to some dipolar compounds and dienes. Studies of bridged benzoheterocycles. Part III, 2750.
 - reactions of cumulenes. Part III, diketen as an allenelike system in the reaction with an azomethine oxide, 222.
 - reactions of epoxy-bridged cyclic olefins with tropone and tropolone, and photochemical behaviour of the adducts. Studies of bridged benzo-heterocycles. Part II, 1951.
 - Allene cycloadditions. Part III, synthesis of alkylidenecyclobutenes, 1365.
 - Reactions of Group IV organometallic compounds. Part XXVI, insertion reactions of isocyanates and isothiocyanates to N-trimethylsilyl(diphenylmethylene)amine and subsequent [4 + 2] cycloadditions of isocyanates with their adducts, 1678.
 - Studies of heteroaromaticity. Part LIX, further investigations of the cycloaddition reactions of tropone with azo-dienophiles and the photochemical behaviour of the adducts, 783.

Cycloalkenes-see also Olefins.

- Cycloalkenes. Diels-Alder reactions of polyfluorocyclohexa-1,3-dienes. Part V, addition of cycloalkenes to octafluorocyclohexa-1,3-diene and dehydrofluorination of some of the adducts, 1527.
 - 2-Isoxazoline derivatives. Part V, regio- and stereoselectivity in the cycloaddition of benzonitrile oxide to some cycloalkene and 2-isoxazoline derivatives, 1711.
- Cyclobutenes, alkylidene-, synthesis of. Allene cycloadditions. Part III, 1365.
- **Cyclodecenones.** Preparation of *cis* and *trans*-cyclodec-2- and -3-enones and studies of interconversions between them, 1509.
- 3α,5α-Cycloergosta-7,22-dien-6-one, iodoacetoxylation and electrophilic additions across the (22)23-bond of: some stereoselective and regioselective olefin additions, 53.
- Cycloheptapyrazole, (1,2-diaza-azulene), approach to the synthesis of, 1623.
- Cycloheptatrienes. Stereochemistry of the 2:1 [4+2] adducts of tetrachlorocyclopentadienone acetals with cyclohepta-1,3,5-triene, tropone, cyclohexa-1,4-diene, and p-benzoquinone, 195.
- Cyclohexadienes. Diels-Alder reactions of polyfluorocyclohexa-1,3-dienes. Part V, addition of cycloalkenes to octafluorocyclohexa-1,3-diene and dehydrofluorination of some of the adducts, 1527. Part VI, reactions of dodecafluorotricyclo[5,2,2,03,6]undeca-2,5,8-triene with ethylene and alkynes. A synthesis of polyfluorotricyclo[6,2,2,03,7]dodeca-2,4,6,9-tetraenes and 2,3-disubstituted hexafluoronaphthalenes, 1830.
 - Enamine chemistry. Part XVI, reaction of αβ-unsaturated acid chlorides with 1,4-dimorpholinocyclohexa-1,3-diene. Synthesis of 7-morpholino- and 4,7-dimorpholino-indan-1-ones, 1639.

Cyclohexadienes (contd.)

- Internuclear cyclisation. Part XXXII, dienol-benzene and related rearrangements of some spirocyclohexadiene-lactams, 1162.
- Rearrangements in the cycloaddition of tetracyanoethylene to 3-methylenecyclohexa-1,4-dienes and homofulvenes, 2971.
- Stereochemistry of the 2:1 [4 + 2] adducts of tetra-chlorocyclopentadienone acetals with cyclohepta-1,3,5-triene, tropone, cyclohexa-1,4-diene, and p-benzo-quinone, 195.
- Cyclohexadienones. Internuclear cyclisation. Part XXXI, cyclisation of 2-(N-alkyl-N-phenylcarbamoyl)phenyl radicals: formation of cyclohexadienones and cyclohexadienyl iodides by scavenging of the spiro-γ-lactam intermediate, 1155.
- Cyclohexanes. Deamination of amino-substituted cyclohexane-methanols and -carboxylic esters, 1727.
- Cyclohexene, 4-vinyl-, and cyclopentadiene, a minor adduct from the Diels-Alder reaction of: 4-vinyltricyclo-[6,2,1,0^{2,7}]undec-9-ene, 1647.
- Cyclohexenes. A new synthesis of ethyl 2-methyl-4-oxocyclohex-2-enecarboxylate (Hagemann's ester) and its methyl and t-butyl analogues, 602.
 - Cyclohexenone derivatives. Part VI, C-3 and C-1 alkylation of Hagemann's ester (ethyl 2-methyl-4-oxocyclohex-2-enecarboxylate) with alkyl halides and Michael acceptors, 1836.
 - Unsaturated nitrogen compounds containing fluorine. Part II, the reactions of hexafluoroacetone azine with cis- or trans-but-2-ene and cyclohexene, 1059.
- Cyclohexylamine and dicyclohexylamine, photo-oxidation of Reactions of organic peroxides. Part XVIII, 13.
- Cyclohexylamine, N-methyl-, reactions of 2-ethyl- and 2-benzyl-1,4-naphthoquinone with, 2046.
- Cyclo-octene. One-step synthesis of cis-5,6-dideuterio-ciscyclo-octene and its thermal stability towards concerted, intramolecular transfer of hydrogen, 342.
- Cyclopentadiene and 4-vinylcyclohexene, a minor adduct from the Diels-Alder reaction of: 4-vinyltricyclo-[6,2,1,0^{2,7}]undec-9-ene, 1647.
- **Cyclopentadienones.** Photoconversion of 2,6-bis(alkylthio)-3,5-diphenyl-4*H*-thiopyran-4-ones into 3,4-bis(alkylthio)-2,5-diphenylcyclopentadienones, 1203.
 - Stereochemistry of the 2:1 [4 + 2] adducts of tetrachlorocyclopentadienone acetals with cyclohepta-1,3,5triene, cyclohexa-1,4-diene, and p-benzoquinone, 195.
- Cyclophanes, heterocyclic. Part I, thiacyclophanes from thiols. 1705.
 - cleavage of chrysanthemic acid relatives to santolinyl, artemisyl, and lavandulyl structures: acid-catalysed and biosynthetic experiments, 642.
 - steroidal, synthesis of, 2423.
- Cyclopropenoids, fatty, reactions with hydrogen halides and halogens, 1750.
- Cyclopropyl ketones. Acid-catalysed rearrangements of some spiro cyclopropyl ketones, 2982.
- Cyphomandra betacea Sendt., alkaloids of, 2017.
- Cysteine. Nitro-heteroaromatic derivatives of amino-acids and peptides. Part IV, a circular dichroic method for the selective determination of cysteinyl residues, 1182.
- Cytosine. Synthesis of some 1-substituted cytosine and uracil derivatives, 2385.
- Cytotoxic compounds. Part XIV, reactions of the bismethanesulphonates of 3-arylthiopropane-1,2-diols and of

2-arylthiopropane-1,3-diols with nucleophiles, 2060. Part XV, reactions of the methanesulphonates of 1-arylthiopropan-2-ols and of 2-(2,4-dinitrophenylthio)propan-1-ol with nucleophiles, 2067.

D

- Daphnandra species, alkaloids of. Part XI, some dibenzop-dioxin-type biscoclaurine alkaloids from an unnamed species. The structure of micranthine, 2884.
- **Deamination** of amino-substituted cyclohexane-methanols and -carboxylic esters, 1727.
 - of methyl 4-amino-4,6-dideoxy-2,3-O-isopropylidene-α-L-talo- and -manno-pyranosides with nitrous acid, 315.
- **Decarbonylation** reaction, new; an N-aminopyridone-to-pyridazine rearrangement. Reactive intermediates. Part XVIII, 77.
- **Deoxyerythrostominol, deoxyerythrostominone,** and erythrostominone, structures of. Pigments of *Gnomonia erythrostoma*. Part I, 380.
- Deuterium. Hindered rotation in xanthenyl-type radicals, 2418.
 - Hydrogenolyses of 3-hydroxycholest-4-enes by mixed hydrides, 2010.
 - Mass spectrometry of bisbenzylisoquinoline alkaloids. Part I, alkaloids derived from coclaurine units joined tail-to-tail, 592. Part II, alkaloids derived from one coclaurine and one isococlaurine unit, 597. Part III, alkaloids derived from coclaurine units joined head-to-tail, 599.
 - 220 MHz Nuclear magnetic resonance analysis and selective deuteriodeprotonation of benzo[a]pyrene and 6-methylbenzo[a]pyrene, 1253.
 - One-step synthesis of cis-5,6-dideuterio-cis-cyclo-octene and its thermal stability towards concerted, intramolecular transfer of hydrogen, 342.
 - Studies of enzyme-mediated reactions. Part I, syntheses of deuterium- or tritium-labelled (3S)- and (3R)- phenylalanines: stereochemical course of the elimination catalysed by L-phenylalanine ammonia-lyase, 2355.
 - related to dihydro-1,4-thiazines. Part I, rearrangements involving 1,3-sulphur migrations, 2509.
- Diamantane, chemistry of. Part I, synthesis and some functionalisation reactions, 2691.
- Diaminoguanidine nitrate. Triazines and related products. Part X, a re-examination of the reaction between benzil and diaminoguanidine nitrate, 1221.
- 1,2-Diaza-azulene, a cycloheptapyrazole, approach to the synthesis of, 1623.
- Diazabutadienes, polyhalogeno-, chemistry of. Part IV, synthesis of dihalogeno- and trihalogeno-diazabutadienes, 2214. Part V, routes to new triazolyl systems: substituted 3-amino-4,5-diacyltriazoles, 2219. Part VI, synthesis and solvolysis of a new group of reactive halides, the imidazolin-2-ylidenehydrazonyl chlorides; a route to 6,7-dihydro-3-aryl-5H-imidazolo[2,1-c]-s-triazoles, 2224.
- Diazafulvenes. Synthesis of N-(4-arylmethylene- Δ^2 -oxazolin-5-ylidene) ammonium salts and their conversion into 5-imino- Δ^2 -oxazolines and 1,3-diazafulvenes, 1140.
- **Diazaindenes.** Synthesis and stability of 2-methyl-2,4-diaza- and 2-methyl-2,5-diazaindene (2-methyl-pyrrolo-[3,4-b]pyridine and -pyrrolo[3,4-c]pyridine), 2485.
- Diaziridine, a novel synthesis of, 485.

- Diazirinecarboxamides and diazo-amides, photochemical interconversion of some, 2034.
- **Diazoalkanes**, reactions of aromatic sulphines with. Sulphines. Part IV, 2490.
- Diazo-amides and diazirinecarboxamides, photochemical interconversion of some, 2034.
- 1,5-Diazocine, octahydro-3,7-dimethoxy-1,5-diphenyl-, rearrangement of the dihydrobromide of, 1209.
- Diazoethanes, acyl-, influence of catalysts on the rearrangement of, 3020.
- α-Diazo-ketones, decomposition of: the oxiren-oxocarbene equilibrium, 2623.
- Diazonium compounds. Formation of N-methylbenzanilide in the decomposition of 2-(N-methyl-N-phenylcarb-amoyl)benzenediazonium fluoroborate in acetic acid, 1170.
 - Novel redox reactions of diazonium fluoroborates. The formation of copper salt—azo-compound complexes: water-induced free radical aromatic arylation, 2555.
- **Dibenzoazepines.** Novel aromatic systems. Part IX, synthesis and substitutions of dibenzo[b, f]azepin-2-one, 539.
- **Dibenzo**[b,f][1,4]diazocine, 5,6,11,12-tetrahydro-, some derivatives of, 1964.
- Dibenzo[b,h]fluoreneones. Reactions of 2-ethyl- and 2-benzyl-1,4-naphthoquinone with N-methylcyclohexylamine, 2046.
- Dibenzophospholium salts and ylides. Preparation, properties, and Wittig olefin synthesis, 2713.
- 10,11-Didehydrostrychnidine, 1068.
- Diels-Alder reaction of 4-vinylcyclohexene and cyclopentadiene, a minor adduct from: 4-vinyltricyclo-[6,2,1,0^{2,7}]undec-9-ene, 1647.
 - of 2,1-benzisothiazoles. Chemistry of 2,1-benzisothiazoles. Part V, 935.
 - of polyfluorocyclohexa-1,3-dienes. Part V, addition of cycloalkenes to octafluorocyclohexa-1,3-diene and dehydrofluorination of some of the adducts, 1527. Part VI, reactions of dodecafluorotricyclo[5,2,2,0^{2,6}]undeca-2,5,8-triene with ethylene and alkynes. A synthesis of polyfluorotricyclo[6,2,2,0^{2,7}]dodeca-2,4,6,9-tetraenes and 2,3-disubstituted hexafluoronaphthalenes, 1830.
 - Addition reactions of heterocyclic compounds. Part XLVII, formation of benzazepines from indoles with dimethyl acetylenedicarboxylate in acetonitrile; crystal structure of dimethyl 2,3-dihydro-2-indol-3-ylbenz-[b]azepine-3,4-dicarboxylate, 968.
- Dienes. Arylazo-glycenosides. Part II, additions of dienes and dimethylsulphoxonium methylide to some 2- and 3-arylazo-derivatives of methyl 4,6-O-benzylidene-2,3-dideoxy-D-hex-2-enopyranosides, 2611.
 - Overcrowded molecules. Part VIII, addition of diphenylketen to (Z)-2-benzylidene-3-dipyenylmethylene-2,3dihydro-5-methylbenzofuran, 1839.
 - Reaction of diphenylmethylene with non-conjugated dienes, 507.
 - Studies of bridged benzo-heterocycles. Part III, cyclo-additions of 1,4-epoxy-1,4-dihydronaphthalene to some dipolar compounds and dienes, 2750.
 - Synthesis of dialkyl adducts of activated olefins and dienes, 286.
- Dienol-benzene and related rearrangements of some spirocyclohexadiene-lactams. Internuclear cyclisation. Part XXXII, 1162.

- Dienone-phenol rearrangement. Studies on the syntheses of heterocyclic compounds. Part CDLIV, abnormal dienone-phenol rearrangement of procularine, 394.
- Diols. Circular dichroism of the $n \longrightarrow \pi^*$ band of cyclic thionocarbonates. Part II, studies on the thionocarbonates of some acyclic vicinal diols, 273.
 - Cytotoxic compounds. Part XIV, reactions of the bismethanesulphonates of 3-arylthiopropane-1,2-diols and of 2-arylthiopropane-1,3-diols with nucleophiles, 2060.
 - Stereochemistry of cyclic ether formation. Part I, stereoselective intramolecular cyclisation of aliphatic disecondary 1,4-diols and their sulphonate esters to tetrahydrofurans, 2460.
- 1,4-Dioxans, halogeno-, and their derivatives. Part VI, 4,4',5,5'-tetrachlorobi-1,3-dioxolan-2-yl, 177.
- 1,3-Dioxolan-4-one, 5,5-biscarboxymethyl-2-trichloromethyl-. Citric acid chloralide, 611.
- Diphenylamine derivatives, rearrangements of. Part III, the Reilly-Hickinbottom rearrangement, 2579.
- Diphenylmethylene, reaction with non-conjugated dienes, 507.
- 1,3-Dipolar character of six-membered aromatic rings. Part III, 2-methyl-3-oxidoisoquinolinium. A novel route to benzotropones, 2054.
- Diquat and paraquat, pyridones derived from. Bipyridylium quaternary salts and related compounds. Part IV, 138.
- cis-Disalicylide, and flavones containing a chromeno[4,3-b]-chromen nucleus, synthesis of, 2007.
- (—)-Discretine (2,10,11-trimethoxy-13aα-berbin-3-ol), total synthesis of, 2834.
- Dithians. 3-Heteraglutaraldehydes. Part III, the 1,2-dithian-4,5-diols and tetrahydrothiophen-3,4-diols and their oxidation by periodate, 2795.
- Dithiocarbamates, N-aryl-, preparation of aryl isothiocyanates by pyrolysis of, 88.
- Dithiocarbamate series, studies in. Part IV, photolysis of some 4-hydroxybenzyl dithiocarbamates, 2658. Part V, reactions of some N-(4-hydroxybenzyl)-piperidines and -pyrrolidines with carbonyl sulphide, 2660.
- Dithioles. Studies of heterocyclic compounds. Part XI, 1-oxa-6,6a-dithia-2-azapentalenes, 1-oxa-6,6a-diselena-2-azapentalenes, and 3-nitromethylene-3H-1,2-dithioles 1360.
 - The dithiole series. Part V, reactions of 1,2-dithiole-3-thiones and 1,3-dithiolan-2-thiones with acetylenic esters and with benzyne, 41.
- 1,2-Dithiolium salts. Reaction of nucleophiles with some isothiazolium and 1,2-dithiolium salts, 2305.
- Dyes. Model studies for azo dye carcinogenesis, 447.
- Dypnopinacol. Part II, tautomerism of 4-methyl-2,4,6-triphenylcyclohexa-2,6-dienyl phenyl ketone (isodypnopinacolone), 1372. Part III, the photochemistry of 4-methyl-2,4,6-triphenylcyclohexa-2,6-dienyl phenyl ketone (isodypnopinacolone), 1374. Part IV, tautomerism of α-and β-photodypnopinacolones (6-exo- and 6-endo-methyl-1,3,6-triphenylbicyclo[3,1,0]hex-2-en-2-yl phenyl ketone), 1380.

E

- (\pm)-Eburnamine, (\pm)-21-epi-eburnamine, (\pm)-homoeburnamenine, and (\pm)-21-epi-homoeburnamenine, synthesis of, 2776.
- Echinocystic acid and primulagenin A, synthesis of, 2994.

 E. coli. Purine studies. Part VII, synthesis of purines as amplifiers of phleomycin against E. coli., 1819.

- Electrochemistry. Electrochemical reactions. Part XI, reduction of apoverbenone (6,6-dimethylnorpin-3-en-2-one), 2529.
- reduction of fluorinated aromatic carboxylic acids, 184.
- Electrocyclic reactions, intramolecular. Part II, reactions of 1,5-diphenylpenta-1,4-dien-3-one, 2271.
- Electron impact fragmentation, synthesis, and properties of fluorinated 1-arylbiguanides, 278.
- Electrophilic substitution at phosphorus: reactions of diphenylphosphinyl systems with carbonyl compounds, 2377.
- substitution reactions and N-methylation of octa-alkylporphins, octaethylchlorin, and metalloporphins, 1789. Ellipticine, a new synthesis of, 2264.
- **Elsinoe** species, pigments of. Part VI, a simple synthesis of a related perylenequinone, 83.
- Emodins. Synthesis of valsarin and 5,7-dichloroemodin, 1466.
- Enamines, action of isoxazol-5-ones on, 1240.
 - reaction of aromatic nitroso-compounds with. Part I, reaction of nitrosobenzene with 1-morpholin-1-ylcyclohexene, 2521.
 - reactions of benzofurazan 1-oxides with, 965.
 - reactions of, with benzylidene ketones. Part II, 1549. 10,11-Didehydrostrychnidine, 1068.
 - Enamine chemistry. Part XIV, reaction of αβ-unsaturated acid chlorides with tertiary enamino-ketones and -esters, 1038. Part XVI, reaction of αβ-unsaturated acid chlorides with 1,4-dimorpholinocyclohexal,3-diene. Synthesis of 7-morpholino- and 4,7-dimorpholino-indan-1-ones, 1639.
 - Reaction of prop-2-ene-1-sulphonyl chloride with enamines: vinylthietan 1,1-dioxides and allylsulphonyl enamines as precursors of thiopyran 1,1-dioxides, 282.
- Enolates. Total synthesis of (\pm) -ethyl acorate $\{(\pm)$ -ethyl-(3RS)-3-[(1SR,4SR)-1-isobutyryl-4-methyl-3-oxocyclohexyl]butyrate $\}$ and (\pm) -epiacoric acid. An application of the generation and alkylation of a specific enolate, 1186.
- Enols. Terpenoids. Part III, the enolisation—ketonisation and optical rotatory dispersion of the *ent*-kauran-15-ones and 13β-kauren-15-ones, 986.
- Enones, bicyclic δ -hydroxy- $\alpha\beta$ -, base-catalysed rearrangements of. Part V, 1516.
 - Studies on the syntheses of heterocyclic compounds. Part CDLXVI, synthesis of narwedine-type enones by photochemical cyclisation, 1513.
- Enzymes. Specific enzyme inhibitors in vitamin biosynthesis. Part I, the synthesis of 8-substituted pyrido[2,3-d]pyrimidines, 1041.
 - Studies of enzyme-mediated reactions. Part I, syntheses of deuterium- or tritium-labelled (3S)- and (3R)- phenylalanines: stereochemical course of the elimination catalysed by L-phenylalanine ammonia-lyase, 2355. Part II, stereochemistry of the elimination of ammonia from L-tyrosine catalysed by the enzyme from maize, 2364.
 - Synthesis of some 4-pyridylpyruvic acids as potential lactate dehydrogenase inhibitors, 2506.
 - Triazines and related products. Part IX, potential irreversible dihydrofolate reductase inhibitors: 2,4-diamino-s-triazines with a masked covalent labelling group, 295.
 - Use of a poly(allyl carbonate) for the preparation of active, water-insoluble derivatives of enzymes, 2568.

- **Epiacoric** acid. A total synthesis of (\pm) -ethyl acorate $\{(\pm)$ -ethyl(3RS)-3-[(1SR,4SR)-1-isobutyryl-4-methyl-3-oxocyclohexyl]butyrate} and (\pm) -epiacoric acid. An application of the generation and alkylation of a specific enolate, 1186.
- Epicamphor derivatives, optical rotatory dispersion and circular dichroism data for some, 351.
- Epoxidation, base-catalysed, of androst-4-en-6-ones, 2051. competitive, during the hydridodemercuration of β-mercurated dialkyl peroxides with sodium borohydride. Oxymetallation. Part III, 2433.
- Epoxides of lanosterol and some related compounds, 2231.

 Meliacins (limonoids). Acid-catalysed reactions of meliacin epoxides, 1084.
- Eremophilane sesquiterpene group, synthetic experiments in. Synthesis of (\pm) -7-epi-nootkatone and partial synthesis of valerianol. The structure of nardostachone, 2193.
- **Ergocalciferol.** Synthesis of [4-14C]ergosterol and [4-14]C-ergocalciferol, 2980.
- Ergosta-7,22,24(28)-trien-3β-ol, the synthesis and metabolism in *Saccharomyces cerevisiae* of. Biosynthesis of terpenes and steroids. Part VIII, 1231.
- Ergosterol. [G-3H]Ergosterol; location of tritium in rings A and B, 1915.
 - Location of tritium in [1-3H]ergosterol, 244.
 - Synthesis of [4-14C]ergosterol and [4-14C]ergocalciferol, 2980.
- Erythrostominone, deoxyerythrostominone, and deoxyerythrostominol, structures of. Pigments of Gnomonia erythrostoma. Part I, 380.
- Erythroxylon species, constituents of. Part VII, diterpenoids from Erythroxylon australe, 1996.
- Esters. 1,3-Elimination with rearrangement during ester pyrolysis. A simple route to protoadamantene and 2,4-didehydroadamantane, 2533.
 - Enamine chemistry. Part XIV, reaction of $\alpha\beta$ -unsaturated acid chlorides with tertiary enamino-ketones and -esters, 1038.
 - Oxymetallation. Part IV, reaction of derivatives from the t-butylperoxymercuration of αβ-unsaturated esters and ketones with sodium borohydride, 2787.
 - Reaction between 3*H*-pyrrolizines and acetylenedicar-boxylic esters. Part I, preparation of 3-(alkoxy-carbonylmethylene)-3*H*-pyrrolizines, 840. Part II, preparation of derivatives of cycl[4,2,2]azine (azepino[2,1,7-cd]pyrrolizine), 844. Part III, the photochemical reaction, 2517.
 - of unsaturated tetra- and tri-esters with hydrazine hydrate and semicarbazide hydrochloride, 1022.
- Estranones. Studies in the steroid group. Part LXXXII, the preparation of nine mono- and eight di-oxoandro-stanes, 5α -estran-17-one, and 5α -pregnane-2,20-dione, 492.
- Ethers. Experiments on the synthesis of tetracycline. Part XI, oxidation of ketone acetals and ethers by hydride transfer, 542.
 - Novel macrocyclic polysulphur compounds. 7,15,17,19-Tetra-alkoxy-2,3,4,5,10,11,12,13-octathiatricyclo-[12,2,2,2^{6,9}]eicosa-6,8,14,16,17,19-hexaenes and 2,3,7,8tetra-alkoxythianthrens; products of the catalysed reaction of aromatic ethers and sulphur monochloride, 1687.
 - Stereochemistry of cyclic ether formation. Part I, stereoselective intramolecular cyclisation of aliphatic disecondary 1,4-diols and their sulphonate esters to tetrahydrofurans, 2460.

Ethers (contd.)

Structure and synthesis of 2-hydroxy-4-methoxy-6-methylphenyl 3-hydroxy-5-methylphenyl ether (LL-V125a), a fungal diaryl ether, 1200.

The allyl ether as a protecting group in carbohydrate chemistry. Part III, the but-2-enyl ether group, 1535. Ethylenes—see also Olefins.

asymmetric diaryl-, reactions with. Part XV, dimerisation of 1,1-bis-p-alkoxyphenylethylenes, 2839.

Diels-Alder reactions of polyfluorocyclohexa-1,3-dienes. Part VI, reactions of dodecafluorotricyclo[5,2,2,0²,6]-undeca-2,5,8-triene with ethylene and alkynes. A synthesis of polyfluorotricyclo[6,2,2,0²,7]dodeca-2,4,6,9-tetraenes and 2,3-disubstituted hexafluoronaphthalenes, 1830

Europium. Application of tris(dipivaloylmethanato)europium(III) to the assignments of the methyl resonances of triterpenes related to serratenediol [C(14a)-homo-27-norgammacer-14-ene-3β,21α-diol], 1682.

Configurations of the 5-methyladamantan-2-ols and the 2,5-dimethyladamantan-2-ols, 2648.

Meliacins (limonoids). Tris(dipivalomethanato)europium-induced upfield and downfield shifts in the nuclear magnetic resonance spectra of the meliacins, 653.

Studies in the norbornene series. Part I, elucidation of the structure of norbornene derivatives by use of the nuclear magnetic resonance shift reagent tris(dipivaloylmethanato)europium(III), the nuclear Overhauser effect, and mass spectrometry, 1500.

Extrusion processes, two-fold, olefin synthesis by. Part I, preliminary experiments, 305.

F

Ferrocenes. Organometallic derivatives. Part IV, the lithiation of ferrocenylmethyl phenyl sulphone and the cleavage of carbon-sulphur bonds by aniline, 2502.

Fibrinogen, synthesis of some tri-, tetra-, and penta-peptide sequences of, by the picolyl ester method, 1452.

Flavin series, studies in. Part XVII, 1564.

Flavipucine (3'-isovaleryl-6-methylpyridine-3-spiro-2'-oxiran-2(1H),4(3H)-dione], an antibiotic from Aspergillus flavipes, 2071.

Synthesis of a flavipucine reduction product, 2962.

Flavofungin: a mixture of 13,15,17,19,21,23,25,27-octahydroxy-31-isopropyl-14-methyl- and 13,15,17,19,21,23,-25,27-octahydroxy-14-methyl-31-s-butyl-hentriaconta-2,4,6,8,10,28-hexaen-31-olide, 1848.

Flavoglaucin. New metabolic products of Aspergillus flavus. Part II, asperflavin, anhydroasperflavin, and 5,7-dihydroxy-4-methylphthalide, 2406.

Flavones containing a chromeno [4,3-b] chromen nucleus, and cis-disalicylide, synthesis of, 2007.

Fluoranthene, 3-methyl-, Friedel-Crafts acetylation of, 2739.

3-methyl-, nitration of, 755.

Fluorine compounds. Aromatic polyfluoro-compounds. Part LIV, copper-assisted nucleophilic displacement reactions of pentafluorohalogenobenzenes, 763.

Aryne chemistry. Part XXX, approaches to the synthesis of 9-alkyl- and 9,10-dialkyl-1,2,3,4,5,6,7,8-octafluoro-9,10-dihydro-9,10-o-benzenoanthracenes (9-alkyl- and 9,10-dialkyl-1,2,3,4,5,6,7,8-octafluorotriptycenes), 2372.

Chemical modification of trehalose. Part XI, 6,6'-dideoxy-6,6'-difluoro-αα-trehalose and its galacto-analogue, 2513.

Diels-Alder reactions of polyfluorocyclohexa-1,3-dienes. Part V, addition of cycloalkenes to octafluorocyclohexa-1,3-diene and dehydrofluorination of some of the adducts, 1527. Part VI, reactions of dodecafluorotricyclo[5,2,2,0^{2,6}]undeca-2,5,8-triene with ethylene and alkynes. A synthesis of polyfluorotricyclo[6,2,2,0^{2,7}]-dodeca-2,4,6,9-tetraenes and 2,3-disubstituted hexafluoronaphthalenes, 1830.

Electrochemical reduction of fluorinated aromatic carboxylic acids, 184.

Fluorinations with potassium tetrafluorocobaltate(III). Part II, fluorination of ketones, 2277.

N-Fluoro-compounds. Part IV, photochemical and fluoride-initiated reactions between perfluoro-N-fluoro-piperidine and perfluoropropene, 1098.

Fluorodenitration of some mildly activated nitro-compounds, 2671.

Nitroxide chemistry. Part III, photolysis of bistrifluoromethyl nitroxide and some reactions of the major product, perfluoro-(2,4-dimethyl-3-oxa-2,4-diazapentane), 1449.

Novel redox reactions of diazonium fluoroborates. The formation of copper salt—azo-compound complexes: water-induced free radical aromatic arylation, 2555.

Organic reactions of fluoro-oxy-compounds. Fluorination of griseofulvin, 2889.

Organosilicon chemistry. Part IX, reaction of bis(trimethylsilyl)mercury with some polyfluoro-olefins, 847.

Perfluoroalkyl derivatives of sulphur. Part X, the reaction of polyfluoromonoiodoalkanes with dimethyl sulphide to give methyl polyfluoroalkyl sulphides, 155. Part XI, the reaction of polyfluoromonoiodoalkanes with dimethyl disulphide, 159. Part XII, the reaction of heptafluoro-1-iodopropane with ethyl methyl sulphide, methyl trifluoromethyl sulphide, and methanethiol, 1506. Part XIII, reaction of polyfluoromonoiodoalkanes with diethyl disulphide and of pentafluoroiodobenzene with bis(trifluoromethyl)disulphide, 2180. Part XIV, the reactions of tetrafluoro-1,2-di-iodoethane and octafluoro-1,4-di-iodobutane with dimethyl sulphide and dimethyl disulphide, 2438.

Photochemically initiated reactions of bistrifluoromethyl disulphide with olefins, 34.

Polyfluoroalkyl derivatives of nitrogen. Part XXXVI, photochemical reaction of N-bromo- and N-chlorobistrifluoromethylamine with cis- or trans-but-2-ene, and the synthesis of 1,2-di(bistrifluoromethylamino)-difluoroethylene and 2-bromo-1,2-difluoro-NN-bistrifluoromethylvinylamine, 1877. Part XXXVII, reaction of N-bromobistrifluoromethylamine with propene under ionic and free-radical conditions, 1880.

Polyfluoroaryl organometallic compounds. Part XV, synthesis and rearrangement of polyhalogenoaryl α -diketones, 2464. Part XVI, reactions of organolithium compounds with halogenated benzils, 2469.

Polyfluorobicyclo[2,1,1]heptanes. Part V, syntheses using bridgehead carbanions generated by removal of bridgehead hydrogen with aqueous bases, 937.

Reactions involving fluoride ion. Part IV, synthesis and rearrangement of perfluoroisopropylpyridines, 1281. Part V, synthesis of perfluoroisopropylquinolines, 1286.

- Fluorine (contd.)
 - Regiospecific syntheses of modified steroid hormones. Part II, 4-fluoro-17β-oestradiol and -oestrone, 2297. Part III, 2-fluoro-oestrone and -17β-oestradiol, 2300.
 - Synthesis, properties, and electron impact fragmentation of fluorinated 1-arylbiguanides, 278.
 - Thermal cyclisation of *trans-o*-fluorocinnamic acids to coumarins. An apparent similarity between mass spectral and thermal fragmentations, 2911.
 - Unsaturated nitrogen compounds containing fluorine. Part II, the reactions of hexafluoroacetone azine with cis- or trans-but-2-ene and cyclohexene, 1059.
 - Valence-bond isomer chemistry. Part III, some addition and nucleophilic substitution reactions of hexafluoro-bicyclo[2,2,0]hexa-2,5-diene, 2170.
- Formylation. Friedel-Crafts acylations of aromatic hydrocarbons. Part XIII, syntheses of methyl-substituted naphthalenes. Some anomalous Gattermann formylation reactions, 892.
- Fourier studies, ¹³C. The configurational dependence of the carbon-13 chemical shifts in santonin derivatives, 299.
- Free-radicals—see also Nitroxides.
 - Homolytic substitution of halogenobenzenes by arylthioand arylsulphonyl radicals, 2817.
 - Internuclear cyclisation. Part XXVIII, free radical reactions of some spirocyclohexadiene lactams, 113.
 - Novel redox reactions of diazonium fluoroborates. The formation of copper salt-azo-compound complexes: water-induced free radical aromatic arylation, 2555.
 - Polyfluoroalkyl derivatives of nitrogen. Part XXXVII, reaction of N-bromobistrifluoromethylamine with propene under ionic and free-radical conditions, 1880.
 - Reactivity of thieno[3,2-b]thiophen and thieno[2,3-b]-thiophen with phenyl radicals, 93.
- Freundler reaction. Chloro-derivatives of indazolo[2,3-a]-[3,1]benzoxazin-5-one and indazolo[2,1-a]indazole-6,12-dione, 2498.
- Friedel-Crafts acetylation of 3-methylfluoranthene, 2739.
 - acylations of aromatic hydrocarbons. Part XIII, syntheses of methyl-substituted naphthalenes. Some anomalous Gattermann formylation reactions, 892. Part XIV, monoacetylation and monobenzoylation of 2,7-dimethylnaphthalene, 1442. Part XV, acetylation of 2-methylnaphthalene, 1781.
 - cyclisations. Part III, synthesis of derivatives of 2(1H)-quinolone (carbostyril) by aluminium chloride-catalysed cycloeliminations of cinnamanilide and related compounds, 1648.
- Fungi and lichens. Part X, 14α -taraxerane, 2827.
 - chemistry of. Part VIII, constituents of Valsaria rubricosa and the identification of papulosin with valsarin, 1464.
 - extractives of. Part III, introduction of a (Z)-17(20)-double bond into a tumulosic acid derivative, 2260.
 - Fungal products. Part II, structure and stereochemistry of the acid C₁₈H₁₆O₅, a degradation product of wortmannin, 2892. Part III, structure of wortmannin and some hydrolysis products, 2898.
- Furan, reaction of allyl and benzyl alcohols, and their toluene-p-sulphonates, with, 1617.
- Furans, reaction of phthalimidonitrene with, 2728.
 - Acylarylnitrosamines. Part VI, anomalous reactions with 2,5-dimethylfuran: the formation of 2-benzyl-5-methyfurans and 3-acetyl-1-aryl-4-arylazo-5-methylpyrazoles, 1304.

- Photochemical transformations. Part VI, the photorearrangement of 2-nitrofuran and 2-nitropyrrole, 2527
- Stereochemistry of cyclic ether formation. Part I, stereoselective intramolecular cyclisation of aliphatic disecondary 1,4-diols and their sulphonate esters to tetrahydrofurans, 2460.
- Synthesis of dihydrofurobenzodioxins by reaction of tetrachloro-1,2-benzoquinone with some 2,3-diphenylfurans, 532.
- of tetronic acid [furan-2(3H),4(5H)-dione] and three analogues, 1225.
- Furazans and furazan oxides. Part I, synthesis and reactions of some strained furazan N-oxides, 1587.
 - Nitro-steroids. Part VI, structure of 5α -cholestano-[2,3-c]furazan 2'-oxide, and the preparation of 6-nitro- 5α -cholestan-7-ones, 655.
- Furobenzodioxins, dihydro-, synthesis of, by reaction of tetrachloro-1,2-benzoquinone with some 2,3-diphenyl-furans, 532.
 - of phenanthro [9,10-b] furans by the photolysis of, 536.
- **Furopyridinones.** Syntheses with isoxazoles. Part II, rearrangement of isoxazolo[2,3-a]pyridinium salts into 5,6-dihydro-4*H*-furo[3,2-*b*]pyridin-2-ones, 2441.
- Fusidic acid, conversion of lanosterol into a compound with the carbon skeleton of, 1243.

G

- Gastrins. Polypeptides. Part XIII, peptides related to the C-terminal tetrapeptide sequence of the gastrins by complementary reading of the genetic message, 1407.
- Gatterman formylation reactions, some anomalous. Friedel-Crafts acylations of aromatic hydrocarbons. Part XIII, syntheses of methyl-substituted naphthalenes,
- Genetic message, peptides related to the C-terminal tetrapeptide sequence of the gastrins by complementary reading of. Polypeptides. Part XIII, 1407.
- Gibberella fujikuroi, formation of (-)-kaurene in a cellfree system from, 2382.
 - new metabolites of. Part XIX, 3β , 7β -dihydroxykaurenolide, 1117.
- Gibberellins, synthesis of compounds related to. Part I, methyl 3-methoxy- 6β -methyl-16-methylene- $9\alpha H$ -gibba-1(10),2,4-triene-4-carboxylate, 1256.
 - Studies in terpenoid biosynthesis. Part IX, the sequence of oxidation on ring B in kaurene-gibberellin biosynthesis, 1892.
- Glutaconimides, dicyano-, and cyano-amides, derived from pyridine aldehydes, 2946.
- **Glyoxal.** Substituted 3-anilinoindoles and anilinoacetanilides from the reaction of glyoxal with N-alkylanilines: crystal structure of 5-chloro-3-(4-chloro-N-methylanilino)-1-methylindole, 2001.
- **Gnomonia erythrostoma**, pigments of. Part I, structures of erythrostominone, deoxyerythrostominone, and deoxyerythrostominol, 380.
- Grignard reaction, a one-step alternative to, 1655.
 - reagents. Pyridazines. Part IV, action of Grignard reagents on 6-methyl- and 4,5-dihydro-6- α -styryl-pyridazin-3(2H)-ones, 1091.
 - Reactions of thiocoumarin with phenylmagnesium bromide and with bromine, 817.

- Griseofulvin, fluorination of. Organic reactions of fluorooxy-compounds, 2889.
- Guanandins. Extractives from Guttiferae. Part XXV, synthesis of the natural 1,5-dioxygenated xanthones, dehydrocycloguanandin, guanandin, isoguanandin, and 5-hydroxy-1-methoxyxanthone, 1382.
- Guanosine. ¹H nuclear magnetic resonance spectroscopic study of some N-methyl and N-acyl derivatives of guanosine. The structure of N,O(2'),O(3'),O(5')-tetra-acetyl-guanosine, 2937.
- Guarea, limonoid extractives from species of. An unusual shielding effect on an acetyl group, 1145.
- Guttiferae, extractives from. Part XXV, synthesis of the natural 1,5-dioxygenated xanthones, dehydrocycloguanandin, guanandin, isoguanandin, and 5-hydroxy-1methoxyxanthone, 1382.
 - Chemical investigation of Ceylonese plants. Part I, extractives of Calophyllum calaba L. and Calophyllum bracteatum Thw. (Guttiferae), 1935.

\mathbf{H}

- Hagemann's ester (ethyl 2-methyl-4-oxocyclohex-2-ene-carboxylate), and its methyl and t-butyl analogues, a new synthesis of, 602.
 - Cyclohexenone derivatives. Part VI, C-3 and C-1 alkylation of Hagemann's ester (ethyl 2-methyl-4-oxocyclohex-2-enecarboxylate) with alkyl halides and Michael acceptors, 1836.
- Hallachrome. Structure of hallachrome: 7-hydroxy-8-methoxy-6-methyl-1,2-anthraquinone, 1614.
- Halogen compounds, organo. Part I, the preparation of 1,4-dibromo-2,3-dimethylbuta-1,3-diene and 1-bromo-4-chloro-2,3-dimethylbuta-1,3-diene, 1399. Part II, reactions of 2,3-dimethylbuta-1,3-diene with chlorine and with iodine monochloride, 1986.
 - Action of sodium and lithium chlorodifluoroacetates on phenanthrene-9,10-quinone, 1056.
 - A one-step alternative to the Grignard reaction, 1655.
 - Aromatic polyfluoro-compounds. Part LIV, copperassisted nucleophilic displacement reactions of pentafluorohalogenobenzenes, 763.
 - Chemistry of polyhalogenodiazabutadienes. Part IV, synthesis of dihalogeno- and trihalogeno-diazabutadienes, 2214. Part V, routes to new triazolyl systems: substituted 3-amino-4,5-diaryltriazoles, 2219. Part VI, synthesis and solvolysis of a new group of reactive halides, the imidazolin-2-ylidenehydrazonyl chlorides; a route to 6,7-dihydro-3-aryl-5H-imidazolo[2,1-c]-s-triazoles, 2224.
 - Condensation of β -dicarbonyl compounds with halogenopyridinecarboxylic acids. A convenient synthesis of some naphthyridine derivatives, 705.
 - Cyclohexenone derivatives. Part VI, C-3 and C-1 alkylation of Hagemann's ester (ethyl 2-methyl-4-oxocyclohex-2-enecarboxylate) with alkyl halides and Michael acceptors, 1836.
 - 2,3-Dihydroquinolin-4(1H)-ones. Part I, halogen-substituted 2,3-dihydroquinolin-4(1H)-ones and their 1-(2-acylethyl) derivatives, 2019.
 - Factors in the formation of isomerically and optically pure alkyl halides. Part IX, reactions of (1-substituted n-alkyl) diphenylphosphinites with hydrogen halides and with halogens, 1595.

- Halogeno-1,4-dioxans and their derivatives. Part VI, 4,4',5,5'-tetrachlorobi-1,3-dioxolan-2-yl, 177.
- Homolytic substitution of halogenobenzenes by arylthioand arylsulphonyl radicals, 2817.
- Hydroxy-steroids. Part XVIII, reactions of 17β -chloro- 16α , 17α -epoxy- 5α -androstane and the preparation of 17α -iodo- 16α , 17α -epoxy- 5α -androstane, 486.
- Lignans and related phenols. Part XIII, halogenated derivatives of podophyllotoxin, 1350.
- Peroxide-initiated addition of 1,1-dibromotetrafluoroethane to ethylene, propene, and 2-methylpropene, 1146.
- Polyfluoroalkyl derivatives of nitrogen. Part XXXVI, photochemical reaction of N-bromo- and N-chlorobistrifluoromethylamine with cis- or trans-but-2-ene and the synthesis of 1,2-di(bistrifluoromethylamino)-difluoroethylene and 2-bromo-1,2-difluoro-NN-bistrifluoromethylvinylamine, 1877. Part XXXVII, reaction of N-bromobistrifluoromethylamine with propene under ionic and free-radical conditions, 1880.
- Polyfluoroaryl organometallic compounds. Part XV, synthesis and rearrangement of polyhalogenoaryl α-diketones, 2464. Part XVI, reactions of organolithium compounds with halogenated benzils, 2469.
- Polyhalogenoallenes. Part IX, reaction of tetrafluoroallene with bistrifluoromethyl nitroxide and with perfluoro(2,4-dimethyl-3-oxa-2,4-diazapentane), 2336.
- Polyhalogeno-aromatic compounds. Part XXII, some reactions of tetrachloro-4-methylsulphonylpyridine and related compounds, 133. Part XXIII, synthesis and reactions of heptachloro-3-lithio-4,4'-bipyridyl, 995. Part XXIV, reaction of chloropyridyl-lithium compounds with nitriles as a route to triazanaphthalenes, 2190.
- Reactions of fatty cyclopropenoids with hydrogen halides and halogens, 1750.
 - of organocopper compounds. Part I, 639.
- Some reactions of 7-chloro-3-methylbenzo[b]thiophen, 1404.
- Stereochemistry of α-halogeno-sulphoxides. Part I, inversion of chirality at the sulphinyl sulphur atom in a reaction not involving the breaking of the sulphinyl bonds at the chiral sulphur atom, 1886.
- Studies in azide chemistry. Part V, synthesis of 4-azido-2,3,5,6-tetrafluoro-, 4-azido-3-chloro-2,5,6-trifluoro-, and 4-azido-3,5-dichloro-2,6-difluoro-pyridine, and some thermal reactions of the tetrafluoro-compound, 2964.
- Synthesis of α-halogeno-sulphoxides, 1883.
- Harmaline (4,9-dihydro-7-methoxy-1-methyl-3*H*-pyrido-[3,4-*b*]indole) and its derivatives, reactions of. Part I, reactions of harmaline with methyl acrylate, 731. Part II, reinvestigation of acetylharmaline, 736.
- Helicobasidin, biosynthesis of. Studies in terpenoid biosynthesis. Part VII, 586.
- Heptane-3,4,5-trione, 2,2,6,6-tetramethyl-, 3015.
- Herqueinone. Naturally occurring compounds related to phenalenone. Part III, the structure of herqueinone and norherqueinone and their relationships with isoherqueinone and isonorherqueinone, 421. Part IV, some transformations and molecular rearrangements of compounds in the herqueinone series, 2990.
- Heterocycles. Addition reactions of heterocyclic compounds. Part XLVII, formation of benzazepines from indoles with dimethyl acetylenedicarboxylate

Heterocycles (contd.)

in acetonitrile; crystal structure of dimethyl 2,3-dihydro-2-indol-3-ylbenz[b]azepine-3,4-dicarboxylate, 968. Part LXVIII, reactions of indoles with dimethyl acetylenedicarboxylate in the presence and absence of solvents, 1569. Part XLIX, reactions of benzimidazoles possessing an activated 2-methylene group with acetylenic esters, 1577. Part L, reactions of 1-alkylbenzotriazoles and benzo[c]cinnolines with dimethyl acetylenedicarboxylate, 2182. Part LI, cyclobuta[b]pyridines from reactions of dimethyl acetylenedicarboxylate with 1-alkyl-1,4-dihydropyridines and the cycloelimination of amide and carboxy-groups, 2918.

- Amino- and dienamino-derivatives formed from adrenocorticol steroids and heterocyclic bases, 502.
- Heterocyclic cyclophanes. Part I, thiacyclophanes from thiols, 1705.
 - imines and amines. Part XII, imino-derivatives of piperazine, 1009. Part XIII, 3,6-dihydrazinopyridazine and the nature of the reaction between 3,6-dimethoxypyridazine and hydrazine, 1483. Part XIV, products from 2,5-di-iminopyrrolidine (succinimidine) and hydrazine, 2346. Part XV, reactions of hydrazines with 1,3-di-iminoisoindoline and related compounds, 2320.
 - rearrangements. Part VI, structure and stereochemistry of a sulphur-bridged tetrahydroazepine and derived sulphoxides, by X-ray crystallography and nuclear magnetic resonance spectroscopy, 357.
 - studies. Part XXVI, cleavage of pyrimido[5,4-e]-astriazin-5(6H)-one by nucleophiles, 247.
- Homolytic aromatic substitution of heterocyclic compounds. Part V, the phenylation of benzo[b]thiophen and benzo[b]furan, 556.
- Organolithium chemistry of N-heterocycles. Part IV, formation of 1,2,4,5-tetrahydro-4,4-diphenyl-2,5-methano-3,1-benzoxazepines from quinolines, 1176.
- Reactions of condensed N-heteroaromatic molecules. Part I, alkylation by thallium(I) ethoxide, 2292.
- Ring transformations involving chloroheterocycles. Part I, reaction of chloronaphthyridines with hydrazine hydrate, 1106. Part II, reaction of 4-chloro-1,8-naphthyridines and 4-chloroquinolines with substituted hydrazines, 1109. Part III, reaction of 4-chloroquinazolines with hydrazines, 1842.
- Studies of bridged benzo-heterocycles. Part II, cyclo-addition reactions of epoxy-bridged cyclic olefins with tropone and tropolone, and photochemical behaviour of the adducts, 1951. Part III, cyclo-additions of 1,4-epoxy-1,4-dihydronaphthalene to some dipolar compounds and dienes, 2750.
 - of heterocyclic compounds. Part XI, 1-oxa-6,6a-dithia-2-azapentalenes, 1-oxa-6,6a-diselena-2-azapentalenes, and 3-nitromethylene-3H-1,2-dithioles, 1360. Part XII, a three-step synthesis of 6a-thia-thiophen from γ-pyrone, 1447.
 - on heterocyclic chemistry. Part XII, tautomerism of α -(5-oxo- Δ^3 -isoxazolin-4-yl)benzylphosphonates, 90. Part XIII, cleavage of 5-benzylamino-oxazoles, photoproducts of N-benzyl-2H-azirine-2-carboxamides, by dialkyl phosphite, 1456.
 - on the syntheses of heterocyclic compounds. Part CDLIII, total synthesis of (±)-ochrobirine, 391. Part CDLIV, abnormal dienone-phenol rearrange-

ment of procularine, 394. Part CDLXII, total photolytic syntheses of aporphine $[(\pm)-N$ -methyllaurotetanine, (\pm) -cassythicine, and (\pm) -pukateine], proaporphine $[(\pm)$ -orientalinone], and morphinandienone $[(\pm)$ -pallidine and (\pm) -salutaridine] alkaloids, 1435. Part CDLXVI, synthesis of narwedine-type enones by photochemical cyclisation, 1513. Part CDLXXV, total syntheses of (-)-O-methylandrocymbine, (-)-kreysigine, and alkaloid CC-10 methyl ether, 2160.

Synthesis of some heterocyclic sulphonium salts, 899. Tellurophen and some of its derivatives, 199.

Useful preparations involving the reactions of nucleophiles with some trimethylammonio-derivatives of nitrogen heterocycles, 1269.

- Heterometra savignii (J. Müller). Naturally occurring quinones. Part XXI, anthraquinones in the crinoids Heterometra savignii (J. Müller) and Lamprometra klunzingeri (Hartlaub), 1291.
- Hexacene, naphthacene, and pentacene sulphides, synthesis, structure, and electrical properties of, 1310.
- Hinsberg reaction, preparation of thiophen esters by, 2079.
- Homoaerothionin and aerothionin: two tetrabromo-spirocyclohexadienylisoxazoles from *Verongia* sponges, 18.
- (\pm)-Homoeburnamenine, (\pm)-21-epi-homoeburnamenine, (\pm)-eburnamine, and (\pm)-21-epi-eburnamine, synthesis of, 2776.
- **Homofulvenes.** Rearrangements in the cycloaddition of tetracyanoethylene to 3-methylenecyclohexa-1,4-dienes and homofulvenes, 2971.
- Homolytic aromatic substitution of heterocyclic compounds. Part V, the phenylation of benzo[b]thiophen and benzo-[b]furan, 556.
 - substitution of halogenobenzenes by arylthio- and arylsulphonyl radicals, 2817.
- c(14a)-Homo-27-norgammacer-14-ene-3β,21α-diol. Application of tris(dipivaloylmethanato)europium(III) to the assignments of the methyl resonances of triterpenes related to serratenediol [c(14a)-homo-27-norgammacer-14-ene-3β,21α-diol], 1682.
- Hop bitter acids, oxidation products of. Part VI, fivemembered ring products from the oxidation of colupulone, 1599.
- Hormones, modified steroid, regiospecific syntheses of.
 Part II, 4-fluoro-17β-oestradiol and -oestrone, 2297.
 Part III, 2-fluoro-oestrone and -17β-oestradiol, 2300.
 Part IV, 4-bromo-oestrone and -17β-oestradiol, 2302.
 Syntheses of the insect juvenile hormone, 361.
- Humulones, deoxy-, synthetic approaches to the; some new 2,2-dimethylchromens from phloroacetophenone, 25.
- **Hydrazine**, NN'-di-isopropyl-, a new reagent for protection of carboxylic acids. Transformations of penicillin. Part II, 929.
 - Carbonyl and thiocarbonyl compounds. Part XIII, 2-aroyl-1,3-benzodioxoles of potential pesticidal activity and their cleavage with hydrazines, 1095.
 - Heterocyclic imines and amines. Part XIII, 3,6-dihydrazinopyridazine and the nature of the reaction between 3,6-dimethoxypyridazine and hydrazine, 1483. Part XIV, products from 2,5-di-iminopyrrolidine (succinimidine) and hydrazine, 2346. Part XV, reactions of hydrazines with 1,3-di-iminoisoindoline and related compounds, 2320.

Hydrazine (contd.)

Reactions of lead(IV). Part XXV, oxidation of some benzyl-substituted hydrazine derivatives, 1692.

of unsaturated tetra- and tri-esters with hydrazine hydrate and semicarbazide hydrochloride, 1022.

Ring transformations involving chloroheterocycles. Part I, reaction of chloronaphthyridines with hydrazine hydrate, 1106. Part II, reaction of 4-chloro-1,8-naphthyridines and 4-chloroquinolines with substituted hydrazines, 1109. Part III, reaction of 4-chloroquinazolines with hydrazines, 1842

3,4,5-Triarylpyrazoles, 1193.

Hydrides, mixed, hydrogenolyses of 3-hydroxycholest-4-enes by, 2010.

Hydrocarbons, acetylenic, the isomerization of. Base-catalysed prototropic isomerization. Part VI, 1653.

aromatic, Friedel-Crafts acylations of Part XIII, syntheses of methyl-substituted naphthalenes. Some anomalous Gattermann formylation reactions, 892. Part XIV, monoacetylation and monobenzoylation of 2,7-dimethylnaphthalene, 1442. Part XV, acetylation of 2-methylnaphthalene, 1781.

Concurrent chlorination and carboxylation of aromatic hydrocarbons with thallium(III) chloride tetrahydrate in carbon tetrachloride, 2268.

Hydrogenation, stereospecific, of (Z)- α -benzoylamino-obenzyloxy[β - 2 H]cinnamic acid, 203.

with palladium precipitated in the presence of the substrate, 554.

Hydrogen bonding, intramolecular, in hydroxy-keto-steroids, 171.

Hydrogen transfer, intramolecular. One-step synthesis of *cis-5*,6-dideuterio-*cis-cyc*lo-octene and its thermal stability towards concerted, intramolecular transfer of hydrogen, 342.

Hydroxyimino- compounds. Photochemical transformations. Part VI, photorearrangement of 2-nitrofuran and 2-nitropyrrole, 2527.

Hydroxylamine, oxidation of some derivatives of. Reactions of lead(Iv). Part XXVI, 1701.

Hydroxylation, microbiological, of steroids. Part IV, the pattern of dihydroxylation of mono-oxygenated 5α-androstanes with cultures of the fungus Calonectiva decora, 2081. Part V, the pattern of hydroxylation of dioxygenated 5α-androstanes with cultures of the fungus Calonectria decora, 2759. Part VI, hydroxylation of simple mono- and di-oxygenated 5α-androstanes and of 3-oxoestranes with the fungus Aspergillus ochraceus, 2930.

I

Imidazoles, 1-glucopyranosyl-, synthesis and hydrolytic stability of, 2202.

purines, and pyrimidines. Part XXXIX, formation of some 5-aminoimidazole-4-carboxylic acid derivatives from ethyl α-amino-α-cyanoacetate, 1715.

some α-D-ribofuranosyl-, related to purine nucleotide precursors, syntheses of, 1773.

Chemistry of polyhalogenodiazabutadienes. Part VI, synthesis and solvolysis of a new group of reactive halides, the imidazolin-2-ylidenehydrazonyl chlorides; a route to 6,7-dihydro-3-aryl-5*H*-imidazolo[2,1-*c*]-s-triazoles, 2224.

Convenient syntheses of 2,4(5)-dialkylimidazoles and 1-methyl-2,4-dialkylimidazoles, 1960.

Direct monobromination of imidazole and N-methylimidazole, 2567.

Reactions of N-(1-cyanoalkyl)alkylideneamine N-oxides with dipolarophiles and nucleophiles. Part I, a novel synthesis of 2,4(5)-dialkyl-5(4)-phenylthioimidazoles, 1955.

Synthesis and oxidation of quaternary salts of 1-aminoimidazoles, 2927.

Imidazolotriazoles. Chemistry of polyhalogenodiazabutadienes. Part VI, synthesis and solvolysis of a new group of reactive halides, the imidazolin-2-ylidenehydrazonyl chlorides; a route to 6,7-dihydro-3-aryl-5H-imidazolo-[2,1-c]-s-triazoles, 2224.

Imides. Overcrowded molecules. Part VII, thermal and photochemical reactions of photochromic (E)- and (Z)-benzylidene(diphenylmethylene)succinic anhydrides and imides, 1321.

Imines and amines, heterocyclic. Part XII, imino-derivatives of piperazine, 1009. Part XIII, 3,6-dihydrazino-pyridazine and the nature of the reaction between 3,6-dimethoxypyridazine and hydrazine, 1483. Part XIV, products from 2,5-di-iminopyrrolidine (succinimidine) and hydrazine, 2346. Part XV, reactions of hydrazines with 1,3-di-iminoisoindoline and related compounds, 2320.

Indanes. Enamine chemistry. Part XVI, reaction of $\alpha\beta$ -unsaturated acid chlorides with 1,4-dimorpholinocyclohexa-1,3-diene. Synthesis of 7-morpholino- and 4,7-dimorpholinoindan-1-ones, 1639.

Some derivatives of indan-1-one. Part II, 151.

Structure of the indene-3-acetic acids. Part II, Reformatsky reactions of 6-benzyloxy-, 5,6-dimethoxy- and 6-methoxy-indan-1-ones, 941.

Indazolo[2,3-a][3,1]benzoxazin-5-one and indazolo[2,1-a]-indazole-6,12-dione, chloro-derivatives of, 2498.

Indazolones. Chemistry of nitro-compounds. Part II, scope and mechanism of the base-catalysed transformations of some NN-disubstituted o-nitrobenzamides, 97.

Indenes, 2-aryl-, a convenient synthesis of, 2732.

Indenoacridines. Carcinogenic nitrogen compounds. Part LXXVIII, some indeno[1,7-bc]-, benz[a]indeno[7,1-hi]-, and benz[c]indeno[7,1-hi]-acridines, 1261.

Indenoindoles, penta- and hexa-cyclic. Carcinogenic nitrogen compounds. Part LXXVI, 527.

Indenopyridines. Hydrogenations with palladium precipitated in the presence of the substrate, 554.

Indoles. Addition reactions of heterocyclic compounds. Part LXVII, formation of benzazepines from indoles with dimethyl acetylenedicarboxylate in acetonitrile; crystal structure of dimethyl 2,3-dihydro-2-indol-3-ylbenz[b]azepine-3,4-dicarboxylate, 968. Part XLVIII, reactions of indoles with dimethyl acetylenedicarboxylate in the presence and absence of solvents, 1569.

A new synthesis of ellipticine, 2264.

2-Arylmethylideneindolin-3-ones: stereochemistry and reduction with sodium borohydride, 1607.

Carcinogenic nitrogen compounds. Part LXXXII, polycyclic indoles by means of the Möhlau-Bischler synthesis, 2573.

Configurational and conformational isomerism in 2- γ -picolinylideneindolin-3(2H)-one derivatives, 2415.

Light-induced reactions of α -N-alkylanilino ketones: formation of di-indolylmethanes, 1210.

Indoles (contd.)

Reactions of arenesulphonyl azides with indole and with 1-methylindole, 2411.

of some 1,3-disubstituted indoles and of 3-methylindole with arylsulphonyl azides, 1626.

Substituted 3-anilinoindoles and anilinoacetanilides from the reaction of glyoxal with N-alkylanilines: crystal structure of 5-chloro-3-(4-chloro-N-methylanilino)-1-methylindole, 2001.

Indolizines. Part V, the synthesis of 3-amino- and 3-acetamido-indolizines and their precursors, the 3-azo-, -nitroso-, -nitro-, and -acetyl-indolizines, 2954. Part VI, ring-opening reactions of 3-amino- and 3-nitroso-indolizines, 2958.

Inhibitors. Specific enzyme inhibitors in vitamin biosynthesis. Part I, the synthesis of 8-substituted pyrido[2,3-d]pyrimidines, 1041.

Triazines and related products. Part IX, potential irreversible dihydrofolate reductase inhibitors: 2,4-diamino-s-triazines with a masked covalent labelling group, 295.

Insect juvenile hormone, syntheses of, 361.

Insecticidal compounds. Extractives of Mammea americana L. Part V, 2255.

Intermediates, reactive. Part XVI, dihydrobenz[cd]indazoles and attempted routes to benz[cd]indazole, 68. Part XVII, conversion of peri-substituted azidonaphthalenes into naphthoxazoles, 1,2-dihydrobenz[cd]indazoles and perimidines, 72. Part XVIII, an N-aminopyridone-to-pyridazine rearrangement; a new decarbonylation reaction, 77. Part XIX, the lithium salt of 1-(benzotriazol-1-yl)-4-p-tolylsulphonyltetrazene: a new benzyne precursor, 1315. Part XX, preparation of sulphoximides from sulphoxides and N-amino-lactams, and a study of their fragmentation, 1317.

Iodine, ring opening of (-)-pin-2(10)-ene with, 614.

Internuclear cyclisation. Part XXX, the photolysis of 2-iodo-2'-, -3'-, and -4'-methoxy-N-alkylbenzanilides in benzene, 1150. Part XXXI, cyclisation of 2-(N-alkyl-N-phenylcarbanoyl)phenyl radicals: formation of cyclohexadienones and cyclohexadienyl iodides by scavenging of the spiro-y-lactam intermediate, 1155.

Perfluoroalkyl derivatives of sulphur. Part X, the reaction of polyfluoromonoiodoalkanes with dimethyl sulphide to give methyl polyfluoroalkyl sulphides, 155. Part XI, the reaction of polyfluoromonoiodoalkanes with dimethyl disulphide, 159. Part XII, the reaction of heptafluoro-1-iodopropane with ethyl methyl sulphide, methyl trifluoromethyl sulphide, and methanethiol, 1506. Part XIII, the reaction of polyfluoromonoiodoalkanes with diethyl disulphide and of pentafluoroiodobenzene with bis(trifluoromethyl) disulphide, 2180. Part XIV, reactions of tetrafluoro-1,2-diiodoethane and octafluoro-1,4-di-iodobutane with dimethyl sulphide and dimethyl disulphide, 2438.

Reactions of biphenyl, diphenylmethane, and bibenzyl with acetyl hypoiodite, 180.

Thermal decomposition of oxalate diesters in the presence of iodine, 369.

Iodoacetoxylation and related electrophilic additions across the 22(23)-bond of $3\alpha,5\alpha$ -cycloergosta-7,22-dien-6-one: some stereoselective and regioselective olefin additions, 53.

Iron. Organometallic derivatives. Part IV, the lithiation of ferrocenylmethyl phenyl sulphone and the cleavage of carbon-sulphur bonds by aniline, 2502.

Reaction of 1,2,3-thiadiazoles and 1,2,3-selenadiazoles with nonacarbonyldi-iron, 2165.

Isatin and some amines, reaction between, 124.

Isococlaurine. Mass spectrometry of bisbenzylisoquinoline alkaloids. Part II, alkaloids derived from one coclaurine and one isococlaurine unit, 597.

Isocoumarins. New metabolic products of Aspergillus flavus. Part I, asperentin, its methyl ethers, and 5'-hydroxyasperentin, 2400.

Isocyanates. Reactions of Group IV organometallic compounds. Part XXVI, insertion reactions of isocyanates and isothiocyanates to N-trimethylsilyl(diphenylmethylene)amine and subsequent [4+2] cycloadditions of isocyanates with their adducts, 1678.

Isodypnopinacolone. Dypnopinacol. Part II, tautomerism of 4-methyl-2,4,6-triphenylcyclohexa-2,6-dienyl phenyl ketone (isodypnopinacolone), 1372. Part III, the photochemistry of 4-methyl-2,4,6-triphenylcyclohexa-2,6-dienyl phenyl ketone (isodypnopinacolone), 1374.

Isoherqueinone. Naturally occurring compounds related to phenalenone. Part III, structure of herqueinone and norherqueinone and their relationships with isoherqueinone and isonorherqueinone, 421.

Isoindoles, reactions with acetylenic esters, 904.

Formation of metal octamethyltetrabenzporphyrins from isoindole precursors, 771.

Isoindolines. Chemistry of nitro-compounds. Part III, the intramolecular nucleophilic displacement of aromatic nitro-groups by carbanions, 835.

Heterocyclic imines and amines. Part XV, reactions of hydrazines with 1,3-di-iminoisoindoline and related compounds, 2320.

Isoline, structure and absolute configuration of. The Senecio alkaloids, 2339.

Isomerism of semicarbazones of 6-hydroxy-4,7-dimethoxyand 6-hydroxy-4-methoxy-benzofuran-5-yl methyl ketone and derivatives, 616.

Valence-bond isomer chemistry. Part III, some addition and nucleophilic substitution reactions of hexafluoro-bicyclo[2,2,0]hexa-2,5-diene, 2170.

Isomerisation, base-catalysed prototropic. Part VI, the isomerisation of acetylenic hydrocarbons, 1653.

Isonorherqueinone. Naturally occurring compounds related to phenalenone. Part III, structure of herqueinone and norherqueinone and their relationships with isoherqueinone and isonorherqueinone, 421.

Isophyllocladene and phyllocladene, some transformations of. Diterpenes. Part X, 190.

Isoquinoline bisbenzyl-, alkaloids, mass spectrometry of. Part I, alkaloids derived from coclaurine units joined tail-to-tail, 592. Part II, alkaloids derived from one coclaurine and one isococlaurine unit, 597. Part III, alkaloids derived from coclaurine units joined head-to-tail, 599.

1,3-Dipolar character of six-membered aromatic rings. Part III, 2-methyl-3-oxidoisoquinolinium. A novel route to benzotropones, 2054.

Isoquinolinetrione. Oxidative fission of some α -substituted β -diketones by selenium dioxide, 977.

Isothiazoles. Part XV, 5-nitroisothiazoles, 1247.

5-substituted and 3,5-disubstituted, preparation of, by nucleophilic displacement reactions of the corresponding methylsulphonyl compounds, 638.

Reaction of phenylacetonitrile anion with sulphites: a novel isothiazole synthesis, 1432.

Isothiazolium salts. Reaction of nucleophiles with some isothiazolium and 1,2-dithiolium salts, 2305.

- **Isothiocyanates**, aryl, preparation of, by pyrolysis of *N*-aryldithiocarbamates, 88.
 - Reactions of Group IV organometallic compounds. Part XXVI, insertion reactions of isocyanates and isothiocyanates to N-trimethylsilyl(diphenylmethylene)amine and subsequent [4+2] cycloadditions of isocyanates with their adducts, 1678.
- 3'-Isovaleryl-6-methylpyridine-3-spiro-2'-oxiran-2(1H),-
 - **4(3H)**-dione, (flavipucine), an antibiotic from Aspergillus flavipes, 2071.
- **Isoxazoles**, syntheses with. Part II, rearrangement of isoxazolo[2,3-a]pyridinium salts into 5,6-dihydro-4*H*-furo[3,2-b]pyridin-2-ones, 2441.
- 2-Isoxazoline derivatives. Part V, regio- and stereoselectivity in the cycloaddition of benzonitrile oxide to some cycloalkene and 2-isoxazoline derivatives,
- Isoxazolines. Reductive and oxidative cleavage of 5-phenyl- Δ^2 -isoxazoline-3-carboxylic acid, 437.
- **Isoxazolones.** Action of isoxazol-5-ones on enamines, 1240.
- Isoxazolopyridines. Syntheses with isoxazoles. Part II, rearrangement of isoxazolo[2,3-a]pyridinium salts into 5,6-dihydro-4H-furo[3,2-b]pyridin-2-ones, 2441.

J

Jatrorrhiza palmata [Lam.] Miers, a new dimeric protoberberine-alkaloid, bisjatrorrhizine, from, 327.

K

- Kauranes. Terpenoids. Part II, some ring D derivatives of 13β-kaurane, 981. Part III, the enolisation-ketonisation and optical rotatory dispersion of the ent-kauran-15-ones and 13β-kauran-15-ones, 986. Part IV, the nuclear magnetic resonance properties of the stereoisomeric ent-kauran-15-ols and 13β-kauran-15-ols, 1272. Part V, rearrangement of ent-kaurane 15β,16β-epoxide to ent-(16R)-atisan-15-one, 1274.
- **Kaurene.** Formation of (—)-kaurene in a cell-free system from *Gibberella fujikuroi*, 2382.
 - Studies in terpenoid biosynthesis. Part IX, the sequence of oxidation on ring B in kaurene-gibberellin biosynthesis, 1892.
- (—)-Kaur-15-ene-7β,19-diol [sideridiol], further reaction of, 759.
- Kaurenolide, 3β,7β-dihydroxy-. New metabolites of Gibberella fujikuroi. Part XIX, 1117.
- Ketens. Cycloaddition reactions of cumulenes. Part III, diketen as an allene-like system in the reaction with an azomethine oxide, 222.
 - Overcrowded molecules. Part VIII, addition of diphenylketen to (Z)-2-benzylidene-3-diphenylmethylene-2,3-dihydro-5-methylbenzofuran, 1839.
- Ketols, α -, brominative cleavage of, 1875.
- **Ketones**, α -N-alkylanilino-, light-induced reactions of: formation of di-indolylmethanes, 1210.
 - aromatic, pyrylium salt formation from. Part I, reactions of β -methylchalcones in non-aqueous acidic media, 809.

benzylidene, reaction of enamines with. Part II, 1549.

- derived from carbohydrates, the photochemistry of. Part III, type II reactions of some pyranosid-2- and -3-ulose derivatives, 1670.
- $\beta\gamma$ -epoxy-, a study of base-catalysed opening of, 919.
- Acid-catalysed rearrangements of some spiro cyclopropyl ketones, 2982.
- Addition of secondary amines to diacetylenic ketones,
- Dypnopinacol. Part II, tautomerism of 4-methyl-2,4,6-triphenylcyclohexa-2,6-dienyl phenyl ketone (isodypnopinacolone), 1372. Part III, the photochemistry of 4-methyl-2,4,6-triphenylcyclohexa-2,6-dienyl phenyl ketone (isodypnopinacolone), 1374. Part IV, tautomerism of α and β -photodypnopinacolones (6-exo- and 6-endo-methyl-1,3,6-triphenylbicyclo[3,1,0]hex-2-en-2-yl phenyl ketone), 1380.
- Enamine chemistry. Part XIV, reaction of $\alpha\beta$ -unsaturated acid chlorides with tertiary enamino-ketones and -esters. 1038.
- Fluorinations with potassium tetrafluorocobaltate(III). Part II, fluorination of ketones, 2277.
- Formation of a δ -diketone in the cathodic cleavage of a β -keto-sulphoxide, 652.
- Isomerism of semi-carbazones of 6-hydroxy-4,7-dimethoxy- and 6-hydroxy-4-methoxy-benzofuran-5-yl methyl ketone and derivatives, 616.
- Mannich reaction on 1,2-diketones, 1667.
- Oxidative fission of some α -substituted β -diketones by selenium dioxide, 977.
- Oxymetallation. Part IV, reaction of derivatives from the t-butylperoxymercuration of $\alpha\beta$ -unsaturated esters and ketones with sodium borohydride, 2787.
- Polyfluoroaryl organometallic compounds. Part XV, synthesis and rearrangement of polyhalogenoaryl α -diketones, 2464.
- Preparation and cyclisation of some 3-aza-1,5-diketones,
- Pungent compounds. Part I, an improved synthesis of the paradols (alkyl 4-hydroxy-3-methoxyphenethyl ketones) and an assessment of their pungency, 3001.
- Stereochemistry of cyclopropyl ketones from the reaction of dimethylsulphoxonium methylide with 3-benzylidenechroman-4-ones, 1554.
- Terpenoids. Part III, the enolisation-ketonisation and optical rotatory dispersion of the *ent*-kauran-15-ones and 13β-kauran-15-ones, 986.
- 1,3,4,5-Tetrahydrobenz[cd]indoles and related compounds. Part I, a new synthesis of 3,4-dihydrobenz-[cd]indol-5(1H)-one (Uhle's ketone), 1121.
- Total synthesis of (\pm) -ethyl acorate $\{(\pm)$ -ethyl(3RS)-3-[(1SR,4SR)-1-isobutyryl-4-methyl-3-oxocyclohexyl]-butyrate $\}$ and (\pm) -epiacoric acid. An application of the generation and alkylation of a specific enolate, 1186.
- **Khellinone.** Isomerism of semicarbazones of 6-hydroxy-4,7-dimethoxy- and 6-hydroxy-4-methoxy-benzofuran-5-yl methyl ketone and derivatives, 616.
- Koch synthesis of carboxylic acids, a study of, 2096.
- (—)-Kreysigine, (—)-O-methylandrocymbine and alkaloid CC-10 methyl ether, total syntheses of. Studies on the syntheses of heterocyclic compounds. Part CDLXXV, 2160.

L

Lactams. Internuclear cyclisation. Part XXVII, further studies on the aromatisation of spirocyclohexadienyl dimers, 105. Part XXVIII, free radical reactions of some spirocyclohexadiene lactams, 113. Part XXIX, oxidation of some N-methylbiphenyl-2-carboxamides with persulphate, 118. Part XXX, photolysis of 2-iodo-2'-, -3'-, and -4'-methoxy-N-alkylbenzanilides in benzene, 1150. Part XXXI, cyclisation of 2-(N-alkyl-N-phenylcarbamoyl)phenyl radicals: formation of cyclohexadienones and cyclohexadienyl iodides by scavenging of the spiro-y-lactam intermediates, 1155. Part XXXII, dienol-benzene and related rearrangements of some spirocyclohexadiene-lactams, 1162.

Reactive intermediates. Part XX, preparation of sulphoximides from sulphoxides and N-amino-lactams, and a study of their fragmentation, 1317.

Studies related to penicillins and cephalosporins. Part I, the preparation of 4-alkylthio- β -lactams in which the ring nitrogen atom is part of an α -amino-acid ester system, 2326. Part II, an approach to the synthesis of β -lactam antibiotics, 2332.

Lamprometra kluzingeri (Hartlaub) and Heterometra savignii (J. Müller), the crinoids, anthraquinones in. Naturally occurring quinones. Part XXI, 1291.

Lanostanes. C-8 Epimers of 7-oxo- 5α -lanost-9(11)-en- 3β -yl acetate, 2591.

Synthesis and configuration of some 32-norlanosterol derivatives, 749.

Synthesis of some 32-functionalised lanostane derivatives, 739.

Lanostenones. Identification of Marker's ' α -ketodihydrolanosteryl acetate' as 3β -acetoxylanost-9(11)-en-7-one, 581.

Lanosterol and derivatives, equilibration of 24,25-dibromides of, 1584.

conversion of, into a compound with the carbon skeleton of fusidic acid, 1243.

epoxides of, and some related compounds, 2231.

Photo-oxygenation of lanosteryl acetate, 799.

Laurotetanine, (±)-N-methyl-, total photolytic synthesis of. Studies on the syntheses of heterocyclic compounds. Part CDLXII, 1435.

Lavandulyl, santolinyl, and artemisyl structures, cyclopropane cleavage of chrysanthemic acid relatives to: acid-catalysed and biosynthetic experiments, 642.

Lead(IV), reactions of. Part XXII, radical-initiated oxidation of anisole, 562. Part XXIII, reactions of lead tetrabenzoate with some benzenoid compounds, and comparison with those of dibenzoyl peroxide, 570. Part XXIV, reactions with some benzenoid compounds in the presence of monomethyl oxalate, 578. Part XXV, oxidation of some benzyl-substituted hydrazine derivatives, 1692. Part XXVI, oxidation of some derivatives of hydroxylamine, 1701.

tetra-acetate, reactions of bromine and lead tetra-acetate with 2-(substituted hydrazino)-5-phenyl-1,3,4-oxadiazoles: routes to 3-aryl-6-phenyl-1,2,4-triazolo[3,4-b]-[1,3,4]oxadiazoles, 269.

Least motion, principle of. Alkylation of 1,1-diphenylpropene carbanions. 1,1-Diphenylalkenes. Part II, 1292.

Lepista dienii Singer. Natural acetylenes. Part XXXV, polyacetylenic acid and benzenoid metabolites from cultures of the fungus Lepista dienii Singer, 2032. **Leucospermum reflexum** Buek ex Meisner. Metabolites of Proteaceae. Part V, reflexin and conocarpic acid from *Leucospermum reflexum* Buek ex Meisner, and the phenol-dienone rearrangement of reflexin and conocarpin, 2450.

Lichens and fungi. Part X, 14α-taraxerane, 2827.

Lignans and related phenols. Part XII, application of nuclear magnetic double resonance to the aryltetrahydronaphthalene class, 1343. Part XIII, halogenated derivatives of podophyllotoxin, 1350.

Limonoids (meliacins). Acid-catalysed reactions of meliacin epoxides, 1084.

Limonoid extractives from species of Guarea. An unusual shielding effect on an acetyl group, 1145. from Trichilia heudelottii. Part II, 1488.

Some transformations and interconversions of the meliacins, 1943.

Tris(dipivalomethanato)europium-induced upfield and downfield shifts in the nuclear magnetic resonance spectra of the meliacins, 653.

Lincomycin, modifications of, involving the carbohydrate portion. Part I, the 2-O-methyl and 2-deoxy-analogues, 3025. Part II, analogues with D-gluco- and D-ido-stereochemistry, 3031.

Lithium and sodium chlorodifluoroacetates, action of, on phenanthrene-9,10-quinone, 1056.

1,2-Dihydrobenzocyclobutene ('benzocyclobutene'): lithiation, and the preparation of some 3-substituted derivatives, 2481.

Organolithium chemistry of N-heterocycles. Part IV, formation of 1,2,4,5-tetrahydro-4,4-diphenyl-2,5-methano-3,1-benzoxazepines from quinolines, 1176.

Organometallic derivatives. Part IV, the lithiation of ferrocenylmethyl phenyl sulphone and the cleavage of carbon-sulphur bonds by aniline, 2502.

Polyfluoroaryl organometallic compounds. Part XVI, reactions of organolithium compounds with halogenated benzils, 2469.

Polyhalogenoaromatic compounds. Part XXIII, synthesis and reactions of heptachloro-3-lithio-4,4'-bi-pyridyl, 995. Part XXIV, reaction of chloropyridyl-lithium compounds with nitriles as a route to triazanaphthalenes, 2190.

Reactive intermediates. Part XIX, the lithium salt of 1-(benzotriazol-1-yl)-4-p-tolylsulphonyltetrazene: a new benzyne precursor, 1315.

The question of 1,2- or 1,4-addition of organolithium compounds to quinolines, 2807.

Luteoleersin and alboleersin, structures of; the identity of luteoleersin with cochlioquinone A, 2837.

8-Lycorane derived from the alkaloid caranine, synthesis of, 588.

Lythraceous alkaloids. Part VI, the structures of lythrancine-I, -II, -III, and -IV and lythrancepine-I, -II, and -III, 2141.

M

Macrocycles. Novel macrocyclic polysulphur compounds. 7,15,17,19-Tetra-alkoxy-2,3,4,5,10,11,12,13-octathia-tricyclo[12,2,2,2^{6,9}]eicosa-6,8,14,16,17,19-hexaenes and 2,3,7,8-tetra-alkoxythianthrens; products of the catalysed reaction of aromatic ethers and sulphur monochlorides, 1687.

- Macrocycles (contd.)
 - Synthesis of 22 π -electron macrocycles. Sapphyrins and related compounds, 2111.
 - of new macrocycles. Part I, monomeric and dimeric o-phthalate esters, 2148.
 - Unsaturated macrocyclic compounds. Part LXXXVIII, monodehydro[24]annulene, 355.
- Macrolides. Flavofungin: a mixture of 13,15,17,19,21,23,25,27-octahydroxy-31-isopropyl-14-methyl-and 13,15,17,19,21,23,25,27-octahydroxy-14-methyl-31-s-butyl-hentriaconta-2,4,6,8,10,28-hexaen-31-olide, 1848.
- Maize. Studies of enzyme-mediated reactions. Part II, stereochemistry of the elimination of ammonia from L-tyrosine catalysed by the enzyme from maize, 2364.
- Mammea americana L., constituents of. Part X, the isolation of some mono- and di-hydroxyxanthones. Observations on the synthesis of 1,5-, 3,5-, 1,6-, and 1,7-dihydroxyxanthone, 1896.
 - extractives of. Part III, identification of new coumarin relatives of mammea B/BA, B/BB, and B/BC having 5,6-annulation and higher oxidation levels, 2241. Part IV, identification of new 7,8-annulated relatives of the coumarins mammea A/AA, A/AB, B/AA, and B/AB, and new members of the 6-acyl family B/AA, B/AB, and B/AC, 2248. Part V, the insecticidal compounds, 2255.
- Mannich reactions on 1,2-diketones, 1667.
- Marckwald rule. Carcinogenic nitrogen compounds. Part LXXV, Skraup reactions with some polycyclic amines, and two cases of anti-Marckwald orientation, 263.
- Marker's ' α -ketodihydrolanosteryl acetate,' identification of, as 3β -acetoxylanost-9(11)-en-7-one, 581.
- Meliacins-see Limonoids.
- p-Menthane, some oxygenated derivatives of. Chemistry of terpenes. Part XV, 1971.
- Mentha pulegium L., biosynthesis of (+)-pulegone in. Terpene biosynthesis. Part IV, 1532.
- Mercapto-compounds. Some reactions of 7-hydroxy- and mercapto-3-methylbenzo[b]thiophen, 2593.
- Mercury. Organosilicon chemistry. Part IX, reaction of bis(trimethylsilyl)mercury with some polyfluoro-olefins, 847
 - Oxymetallation. Part III, competitive epoxidation during the hydridodemercuration of β -mercurated dialkyl peroxides with sodium broohydride, 2433. Part IV, reaction of derivatives from the t-butylperoxymercuration of $\alpha\beta$ -unsaturated esters and ketones with sodium borohydride, 2787.
- Mesoionic oxazolium-5-oxides, unstable, 914.
- Metabolites, new, of Gibberella fujikuroi. Part XIX, 3β,7β-dihydroxykaurenolide, 1117.
 - of Nectria coccinea, 2136.
 - of Proteaceae. Part V, reflexin and conocarpic acid from Leucospermum reflexum Buek ex Meisner, and the phenol-dienone rearrangement of reflexin and conocarpin, 2450. Part VI, the stereochemistry of reflexin and conocarpin, 2457.
 - Natural acetylenes. Part XXXV, polyacetylenic acid and benzenoid metabolites from cultures of the fungus Lepista diemii Singer, 2032.
 - New metabolic products of Aspergillus flavus. Part I, asperentin, its methyl ethers, and 5'-hydroxyasperentin, 2400. Part II, asperflavin, anhydroasperflavin, and 5,7-dihydroxy-4-methylphthalide, 2406.

- Scytalidin: a new fungitoxic metabolite produced by a *Scytalidium* species, 2280.
- Sporidesmins. Part XIII. Ovine III-thrift in Nova Scotia. Part III. The characterisation of chetomin, a toxic metabolite of *Chaetomium cochliodes* and *Chaetomium globosum*, 472.
- Metals. Mechanism of metal-ammonia reduction of camphor, 999.
- Metal ions and complexes in organic reactions. Part XIV, syntheses of NN'-bisdiarylphenylenediamines, 2391.
- Reduction by dissolving metals. Part XVIII, metalammonia reductions of some bicyclo[2,2,2]octene derivatives: structural effects on double bond reduction and nitrile cleavage, 1546.
- Methanolysis. Reactions of phosphines with acetylenes. Part XVI, formation of β-alkoxy-phosphonium ylides and vinyl ethers *via* methanolysis of vinylphosphonium salts, 2830.
- Methyl acrylate. Reactions of harmaline (4,9-dihydro-7-methoxy-1-methyl-3*H*-pyrido[3,4-*b*]indole) and its derivatives. Part I, reactions of harmaline with methyl acrylate, 731.
- N-Methylation and electrophilic substitution reactions of octa-alkylporphins, octaethylchlorin, and metalloporphins, 1789.
- Michael acceptors and alkyl halides, C-3 and C-1 alkylation of Hagemann's ester (ethyl 2-methyl-4-oxocyclohex-2-enecarboxylate) with. Cyclohexenone derivatives. Part VI, 1836.
- Micranthine, structure of. Some dibenzo-p-dioxin-type biscoclaurine alkaloids from an unnamed species. Alkaloids of Daphnandra species. Part XI, 2884.
- Microbiological hydroxylation of steroids. Part IV, the pattern of dihydroxylation of mono-oxygenated 5α-androstanes with cultures of the fungus Calonectria decora, 2081. Part V, the pattern of hydroxylation of dioxygenated 5α-androstanes with cultures of the fungus Calonectria decora, 2759. Part VI, hydroxylation of simple monoand di-oxygenated 5α-androstanes and of 3-oxoestranes with the fungus Aspergillus ochraceus, 2930.
- Möhlau-Bischler synthesis, polycyclic indoles by means of. Carcinogenic nitrogen compounds. Part LXXXII, 2573.
- Morphine-thebaine group, novel analgesics and molecular rearrangements in. Part XXIII, adducts of thebaine with divinyl sulphone and with methyl vinyl sulphone, 870. Part XXIV, 15,16-didehydro-6,14-endo-etheno-6,7,8,14-tetrahydro-thebaines and -oripavines, 872. Part XXV, substitution of the piperidine ring in derivatives of 6,14-endo-ethenotetrahydrothebaine, 875. Part XXVI, some reactions of the thebaine-2-chloro-acrylonitrile adduct, 878. Part XXVII, 7-alkylidene-and 7α-vinyl-6,14-endo-etheno-6,7,8,14-tetrahydrothebaines, 881.
 - Biosynthesis of unnatural morphine derivatives in *Papaver* somniferum, 1642.
- Morpholines. Enamine chemistry. Part XVI, reaction of αβ-unsaturated acid chlorides with 1,4-dimorpholinocyclohexa-1,3-diene. Synthesis of 7-morpholino- and 4,7-dimorpholino-indan-1-ones, 1639.
- 1-Morpholin-1-ylcyclohexene, reaction of nitrosobenzene with. Reaction of aromatic nitroso-compounds with enamines. Part I, 2521.
- Mutagens. Azidoacridines: potential nucleic acid mutagens, 161.
- Mycophenolic acid, biosynthesis of, 2639.

- Naphthacene, pentacene, and hexacene sulphides, synthesis, structure, and electrical properties of, 1310.
- Naphthaldehyde, 8-hydroxy-1-, and 2*H*-naphtho[1,8-*bc*]-furan, 699.
- Naphthalene, 2-methyl-, a study of the sulphonation of, 2344.
- Naphthalenes, methyl-substituted, syntheses of. Some anomalous Gattermann formylation reactions. Friedel—Crafts acylations of aromatic hydrocarbons. Part XIII, 892.
 - peri-substituted azido-, conversion of into naphthoxazoles, 1,2-dihydrobenz[cd]indazoles and perimidines. Reactive intermediates. Part XVII, 72.
 - Diels-Alder reactions of polyfluorocyclohexa-1,3-dienes. Part VI, reactions of dodecafluorotricyclo[5,2,2,0^{2,6}]-undeca-2,5,8-triene with ethylene and alkynes. A synthesis of polyfluorotricyclo[6,2,2,0^{2,7}]dodeca-2,4,6,9-tetraenes and 2,3-disubstituted hexafluoronaphthalenes, 1830.
 - Friedel-Crafts acylations of aromatic hydrocarbons. Part XIV, monoacetylation and monobenzoylation of 2,7-dimethylnaphthalene, 1442. Part XV, acetylation of 2-methylnaphthalene, 1781.
 - Lignans and related phenols. Part XII, application of nuclear magnetic double resonance to the aryltetrahydronaphthalene class, 1343.
 - Studies of bridged benzo-heterocycles. Part III, cyclo-additions of 1,4-epoxy-1,4-dihydronaphthalene to some dipolar compounds and dienes, 2750.
- 2H-Naphtho[1,8-bc]furan and 8-hydroxy-1-naphthaldehyde, 699.
- Naphthopyrans. Pigments of Gnomonia erythrostoma. Part I, structures of erythrostominone, deoxyerythrostominone, and deoxyerythrostominol, 380.
- Naphtho[2,1,8-def]quinoline. Carcinogenic nitrogen compounds. Part LXXIII, cyclisation of 12-(o-chloroaryl)-benz[a]acridines: a route to new condensed acridines derived from naphtho[2,1,8-def]quinoline (1-azapyrene), 234
- 2,3-Naphthoquinone dimethide, derivatives of. o-Quinonoid compounds. Part V, 2722.
- Naphthoquinones. Reactions of 2-ethyl- and 2-benzyl-1,4-naphthoquinone with N-methylcyclohexylamine, 2046.
- Naphthothiopyrans, dihydro-, and some related 3,4-disubstituted thiochromans, stereochemistry and reactions of, 787.
- Naphthoxazoles, 1,2-dihydrobenz[cd]indazoles and perimidines, conversion of peri-substituted azidonaphthalenes into. Reactive intermediates. Part XVII, 72.
- Naphthyridines. Condensation of β -dicarbonyl compounds with halogenopyridinecarboxylic acids. A convenient synthesis of some naphthyridine derivatives, 705.
 - Ring transformations involving chloroheterocycles. Part I, reaction of chloronaphthyridines with hydrazine hydrate, 1106. Part II, reaction of 4-chloro-1,8-naphthyridines and 4-chloroquinolines with substituted hydrazines, 1109.
- Nardostachone, structure of. Synthetic experiments in the eremophilane sesquiterpene group. Synthesis of (±)-7-epi-nootkatone and partial synthesis of valerianol, 2193.
- Narwedine. Studies on the syntheses of heterocyclic compounds. Part CDLXVI, synthesis of narwedine-type enones by photochemical cyclisation, 1513.

- Nectria coccinea, metabolites of, 2136.
- Neoantimycin, biosynthesis of the 3,4-dihydroxy-2,2-dimethyl-5-phenylvaleric acid residue of, 1235.
- Neocembrene-A, a termite trail pheromone, 2653.
- Neopinone. Nitrosation of the baine leading to 7-substituted neopinone derivatives, 302.
- **Nicandra physaloides** (Solanaceae), withanicandrin, a ring-c-substituted withanolide from, 2109.
- Nickel and cobalt 1,19-dimethylcorrin and 1,19-dimethyl-4,5-dihydrocorrin perchlorates. Synthesis of corrins. Part I, 2681.
- Nitration of 3-methylfluoroanthene, 755.
 - Substitution reactions of benzo[b]thiophen derivatives. Part IV, nitration of 3-bromo-2-methylbenzo[v]thiophen and 2,3-dimethylbenzo[b]thiophen, 265. Part V, t-butylation of benzo[b]thiophen and nitration of 3-t-butylbenzo[b]thiophen-2-carboxylic acid, 414.
- Nitrenes. Photochemistry of some N-(2-methyl-4,6-diphenyl-1-pyridinio)anilides, 1020.
 - Preparation and thermal rearrangement of a benzofurannitrene adduct, 225.
- Nitriles, reactions of. Part VIII, synthesis of 2,3-dihydro-quinolin-4(1H)-ones, 932.
 - Benzopyrones. Part VIII, mono- and di-tetrazol-5-ylchromones. The infrared cyano-absorption of some 4-oxochromencarbonitriles, 779.
 - Polyhalogenoaromatic compounds. Part XXIV, reaction of chloropyridyl-lithium compounds with nitriles as a route to triazanaphthalenes, 2190.
 - Reaction of phenylacetonitrile anion with sulphites: a novel isothiazole synthesis, 1432.
 - Reduction by dissolving metals. Part XVIII, metalammonia reductions of some bicyclo[2,2,2]octene derivatives: structural effects on double bond reduction and nitrile cleavage, 1546.
 - Some cyano-amides and dicyano-glutaconimides derived from pyridine aldehydes, 2946.
 - v-Triazolo[4,5-d]pyrimidines (8-azapurines). Part X, new routes to v-triazolo[4,5-d]pyrimidines via 4-dimethylaminomethyleneamino-1,2,3-triazole-5-carbonitriles, 461.
- Nitro-compounds, chemistry of. Part II, the scope and mechanism of the base-catalysed transformations of some NN-disubstituted o-nitrobenzamides, 97. Part III, the intramolecular nucleophilic displacement of aromatic nitro-groups by carbanions, 835.
 - some mildly activated, fluorodenitration of, 2671.
 - Amino-acids and peptides. Part XXXV, the effect of solvent on the rates of racemisation and coupling of some acylamino-acid p-nitrophenyl esters; the base strengths of some amines in organic solvents, and related investigations, 1194.
 - Nitro-heteroaromatic derivatives of amino-acids and peptides. Part III, application of ultraviolet-visible absorption and circular dichroism to N-(3-nitro-2-pyridyl)amino-acids, 1179. Part IV, a circular dichroic method for the selective determination of cysteinyl residues, 1182.
 - Nitrophenylcarbenes. Part II, the generation and reactions of 4-nitrophenylcarbene. Nature of the reactions of 4-nitrobenzyl derivatives with sodium hydroxide, 2103.
 - Nitro-steroids. Part VI, structure of 5α -cholestano[2,3-c]furazan 2'-oxide, and the preparation of 6-nitro- 5α -cholestan-7-ones, 655.

Nitro-compounds (contd.)

Photochemical transformations. Part VI, the photorearrangement of 2-nitrofuran and 2-nitropyrrole, 2527.

Studies on nitroaromatic compounds. Part III, synthesis of some new polynitroacenaphthenes, 166.

The use of a nitro-group to ensure intermolecular acylation by p-nitrohydrocinnamic acid and p-nitro- γ -phenylbutyric acid, 62.

Nitrogen compounds, carcinogenic. Part LXXIII, cyclisation of 12-(o-chloroaryl)benz[a]acridines: a route to new condensed acridines derived from naphtho[2,1,8def]quinoline (1-azapyrene), 234. Part LXXIV, Skraup and Combes-Beyer reactions with 3-aminocarbazoles; a new route to pyrido[3,2'-b]carbazoles, 260. Part LXXV, Skraup reactions with some polycyclic amines, and two cases of anti-Marckwald orientation, 263. Part LXXVI, penta- and hexa-cyclic indenoindoles, 527. Part LXXVII, a novel synthesis of β-carbolines, 531. Part LXXVIII, some indeno[1,7bc]-, benz[a]indeno[7,1-hi]-, and benz[c]indeno[7,1-hi]acridines, 1261. Part LXXIX, a route to new condensed acridines containing a cyclopent[kl]acridine nucleus, 1263. Part LXXX, [1]benzopyrano[4,3-b]indoles and 6H-[1]benzopyrano[4,3-b]quinolines, 1266. Part LXXXI, steric control in heterocyclic cyclisations with 6-substituted chrysenes, 1932. Part LXXXII, polycyclic indoles by means of the Möhlau-Bischler synthesis, 2573.

organic, anodic oxidation of. Part I, cyclization of l-arylmethylenesemicarbazides, 1718.

containing fluorine, unsaturated. Part II, the reactions of hexafluoroacetone azine with *cis-* or *trans-*but-2-ene and cyclohexene, 1059.

Nitrogen-containing carbohydrate derivatives. Part XXIX, derivatives of 2,6-diamino-2,3,4,6-tetradeoxy-D-threo-hexose (epi-purpurosamine C), 2619.

N-Nitroxymethyl derivatives of 1,3-dinitroperhydro-1,3,5-triazine, piperidine, and succinimide, 1902.

Polyfluoroalkyl derivatives of nitrogen. Part XXXVI, photochemical reaction of N-bromo- and N-chlorobistrifluoromethylamine with cis- or trans-but-2-ene, and the synthesis of 1,2-di(bistrifluoromethylamino)-difluoroethylene and 2-bromo-1,2-difluoro-NN-bistrifluoromethylvinylamine, 1877. Part XXXVII, reaction of N-bromobistrifluoromethylamine with propene under ionic and free-radical conditions, 1880.

Useful preparations involving the reactions of nucleophiles with some trimethylammonio-derivatives of nitrogen heterocycles. 1269.

Nitrosamines, acylaryl-. Part V, decompositions of N-nitrosobenzanilides in carbon tetrachloride and benzene: the formation of carboxylic acids, anhydrides, and arynes, 1296. Part VI, anomalous reactions with 2,5-dimethylfuran: the formation of 2-benzyl-5-methylfurans and 3-acetyl-1-aryl-4-arylazo-5-methylpyrazoles, 1304.

Nitrosation of thebaine leading to 7-substituted neopinone derivatives, 302.

Nitroso-compounds. One-step synthesis of 3,5-dihydro-2H-pyrrolo[3,4-d]oxazoles by reaction of p-nitrosophenols with 2-aroylaziridines, 1459.

Reaction of aromatic nitroso-compounds with enamines. Part I, the reaction of nitrosobenzene with 1-morpholin-1-ylcyclohexene, 2521.

Nitrous acid, the deamination of methyl 4-amino-4,6-dide-

oxy-2,3- ${\it O}$ -isopropylidene- α -L-talo- and -manno-pyranosides with, 315.

Nitroxides. Nitroxide chemistry. Part III, photolysis of bistrifluoromethyl nitroxide and some reactions of the major product, perfluoro-(2,4-dimethyl-3-oxa-2,4-diazapentane), 1449.

Polyhalogenoallenes. Part IX, reaction of tetrafluoroallene with bistrifluoromethyl nitroxide and with perfluoro(2,4-dimethyl-3-oxa-2,4-diazapentane), 2336.

Nonadrides. Part VI, dimerisation of the C₉ unit in vivo and in vitro, 2584.

Nootkatone. Synthetic experiments in the eremophilane sesquiterpene group. Synthesis of (\pm) -7-epi-nootkatone and partial synthesis of valerianol. The structure of nardostachone, 2193.

Norbornadienes, some chlorine-substituted, reaction of alkoxide ions with, 1237.

Norbornanes. Studies on terpenes. Part I, rearrangement of 7-oxatricyclo[4,3,0,0³,9]nonanes into 8-substituted 1,3,3-trimethylnorbornane derivatives, 943.

Norbornene series, studies in. Part I, elucidation of the structure of norbornene derivatives by use of the nuclear magnetic resonance shift reagent trisdipivaloylmethanato-europium(III), the nuclear Overhauser effect, and mass spectrometry, 1500.

Norcholestanes. Secosteroids. Preparation of 5-oxo-2,5-seco-A-dinorcholestan-2-amide, 2755.

Norherqueinone and herqueinone, structure of, and their relationships with isoherqueinone and isonorherqueinone. Naturally occurring compounds related to phenalenone. Part III, 421.

Norlanosterol. Synthesis and configuration of some 32-norlanosterol derivatives, 749.

Norpinenones. Apoverbenone (6,6-dimethylnorpin-3-en-2-one). An investigation into its preparation by dehydro-bromination of a sterically hindered bromoketone, 50.

Electrochemical reactions. Part XI, reduction of apoverbenone (6,6-dimethylnorpin-3-en-2-one), 2529.

Norpregnenes. Steroidal analogues of unnatural configuration. Part IV, stereoselective additions to the 5,6-bond of $4,4,14\alpha$ -trimethyl- $19(10 \longrightarrow 9\beta)abeo$ - 10α -pregn-5-enes and correlation with the related 19-nor- 10α -series, 627.

Nucleic acids. Azidoacridines: potential nucleic acid mutagens, 161.

Nucleophilic addition. v-Triazolo[4,5-d]pyrimidines (8-azapurines). Part IX, some nucleophilic addition reactions, 457.

Nucleophilic centres. Competition between carbon, nitrogen, and oxygen nucleophilic centres for sulphur(vi) attack in NN'-disubstituted sulphamides, 2666.

displacement. Preparation of 5-substituted and 3,5-disubstituted isothiazoles by nucleophilic displacement reactions of the corresponding methylsulphonyl compounds, 638.

Chemistry of nitro-compounds. Part III, intramolecular nucleophilic displacement of aromatic nitro-groups by carbanions, 835.

substitution at phosphorus in $\mathbf{P^{III}}$ and $\mathbf{P^{V}}$ phosphetans, stereochemistry of, 713.

Nucleosides and Nucleotides. Pyrazolopyrimidine nucleosides. Part III, synthesis of 1- and 2-(β-D-ribofuranosyl)pyrazolo[3,4-d]pyrimidines from pyrazole nucleoside derivatives, 2672. Part IV, synthesis and chemical reactivity of the C-nucleoside selenoformycin B and derivatives, 2677.

Nucleosides and Nucleotides (contd.)

Syntheses of some α-p-riboturanosylimidazoles related to purine nucleotide precursors, 1773.

Synthetic analogues of polynucleotides. Part VIII, analogues of oligonucleotides containing carboxymethylthymidine, 1991.

0

- (+)-Occidentalol, oxidation of, with t-butyl chromate, 962.
 (±)-Ochrobirine, total synthesis of. Studies on the syntheses of heterocyclic compounds. Part CDLIII, 391.
- Octenes. Synthesis of dihydrotagetone (2,6-dimethyloct-7-en-4-one), 367.
- 17β-Oestradiol and Oestrone. Regiospecific syntheses of modified steroid hormones. Part II, 4-fluoro-17β-oestradiol and -oestrone, 2297. Part III, 2-fluoro-oestrone and -17β-oestradiol, 2300. Part IV, 4-bromo-oestrone and -17β-oestradiol, 2302.

Olefins—see also Cycloalkenes and Ethylenes.

- photochemically initiated reactions of bistrifluoromethyl disulphide with, 34.
- Dibenzophospholium salts and ylides. Preparation, properties, and Wittig olefin synthesis, 2713.
- 1,1-Diphenylalkenes. Part II, alkylation of 1,1-diphenylpropene carbanions. The principle of least motion, 1292.
- Olefin synthesis by two-fold extrusion processes. Part I, preliminary experiments, 305.
- Organosilicon chemistry. Part IX, reaction of bis(trimethylsilyl)mercury with some polyfluoro-olefins, 847.
- Peroxide-initiated addition of 1,1-dibromotetrafluoroethane to ethylene, propene, and 2-methylpropene, 1146.
- Polyfluoroalkyl derivatives of nitrogen. Part XXXVI, photochemical reaction of N-bromo- and N-chlorobistrifluoromethylamine with cis- or trans-but-2-ene, and the synthesis of 1,2-di(bistrifluoromethylamino)-difluoroethylene and 2-bromo-1,2-difluoro-NN-bistrifluoromethylvinylamine, 1877. Part XXXVII, reaction of N-bromobistrifluoromethylamine with propene under ionic and free-radical conditions, 1880.
- Reactions of carbonyl compounds with tervalent phosphorus reagents. Part III, formation of olefins by deoxygenation of carbonyl compounds with diphenylphosphine oxide, 1113.
 - of organocopper compounds. Part I, 639.
- Redox-transfer. Part VII, addition of ethylene and butadiene to functionally substituted aromatic sulphonyl chlorides, 1543.
- Some observations on the Wordsworth-Emmons olefination reaction, 2582.
 - stereoselective and regionelective olefin additions: iodoacetoxylation and related electrophilic additions across the 22(23)-bond of $3\alpha,5\alpha$ -cycloergosta-7,22-dien-6-one, 53.
- Studies of bridged benzo-heterocycles. Part II, cyclo-addition reactions of epoxy-bridged cyclic olefins with tropone and tropolone, and photochemical behaviour of the adducts, 1951.
- Synthesis of dialkyl adducts of activated olefins and dienes, 286.

- Transannular cyclisation of cyclo-olefinic N-chloroamines. Synthesis of azabicyclic compounds, 2205.
- Organometallic compounds, polyfluoroaryl. Part XV, synthesis and rearrangement of polyhalogenoaryl α-diketones, 2464. Part XVI, reactions of organolithium compounds with halogenated benzils, 2469.
 - 1,2-Dihydrobenzocyclobutene ('benzocyclobutene'): lithiation, and the preparation of some 3-substituted derivatives, 2481.
 - Organometallic derivatives. Part IV, the lithiation of ferrocenylmethyl phenyl sulphone and the cleavage of carbon-sulphur bonds by aniline, 2502.
 - Oxymetallation. Part III, competitive epoxidation during the hydridodemercuration of β-mercurated dialkyl peroxides with sodium borohydride, 2433.
 - Polyhalogenoaromatic compounds. Part XXIII, synthesis and reactions of heptachloro-3-lithio-4,4'-bipyridyl, 995.
 - Reaction of 1,2,3-thiadiazoles and 1,2,3-selenadiazoles with nonacarbonyldi-iron, 2165.
 - of Group IV organometallic compounds. Part XXVI, insertion reactions of isocyanates and isothiocyanates to N-trimethylsilyl(diphenylmethylene)amine and subsequent [4 + 2] cycloadditions of isocyanates with their adducts, 1678.
 - of organocopper compounds. Part I, 639.
 - Some addition reactions of N-tributylstannyldiphenylmethyleneamine, 130.
 - The question of 1,2- or 1,4-addition of organolithium compounds to quinolines, 2807.
- Organosilicon chemistry. Part IX, reaction of bis(trimethylsilyl)mercury with some polyfluoro-olefins, 847.
- (±)-Orientalinone, total photolytic synthesis of. Studies on the syntheses of heterocyclic compounds. Part CDLXII, 1435.
- Oripavines. Novel analgesics and molecular rearrangements in the morphine-thebaine group. Part XXIV, 15,16-didehydro-6,14-endo-etheno-6,7,8,14-tetrahydro-thebaines and oripavines, 872.
- Orixa japonica Thunb, alkaloids and coumarins of. Identification of a new quinoline alkaloid, orixinone. Quinoline alkaloids. Part XII, 2116.
- Overcrowded molecules. Part VII, thermal and photochemical reactions of photochromic (E)- and (Z)-benzylidene(diphenylmethylene)succinic anhydrides and imides, 1321. Part VIII, addition of diphenylketen to (Z)-2-benzylidene-3-diphenylmethylene-2,3-dihydro-5-methylbenzofuran, 1839.
- Overhauser effect. Studies in the norbornene series. Part I, elucidation of the structure of norbornene derivatives by use of the nuclear magnetic resonance shift reagent tris-(dipivaloylmethanato)europium(III), the nuclear Overhauser effect, and mass spectrometry, 1500.
- Ovine III-thrift in Nova Scotia. Sporidesmins. Part XIII. The characterisation of chetomin, a toxic metabolite of Chaetomium cochliodes and Chaetomium globosum, 472.
- 3-0xa-2,4-diazapentane. Nitroxide chemistry. Part III, photolysis of bistrifluoromethyl nitroxide and some reactions of the major product, perfluoro-(2,4-dimethyl-3-oxa-2,4-diazapentane), 1449.
 - Polyhalogenoallenes. Part IX, reaction of tetrafluoroallene with bistrifluoromethyl nitroxide and with perfluoro-(2,4-dimethyl-3-oxa-2,4-diazapentane), 2336.
- Oxadiazoles. Action of Δ^2 -oxazolin-5-ones on 1,3,4-oxadiazolium salts, 777.

- Oxadiazoles (contd.)
 - Reactions of bromine and lead tetra-acetate with 2-(substituted hydrazino)-5-phenyl-1,3,4-oxadiazoles: routes to 3-aryl-6-phenyl-1,2,4-triazolo[3,4-b][1,3,4]-oxadiazoles, 269.
- 1-0xa-6,6a-diselena-2-azapentalenes, 1-oxa-6,6a-dithia-2-azapentalenes, and 3-nitromethylene-3*H*-1,2-dithioles. Studies of heterocyclic compounds. Part XI, 1360.
- Oxalate, monomethyl. Reactions of lead(IV). Part XXIV, reactions with some benzenoid compounds in the presence of monomethyl oxalate, 578.
- Oxalic acid. Thermal decomposition of oxalate diesters in the presence of iodine, 369.
- 7-Oxatricyclo[4,3,0,0^{3,9}]nonanes, rearrangement of, into 8-substituted 1,3,3-trimethylnorbornane derivatives. Studies on terpenes. Part I, 943.
- Oxazoles. Studies on heterocyclic chemistry. Part XIII, cleavage of 5-benzylamino-oxazoles, photoproducts of N-benzyl-2H-azirine-2-carboxamides, by dialkyl phosphite, 1456.
- Oxazoline derivatives, phenyl-, of amino-sugars. Part I, 248. Part II, fission of phenyloxazolines under basic conditions, 2748.
- Oxazolines. Action of Δ^2 -oxazolin-5-ones on 1,3,4-oxadiazolium salts, 777.
 - Formation of benzanilides from pyrylium salts and 2-phenyl- Δ^2 -oxazolin-5-one, 1142.
 - Synthesis of N-(4-arylmethylene- Δ^2 -oxazolin-5-ylidene) ammonium salts and their conversion into 5-imino- Δ^2 -oxazolines and 1,3-diazafulvenes, 1140.
- Oxazolium-oxides. Unstable mesoionic oxazolium-5-oxides, 914.
- Oxazolinium salts. Cyclisation of α -acylamino-acids in the presence of perchloric acid to give 5-oxo- Δ^2 -oxazolinium perchlorates, 909.
- **Oxidation**, allylic, by N-bromosuccinimide. Triterpenoids. Part VIII, 1856.
 - amine. Part VI, metal-ion induced dehydrative cyclisation, reduction, and reductive fragmentation of arylethyldimethylamine N-oxides, 229.
 - and synthesis of quaternary salts of 1-aminoimidazoles, 2927.
 - anodic, of organic nitrogen compounds. Part I, cyclization of 1-arylmethylenesemicarbazides, 1718.
 - of 2-benzylphenol to benzylbenzoquinones, mechanism of. Applications of high-potential quinones. Part VIII, 2294.
 - of (+)-occidentalol with t-butyl chromate, 962.
 - of some benzyl-substituted hydrazine derivatives. Reactions of lead(Iv). Part XXV, 1692.
 - persulphate. Part V, oxidation of o-(arylthio)- and o-(arylsulphonyl)-benzoic acids, 2842. Part VI, oxidation of biphenyl-2-carboxamides, 2847. Part VII, oxidation of o-benzyl- and o-benzyl-benzamides, 2853. Part VIII, oxidation of arylthio-, arylsulphonyl-, and arylamino-acetic acids, 2857. Part IX, oxidation of biphenyl-2-sulphonamides and o-phenoxybenzenesulphonamides, 2862.
 - products of hop bitter acids. Part VI, five-membered ring products from the oxidation of columbine, 1599.
 - radical-initiated, of anisole. Reactions of lead(IV). Part XXII, 562.
 - unusual, of some 5α -hydroxyandrost-2-enes, 590.
 - Amine oxidation and the chemistry of quinone imines. Part I, 3-methoxy-4-t-butylaniline, 396. Part II,

- 2,5-dimethoxy-4-t-butylaniline, 408. Part III, 2,4-dimethoxy-5-t-butylaniline, 813.
- 3-Heteraglutaraldehydes. Part III, the 1,2-dithian-4,5-diols and tetrahydrothiophen-3,4-diols and their oxidation by periodate, 2795.
- Internuclear cyclisation. Part XXIX, oxidation of some N-methylbiphenyl-2-carboxamides with persulphate, 118.
- Reactions of lead(IV). Part XXVI, oxidation of some derivatives of hydroxylamine, 1701.
 - of organic peroxides. Part XVIII, photo-oxidation of cyclohexylamine and dicyclohexylamine, 13.
- The meso-reactivity of porphyrins and related compounds. Part V, the meso-oxidation of metalloporphyrins, 2540.
- Oxidative cleavage and reductive cleavage of 5-phenyl- Δ^2 -isoxazoline-3-carboxylic acid, 437.
- Oxidative coupling. Part IX, cyclisation involving 3-aminobenzophenones, 683. Part X, cyclisations of 2-aminobenzophenones, 2524.
- Oxidative fission of some α -substituted β -diketones by selenium dioxide, 977.
- Oxidative ring closure, ambident, of semicarbazones, 1918.
- **N-Oxides.** Amine oxidation. Part VI, metal-ion induced dehydrative cyclisation, reduction, and reductive fragmentation of arylethyldimethylamine N-oxides, 228.
 - Furazans and furazan oxides. Part I, synthesis and reactions of some strained furazan N-oxides, 1587.
 - Nitro-steroids. Part VI, structure of 5α-cholestano-[2,3-c]furazan 2'-oxide, and the preparation of 6-nitro-5α-cholestan-6-ones, 655.
 - Preparation of O-(methoxymethyl)benzophenone oxime and N-(diphenylmethylene)methoxymethylamine N-oxide and their reactions with trichloroacetic acid, 2803.
 - Reactions of benzofurazan 1-oxides with enamines, 965. of N-(1-cyanoalkyl)alkylideneamine N-oxides with dipolarophiles and nucleophiles. Part I, a novel synthesis of 2,4(5)-dialkyl-5(4)-phenylthioimidazoles, 1955
- **S-Oxides.** 3-Heteraglutaraldehydes. Part II, tetrahydrothiophen-3,4-diol 1,1-dioxides and the chemistry of their oxidation product, 3-thiaglutaraldehyde 3,3-dioxide, and its derivatives, 1335.
 - On the preparation and structure of some *trans*-fused ureas: perhydro-*trans*-thieno[3,4-d]imidazol-2-one SS-dioxides, 1560.
 - Preparation and structure of some *cis*-fused ureas: *cis*-perhydrothieno[3,4-d]imidazol-2-one *SS*-dioxides, 2866.
 - Reactivity of vinyl sulphonic esters. Part XII, cyclisation of arylsulphonylvinyl sulphonates to benzo[b]-thiophen 1,1-dioxides. A novel 1,2-sulphonyl shift, 1355.
- Oximes. Preparation of O-(methoxymethyl)benzophenone oxime and N-(diphenylmethylene)methoxymethylamine N-oxide and their reactions with trichloroacetic acid, 2803.
- Oxiren—oxocarbene equilibrium. Decomposition of α -diazoketones: the oxiren—oxocarbene equilibrium, 2623.
- Oxoestranes. Microbiological hydroxylation of steroids. Part VI, hydroxylation of simple mono- and di-oxygenated 5α-androstanes and of 3-oxoestranes with the fungus Aspergillus ochraceus, 2930.

- Oxymetallation. Part III, competitive epoxidation during the hydridodemercuration of β -mercurated dialkyl peroxides with sodium borohydride, 2433. Part IV, reaction of derivatives from the t-butylperoxymercuration of $\alpha\beta$ -unsaturated esters and ketones with sodium borohydride, 2787.
- Oxytocin. Synthesis of [1-(L-2-hydroxy-3-mercaptopropanoic acid)]oxytocin, a highly potent analogue of oxytocin, 1946.
- **Ozonolysis.** Studies on conformation and reactivity. Part XI, photochemical oxidation, ozonolysis, and rearrangement of 5',6'-dihydrocholesta-3,5-dieno[3,4-b][1,4]oxathiin, 663.

P

- Palladium. Hydrogenations with palladium precipitated in the presence of the substrate, 554.
- (±)-Pallidine, total photolytic synthesis of. Studies on the syntheses of heterocyclic compounds. Part CDLXII, 1435
- **Papaver somniferum,** biosynthesis of unnatural morphine derivatives in, 1642.
- Papulosin. Chemistry of fungi. Part VIII, constituents of *Valsaria rubricosa* and the identification of papulosin with valsarin, 1464.
- Paradols. Pungent compounds. Part I, an improved synthesis of the paradols (alkyl 4-hydroxy-3-methoxy-phenethyl ketones) and an assessment of their pungency, 3001.
- Paraquat and diquat, pyridones derived from. Bipyridylium quaternary salts and related compounds. Part IV, 138.
- Penicillins and cephalosporins, studies related to. Part I, the preparation of 4-alkylthio-β-lactams in which the ring nitrogen atom is part of an α-amino-acid ester system, 2326. Part II, an approach to the synthesis of β-lactam antibiotics, 2332.
 - studies related to. Part VII, the structure of the epimers derived from 6β-substituted penicillanic acids, 895. Part VIII, rearrangement of penicillanic acid derivatives to 1,3-thiazines, 1063.
 - Transformations of penicillin. Part II, NN'-di-isopropylhydrazine a new reagent for protection of carboxylic acids, 929.
- Pentacene, hexacene, and naphthacene sulphides, synthesis, structure, and electrical properties of, 1310.
- Pentadienones. Intramolecular electrocyclic reactions. Part II, reactions of 1,5-diphenylpenta-1,4-dien-3-one, 2271.
- Peptides and amino-acids. Part XXVIII, determination of racemization in peptide synthesis by nuclear magnetic resonance spectroscopy, 1015.
 - and amino-acids. Part XXXV, the effect of solvent on the rates of racemisation and coupling of some acylamino-acid p-nitrophenyl esters; the base strengths of some amines in organic solvents, and related investigations, 1194. Part XXXVI, synthesis of analogues of bradykinin by the picolyl ester method, 1867.
 - nitro-heteroaromatic derivatives of. Part III, application of ultraviolet-visible absorption and circular dichroism to N-(3-nitro-2-pyridyl)amino-acids, 1179. Part IV, a circular dichroic method for the selective determination of cysteinyl residues, 1182.

- poly-. Part XIII, peptides related to the C-terminal tetrapeptide sequence of the gastrins by complementary reading of the genetic message, 1407.
 - Part XVI, synthesis of some diastereoisomeric poly-(γ-t-butyl glutamate)s, 1. Part XVII, synthesis of some sequential polypeptides of γ-benzyl D-glutamate and L-leucine, 5. Part XVIII, syntheses of poly-(β-aspartic acid) and poly-(γ-glutamic acid) and their benzyl esters, 605. Part XIX, synthesis of some sequential polypeptides of β-methyl asparate and γ-methyl glutamate, 1070. Part XX, the synthesis of some diastereoisomeric poly-(γ-benzylglutamate)s, 1523. Part XXI, synthesis of some sequential macromolecular polypeptolides of L-leucine and L-2-hydroxy-4-methylpentanoic acid, 2041. Part XXII, the synthesis of peptides of α-benzylphenylalanine by the dicyclohexylcarbodi-imide method, 2634.
- Sequential polypeptides. Part II, preparation of two partially protected hexapeptides for use in sequential polypeptide synthesis, 1809. Part III, synthesis of two polyheptapeptides with functional side-chains, 1814. Part IV, the synthesis of poly-(L-alanylglycyl-L-proline) and its stereoisomers, 1908. Part V, use of monoesters of catechol in the synthesis of sequential polypeptides with amino- or carboxy-side-chains, 2236. Part VI, synthesis of some sequential polypeptide collagen models containing proline analogues, 2475. Part VII, the synthesis of poly-(L-glutaminyl-L-alanine), a model of the silks produced by sawfiles of the family Argidae, 2923.
- Synthesis of some tri-, tetra-, and penta-peptide sequences of fibrinogen by the picolyl ester method, 1452.
- **Peracids.** Alkaloid studies. Part LXVI, reactions of some *Aspidosperma* alkaloids with *m*-chloroperbenzoic acid. Removal of the angular ethyl groups of aspidospermine, 849.
- **Perchloric acid.** Cyclisation of α -acylamino-acids in the presence of perchloric acid to give 5-oxo- Δ^2 -oxazolinium perchlorates, 909.
- **Perimidines.** Reactive intermediates. Part XVII, conversion of *peri*-substituted azidonaphthalenes into naphthoxazoles, 1,2-dihydrobenz[cd]indazoles, and perimidines, 72.
- Peroxides, organic, reactions of. Part XVIII, photooxidation of cyclohexylamine and dicyclohexylamine, 13. Part XIX, hydroperoxides from alkylpyridines, 2882.
 - Oxymetallation. Part III, competitive epoxidation during the hydridodemercuration of β -mercurated dialkyl peroxides with sodium borohydride, 2433. Part IV, reaction of derivatives from the t-butylperoxymercuration of $\alpha\beta$ -unsaturated esters and ketones with sodium borohydride, 2787.
 - Peroxide-initiated addition of 1,1-dibromotetrafluoroethane to ethylene, propene, and 2-methylpropene, 1146.
 - Reactions of lead(IV). Part XXIII, reactions of lead tetrabenzoate with some benzenoid compounds, and comparison with those of dibenzoyl peroxide, 570.
- **Perylenequinone.** Pigments of *Elsinoe* species. Part VI, a simple synthesis of a related perylenequinone, 83.
- Phenalenone, naturally occurring compounds related to. Part III, structure of herqueinone and norherqueinone and their relationships with isoherqueinone and isonorherqueinone, 421. Part IV, some transformations and molecular rearrangements of compounds in the herqueinone series, 2990.

Phenanthrene-9,10-quinone, action of sodium and lithium chlorodifluoroacetates on, 1056.

- Phenanthrenes. Chemical constituents of the Combretaceae. Part II, substituted phenanthrenes and 9,10-dihydrophenanthrenes and a substituted bibenzyl from the heartwood of Combretum molle, 206. Part III, substituted phenanthrenes, 9,10-dihydrophenanthrenes, and bibenzyls from the heartwood of Combretum psidioides, 2941.
- Phenanthridines, 10-bromo-7,8,9,10-tetrahydro-, synthesis and reactions of, 2119.
- Phenanthrofurans. Synthesis of phenanthro[9,10-b] furans by the photolysis of dihydrofurobenzodioxins, 536.
- 9,10-Phenanthryne, biphenylenes derived from. Polycyclic biphenylenes. Part IV, 634.
- Phenazine. Amine oxidation and the chemistry of quinone imines. Part III, 2,4-dimethoxy-5-t-butylaniline, 813.
 Pigments of Pseudomonas species. Part IV, in vitro and in vivo conversion of 5-methylphenazinium-1-car-boxylate into aeruginosin A, 103.
- Phenol-dienone rearrangement. Metabolites of Proteaceae. Part V, reflexin and conocarpic acid from *Leucospermum reflexum* Buek *ex* Meisner, and the phenol-dienone rearrangement of reflexin and conocarpin, 2450.
- Phenols, biosynthesis of. Part XXIV, conversion of the anthraquinone questin into the benzophenone, sulochrin, in cultures of Aspergillus terreus, 240.
 - related to lignans. Part XII, application of nuclear magnetic double resonance to the aryltetrahydronaphthalene class, 1343. Part XIII, halogenated derivatives of podophyllotoxin, 1350.
 - Applications of high-potential quinones. Part VIII, mechanism of oxidation of 2-benzylpyenol to benzylbenzoquinones, 2294.
- Phenoxazones. Amine oxidation and the chemistry of quinone imines. Part III, 2,4-dimethoxy-5-t-butylaniline, 813.
- Phenylation of benzo[b]thiophen and benzo[b]furan. Homolytic aromatic substitution of heterocyclic compounds. Part V, 556.
- Pheromones. Neocembrene-A, a termite trail pheromone, 2653.
- Phleomycin. Purine studies. Part VII, synthesis of purines as amplifiers of phleomycin against E. coli., 1819.
- Phloroacetophenone, some new 2,2-dimethylchromens from; synthetic approaches to the deoxyhumulones, 25.
- Phosphorus. Aluminium chloride-catalysed reactions of lalkyl-3,5-di-t-butylbenzenes with phosphorus trichloride. Migration of a t-butyl group to the phosphorus atom, 559.
 - Constitution of the adducts derived from tertiary phosphine oxides and arenesulphonamides, 2793.
 - Cyclic organophosphorus compounds. Part XIV, a proton magnetic resonance study of the stereochemistry of some 5,5-di- and 4,5,5-tri-substituted 1,3,2-dioxaphosph(v)orinans, 1660.
 - Dibenzophospholium salts and ylides. Preparation, properties, and Wittig olefin synthesis, 2713.
 - Electrophilic substitution at phosphorus: reactions of diphenylphosphinyl systems with carbonyl compounds, 2377.
 - Factors in the formation of isomerically and optically pure alkyl halides. Part IX, reactions of (1-substituted n-alkyl) diphenylphosphinites with hydrogen halides and with halogens, 1595.

Formyl-, aroyl, and acyl-alkylidenetriphenylphosphoranes: conformational analysis by proton nuclear magnetic resonance spectroscopy, 31.

- Further studies in the chemistry of 2,3-dihydro-1,2,3-triphenyl-1*H*-1,2,3-benzotriphosphole and related compounds. Part I, 1631. Part II, 2548.
- Mass spectra of the trimethylsilyl derivatives of glycerophosphoric acids. Inter- and intra-molecular rearrangements of siliconium ions, 1074.
- 31P Nuclear magnetic resonance spectra of phosphoruscontaining esters in the presence of transition-metal ions, 1233.
- Preparation of phosphinic chlorides from phosphinic amides, 1184.
- Reactions of carbonyl compounds with tervalent phosphorus reagents. Part III, formation of olefins by deoxygenation of carbonyl compounds with diphenylphosphine oxide, 1113.
 - of phosphines with acetylenes. Part XVI, formation of β-alkoxy-phosphonium ylides and vinyl ethers *via* methanolysis of vinylphosphonium salts, 2830.
- Stereochemistry of nucleophilic substitution at phosphorus in P^{III} and P^V phosphetans, 713.
 - of phosphine-induced debromination reactions, 1249.
- Studies of organophosphorochloridates. Part V, some derivatives of 2,4-dichlorophenyl and pentachlorophenyl phosphorodichloridates, 583. Part VI, reactions of steroid phosphorochloridates with amines and some alcohols, 1171.
 - on heterocyclic chemistry. Part XII, tautomerism of α-(5-oxo-Δ³-isoxazolin-4-yl)benzylphosphonates, 90. Part XIII, cleavage of 5-benzylamino-oxazoles, photoproducts of N-benzyl-2H-azirine-2-carboxamides, by dialkyl phosphite, 1456.
- Use of polyphosphoric ester and polyphosphoric acid in the synthesis of 1,4-dihydro-4-oxoquinolines, 173.
- Photochemistry and preparation of some chlorine-substituted derivatives of deoxybenzoin and bibenzyl, 1277.
 - of ketones derived from carbohydrates. Part III, type II reactions of some pyranosid-2- and -3-ulose derivatives, 1670.
 - of 4-methyl-2,4,6-triphenylcyclohexa-2,6-dienyl phenyl ketone (isodypnopinacolone). Dypnopinacol. Part III, 1374.
 - of some N-(2-methyl-4,6-diphenyl-1-pyridinio)anilides,
 - Experiments on the synthesis of tetracyclines. Part XII, extension of the acetal photocyclisation process, 1103.
 - N-Fluoro-compounds. Part IV, photochemical and fluoride-initiated reactions between perfluoro-N-fluoropiperidine and perfluoropropene, 1098.
 - Internuclear cyclisation. Part XXX, the photolysis of 2-iodo-2'-, -3'-, and -4'-methoxy-N-alkylbenzanilides in benzene, 1150.
 - Light-induced and related reactions of quinones. Part IX, t-butyl-1,4-benzoquinones, 372.
 - reactions of α -N-alkylanilino-ketones: formation of diindolylmethanes, 1210.
 - Nitroxide chemistry. Part III, photolysis of bistrifluoromethyl nitroxide and some reactions of the major product, perfluoro-(2,4-dimethyl-3-oxa-2,4diazapentane), 1449.

Photochemistry (contd.)

Overcrowded molecules. Part VII, thermal and photochemical reactions of photochromic (E)- and (Z)-benzylidene(diphenylmethylene)succinic anhydrides and imides, 1321.

Perfluoroalkyl derivatives of sulphur. Part X, reaction of polyfluoromonoiodoalkanes with dimethyl sulphide to give methyl polyfluoroalkyl sulphides, 155. Part XI, reaction of polyfluoromonoiodoalkanes with dimethyl disulphide, 159. Part XIV, reactions of tetrafluoro-1,2-di-iodoethane and octafluoro-1,4-di-iodobutane with dimethyl sulphide and dimethyl disulphide, 2438.

Photochemical interconversion of some diazo-amides and diazirinecarboxamides, 2034.

Photochemically initiated reactions of bistrifluoromethyl disulphide with olefins, 34.

Photochemical rearrangement of bicyclo[3,3,1]nona-3,7-diene-2,6-diones, 1030.

synthesis of alkyl 2,2-dimethyl-3-(2-methylpropenyl)-aziridine-1-carboxylates and 3,3-dimethylaziridine-1,2-dicarboxylates from alkyl azidoformates, 344.

transformations. Part VI, the photorearrangement of 2-nitrofuran and 2-nitropyrrole, 2527.

Photoconversion of 2,6-bis(alkylthio)-3,5-diphenyl-4*H*-thiopyran-4-ones into 3,4-bis(alkylthio)-2,5-diphenyl-cyclopentadienones, 1203.

Photodehydrocyclizations in stilbene-like compounds. Part V, photochemistry of 2,2'-distyrylbiphenyl, 2074.

Photo-oxygenation of lanosteryl acetate, 799.

Polyfluoroalkyl derivatives of nitrogen. Part XXXVI, photochemical reaction of N-bromo- and N-chlorobistrifluoromethylamine with cis- or trans-but-2-ene, and the synthesis of 1,2-di(bistrifluoromethylamino)-difluoroethylene and 2-bromo-1,2-difluoro-NN-bistrifluoromethylvinylamine, 1877. Part XXXVII, reaction of N-bromobistrifluoromethylamine with propene under ionic and free-radical conditions, 1880.

Reaction between 3*H*-pyrrolizines and acetylenedicarboxylic esters. Part III, the photochemical reaction, 2517.

of organic peroxides. Part XVIII, photo-oxidation of cyclohexylamine and dicyclohexylamine, 13.

Studies in the dithiocarbamate series. Part IV, photolysis of some 4-hydroxybenzyl dithiocarbamates, 2658.

of bridged benzo-heterocycles. Part II, cycloaddition reactions of epoxy-bridged cyclic olefins with tropone and tropolone, and photochemical behaviour of the adducts, 1951.

of heteroaromaticity. Part LIX, further investigations of the cycloaddition reactions of tropone with azodienophiles and the photochemical behaviour of the adducts, 783.

on conformation and reactivity. Part XI, photochemical oxidation, ozonolysis, and rearrangement of 5',6'-dihydrocholesta-3,5-dieno[3,4-b][1,4]oxathiin, 663.

on heterocyclic chemistry. Part XIII, cleavage of 5-benzylamino-oxazoles, photoproducts of N-benzyl-2H-azirine-2-carboxamides, by dialkyl phosphite, 1456.

on the syntheses of heterocyclic compounds. Part CDLXII, total photolytic syntheses of aporphine

 $[(\pm)$ -N-methyl-laurotetanine, (\pm) -cassythicine, and (\pm) -pukateine], proaporphine $[(\pm)$ -orientalinone], and morphinandienone $[(\pm)$ -pallidine and (\pm) -salutaridine] alkaloids, 1435. Part CDLXVI, synthesis of narwedine-type enones by photochemical cyclisation, 1513.

Synthesis and photorearrangement of 9-thiabicyclo-[3,3,1]nona-3,7-diene-2,6-dione, 211.

of phenanthro[9,10-b]furans by the photolysis of dihydrofurobenzodioxins, 536.

The photodecomposition of bilirubin and other bile pigments, 288.

Photodypnopinacolones. Dypnopinacol. Part IV, tautomerism of α - and β -photodypnopinacolones (6-exo- and 6-endo-methyl-1,3,6-triphenylbicyclo[3,1,0]hex-2-en-2-yl phenyl ketone, 1380.

Phthalazines. Heterocyclic imines and amines. Part XV, reactions of hydrazines with 1,3-di-iminoisoindoline and related compounds, 2320.

Phthalic acid. Synthesis of new macrocycles. Part I, monomeric and dimeric o-phthalate esters, 2148.

Phthalide, 5,7-dihydroxy-4-methyl-, asperflavin, and anhydroasperflavin. New metabolic products of Aspergillus flavus. Part II, 2406.

Phthalimidonitrene, reaction with furans, 2728.

Phyllocladene and isophyllocladene, some transformations of. Diterpenes. Part X, 190.

Picolyl ester method, synthesis of some tri-, tetra-, and penta-peptide sequences of fibringen by, 1452.

Amino-acids and peptides. Part XXXVI, the synthesis of analogues of bradykinin by the picolyl ester method, 1867.

Pigments of Elsinoe species. Part VI, a simple synthesis of a related perylenequinone, 83.

of Gnomonia erythrostoma. Part I, structures of erythrostominone, deoxyerythrostominone, and deoxyerythrostominol, 380.

of *Pseudomonas* species. Part IV, in vitro and in vivo conversion of 5-methylphenazinium-1-carboxylate into aeruginosin A, 103. Part V, biosynthesis of pyocyanin and the pigments of *Ps. aureofaciens*, 622.

Pinanes. Stereochemical studies of monoterpene compounds. Part XI, rearrangement of 2α-hydroxypinan-3-one in the presence of anhydrous oxalic acid, 258.

Pinenes. Ring opening of (—)-pin-2(10)-ene with iodine, 614.

Piperazines, N-methylated dioxo-, 2146.

Heterocyclic imines and amines. Part XII, iminoderivatives of piperazine, 1009.

Pyrazine chemistry. Part IV, thermal [1,4] eliminations from 3,6-dihydropyrazines, 2494.

Sporidesmins. Part XII, isolation and structure of sporidesmin G, a naturally-occurring 3,6-epitetrathio-piperazine-2,5-dione, 470. Part XIII. Ovine III-thrift in Nova Scotia. Part III. The characterisation of chetomin, a toxic metabolite of Chaetomium cochliodes and Chaetomium globosum, 472.

Piperidine, succinimide, and 1,3-dinitroperhydro-1,3,5-triazine, the N-nitroxymethyl derivatives of, 1902.

Piperidines. Diastereoisomeric esters of 1,2-dimethyl-4-phenylpiperidin-4-ol and related compounds, 726.

N-Fluoro-compounds. Part IV, photochemical and fluoride-initiated reactions between perfluoro-N-fluoro-piperidine and perfluoropropene, 1098.

- Piperidines (contd.)
 - Novel analgesics and molecular rearrangements in the morphine-thebaine group. Part XXV, substitution of the piperidine ring in derivatives of 6,14-endo-ethenotetrahydrothebaine, 875.
 - Stereochemical studies on isomeric 1,2,5-trimethyl-4-phenylpiperidin-4-ols: reactions with acyl chlorides and thionyl chloride, 339.
 - Stereochemistry of isomeric 1,2,5-trimethyl-4-phenyl-piperidin-4-ols: a ¹H nuclear magnetic resonance study, 334.
 - Studies in the dithiocarbamate series. Part V, the reactions of some N-(4-hydroxybenzyl)-piperidines and -pyrrolidines with carbonyl sulphide, 2660.
- Podocarpanes. Synthetic studies on terpenoids. Part XV, syntheses of 8β-methylpodocarpanes, 1325.
- Podophyllotoxin, halogenated derivatives of. Lignans and related phenols. Part XIII, 1350.
- Polycycles. Carcinogenic nitrogen compounds. Part LXXV, Skraup reactions with some polycyclic amines, and two cases of anti-Marckwald orientation, 263.
 - Highly condensed polycyclic systems. Part IV, action of concentrated sulphuric acid on 1,2,4,5-tetrachloro-3,3-ethylenedioxytetracyclo[3,2,0,0^{2,7},0^{4,6}]heptane: a novel rearrangement of a quadricyclanone acetal, 1778.
 - Polycyclic biphenylenes. Part IV, biphenylenes derived from 9,10-phenanthryne, 634.
- Polymers. Use of a poly(allyl carbonate) for the preparation of active, water-insoluble derivatives of enzymes, 2568.
- **Porphins.** N-Methylation and electrophilic substitution reactions of octa-alkylporphins, octaethylchlorin, and metalloporphins, 1789.
- Porphyrins and bile pigments from brominated pyrromethenes, 1471.
 - Formation of metal octamethyltetrabenzporphyrins from isoindole precursors, 771.
 - Pyrroles and related compounds. Part XX, syntheses of coproporphyrins, 1475.
 - The meso-reactivity of porphyrins and related compounds. Part V, the meso-oxidation of metalloporphyrins, 2540.
- Potassium tetrafluorocobaltate(III), fluorinations with. Part II, fluorination of ketones, 2277.
- Pregnanediones. Studies in the steroid group. Part LXXXII, the preparation of nine mono- and eight dioxoandrostanes, 5α-estran-17-one, and 5α-pregnane-2,20-dione, 492.
- Pregnanes. Steroid amines. Part V, 20-pyrrolidin-1-ylpregnane derivatives, 1420.
 - Steroidal analogues of unnatural configuration. Part IV, stereoselective additions to the 5,6-bond of 4,4,14α-trimethyl-19(10 —> 9β)abeo-10α-pregn-5-enes and correlation with the related 19-nor-10α-series, 627.
- Primulagenin A and echinocystic acid, synthesis of, 2994.
- **Pristimerin.** X-ray analysis of pristimerol bis-p-bromobenzoate, a derivative of the triterpene quinone methide pristimerin, 330.
- Proanthocyanidins, plant. Part I, introduction; the isolation, structure, and distribution in nature of plant procyanidins, 1387.
- **Procularine, abnormal** dienone-phenol rearrangement of. Studies on the syntheses of heterocyclic compounds. Part CDLIV, 394.

- **Procyanidins.** Plant proanthocyanidins. Part I, introduction; the isolation, structure, and distribution in nature of plant procyanidins, 1387.
- **Propanols.** Cytotoxic compounds. Part XV, reactions of the methanesulphonates of 1-arylthiopropan-2-ols and of 2-(2,4-dinitrophenylthio)propan-1-ol with nucleophiles, 2067.
- **Propene**, perfluoro-, and perfluoro-N-fluoropiperidine, photochemical and fluoride-initiated reactions between. N-Fluoro-compounds. Part IV, 1098.
- Proteaceae, metabolites of. Part V, reflexin and conocarpic acid from *Leucospermum reflexum* Buek *ex* Meisner, and the phenol-dienone rearrangement of reflexin and conocarpin, 2450. Part VI, the stereochemistry of reflexin and conocarpin, 2457.
- Protoadamantene and 2,4-didehydroadamantane, a simple route to. 1,3-Elimination with rearrangement during ester pyrolysis, 2533.
- Protonation, alkylation, and acetylation of corroles and 21,24-dioxacorroles, 143.
- Pseudomonas species, pigments of. Part IV, in vitro and in vivo conversion of 5-methylphenazinium-1-carboxylate into aeruginosin A, 103. Part V, biosynthesis of pyocyanin and the pigments of Ps. aureofaciens, 622
- L-Psicose, a synthesis of, 63.
- **Psilocin.** Synthesis of the sulphur analogue of psilocin and some related compounds, 3011.
- Pteridines, biosynthesis of. Part VI, studies of the mechanism of riboflavin biosynthesis, 1051.
 - Aza-analogues of pteridine. Part V, 5-alkylaminopyrimido[5,4-e]-as-triazines from 5-alkyl or 5-unsubstituted analogues via 5,6-adducts with amines, 237. Part VI, some 3-alkyl-5(and 7)-aminopyrimido[5,4-e]as-triazines and related compounds, 2316.
- (±)-Pukateine, total photolytic synthesis of. Studies on the syntheses of heterocyclic compounds. Part CDLXII, 1435.
- Pulegone [p-menth-4(8)-en-3-one] synthesis of phenylmethylenepyrans, competitive anion formation in, 46.
 - Terpene biosynthesis. Part IV, biosynthesis of (+)-pulegone in *Mentha pulegium L.*, 1532.
- Pummerer reactions of steroidal sulphoxides induced by acetic anhydride. Steroidal sulphur compounds. Part VIII, 1329.
- Pungent compounds. Part I, an improved synthesis of the paradols (alkyl 4-hydroxy-3-methoxyphenethyl ketones) and an assessment of their pungency, 3001.
- Purines pyrimidines, and imidazoles. Part XXXIX, formation of some 5-aminoimidazole-4-carboxylic acid derivatives from ethyl α-amino-α-cyanoacetate, 1715.
 - Purine studies. Part VII, synthesis of purines as amplifiers of phleomycin against E. coli, 1819.
 - Syntheses of some α-D-ribofuranosylimidazoles related to purine nucleotide precursors, 1773.
 - Tautomerism and ionisation of purin-8-one and its N-methyl derivatives, 2950.
- epi-Purpurosamine C (2,6-diamino-2,3,4,6-tetradeoxy-D-threo-hexose), derivatives of. Nitrogen-containing carbohydrate derivatives. Part XXIX, 2619.
- **Pyocyanin.** Pigments of *Pseudomonas* species. Part V, biosynthesis of pyocyanin and the pigments of *Ps. aureofaciens*, 622.
- **Pyrans.** Competitive anion formation in pulegone [pmenth-4(8)-en-3-one] synthesis of phenylmethylenepyrans, 46.

- Pyrazines, alkyl-, nuclear chlorination of, 2004.
 - Pyrazine chemistry. Part IV, thermal [1,4] eliminations from 3,6-dihydropyrazines, 2494.

Pyrazoles, 3,4,5-triaryl-, 1193.

- Acylarylnitrosamines. Part VI, anomalous reactions with 2,5-dimethylfuran: the formation of 2-benzyl-5-methylfurans and 3-acetyl-1-aryl-4-arylazo-5-methylpyrazoles, 1304.
- Reduction of some esters of pyrazole-3,4-dicarboxylic acid, 720.
- Ring transformations involving chloroheterocycles. Part II, reaction of 4-chloro-1,8-naphthyridines and 4-chloroquinolines with substituted hydrazines, 1109.
- **Pyrazolidines.** Reactions of unsaturated tetra- and triesters with hydrazine hydrate and semicarbazide hydrochloride, 1022.
- Synthesis of ethyl 3-oxopyrazolidine-4-carboxylates, 1416. **Pyrazolopyridopyrimidines.** Ring transformations involving chloroheterocycles. Part I, reaction of chloronaphthyridines with hydrazine hydrate, 1106.
- Pyrazolopyrimidine nucleosides. Part III, synthesis of land 2-(β-D-ribofuranosyl)pyrazolo[3,4-d]pyrimidines from pyrazole nucleoside derivatives, 2672. Part IV, synthesis and chemical reactivity of the C-nucleoside selenoformycin B and derivatives, 2677.
- Pyrenes, 1,6- and 1,8-dibromo-, characterisation of, 1622.
- **Pyridazines.** Part III, reaction of di- and tri-chlorodialkylaminopyridazines with nucleophiles, **2323**. Part IV, reaction of alkoxydichloropyridazines and dialkoxychloropyridazines with amines, **2735**.
 - Part IV, action of Grignard reagents on 6-methyl- and 4,5-dihydro-6-α-styryl-pyridazin-3(2H)-ones, 1091.
 - Heterocyclic imines and amines. Part XIII, 3,6-dihydrazinopyridazine and the nature of the reaction between 3,6-dimethoxypyridazine and hydrazine, 1483. Part XIV, products from 2,5-di-iminopyrrolidine (succinimidine) and hydrazine, 2346.
 - Reactive intermediates. Part XVIII, an N-aminopyridone- to -pyridazine rearrangement; a new decarbonylation reaction, 77.

Pyridazino 4,5-d pyridazine, new derivatives of, 953.

- Pyridines. Addition reactions of heterocyclic compounds. Part LI, cyclobuta[b]pyridines from reactions of dimethyl acetylenedicarboxylate with 1-alkyl-1,4-dihydropyridines and the cycloelimination of amide and carboxy-groups, 2918.
 - Bipyridylium quaternary salts and related compounds. Part IV, pyridones derived from paraquat and diquat, 138.
 - Condensation of β -dicarbonyl compounds with halogenopyridinecarboxylic acids. A convenient synthesis of some naphthyridine derivatives, 705.
 - Configurational and conformational isomerism in 2-y-picolinylideneindolin-3(2H)-one derivatives, 2415.
 - N-Fluoro-compounds. Part IV, photochemical and fluoride-initiated reactions between perfluoro-N-fluoropiperidine and perfluoropropene, 1098.

New synthesis of ellipticine, 2264.

- Photochemistry of some N-(2-methyl-4,6-diphenyl-1-pyridinio)anilides, 1020.
- Polyhalogeno-aromatic compounds. Part XXII, some reactions of tetrachloro-4-methylsulphonylpyridine and related compounds, 133. Part XXIV, reaction of chloropyridyl-lithium compounds with nitriles as a route to triazanaphthalenes, 2190.

- Reactions involving fluoride ion. Part IV, synthesis and rearrangement of perfluoroisopropylpyridines, 1981
 - of organic peroxides. Part XIX, hydroperoxides from alkylpyridines, 2882.
- Some cyano-amides and dicyano-glutaconimides derived from pyridine aldehydes, 2946.
- Studies in azide chemistry. Part V, synthesis of 4-azido-2,3,5,6-tetrafluoro-, 4-azido-3-chloro-2,5,6-trifluoro-, and 4-azido-3,5-dichloro-2,6-difluoro-pyridine, and some thermal reactions of the tetrafluoro-compound, 2964
- Synthesis of some 4-pyridylpyruvic acids as potential lactate dehydrogenase inhibitors, 2506.
- **Pyridobenzodiazepines.** Synthesis of some reduced pyridoand pyrrolo-benzodiazepines, 975.
- Pyridocarbazoles. Carcinogenic nitrogen compounds. Part LXXIV, Skraup and Combes-Beyer reactions with 3-aminocarbazoles; a new route to pyrido[3,2'-b]carbazoles, 260
- Pyridoindoles. Reactions of harmaline (4,9-dihydro-7-methoxy-1-methyl-3*H*-pyrido[3,4-*b*]indole) and its derivatives. Part I, reactions of harmaline with methyl acrylate, 731. Part II, reinvestigation of acetyl-harmaline, 736.
 - Reaction of 1,2,3,4-tetrahydro-2,5-dimethyl-5*H*-pyrido-[4,3-*b*]indole with arenesulphonyl azides, 1003.
- **Pyridones.** Reactive intermediates. Part XVIII, an *N*-aminopyridone- to -pyridazine rearrangement; a new decarbonylation reaction, 77.
- **Pyridopyrimidines.** Specific enzyme inhibitors in vitamin biosynthesis. Part I, the synthesis of 8-substituted pyrido[2,3-d]pyrimidines, 1041.
- **Pyridopyrimidinones.** Reduction of some fused (benzo[d]-and pyrido[3,2-d]-)pyrimidinones, 353.

Pyrimidines—see also Uracils.

- imidazoles, and purines. Part XXXIX, formation of some 5-aminoimidazole-4-carboxylic acid derivatives from ethyl α -amino- α -cyanoacetate, 1715.
- simple. Part XIV, the formation and reactions of some derivatives of simple pyrimidinesulphonic acids, 522.
- **Pyrimidotriazines.** Aza-analogues of pteridine. Part V, 5-alkylaminopyrimido[5,4-e]-as-triazines from 5-alkyl or 5-unsubstituted analogues via 5,6-adducts with amines, 237. Part VI, some 3-alkyl-5(and 7)-aminopyrimido[5,4-e]-as-triazines and related compounds, 2316.
 - Heterocyclic studies. Part XXVI, cleavage of pyrimido-[5,4-e]-as-triazin-5(6H)-one by nucleophiles, 247.

Pyrocatechols, nitro- and amino-, 1088.

- **Pyrones.** Studies of heterocyclic compounds. Part XII, a three-step synthesis of 6a-thiathiophthen from γ -pyrone, 1447.
- **Pyrroles** and related compounds. Part XX, syntheses of coproporphyrins, 1475.
 - Photochemical transformations. Part VI, the photorearrangement of 2-nitrofuran and 2-nitropyrrole, 2527.
- Pyrrolidine-2,4-diones (tetramic acids) and some derivatives, synthesis of, 2121.
- Pyrrolidines. Steroid amines. Part V, 20-pyrrolidin-1ylpregnane derivatives, 1420.
 - Studies in the dithiocarbamate series. Part V, reactions of some N-(4-hydroxybenzyl)-piperidines and -pyrrolidines with carbonyl sulphide, 2660.

- Pyrrolizidine alkaloids. The biosynthesis of senecic acid, 671.
 - and seco-pyrrolizidine alkaloids of *Crotalaria laburnifolia* L. subspecies *eldomae*, 1602.
- Pyrrolizines. Reaction between 3*H*-pyrrolizines and acetylenedicarboxylic esters. Part I, preparation of 3-(alkoxycarbonylmethylene)-3*H*-pyrrolizines, 840. Part II, preparation of derivatives of cycl[4,2,2]azine (azepino-[2,1,7-cd]pyrrolizine), 844. Part III, photochemical reaction, 2517.
- **Pyrrolobenzodiazepines.** Synthesis of some reduced pyridoand pyrrolobenzodiazepines, 975.
- Pyrrolo[1,2-b]benzodiazocine, 6,11-dihydro-, derivatives of, 2504.
- **Pyrrolo-oxazoles.** One-step synthesis of 3,5-dihydro-2H-pyrrolo[3,4-d]oxazoles by reaction of p-nitrosophenols with 2-arylaziridines, 1459.
- **Pyrrolopyridines.** Synthesis and stability of 2-methyl-2,4-diaza- and 2-methyl-2,5-diazaindene (2-methyl-pyrrolo-[3,4-b]pyridine and -pyrrolo[3,4-c]pyridine), 2485.
- Pyrromethenes, brominated, porphyrins and bile pigments from, 1471.
- Pyrylium salt formation from aromatic ketones. Part I, reactions of β-methylchalcones in non-aqueous acidic media, 809.
 - and 2-phenyl- Δ^2 -oxazolin-5-one, formation of benzanilides from, 1142.

Q

- Quaternary salts of 1-aminoimidazoles, synthesis and oxidation of, 2927.
- Questin. Biosynthesis of phenols. Part XXIV, conversion of the anthraquinone questin into the benzophenone, sulochrin, in cultures of Aspergillus terreus, 240.
- Quinazolines. Ring transformations involving chloroheterocycles. Part III, reaction of 4-chloroquinazolines with hydrazines, 1842.
- Quinolines, the question of 1,2- or 1,4-addition of organolithium compounds to, 2807.
 - Azabenzocycloheptenones. Part XIV, cyclisation of amino-acid derivatives to tetrahydro-1-benzazepin-5-ones and tetrahydroquinolin-4-ones, 1803. Part XV, synthesis of benzazatropones and a quinoline aldehyde by the dehydrogenation of certain tetrahydro-1-benzazepine derivatives, 2012.
 - 2,3-Dihydroquinolin-4(1H)-ones. Part I, halogen-substituted 2,3-dihydroquinolin-4(1H)-ones and their 1-(2-acylethyl) derivatives, 2019.
 - Organolithium chemistry of N-heterocycles. Part IV, formation of 1,2,4,5-tetrahydro-4,4-diphenyl-2,5-methano-3,1-benzoxazepines from quinolines, 1176.
 - Quinoline alkaloids. Part XII, alkaloids and coumarins of *Orixa japonica* Thunb. Identification of a new quinoline alkaloid, orixinone, 2116.
 - Reactions involving fluoride ion. Part V, synthesis of perfluoroisopropylquinolines, 1286.
 - of nitriles. Part VIII, synthesis of 2,3-dihydroquinolin-4(1H)-ones, 932.
 - Ring transformations involving chloroheterocycles. Part II, reaction of 4-chloro-1,8-naphthyridines and 4-chloroquinolines with substituted hydrazines, 1109.
 - Use of polyphosphoric ester and polyphosphoric acid in the synthesis of 1,4-dihydro-4-oxoquinolines, 173.

- Quinolone. Friedel-Crafts cyclisations. Part III, synthesis of derivatives of 2(1H)-quinolone (carbostyril) by aluminium chloride-catalysed cycloeliminations of cinnamanilide and related compounds, 1648.
- Quinone imines. Amine oxidation and the chemistry of quinone imines. Part I, 3-methoxy-4-t-butylaniline, 396. Part II, 2,5-dimethoxy-4-t-butylaniline, 408. Part III, 2,4-dimethoxy-5-t-butylaniline, 813.
- Quinones, high-potential, applications of. Part VIII, mechanism of oxidation of 2-benzylphenol to benzylbenzoquinones, 2294.
 - naturally occurring. Part XXI, anthraquinones in the crinoids *Heterometra savignii* (J. Müller) and *Lamprometra klunzingeri* (Hartlaub), 1291.
 - Thiele-Winter acetoxylation of. Part IV, quinones containing one or more t-butyl groups, 2286.
 - Action of sodium and lithium chlorodifluoroacetates on phenanthrene-9,10-quinone, 1056.
 - Light-induced and related reactions of quinones. Part IX, t-butyl-1,4-benzoquinones, 372.
 - Pigments of Elsinoe species. Part VI, a simple synthesis of a related perylenequinone, 83.
 - X-Ray analysis of pristimerol bis-p-bromobenzoate, a derivative of the triterpene quinone methide pristimerin, 330
- o-Quinonoid compounds. Part V, derivatives of 2,3-naphthoquinone dimethide, 2722.
- Quinoxaline dioxides. Reactions of benzofurazan 1-oxides with enamines, 965.

R

- Racemisation in peptide synthesis, determination of, by nuclear magnetic resonance spectroscopy. Aminoacids and peptides. Part XXVIII, 1015.
 - Amino-acids and peptides. Part XXXV, the effect of solvent on the rates of racemisation and coupling of some acylamino-acid p-nitrophenyl esters; the base strengths of some amines in organic solvents, and related investigations, 1194.
- Rearrangements, base-catalysed, of bicyclic δ -hydroxy- $\alpha\beta$ -enones. Part V, 1516.
 - inter- and intra-molecular, of siliconium ions. Mass spectra of the trimethylsilyl derivatives of glycerophosphoric acids, 1074.
 - Novel analgesics and molecular rearrangements in the morphine-thebaine group. Part XXIII, adducts of thebaine with divinyl sulphone and with methyl vinyl sulphone, 870. Part XXIV, 15,16-didehydro-6,14-endo-etheno-6,7,8,14-tetrahydro-thebaines and -oripavines, 872. Part XXV, substitution of the piperidine ring in derivatives of 6,14-endo-ethenotetrahydrothebaine, 875. Part XXVI, some reactions of the thebaine-2-chloroacrylonitrile adduct, 878. Part XXVII, 7-alkylidene- and 7α-vinyl-6,14-endo-etheno-6,7,8,14-tetrahydrothebaines, 881.
- Redox reactions, novel, of diazonium fluoroborates. The formation of copper salt-azo-compound complexes: water-induced free radical aromatic arylation, 2555.
 - transfer. Part VII, addition of ethylene and butadiene to functionally substituted aromatic sulphonyl chlorides, 1543.
- Reduction by dissolving metals. Part XVIII, metalammonia reductions of some bicyclo[2,2,2]octene

Reduction (contd.)

- derivatives: structural effects on double bond reduction and nitrile cleavage, 1546.
- of some esters of pyrazole-3,4-dicarboxylic acid, 720.
- of some fused (benzo[d]- and pyrido[3,2-d]-)pyrimidinones, 353
- Amine oxidation. Part VI, metal-ion induced dehydrative cyclisation, reduction, and reductive fragmentation of arylethyldimethylamine *N*-oxides, 228.
- 2-Arylmethylideneindolin-3-ones: stereochemistry and reduction with sodium borohydride, 1607.
- Hydrogenolyses of 3-hydroxycholest-4-enes by mixed hydrides, 2010.
- Mechanism of metal-ammonia reduction of camphor, 999. Oxymetallation. Part III, competitive epoxidation during the hydridodemercuration of β-mercurated dialkyl peroxides with sodium borohydride, 2433. Part IV, reaction of derivatives from the t-butylperoxymercuration of αβ-unsaturated esters and ketones with sodium borohydride, 2787.
- Preparation of 2,3-dihydrothiazolo[2,3-a]isoquinolinium salts and their reactions with complex metal hydrides, 1799.
- Reductive cleavage and oxidative cleavage of 5-phenyl- Δ^2 -isoxazoline-3-carboxylic acid, 437.
- Reflexin. Metabolites of Proteaceae. Part V, reflexin and conocarpic acid from Leucospermum reflexum Buek ex Meisner, and the phenol-dienone rearrangement of reflexin and conocarpin, 2450. Part VI, stereochemistry of reflexin and conocarpin, 2457.
- Reformatsky reactions of 6-benzyloxy-, 5,6-dimethoxy-, and 6-methoxy-indan-1-ones. Structure of the indene-3-acetic acids. Part II, 941.
- Reilly-Hickinbottom rearrangement. Rearrangements of diphenylamine derivatives. Part III, 2579.
- Reissert compound chemistry. Part III, some rearrangement and substitution reactions, 479.
- Rhoeadine. Total synthesis of the alkaloids rhoeadine and alpinigenine, 2986.
- Riboflavin biosynthesis, studies of the mechanism of. Biosynthesis of pteridines. Part VI, 1051.
- Ring transformations involving chloroheterocycles. Part I, reaction of chloronaphthyridines with hydrazine hydrate, 1106. Part II, reaction of 4-chloro-1,8-naphthyridines and 4-chloroquinolines with substituted hydrazines, 1109. Part III, reaction of 4-chloroquinazolines with hydrazines, 1842.

S

- Saccharomyces cerevisiae, synthesis and metabolism of ergosta-7,22,24(28)-trien-3β-ol in. Biosynthesis of terpenes and steroids. Part VIII, 1231.
- (±)-Salutaridine, total photolytic synthesis of. Studies on the syntheses of heterocyclic compounds. Part CDLXII, 1435.
- Salvia officinalis, concerning the biosynthesis of (—)-camphor and (—)-borneol in. Biosynthesis. Part XIX,
- Santolinyl, artemisyl, and lavandulyl structures, cyclopropane cleavage of chrysanthemic acid relatives to: acid-catalysed and biosynthetic experiments, 642.
- Santonin. ¹³C Fourier studies. The configurational dependence of the carbon-13 chemical shifts in santonin derivatives, 299.

- Sapogenins, 3α -hydroxylated steroidal, biosynthesis of. Part I. Studies on biochemical transformation of plant steroids. Part IV, 957.
- Sapphyrins and related compounds. The synthesis of 22 π-electron macrocycles, 2111.
- Schiff's bases, synthesis of carbonyl compounds via transamination of, 1652.
- Schmidt reaction with cholest-4-ene-3,6-dione, products of. Steroids and related studies. Part XIX, 993.
- Scytalidin: a new fungitoxic metabolite produced by a Scytalidium species, 2280.
- Selenium compounds. Hindered rotation in xanthenyl-type radicals, 2418.
 - Oxidative fission of some α -substituted β -diketones by selenium dioxide, 977.
 - Pyrazolopyrimidine nucleosides. Part IV, synthesis and chemical reactivity of the *C*-nucleoside selenoformycin B and derivatives, 2677.
 - Reaction of 1,2,3-thiadiazoles and 1,2,3-selenadiazoles with nonacarbonyldi-iron, 2165.
 - Studies of heterocyclic compounds. Part XI, 1-oxa-6,6a-dithia-2-azapentalenes, 1-oxa-6,6a-diselena-2-azapentalenes, and 3-nitromethylene-3H-1,2-dithioles, 1360.
- Semicarbazide hydrochloride and hydrazine hydrate, reactions of unsaturated tetra- and tri-esters with, 1022.
 - 1-arylmethylene-, cyclization of. Anodic oxidation of organic nitrogen compounds. Part I, 1718.
- Semicarbazones, ambident oxidative ring closure of, 1918.
- of 6-hydroxy-4,7-dimethoxy- and 6-hydroxy-4-methoxybenzofuran-5-yl methyl ketone and derivatives, isomerism of, 616.
- Senecic acid, biosynthesis of. Pyrrolizidine alkaloids, 671.
 Senecio alkaloids. The structure and absolute configuration of isoline, 2339.
- Serratenediol. Application of tris(dipivaloylmethanato)europium(III) to the assignments of the methyl resonances of triterpenes related to serratenediol [c(14a)-homo-27norgammacer-14-ene-3β,21α-diol], 1682.
- Sideridiol [(--)-kaur-15-ene-7β,19-diol], further reactions of,
- Silicon. Mass spectra of the trimethylsilyl derivatives of glycerophosphoric acids. Inter- and intra-molecular rearrangements of siliconium ions, 1074.
 - Organosilicon chemistry. Part IX, reaction of bis(trimethylsilyl)mercury with some polyfluoro-olefins, 847.
 - Reactions of Group IV organometallic compounds. Part XXVI, insertion reactions of isocyanates and isothiocyanates to N-trimethylsilyl(diphenylmethylene)amine and subsequent [4+2] cycloadditions of isocyanates with their adducts, 1678.
- Skraup reactions. Carcinogenic nitrogen compounds. Part LXXIV, Skraup and Combes—Beyer reactions with 3-aminocarbazoles; a new route to pyrido[3,2'-b]carbazoles, 260. Part LXXV, Skraup reactions with some polycyclic amines, and two cases of anti-Marckwald orientation, 263.
- Sodium and lithium chlorodifluoroacetates, action of, on phenanthrene-9,10-quinone, 1056.
- Spectra, circular dichroism and optical rotatory dispersion, data for some epicamphor derivatives, 351.
 - of the $n \longrightarrow \pi^*$ band of cyclic thionocarbonates. Part II, studies on the thionocarbonates of some acyclic vicinal diols, 273.
 - Nitro-heteroaromatic derivatives of amino-acids and peptides. Part III, application of ultraviolet-visible

Spectra (contd.)

- absorption and circular dichroism to N-(3-nitro-2-pyridyl)amino-acids, 1179. Part IV, a circular dichroic method for the selective determination of cysteinyl residues, 1182.
- electron spin resonance. Hindered rotation in xanthenyltype radicals, 2418.
- infrared. Benzopyrones. Part VIII, mono- and ditetrazol-5-ylchromones. The infrared cyano-absorption of some 4-oxochromencarbonitriles, 779.
- mass, of polychlorinated biphenyls, 686.
 - of the trimethylsilyl derivatives of glycerophosphoric acids. Inter- and intra-molecular rearrangements of silicon ions, 1074.
 - Mass spectrometry in structural and stereochemical problems. Part CCXX, synthesis and mass spectra of 5α -cholest-8(9)- and 8(14)-en-7-ones, 2771.
 - Mass spectrometry of bisbenzylisoquinoline alkaloids. Part I, alkaloids derived from coclaurine units joined tail-to-tail, 592. Part II, alkaloids derived from one coclaurine and one isococlaurine unit, 597. Part III, alkaloids derived from coclaurine units joined head-to-tail, 599.
 - Mass spectrometry of tautomeric compounds. Part IV, structure of the molecular ions of 4-hydroxy-coumarins, 1924.
 - Studies in the norbornene series. Part I, elucidation of the structure of norbornene derivatives by use of the nuclear magnetic resonance shift reagent tris(dipivaloylmethanato)europium(III), the nuclear Overhauser effect, and mass spectrometry, 1500.
 - Thermal cyclisation of *trans-o-fluorocinnamic* acids to coumarins. An apparent similarity between mass spectral and thermal fragmentations, 2911.
- nuclear magnetic resonance, 220 MHz, analysis, and selective deuteriodeprotonation of benzo[a]pyrene and 6-methylbenzo[a]pyrene, 1253.
 - ¹P, of phosphorus-containing esters in the presence of transition-metal ions, 1233.
 - Amino-acids and peptides. Part XXVIII, determination of racemization in peptide synthesis by nuclear magnetic resonance spectroscopy, 1015.
 - Application of tris(dipivaloylmethanato)europium(III) to the assignments of the methyl resonances of triterpenes related to serratenediol [c(14a)-homo-27-norgammacer-14-ene-3β,21α-diol], 1682.
 - Heterocyclic rearrangements. Part VI, structure and stereochemistry of a sulphur-bridged tetrahydroaze-pine and derived sulphoxides, by X-ray crystallography and nuclear magnetic resonance spectroscopy, 357.
 - ¹H Nuclear magnetic resonance spectroscopic study of some N-methyl and N-acyl derivatives of guanosine. The structure of N,O(2'),O(3'),O(5')-tetra-acetylguanosine, 2937.
 - Lignans and related phenols. Part XII, application of nuclear magnetic double resonance to the aryltetrahydronaphthalene class, 1343.
 - Meliacins (limonoids). Tris(dipivalomethanato)europium-induced upfield and downfield shifts in the nuclear magnetic resonance spectra of the meliacins, 653.
 - Stereochemistry of isomeric 1,2,5-trimethyl-4-phenyl-piperidin-4-ols: a ¹H nuclear magnetic resonance study, 334.

- Studies in the norbornene series. Part I, elucidation of the structure of norbornene derivatives by use of the nuclear magnetic resonance shift reagent tris(dipivaloylmethanato)europium(III), the nuclear Overhauser effect, and mass spectrometry, 1500.
- Terpenoids. Part IV, the nuclear magnetic resonance properties of the stereoisomeric *ent*-kauran-15-ols and 13β-kauran-15-ols, 1272.
- optical rotatory dispersion and circular dichroism, data for some epicamphor derivatives, 351.
 - Terpenoids. Part III, the enolisation–ketonisation and optical rotatory dispersion of the *ent*-kauran-15-ones and 13β-kauran-15-ones, 986.
- proton magnetic resonance. Cyclic organophosphorus compounds. Part XIV, a proton magnetic resonance study of the stereochemistry of some 5,5-di- and 4,5,5-tri-substituted 1,3,2-dioxaphosph(v)orinans, 1860
 - Formyl-, aroyl, and acyl-alkylidenetriphenylphosphoranes: conformational analysis by proton nuclear magnetic resonance spectroscopy, 31.
- ultraviolet-visible. Nitro-heteroaromatic derivatives of amino-acids and peptides. Part III, application of ultraviolet-visible absorption and circular dichroism to N-(3-nitro-2-pyridyl)amino-acids, 1179.
- Spirocyclohexadiene lactams, free radical reactions of some. Internuclear cyclisation. Part XXVIII, 113.
- Spirocyclohexadienyl dimers, further studies on the aromatisation of. Internuclear cyclisation. Part XXVII, 105
- Spirocyclohexadienylisoxazoles. Aerothionin and homoaerothionin: two tetrabromo spirocyclohexadienylisoxazoles from *Verongia* sponges, 18.
- Sporidesmins. Part XII, isolation and structure of sporidesmin G, a naturally-occurring 3,6-epitetrathiopiperazine-2,5-dione, 470. Part XIII. Ovine III-thrift in Nova Scotia. Part III. The characterisation of chetomin, a toxic metabolite of Chaetomium cochliodes and Chatomium globosum, 472.
- Statistical association of fragment incidence. Analysis of structural characteristics of chemical compounds in a large computer-based file. Part III, 2428.
- Stereochemistry and reactions of some 3,4-disubstituted thiochromans and related dihydronaphthothiopyrans, 787.
 - and synthesis of optically active [16 O, 18 O]sulphones, 2057. of aurones [2-substituted benzylidenebenzofuran-3(2H)-ones], 2128.
 - of cubebol and synthesis of cubebane-type sesquiterpenoids, 1721.
 - of cyclic ether formation. Part I, stereoselective intramolecular cyclisation of aliphatic disecondary 1,4diols and their sulphonate esters to tetrahydrofurans, 2460
 - of cyclopropyl ketones from the reaction of dimethylsulphoxonium methylide with 3-benzylidenechroman-4-ones, 1554.
 - of α -halogeno-sulphoxides. Part I, inversion of chirality at the sulphinyl sulphur atom in a reaction not involving the breaking of the sulphinyl bonds at the chiral sulphur atom, 1886.
 - of isomeric 1,2,5-trimethyl-4-phenylpiperidin-4-ols: a ¹H nuclear magnetic resonance study, 334.
 - of nucleophilic substitution at phosphorus in P^{III} and P^{V} phosphetans, 713.

Stereochemistry (contd.)

- of phosphine-induced debromination reactions, 1249.
- of reflexin and conocarpin. Metabolites of Proteaceae. Part VI, 2457.
- of some reactions of the sesquiterpenoid trichodermol, 2283
- of the 2:1 [4 + 2] adducts of tetrachlorocyclopenta-dienone acetals with cyclohepta-1,3,5-triene, tropone, cyclohexa-1,4-diene, and p-benzoquinone, 195.
- Absolute configuration of tropic acid, 1597.
- Alkaloid biosynthesis. Part XVII. Substances from plants of the sub-family Wurmbaeoideae and their derivatives. Part LXXVII. 1-Phenethylisoquinoline alkaloids. Part II. Structure and chemistry of androcymbine, 1736.
- Allenes. Part XXII, synthesis and absolute configuration of laballenic and lamenallenic acids, 2197.
- 2-Arylmethylideneindolin-3-ones: stereochemistry and reduction with sodium borohydride, 1607.
- Carcinogenic nitrogen compounds. Part LXXXI, steric control in heterocyclic cyclisations with 6-substituted chrysenes, 1932.
- ¹³C Fourier studies. The configurational dependence of the carbon-13 chemical shifts in santonin derivatives, 299.
- Configurational and conformational isomerism in $2-\gamma$ picolinylideneindolin-3(2H)-one derivatives, 2415.
- picolinylideneindolin-3(2H)-one derivatives, 2415. Configuration of 1α -methyl- 5α -androstan-3-ones, 1219.
- Configurations of the 5-methyladamantan-2-ols and the 2,5-dimethyladamantan-2-ols, 2648.
- Cyclic organophosphorus compounds. Part XIV, a proton magnetic resonance study of the stereochemistry of some 5,5-di- and 4,5,5-tri-substituted 1,3,2-dioxaphosph(v)orinans, 1660.
- Diastereoisomeric esters of 1,2-dimethyl-4-phenylpiperidin-4-ol and related compounds, 726.
- Diterpenoids. Part XVIII, synthesis and stereochemistry of 1,2,3,4,4a,9a-hexahydro-1β,4aα-dimethylfluorene-1α,9-dicarboxylic acids, 320.
- Epimerisations accompanying the reductive desulphurisation of some 5-S-alkyl-5-thiopentose dialkyl dithioacetals, 38.
- Equilibration of 24,25-dibromides of lanosterol and derivatives, 1584.
- Formyl-, aroyl-, and acyl-alkylidenetriphenylphosphoranes: conformational analysis by proton nuclear magnetic resonance spectroscopy, 31.
- Fungal products. Part II, structure and stereochemistry of the acid C₁₈H₁₆O₅, a degradation product of wortmannin, 2892. Part III, structure of wortmannin and some hydrolysis products, 2898.
- Heterocyclic rearrangements. Part VI, structure and stereochemistry of a sulphur-bridged tetrahydro-azepine and derived sulphoxides, by X-ray crystallography and nuclear magnetic resonance spectroscopy, 357.
- Hindered rotation in xanthenyl-type radicals, 2418.
- Mass spectrometry in structural and stereochemical problems. Part CCXX, synthesis and mass spectra of 5α cholest-8(9)- and 8(14)-en-7-ones, 2771.
- Modifications of lincomycin involving the carbohydrate portion. Part II, analogues with D-gluco- and D-ido-stereochemistry, 3031.
- Optical stabilities of some oo'-bridged oo'-dichlorobiphenyls, 2717.

- Polypeptides. Part XX, the synthesis of some diastereoisomeric poly-(y-benzyl glutamate)s, 1523.
- Senecio alkaloids. Structure and absolute configuration of isoline, 2329.
- Stereochemical studies of monoterpene compounds. Part XI, rearrangement of 2α-hydroxypinan-3-one in the presence of anhydrous oxalic acid, 258.
 - on isomeric 1,2,5-trimethyl-4-phenylpiperidin-4-ols: reactions with acyl chlorides and thionyl chloride, 339.
- Stereospecific hydrogenation of (Z)- α -benzoylamino-obenzyloxy[β - 2 H]cinnamic acid, 203.
- Steroidal analogues of unnatural configuration. Part IV, stereoselective additions to the 5,6-bond of $4,4,14\alpha$ -trimethyl- $19(10 \longrightarrow 9\beta)abeo-10\alpha$ -pregn-5-enes and correlation with the related 19-nor- 10α -series, 627.
- Studies of enzyme-mediated reactions. Part I, synthesis of deuterium- or tritium-labelled (3S)- and (3R)-phenylalanines: stereochemical course of the elimination catalysed by L-phenylalanine ammonia-lyase, 2355. Part II, stereochemistry of the elimination of ammonia from L-tyrosine catalysed by the enzyme from maize, 2364.
 - on conformation and reactivity. Part XI, photochemical oxidation, ozonolysis, and rearrangement of 5',6'-dihydrocholesta-3,5-dieno[3,4-b][1,4]oxathiin, 663.
- Terpenoids. Part IV, the nuclear magnetic resonance properties of the stereoisomeric *ent*-kauran-15-ols and 13β-kauran-15-ols, 1272.
- v-Triazolines. Part III, cis-trans-equilibrium of 1-aryl-4,5-dihydro-v-triazoles, 997.
- Steroids. Part XV, rearrangements of 9- and 10-hydroxy-5β-methyl-19-nor-steroids, 792.
 - and related studies. Part XVIII, 3-aza-A-homo-4a-eno-[3,4-d]tetrazole steroid analogues, 990. Part XIX, products of the Schmidt reaction with cholest-4-ene-3,6-dione, 993.
 - and terpenes, biosynthesis of. Part VIII, the synthesis and metabolism in *Saccharomyces cerevisiae* of ergosta-7,22,24(28)-trien-3β-ol, 1231.
 - and terpenoids, investigations on the biosynthesis of. Part VI, the sterols of yeast, 513.
 - hydroxy-. Part XVIII, reactions of 17β-chloro-16α,17α-epoxy-5α-androstane and the preparation of 17β-iodo-16α,17α-epoxy-5α-androstane, 486.
 - microbiological hydroxylation of. Part IV, the pattern of dihydroxylation of mono-oxygenated 5α-androstanes with cultures of the fungus Calonectria decora, 2081. Part V, the pattern of hydroxylation of dioxygenated 5α-androstanes with cultures of the fungus Calonectria decoxa, 2759. Part VI, hydroxylation of simple mono- and di-oxygenated 5α-androstanes and of 3-oxoestranes with the fungus Aspergillus ochraceus, 2930.
 - nitro. Part VI, structure of 5α -cholestano[2,3-c]furazan 2'-oxide and the preparation of 6-nitro- 5α -cholestan-7-ones. 655.
 - some $2\alpha,3\alpha$ -epoxy- 5α -hydroxy-, aromatization of, 1445.
 - Acetolytic cleavage of the epimeric 2- and 6-methoxy-5α-cholestanes involving a 1,2-hydride shift to C-2, 2319.
 - Amino- and dienamino-derivatives formed from adrenocorticol steroids and heterocyclic bases, 502.
 - An unusual oxidation of some 5α -hydroxyandrost-2-enes, 590.

- Steroids (contd.)
 - Aromatization of some 4,5-epoxy-3-hydroxysteroids, 1889.
 - of some 3-substituted 5α , 6α -epoxysteroids, 1981.
 - Configuration of 1α -methyl- 5α -androstan-3-ones, 1219.
 - Conversion of lanosterol into a compound with the carbon skeleton of fusidic acid, 1243.
 - Extractives of fungi. Part III, introduction of a (Z)-17(20)-double bond into a tumulosic acid derivative, 2260.
 - Intramolecular hydrogen bonding in hydroxy-ketosteroids, 171.
 - Location of tritium in [1-3H]ergosterol, 244.
 - Marine sterols with a new pattern of side-chain alkylation from the sponge Aplysina (= Verongia) aerophoba, 2132
 - Mass spectrometry in structural and stereochemical problems. Part CCXX, synthesis and mass spectra of 5α -cholest-8(9) and 8(14)-en-7-ones, 2771.
 - Regiospecific syntheses of modified steroid hormones. Part II, 4-fluoro-17β-oestradiol and -oestrone, 2297. Part III, 2-fluoro-oestrone and -17β-oestradiol, 2300. Part IV, 4-bromo-oestrone and -17β-oestradiol, 2302.
 - Secosteroids. Preparation of 5-oxo-2,5-seco-A-dinor-cholestan-2-amide, 2755.
 - Some stereoselective and regioselective olefin additions: iodoacetoxylation and related electrophilic additions across the 22(23)-bond of $3\alpha,5\alpha$ -cycloergosta-7,22-dien-6-one, 53.
 - Steroidal analogues of unnatural configuration. Part IV, stereoselective additions to the 5,6-bond of 4,4,14 α -trimethyl-19(10 \longrightarrow 9 β) abeo-10 α -pregn-5-enes and correlation with the related 19-nor-10 α -series, 627.
 - sulphur compounds. Part VIII, Pummerer reactions of steroidal sulphoxides induced by acetic anhydride, 1329.
 - Steroid amines. Part V, 20-pyrrolidin-1-ylpregnane derivatives, 1420.
 - Structure of 'cholestane-3,4,6-trione,' 1358.
 - Studies in the steroid group. Part LXXXII, the preparation of nine mono- and eight di-oxoandrostanes, 5α-estran-17-one, and 5α-pregnane-2,20-dione, 492. Part LXXXIII, 1-, 2-, 3-, 4-, 6-, 12-, 15-, and 16-monohydroxy-5α-androstanes and their derivatives, 499. Part LXXXIV, preparation and reactions of 15-oxygenated androstanes, 2765.
 - of organophosphorochloridates. Part VI, reactions of steroid phosphorochloridates with amines and some alcohols, 1171.
 - on biochemical transformation of plant steroids. Part IV, biosynthesis of 3α -hydroxylated steroidal sapogenins. Part I, 957.
 - on conformation and reactivity. Part XI, photochemical oxidation, ozonolysis, and rearrangement of 5',6'-dihydrocholesta-3,5-dieno[3,4-b][1,4]oxathiin, 663.
 - Synthesis and configuration of some 32-norlanosterol derivatives, 749.
 - of some 32-functionalised lanostane derivatives, 739. of steroidal cyclopropanes, 2423.
 - Withanicandrin, a ring-c-substituted withanolide from *Nicandra physaloides* (Solanaceae), 2109.
- Stilbene. Photodehydrocyclizations in stilbene-like compounds. Part V, photochemistry of 2,2'-distyrylbiphenyl, 2074.

- Structures. Analysis of structural characteristics of chemical compounds in a large computer-based file. Part III, statistical association of fragment incidence, 2428.
- Strychnines. 10,11-Didehydrostrychnidine, 1068.
 - Studies on the reaction of benzoyl peroxide with NN-disubstituted aromatic amines and related compounds. Part VI, some attempts to effect o-hydroxylation in the strychnine series, 1429.
- Succinimide, piperidine, and 1,3-dinitroperhydro-1,3,5-triazine, the *N*-nitroxymethyl derivatives of, 1902.
 - Heterocyclic imines and amines. Part XIV, products from 2,5-di-iminopyrrolidine (succinimidine) and hydrazine, 2346.
- Sugars—see also Carbohydrates.
 - A new synthesis of D-galactosamine from D-glucosamine,
 - A synthesis of L-psicose, 63.
 - Chemical modification of trehalose. Part X, some further 3,3'-dideoxy-analogues, 949. Part XI, 6,6'-dideoxy-6,6'-difluoro-αα-trehalose and its galacto-analogue, 2513.
 - Direct conversion of 3,5,6-tri-O-benzoyl-1,2-O-isopropyl-idene-α-D-glucose into 4,5,6-tri-O-benzoyl-2,3-di-S-ethyl-2,3-dithio-D-allose diethyl dithioacetal, 1033.
 - Epimerisations accompanying the reductive desulphurisation of some 5-S-alkyl-5-thiopentose dialkyl dithioacetals, 38.
 - Formation of 3,6-anhydro-4,5-O-isopropylidene-D-allose dimethyl acetal in the methanolysis of 1,2:5,6-di-O-isopropylidene-3-O-p-tolylsulphonyl-α-D-gluco-furanose. Synthesis of 3,6-anhydro-D-allose, 346.
 - Phenyloxazoline derivatives of amino-sugars. Part I, 248. Part II, the fission of phenyloxazolines under basic conditions, 2748.
 - Structure of an amino-sugar from the antibiotic vancomycin, 443.
 - Syntheses of methyl 2,3,6-trideoxy-α-L-erythro-hexopyranoside (methyl α-L-amicetoside) and methyl 2,3,4,6-tetradeoxy-4-(dimethylamino)-α-L-threo-hexopyranoside (methyl α-L-ossaminide), 2977.
 - and hydrolytic stability of 1-glucopyranosylimidazoles,
 - The path of the conversion of 3,5,6-tri-O-benzoyl-1,2-O-isopropylidene-α-D-glucose into 4,5,6-tri-O-benzoyl-2,3-di-S-ethyl-2,3-dithio-D-allose diethyl dithio-acetal, 2873.
 - Vancosamine: the structure and configuration of a novel amino-sugar from vancomycin, 2153.
- Sulochrin. Biosynthesis of phenols. Part XXIV, conversion of the anthraquinone questin into the benzophenone, sulochrin, in cultures of Aspergillus terreus, 240.
- Sulphides, of naphthacene, pentacene, and hexacene, synthesis, structure, and electrical properties of, 1310.
- Sulphines. Part IV, reactions of aromatic sulphines with diazoalkanes, 2490.
- Sulphites, reaction of phenylacetonitrile anion with: a novel isothiazole synthesis, 1432.
- Sulphonamides, arene-, and tertiary phosphine oxides, constitution of the adducts derived from, 2793.
 - Persulphate oxidations. Part IX, Oxidation of biphenyl-2-sulphonamides and o-phenoxybenzenesulphonamides, 2862.
 - Preparation and reactivity of N-phenyl- and N-methyl-odiazoacetylbenzenesulphonamide. A novel synthesis of benzothiazine dioxides, 2351.

- Sulphonation of 2-methylnaphthalene, a study of, 2344.
 - Transfer of sulphonic acid groups from N-alkylsulphamic acids: a new and simple sulphonation procedure, 2663.
- Sulphones. Novel analysis and molecular rearrangements in the morphine-thebaine group. Part XXIII, adducts of thebaine with divinyl sulphone and with methyl vinyl sulphone, 870.
 - Organometallic derivatives. Part IV, the lithiation of ferrocenylmethyl phenyl sulphone and the cleavage of carbon-sulphur bonds by aniline, 2502.
 - Polyhalogeno-aromatic compounds. Part XXII, some reactions of tetrachloro-4-methylsulphonylpyridine and related compounds, 133.
 - Preparation of 5-substituted and 3,5-disubstituted isothiazoles by nucleophilic displacement reactions of the corresponding methylsulphonyl compounds, 638.
 - Synthesis and stereochemistry of optically active [16O,18O]sulphones, 2057.
- Sulphonic acids. Simple pyrimidines. Part XIV, the formation and reactions of some derivatives of simple pyrimidinesulphonic acids, 522.
- Sulphonium salts, heterocyclic, synthesis of some, 899.
- Sulphonyl azides. Reaction of 1,2,3,4-tetrahydro-2,5-dimethyl-5*H*-pyrido[4,3-*b*]indole with arenesulphonyl azides, 1003.
 - of some 1,3-disubstituted indoles and of 3-methylindole with arylsulphonyl azides, 1626.
 - of arenesulphonyl azides with indole and with 1-methylindole, 2411.
- Sulphonyl chlorides. Redox-transfer. Part VII, addition of ethylene and butadiene to functionally substituted aromatic sulphonyl chlorides, 1543.
- Sulphoxide, a β -keto-, formation of a δ -diketone in the cathodic cleavage of, 652.
- Sulphoxides. Reactive intermediates. Part XX, preparation of sulphoximides from sulphoxides and N-aminolactams, and a study of their fragmentation, 1317.
 - Stereochemistry of α-halogeno-sulphoxides. Part I, inversion of chirality at the sulphinyl sulphur atom in a reaction not involving the breaking of the sulphinyl bonds at the chiral sulphur atom, 1886.
 - Synthesis of α-halogeno-sulphoxides, 1883.
 - Reactive intermediates. Part XX, preparation of sulphoximides from sulphoxides and N-amino-lactams, and a study of their fragmentation, 1317.
- Sulphoxonium compounds. Arylazo-glycenosides. Part II, additions of dienes and dimethylsulphoxonium methylide to some 2- and 3-arylazo-derivatives of methyl 4,6-O-benzylidene-2,3-dideoxy-D-hex-2-enopyranosides, 2611.
 - Stereochemistry of cyclopropyl ketones from the reaction of dimethylsulphoxonium methylide with 3-benzylidenechroman-4-ones, 1554.
- Sulphur compounds.—see also Thia- and Thio-compounds. steroidal. Part VIII, Pummerer reactions of steroidal sulphoxides, induced by acetic anhydride, 1329.
 - Competition between carbon, nitrogen, and oxygen nucleophilic centres for sulphur(vi) attack in NN'-disubstituted sulphamides, 2666.
 - Cytotoxic compounds. Part XIV, reactions of the bismethanesulphonates of 3-arylthiopropane-1,2-diols and of 2-arylthiopropane-1,3-diols with nucleophiles, 2060. Part XV, reactions of the methanesulphonates of 1-arylthiopropan-2-ols and of 2-(2,4-dinitrophenylthio)propan-1-ol with nucleophiles, 2067.

- Direct conversion of 3,5,6-tri-O-benzoyl-1,2-O-isopropyl-idene-α-D-glucose into 4,5,6-tri-O-benzoyl-2,3-di-S-ethyl-2,3-dithio-D-allose diethyl dithioacetal, 1033.
- Epimerisations accompanying the reductive desulphurisation of some 5-S-alkyl-5-thiopentose dialkyl dithioacetals, 38.
- 3-Heteraglutaraldehydes. Part III, the 1,2-dithian-4,5-diols and tetrahydrothiophen-3,4-diols and their oxidation by periodate, 2795.
- Heterocyclic rearrangements. Part VI, structure and stereochemistry of a sulphur-bridged tetrahydro-azepine and derived sulphoxides, by X-ray crystal-lography and nuclear magnetic resonance spectroscopy, 357.
- Homolytic substitution of halogenobenzenes by arylthioand arylsulphonyl radicals, 2817.
- Novel macrocyclic polysulphur compounds. 7,15,17,19-Tetra-alkoxy-2,3,4,5,10,11,12,13-octathiatricyclo-[12,2,2,2^{6,9}]eicosa-6,8,14,16,17,19-hexaenes and 2,3,-7,8-tetra-alkoxythianthrens; products of the catalysed reaction of aromatic ethers and sulphur monochloride, 1687.
- Perfluoroalkyl derivatives of sulphur. Part X, the reaction of polyfluoromonoiodoalkanes with dimethyl sulphide to give methyl polyfluoroalkyl sulphides, 155. Part XI, the reaction of polyfluoromonoiodoalkanes with dimethyl disulphide, 159. Part XII, the reaction of heptafluoro-1-iodopropane with ethyl methyl sulphide, methyl trifluoromethyl sulphide, and methanethiol, 1506. Part XIII, reaction of polyfluoromonoiodoalkanes with diethyl disulphide and of pentafluoroiodobenzene with bis(trifluoromethyl) disulphide, 2180. Part XIV, the reactions of tetrafluoro-1,2-di-iodoethane and octafluoro-1,4-di-iodobutane with dimethyl sulphide and dimethyl disulphide, 2438.
- Persulphate oxidations. Part V, oxidation of o-(arylthio)- and o-(arylsulphonyl)-benzoic acids, 2842. Part VIII, oxidation of arylthio-, arylsulphonyl-, and arylamino-acetic acids, 2857.
- Photochemically initiated reactions of bistrifluoromethyl disulphide with olefins, 34.
- Photoconversion of 2,6-bis(alkylthio)-3,5-diphenyl-4*H*-thiopyran-4-ones into 3,4-bis(alkylthio)-2,5-diphenyl-cyclopentadienones, 1203.
- Reaction of prop-2-ene-1-sulphonyl chloride with enamines: vinylthietan 1,1-dioxides and allylsulphonyl enamines as precursors of thiopyran 1,1-dioxides, 282.
- Reactions of β -benzylthio- and β -benzylsulphonyl-cinnamic acids and esters, 2630.
 - of N-(1-cyanoalkyl)alkylideneamine N-oxides with dipolarophiles and nucleophiles. Part I, a novel synthesis of 2,4(5)-dialkyl-5(4)-phenylthioimidazoles, 1955.
- Reactivity of vinyl sulphonic esters. Part IX, cyclisation of aryloxyvinyl p-bromobenzenesulphonates to benzo-[b]furans, 216. Part X, effect of the substituents on the cyclisation of arylthiovinyl sulphonates to benzo-[b]thiophens, 218. Part XI, behaviour of amino-vinyl p-bromobenzenesulphonates, 1136. Part XII, cyclisation of arylsulphonylvinyl sulphonates to benzo-[b]thiophen 1,1-dioxides. A novel 1,2-sulphonyl shift, 1355.

Sulphur (contd.)

Sporidesmins. Part XII, isolation and structure of sporidesmin G, a naturally-occurring 3,6-epitetrathiopiperazine-2,5-dione, 470.

Studies of heterocyclic compounds. Part XI, 1-oxa-6,6a-dithia-2-azapentalenes, 1-oxa-6,6a-diselena-2-azapentalenes, and 3-nitromethylene-3H-1,2-dithioles, 1360.

related to penicillins and cephalosporins. Part I, preparation of 4-alkylthio- β -lactams in which the ring nitrogen atom is part of an α -amino-acid ester system, 2326. Part II, an approach to the synthesis of β -lactam antibiotics, 2332.

Synthesis of the sulphur analogue of psilocin and some related compounds, 3011.

of unsymmetrical disulphides, 680.

Sulphur extrusion reactions applied to the synthesis of corroles and related systems, 1124.

T

Tagetone, dihydro-, (2,6-dimethyloct-7-en-4-one), synthesis of. 367.

Tanacetum vulgare L. Terpene biosynthesis. Part VI, monoterpenes and carotenoids from tissue cultures of Tanacetum vulgare L., 1769.

14α-Taraxerane. Lichens and fungi. Part X, 2827.

Tautomeric compounds, mass spectrometry of. Part, IV structure of the molecular ions of 4-hydroxycoumarins, 1994

Tautomerism of α -(5-oxo- Δ 3-isoxazolin-4-yl)benzylphosphonates. Studies on heterocyclic chemistry. Part XII, 90.

Dypnopinacol. Part II, tautomerism of 4-methyl-2,4,6-triphenylcyclohexa-2,6-dienyl phenyl ketone (isodypnopinacolone), 1372. Part IV, tautomerism of α- and β-photodypnopinacolones (6-exo- and 6-endo-methyl-1,3,6-triphenylbicyclo[3,1,0]hex-2-en-2-yl phenyl ketone), 1380.

Tellurium. Tellurophen and some of its derivatives, 199.

Termites. Neocembrene-A, a termite trail pheromone, 2653.

Terpenes and steroids, biosynthesis of. Part VIII, the synthesis and metabolism in Saccharomyces cerevisiae of ergosta-7,22,24(28)-trien-3β-ol, 1231.

studies on. Part I, rearrangement of 7-oxatricyclo-[4,3,0,0^{3,9}]nonanes into 8-substituted 1,3,3-trimethylnorbornane derivatives, 943.

the chemistry of. Part XV, some oxygenated derivatives of p-menthane, 1971.

Application of tris(dipivaloylmethanato)europium(III) to the assignments of the methyl resonances of triterpenes related to serratenediol [c(14a)-homo-27-norgammacer-14-ene-3β,21α-diol], 1682.

Biosynthesis. Part XIX, concerning the biosynthesis of (-)-camphor and (-)-borneol in Salvia officinalis, 2743.

Calonectrin and 15-deacetylcalonectrin, new trichothecanes from Calonectria nivalis, 2576.

Constituents of Erythroxylon species. Part VII, diterpenoids from *Erythroxylon australe*, 1996.

Conversion of lanosterol into a compound with the carbon skeleton of fusidic acid, 1243.

Cyclopropane cleavage of chrysanthemic acid relatives to santolinyl, artemisyl, and lavandulyl structures: acid-catalysed and biosynthetic experiments, 642.

Diterpenes. Part X, some transformations of phyllocladene and isophyllocladene, 190.

Diterpenoids. Part XVIII, synthesis and stereochemistry of 1,2,3,4,4a,9a-hexahydro-1β,4aα-dimethyl-fluorene-1α,9-dicarboxylic acids, 320.

Formation of (-)-kaurene in a cell-free system from Gibberella fujikuroi, 2382.

Further reactions of sideridiol [(-)-kaur-15-ene-7β,19-diol], 759.

Investigations on the biosynthesis of steroids and terpenoids. Part VI, the sterols of yeast, 513.

Neocembrene-A, a termite trail pheromone, 2653.

Stereochemical studies of monoterpene compounds. Part XI, rearrangement of 2α-hydroxypinan-3-one in the presence of anhydrous oxalic acid, 258.

Stereochemistry of some reactions of the sesquiterpenoid trichodermol, 2283.

Structure of azadirachtin; the functional groups, 2445.

Studies in terpenoid biosynthesis. Part VII, the biosynthesis of helicohasidin, 586. Part VIII, the formation of the trichothecane nucleus, 1425. Part IX, the sequence of oxidation on ring B in kaurene-gibberellin biosynthesis, 1892.

Synthesis of cubebane-type sesquiterpenoids and the stereochemistry of cubebol, 1721.

of dihydrotagetone (2,6-dimethyloct-7-en-4-one), 367. of primulagenin A and of echinocystic acid, 2994.

Synthetic experiments in the erenophilane sesquiterpene group. Synthesis of (\pm) -7-epi-nootkatone and partial synthesis of valerianol. The structure of nardostachone, 2193.

studies on terpenoids. Part XV, syntheses of 8β-methylpodocarpanes, 1325.

study on zizaane-type sesquiterpenoids, 1755.

Terpene biosynthesis. Part IV, biosynthesis of (+)-pulegone in *Mentha pulegium* L., 1532. Part V, interconversions of some monoterpenes in higher plants and their possible role as precursors of carotenoids, 1764. Part VI, monoterpenes and carotenoids from tissue cultures of *Tanacetum vulgare* L., 1769.

Terpenoids. Part II, some ring D derivatives of 13β-kaurane, 981. Part III, the enolisation-ketonisation and optical rotatory dispersion of the ent-kauran-15-ones and 13β-kauran-15-ones, 986. Part IV, the nuclear magnetic resonance properties of the stereo-isomeric ent-kauran-15-ols and 13β-kauran-15-ols, 1272. Part V, rearrangement of ent-kaurane 15β,16β-epoxide to ent-(16R)-atisan-15-one, 1274.

Triterpenoids. Part VIII, allylic oxidation by N-bromosuccinimide, 1856.

X-Ray analysis of pristimerol bis-p-bromobenzoate, a derivative of the triterpene quinone methide pristimerin, 330.

Tetracyanoethylene. Rearrangements in the cycloaddition of tetracyanoethylene to 3-methylenecyclohexa-1,4-dienes and homofulvenes, 2971.

Tetracycline, experiments on the synthesis of. Part XI, oxidation of ketone acetals and ethers by hydride transfer, 542. Part XII, extension of the acetal photocyclisation process, 1103.

- Tetracyclo[3,2,0,0^{2,7},0^{4,6}]heptane, 1,2,4,5-tetrachloro-3,3-ethylenedioxy-, action of concentrated sulphuric acid on: a novel rearrangement of quadricyclanone acetal. Highly condensed polycyclic systems. Part IV, 1778.
- Tetrazenes. Reactive intermediates. Part XIX, the lithium salt of 1-(benzotriazol-1-yl)-4-p-tolylsulphonyl tetrazene: a new benzyne precursor, 1315.
- Tetrazines. Studies on some symmetrically and unsymmetrically 3,6-disubstituted 1,2-dihydro-1,2,4,5-tetrazines including their conversion into the corresponding tetrazines and 3,5-disubstituted 4-amino-1,2,4-triazoles, 2395
- Tetrazoles. Steroids and related studies. Part XVIII, 3-aza-A-homo-4a-eno[3,4-d]tetrazole steroid analogues, 990.
- **Tetrazolylchromones.** Benzopyrones. Part VIII, monoand di-tetrazol-5-ylchromones. The infrared cyanoabsorption of some 4-oxochromencarbonitriles, 779.
- **Tetronic acid** [furan-2(3H), 4(5H)-dione] and three analogues, synthesis of, 1225.
- Thallium. Aryl thalliation as a route to substituted 1,4-benzoquinones, 1629.
 - Concurrent chlorination and carboxylation of aromatic hydrocarbons with thallium(III) chloride tetrahydrate in carbon tetrachloride, 2268.
 - Reactions of condensed N-heteroaromatic molecules. Part I, alkylation by thallium(I) ethoxide, 2292.
- Thebaine, nitrosation of, leading to 7-substituted neopinone derivatives, 302.
 - Novel analgesics and molecular rearrangements in the morphine-thebaine group. Part XXIII, adducts of thebaine with divinyl sulphone and with methyl vinyl sulphone, 870. Part XXIV, 15,16-didehydro-6,14-endo-etheno-6,7,8,14-tetrahydro-thebaines and oripavines, 872. Part XXV, substitution of the piperidine ring in derivatives of 6,14-endo-ethenotetrahydrothebaine, 875. Part XXVI, some reactions of the thebaine-2-chloroacrylonitrile adduct, 878. Part XXVII, 7-alkylidene- and 7a-vinyl-6,14-endo-etheno-6,7,8,14-tetrahydrothebaines, 881.
- Thermolytic and similar reactions. Overcrowded molecules. Part VII, thermal and photochemical reactions of photochromic (E)- and (Z)-benzylidene(diphenylmethylene)succinic anhydrides and imides, 1321.
 - Preparation and thermal rearrangement of a benzofurannitrene adduct, 225.
 - of aryl isothiocyanates by pyrolysis of N-aryldithiocarbamates, 88.
 - Pyrazine chemistry. Part IV, thermal [1,4] eliminations from 3,6-dihydropyrazines, 2494.
 - Studies in azide chemistry. Part V, synthesis of 4-azido-2,3,5,6-tetrafluoro-, 4-azido-3-chloro-2,5,6-trifluoro-, and 4-azido-3,5-dichloro-2,6-difluoro-pyridine, and some thermal reactions of the tetrafluoro-compound, 2964.
 - Thermal cyclisation of *trans-o*-fluorocinnamic acids to coumarins. An apparent similarity between mass spectral and thermal fragmentations, 2911.
 - decomposition of oxalate diesters in the presence of iodine, 369.
- Thia—see also Sulphur.
- 9-Thiabicyclo[3,3,1]nona-3,7-deine-2,6-dione, synthesis and photorearrangement of, 211.
- Thiacyclophanes from thiols. Heterocyclic cyclophanes. Part I, 1705.

- 1,2,3-Thiadiazoles and 1,2,3-selenadiazoles, reaction with nonacarbonyldi-iron, 2165.
- Thianthrens. Novel macrocyclic polysulphur compounds. 7,15,17,19-tetra-alkoxy-2,3,4,5,10,11,12,13-octathiatricyclo[12,2,2,26,9]eicosa-6,8,14,16,17,19-hexaenes and 2,3,7,8-tetra-alkoxythianthrens, products of the catalysed reaction of aromatic ethers and sulphur monochloride, 1687.
- Thiathiophthens. Studies of heterocyclic compounds. Part XII, a three-step synthesis of 6a-thiathiophthen from γ -pyrone, 1447.
- Thiazines. Studies related to dihydro-1,4-thiazines. Part I, rearrangements involving 1,3-sulphur migrations, 2509.
 - related to penicillins. Part VIII, the rearrangement of penicillanic acid derivatives to 1,3-thiazines, 1063.
- Thiazolines. Some new aspects in the chemistry of 4-alkylidene- Δ^2 -thiazolin-5-ones, 310.
- Thiazolinones. Structure and reactivity of 2-alkyl- and 2-alkoxy-thiazolin-5-ones, 1983.
- Thiazolo[2,3-a]isoquinolinium salts, 2,3-dihydro-, preparation of, and their reactions with complex metal hydrides, 1799.
- Thiele-Winter acetoxylation of quinones. Part IV, quinones containing one or more t-butyl groups, 2286.
- **Thienoimidazoles.** Preparation and structure of some *cis*-fused ureas: *cis*-perhydrothieno[3,4-d]imidazol-2-one SS-dioxides, 2866.
- trans-Thieno[3,4-d]imidazol-2-one SS-dioxides, perhydro-: on the preparation and structure of some transfused ureas, 1560.
- Thienothiophens. Reactivity of thieno[3,2-b]thiophen and thieno[2,3-b]thiophen with phenyl radicals, 93.
- Thietan 1,1-dioxides, vinyl-. Reaction of prop-2-ene-1-sulphonyl chloride with enamines: vinylthietan 1,1-dioxides and allylsulphonyl enamines as precursors of thiopyran 1,1-dioxides, 282.
- Thio-see also Sulphur.
- Thiocarbonyl and carbonyl compounds. Part XIII, 2-aroyl-1,3-benzodioxoles of potential pesticidal activity and their cleavage with hydrazines, 1095.
- Thiochromans, some 3,4-disubstituted, and related dihydronaphthothiopyrans, stereochemistry and reactions of, 787.
- Thiocoumarin, reactions of, with phenylmagnesium bromide and with bromine, 817.
- Thiols, thiacyclophanes from. Heterocyclic cyclophanes. Part I, 1705.
- Thionocarbonates. The circular dichroism of the $n \longrightarrow \pi^*$ band of cyclic thionocarbonates. Part II, studies on the thionocarbonates of some acyclic vicinal diols, 273.
- Thiophens. Condensed thiophen ring systems. Part VIII, intramolecular cyclisation of azido- and nitro-substituted 2-arylbenzo[b]thiophens; new routes to 10*H*-[1]benzothieno[3,2-b]indoles, 2023. Part IX, synthesis and some reactions of [1]benzothieno[3,2-c]cinnolines, 2030.
 - 3-Heteraglutaraldehydes. Part II, tetrahydrothiophen-3,4-diol 1,1-dioxides and the chemistry of their oxidation product, 3-thiaglutaraldehyde 3,3-dioxide, and its derivatives, 1335. Part III, the 1,2-dithian-4,5diols and tetrahydrothiophen-3,4-diols and their oxidation by periodate, 2795.

- Thiophenes (contd.)
 - Preparation of thiophen esters by the Hinsberg reaction, 2079.
 - Photoconversion of 2,6-bis(alkylthio)-3,5-diphenyl-4H-thiopyran-4-ones into 3,4-bis(alkylthio)-2,5-diphenyl-cyclopentadienones, 1203.
 - Reaction of prop-2-ene-1-sulphonyl chloride with enamines: vinylthietan 1,1-dioxides and allylsulphonyl enamines as precursors of thiopyran 1,1-dioxides, 282.
- Thymidine, carboxymethyl-, analogues of oligonucleotides containing. Synthetic analogues of polynucleotides. Part VIII, 1991.
- Thyroxine analogues: synthesis of 3,3',5,5'-tetramethyl-L-thyronine, 633.
- Tin. Some addition reactions of N-tributylstannyldiphenylmethyleneamine, 130.
- Toluene-p-sulphonates, exo- and endo-1,5-dimethyl-9-oxobicyclo[3,3,1]nonan-2-yl, solvolytic behaviour of, 1760.
 - Reaction of allyl and benzyl alcohols, and their toluene-p-sulphonates, with furan, 1617.
- Transamination of Schiff bases, synthesis of carbonyl compounds via, 1652.
- Transition-metal ions, ³¹P nuclear magnetic resonance spectra of phosphorus-containing esters in the presence of, 1233.
- Trehalose, chemical modification of. Part X, some further 3,3'-dideoxy-analogues, 949. Part XI, 6,6'-dideoxy-6,6'-difluoro-αα-trehalose and its galacto-analogue, 2513.
- Triazanaphthalenes. Polyhalogenoaromatic compounds. Part XXIV, reaction of chloropyridyl-lithium compounds with nitriles as a route to triazanaphthalenes, 2190.
- Triazines and related products. Part IX, potential irreversible dihydrofolate reductase inhibitors: 2,4-diamino-striazines with a masked covalent labelling group, 295. Part X, a re-examination of the reaction between benzil and diaminocyananidine nitrate, 1221.
- **Triazines.** N-Nitroxymethyl derivatives of 1,3-dinitroperhydro-1,3,5-triazine, piperidine, and succinimide, 1902.
- Triazoles. Carbonyl and thiocarbonyl compounds. Part XIII, 2-aroyl-1,3-benzodioxoles of potential pesticidal activity and their cleavage with hydrazines, 1095.
 - Chemistry of polyhalogenodiazabutadienes. Part V, routes to new triazolyl systems: substituted 3-amino-4,5-diaryltriazoles, 2219.
 - Ring transformations involving chloroheterocycles. Part III, reaction of 4-chloroquinazolines with hydrazines, 1842.
 - Studies on some symmetrically and unsymmetrically 3,6-disubstituted 1,2-dihydro-1,2,4,5-tetrazines including their conversion into the corresponding tetrazines and 3,5-disubstituted 4-amino-1,2,4-triazoles, 2395.
 - v-Triazolo[4,5-d]pyrimidines (8-azapurines). Part VIII, synthesis, from 1,2,3-triazoles, of 1- and 2-methyl derivatives of 5,7-disubstituted v-triazolo[4,5-d]pyrimidines (7- and 8-methyl 2,6-disubstituted 8-azapurines), 449. Part X, new routes to v-triazolo[4,5-d]pyrimidines via 4-dimethylaminomethyleneamino-1,2,3-triazole-5-carbonitriles, 461. Part XI, preparation of 2-benzyl-v-triazolo[4,5-d]pyrimidine (8-benzyl-8-azapurine), 468.
- v-Triazolines. Part I, synthesis and properties of 5-amino-4-(α-aminoethyl)-1-aryl-4,5-dihydro-v-triazoles, 619. Part II, synthesis and reactions of 5-amino-4-amino-

methyl-1-aryl-v-triazolines, 769. Part III, cis-trans equilibrium of 1-aryl-4,5-dihydro-v-triazoles, 997.

- **Triazolobenzothiazoles.** Reactions of substituted benzothiazol-2-ylhydrazones with bromine: a route to striazolo[3,4-b][1,3]benzothiazoles, 1519.
- v-Triazolo[4,5-d]pyrimidines (8-azapurines). Part VIII, synthesis, from 1,2,3-triazoles, of 1- and 2-methyl derivatives of 5,7-disubstituted v-triazolo[4,5-d]pyrimidines (7- and 8-methyl 2,6-disubstituted 8-azapurines), 449. Part IX, some nucleophilic addition reactions, 457. Part X, new routes to v-triazolo[4, 5-d]pyrimidines via 4-dimethylaminomethyleneamino-1,2,3-triazole-5-carbonitriles, 461. Part XI, preparation of 2-benzyl-v-triazolo-[4,5-d]pyrimidine (8-benzyl-8-azapurine), 468.
- Trichilia heudelottii, limonoids from. Part II, 1488. Trichloroacetic acid. Preparation of O-(methoxymethyl)-benzophenone oxime and N-(diphenylmethylene)methoxymethylamine N-oxide and their reactions with trichloroacetic acid, 2803.
- **Trichodermol**, the sesquiterpenoid, stereochemistry of some reactions of, **2283**.
- Trichothecane nucleus, formation of. Studies in terpenoid biosynthesis. Part VIII, 1425.
 - Calonectrin and 15-deacetylcalonectrin, new trichothecanes from *Calonectria nivalis*, 2576.
- Tricyclo[6,2,1,0^{2,7}]undec-9-ene, 4-vinyl-, a minor adduct from the Diels-Alder reaction of 4-vinylcyclohexene and cyclopentadiene, 1647.
- **Triptycenes.** Aryne chemistry. Part XXX, approaches to the synthesis of 9-alkyl- and 9,10-dialkyl-1,2,3,4,5,6,7,8-octafluoro-9,10-dihydro-9,10-o-benzenoanthracenes (9-alkyl- and 9,10-dialkyl-1,2,3,4,5,6,7,8-octafluorotripty-cenes), 2372.
- Tritium, location of in [1-3H]ergosterol, 244.
 - [G-3H]Ergosterol; location of tritium in rings A and B, 1915.
 - Studies in terpenoid biosynthesis. Part VII, biosynthesis of helicobasidin, 586.
 - of enzyme-mediated reactions. Part I, syntheses of deuterium- or tritium-labelled (3S)- and (3R)-phenylalanimes: stereochemical course of the elimination catalysed by L-phenylalanine ammonialyase, 2355.
- Tropic acid, absolute configuration of, 1597.
- Tropolones and Tropones. Alkaloid biosynthesis. Part XVI, colchicine: origin of the tropolone ring and studies with the C₆-C₃-C₆-C₁ system, 1730.
 - Stereochemistry of the 2:1 [4+2] adducts of tetrachlorocyclopentadienone acetals with cyclohepta-1,3,5-triene, tropone, cyclohexa-1,4-diene, and p-benzoquinone, 195.
 - Studies of bridged benzo-heterocycles. Part II, cyclo-addition reactions of epoxy-bridged cyclic olefins with tropone and tropolone, and photochemical behaviour of the adducts, 1951.
 - of heteroaromaticity. Part LIX, further investigations of the cycloaddition reactions of tropone with azodienophiles and the photochemical behaviour of the adducts, 783.
- Tumulosic acid. Extractives of fungi. Part III, introduction of a (Z)-17(20)-double bond into a tumulosic acid derivative, 2260.
- L-Tyrosine. Studies of enzyme-mediated reactions. Part II, stereochemistry of the elimination of ammonia from L-tyrosine catalysed by the enzyme from maize, 2364.

U

Uhle's ketone. 1,3,4,5-Tetrahydrobenz[cd]indoles and related compounds. Part I, a new synthesis of 3,4-dihydrobenz[cd]indol-5(1H)-one, 1121.

Uracils. Synthesis of some 1-substituted cytosine and uracil derivatives, 2385.

Ureas, some *cis*-fused, preparation and structure of: *cis*-perhydrothieno[3,4-d]imidazol-2-one SS-dioxides, 2866.

On the preparation and structure of some *trans*-fused ureas: perhydro-*trans*-thieno[3,4-d]imidazol-2-one SS-dioxides, 1560.

\mathbf{v}

Valerianol, partial synthesis of, and synthesis of (±)-7-epi-nootkatone. Synthetic experiments in the eremophilane sesquiterpene group. The structure of nardostachone, 2193.

Valsaria rubricosa, constituents of, and the identification of papulosin with valsarin. Chemistry of fungi. Part VIII, 1464.

Valsarin and 5,7-dichloroemodin, synthesis of, 1466.

Chemistry of fungi. Part VIII, constituents of *Valsaria* rubricosa and the identification of papulosin with valsarin, 1464.

Vancomycin, the antibiotic, structure of an amino-sugar from, 443.

the structure and configuration of a novel amino-sugar, vancosamine, from, 2153.

Vancosamine: the structure and configuration of a novel amino-sugar from vancomycin, 2153.

Verongia aerophoba. Aeroplysinin-1, an antibacterial bromo-compound from the sponge Verongia aerophoba, 16

Verongia sponges. Aerothionin and homoaerothionin: two tetrabromo-spirocyclohexadienylisoxazoles from *Verongia* sponges, 18.

(±)-Versimide [methyl α-(methylsuccinimido)acrylate] and related compounds, synthesis of, 65.

Vinyl ethers. Reactions of phosphines with acetylenes. Part XVI, formation of α-alkoxy-phosphonium ylides and vinyl ethers *via* methanolysis of vinyl phosphonium salts, 2830.

Novel analysics and molecular rearrangements in the morphine-thebaine group. Part XXIII, adducts of thebaine with divinyl sulphone and with methyl vinyl sulphone, 870.

reactivity of. Part IX, cyclisation of aryloxyvinyl p-bromobenzenesulphonates to benzo[b]furans, 216. Part X, effect of the substituents on the cyclisation of arylthiovinyl sulphonates to benzo[b]thiophens, 218. Part XI, behaviour of aminovinyl p-bromobenzenesulphonates, 1136. Part XII, cyclisation of arylsulphonylvinyl sulphonates to benzo[b]thiophen 1,1-dioxides. A novel 1,2-sulphonyl shift, 1355

Viomycin. Part I, the structure of the guanidine-containing unit, 820. Part II, the structure of the chromophore, 827.

Visnaginone. Isomerism of semicarbazones of 6-hydroxy-4,7-dimethoxy- and 6-hydroxy-4-methoxy-benzofuran-5-yl methyl ketone and its derivatives, 616.

Vitamins. Specific enzyme inhibitors in vitamin biosynthesis. Part I, the synthesis of 8-substituted pyrido-[2,3-d]pyrimidines, 1041.

W

Wadsworth-Emmons olefination reaction, some observations on, 2582.

Withanolides. Withanicandrin, a ring-c-substituted withanolide from *Nicandra physaloides* (Solanaceae), 2109.

Wittig olefin synthesis. Dibenzophospholium salts and ylides. Preparation, properties, and Wittig olefin synthesis, 2713.

Wortmannin. Fungal products. Part II, structure and stereochemistry of the acid $C_{18}H_{16}O_5$, a degradation product of wortmannin, 2892. Part III, structure of wortmannin and some hydrolysis products, 2898.

Wurmbaeoideae, substances from plants of the subfamily, and their derivatives. Part LXXVII. Alkaloid biosynthesis. Part XVII. 1-Phenethylisoquinoline alkaloids. Part II. Structure and chemistry of androcymbine, 1736.

\mathbf{x}

Xanthenyl-type radicals, hindered rotation in, 2418.

Xanthones. Chemical investigation of Ceylonese plants. Part I, extractives of Calophyllum calaba L., and Calophyllum bracteatum Thw. (Guttiferae), 1935.

Constituents of Mammea americana L. Part X, the isolation of some mono- and di-hydroxyxanthones. Observations on the synthesis of 1,5-, 3,5-, 1,6-, and 1,7-dihydroxyxanthone, 1896.

Extractives from Guttiferae. Part XXV, synthesis of the natural 1,5-dioxygenated xanthones, dehydrocycloguanandin, guanandin, isoguanandin, and 5-hydroxy-1-methoxyxanthone, 1382.

X-Ray analysis of pristimerol bis-p-bromobenzoate, a derivative of the triterpene quinone methide pristimerin, 330.

crystallography. Heterocyclic rearrangements. Part VI, structure and stereochemistry of a sulphur-bridged tetrahydroazepine and derived sulphoxides, by X-ray crystallography and nuclear magnetic resonance spectroscopy, 357.

\mathbf{Y}

Yeast, the sterols of. Investigations on the biosynthesis of steroids and terpenoids. Part VI, 513.

Ylides. Dibenzophospholium salts and ylides. Preparation, properties, and Wittig olefin synthesis, 2713.

Reactions of phosphines with acetylenes. Part XVI, formation of β -alkoxy-phosphonium ylides and vinyl ethers via methanolysis of vinylphosphonium salts, 2830.

\mathbf{Z}

Zizaanes. Synthetic study on zizaane-type sesquiterpenoids, 1755.