OBITUARY NOTICES.

DAVID RUNCIMAN BOYD.

1872—1955.

DAVID RUNCIMAN BOYD was born on February 26th, 1872. His father, William Boyd, was minister of the parish of Mains and Strathmartine near Dundee: he was descended from a line of farmers, some of whom were also brewers. William Boyd was a graduate of the University of St. Andrews, distinguished in classical and oriental languages and divinity. After receiving licence to preach, he became assistant to the Rev. David Runciman, minister of Leslie in Fifeshire; here he met his future wife, Janet Lockie Runciman, who was keeping house for her brother. Their father, also David Runciman, was minister of St. Andrew's in Glasgow, so in David Boyd's ancestry there was a strong strain of the Church, as well as of farming and business. The marriage took place on October 2nd, 1866; a girl and two boys were born. The manse at Mains, then in pleasant country, was an idyllic home, but tragedy struck the family in 1873. William Boyd's health had given trouble and he was advised to spend the winter in southern Europe; on his way home he fell a victim to malaria and died in Florence, leaving his widow and three young children with a very small income. They removed to Edinburgh, and in a few years the two boys entered John Watson's institution, a school where the education was good but the diet and living at that time spartan. After six years there David spent about a year on the classical side at George Watson's College, when the family moved to Glasgow. He entered Glasgow University in 1888, and at once made his mark as the best student of Chemistry of his year. He also gained prizes in Natural Philosophy and Mathematics; he graduated with first-class honours in Chemistry in 1892, and was awarded the Robert Donaldson scholarship. He then studied in Victor Meyer's laboratory at Heidelberg, being assistant to Paul Jacobson for a year, and gained the Ph.D. degree. Returning to England, he was demonstrator under Frankland at the Mason College, Birmingham, for about two years.

In 1896 his real life work began. He was one of five lecturers appointed in that year to the Hartley Institution, Southampton, with the object of raising the teaching to University standard. Although the Institution had been in existence for over thirty years and (in addition to the public library, museum, and large hall for public lectures, which were at first its principal features) a good many classes were held, work of university standard had not been seriously attempted, the more promising pupils going on to universities elsewhere. In the 1890's a serious attempt was made to start a university college, and by 1902 this was so far successful that the Institution became the Hartley University College, with a small Treasury grant. There were frequent crises in the first decade of this century, once indeed a recommendation to withdraw the Treasury grant altogether, and compel the College to become solely a local technical college. It was largely due to the work of a very few men, of whom Boyd and John Eustice, head of the Engineering Department from 1892 to 1931, were perhaps the ablest, that the grant was continued and the University College survived.

Before 1919 Boyd never had more than one academic assistant and carried a heavy load of teaching: there were classes from matriculation up to Special Honours degree level, the elementary classes being quite large. The teaching reached a very high standard. Professor Ingold, a student from 1911 to 1913, writes: "My chief memory of him is as a marvellous lecturer. He treated us to a most exciting exposition of the whole of Chemistry as a living, growing subject, rich in opportunity for the questing spirit. In 1911 Werner's resolution of cobaltammines, and Knorr's and Kurt Meyer's work on ethyl acetoacetate all came hot from the *Annalen* or *Berichte*, yet without sacrifice to the pattern of the lecture course as a whole. Everything was critically and remarkably soundly assessed, and some much publicised but unsound work was dealt with severely."

During nearly all his tenure of the chair, Boyd kept a substantial amount of research going, although accommodation and resources were so poor that most men would have been discouraged. Between 1901 and 1929 some twenty papers bear his name, and another ten by his pupils were inspired by him. The College remained in the old buildings in the High Street until 1919; here the chemical department consisted of one general-purpose laboratory and one lecture room. Boyd had boarded off a corner of the lecture room for a private room and laboratory: the balances were kept on the stairs. He had several lines of research; he was publishing work on organic derivatives of phosphorous acid as early as 1901 and was still publishing on organic phosphorus derivatives in 1928. He was one of the first to study the effect of chemical constitution on the velocity of reaction of epoxides with sodium derivatives of phenols, or with amines; some of his papers in this field are still often quoted.

In 1919, the College moved into new buildings on a site some two miles from the centre of the town; improved laboratory accommodation and a rather larger staff were provided, though both would nowadays be considered quite inadequate for a university department. The tradition of first-class teaching was carried on, usually with very good results in the London external examinations, and in the 1920's a few students remained to do post-graduate research under Boyd's direction. Some of these, F. J. Smith, H. H. Hatt, D. V. N. Hardy, and D. E. Ladhams held posts for a short time on the teaching staff. In this period the work on organic phosphorus compounds was further developed, and a number of papers were published on Grignard reactions and processes accompanying them. After 1930 he did little research, but he gave every encouragement to new and successful lines of research in several different fields by his lecturers. He retired in 1937, after forty-one years' service.

He gave excellent administrative service also to the College. For many years he was chairman, later styled Dean, of the Faculty of Science, and Vice-Principal after Professor Eustice's retirement in 1931. He was tall and dignified; his gentle kindliness, sympathy, and courtly manners won the respect and affection of all his colleagues. Up to 1919 he was perhaps the chief symbol of the hope the struggling College had of ultimately attaining University rank. Later the College staff became stronger but his maintenance of high academic standards and discipline among a sometimes intractable student body were always outstanding. His judgment was penetrating and sound, and he spoke and wrote with great clarity and persuasiveness. In 1904 he began reading for the Bar; he passed his final examination in 1907 and was called in 1922. It was characteristic of his modesty that few of his colleagues knew of this unusual qualification. He gained the D.Sc. degree of Glasgow University in 1902, and was examiner in Chemistry for that university on many occasions. In 1954 he completed sixty years as a Fellow of this Society, and fifty years as a Fellow of the Royal Institute of Chemistry.

He married, in 1907, Marion, daughter of Col. Edward Persse of the Madras Army, and had two sons, both graduates of St. Andrews University. His later years were saddened by the death of both his sons on war service in 1944. His wife died in the summer of 1955, after a long and trying illness during which he devoted himself entirely to her; he died four months later, on December 28th, 1955.

What the University College of Southampton owed to him cannot be over-estimated: without him and a very few other able men who remained with the College, the University of Southampton would not have been possible. He gave good service to Chemistry: his researches were always sound, never trivial, and had sometimes a pioneering quality; they were done with very meagre resources. He had many able and some distinguished students, whose many and varied achievements in research, industry, and teaching are an enduring monument to the teacher they loved so well.

I thank Miss Elsa Boyd for the loan of family records, and Professor Ingold for kindly sharing his recollections.

N. K. ADAM.

WALLACE FRANK SHORT.

1898—1955.

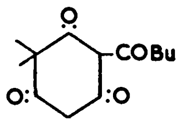
WALLACE FRANK SHORT, D.Sc., Head of the Chemical Division of the Research Department of Boots Pure Drug Co. Ltd., died on June 7th, 1955, after a long illness. He was born on October 4th, 1898, at Kimbolton, Huntingdon, only son of Mr. W. J. Short, and was educated at Kimbolton School and Manchester University, gaining his B.Sc. with First Class Honours in 1918. As Levinstein Research Scholar and Schunck Bursar he took the M.Sc. Degree in 1919 (Henry Stephen supervised his research[1]) and became a Beyer Fellow of Manchester University. In 1929 he was awarded the D.Sc. Degree.

On reaching the age of 18 he volunteered for military service but, not being accepted, he joined Professor H. B. Dixon's staff working for the Department of Explosives Supply, and carried on this work concurrently with his degree course until the end of hostilities. In 1919 he continued research for the Ph.D. Degree, but his lungs had been affected during his M.Sc. year, and he was advised to seek a purer atmosphere than that of Manchester. He therefore made the sea voyage to New Zealand. On arrival there he was pronounced fit, and took up a lectureship at Auckland University College in 1920, under Professor F. P. Worley. His great enthusiasm for Organic Chemistry and his most engaging personality attracted students from other colleges and he soon had a " school " of keen young chemists.

[1] Stephen, Short, and Gladding, *J.*, 1920, **117**, 510.

Scarcely any equipment, chemicals, or books were available at Auckland: he had to improvise and build everything, even to make-do with a mixture of 2nd and 3rd editions of Beilstein's "Handbuch." Nevertheless he was soon publishing papers on acylphenylhydrazines [2] and the Hoesch reaction.[3] He realised the importance of the almost virgin field of natural products in New Zealand with a large number of endemic species growing in abundance. His early investigation into the dominant shrubs of the country, *Leptospermum scoparium* [4] and *L. ericoides* [5] led him into the field of essential oils. In addition to investigating the oils of further endemic species, *Podocarpus ferrugineus* [6] and *Phebalium nudum*,[7] he also studied the oil of *Cinnamonum camphora* [8] grown in the country and the residues of commercial oils of *Eucalyptus nova-angelica* [9] and *E. variflora*,[10] Japanese peppermint oil,[11] and star-aniseed oil.[12]

Following up this work he investigated the structure of some of the constituents, including the sesquiterpenes aromadendrene [13] and cedrene,[14] the hydrofuran derivative anisoxide,[15] and the unusual methylated phloroglucinol derivative leptospermone (I).[16] His interest also extended to the synthetic diterpenes [17] and the synthesis of *apo*fenchocamphoric acid.[18]



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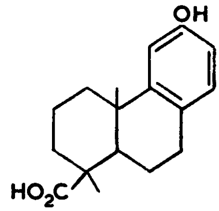

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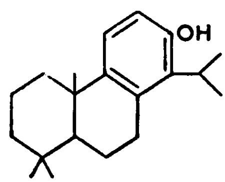


(III)

Short was one of the early investigators of heart-wood constituents, and his examination of podocarpic acid (II) from *Podocarpus dacrydioides* and *Dacrydium cupressum*,[19] and of totarol (III) from *Podocarpus totara* [20] formed the basis for the constitution of these diterpenoids. They are of unusual interest in that they both contain an aromatic nucleus and also in that they contravene the "isoprene rule." Parallel experiments on the synthetic side of the podocarpic acid problem led to a series of novel syntheses in the phenanthrene field.[21]

His curiosity about the mechanism of reactions led him to study the rearrangement of benzyl ethers,[22] the action of potassium cyanide on monochloramine,[23] the acetoacetic ester condensation,[24] and the polymerisation of formaldehyde in presence of inorganic substances,[25] in which research he was assisted by his wife, Kathleen, née Brown, also a Manchester graduate. Papers followed on a new melting-point apparatus [26] and a modification of Baeyer's strain theory [27]—altogether an amazing output for one burdened with a heavy teaching programme and much

[2] Short, *J.*, 1921, **119**, 1446.
[3] Short and Smith, *J.*, 1922, **121**, 1803.
[4] Short, *J. Soc. Chem. Ind.*, 1926, **45**, 96T.
[5] Johnson and Short, *Rep. Austral. New Zealand Assoc. Adv. Sci.*, 1923, **16**, 220.
[6] Hosking and Short, *Rec. Trav. chim.*, 1928, **47**, 834.
[7] Radcliffe ahd Short, *J. Soc. Chem. Ind.*, 1928, **47**, 324T.
[8] Sherwood and Short, *ibid.*, 1931, **50**, 195T.
[9] Briggs and Short, *ibid.*, 1928, **47**, 323T.
[10] Penfold, Radcliffe, and Short, *J. Roy. Soc. N.S.W.*, 1930, **64**, 101.
[11] Duncan and Short, *J. Soc. Chem. Ind.*, 1931, **50**, 188T.
[12] Duncan, Sherwood, and Short, *ibid.*, 1931, **50**, 410T; Jackson and Short, *ibid.*, 1936, **55**, 8T.
[13] Briggs and Short, *J.*, 1928, 2524; Radcliffe and Short, *J.*, 1938, 1200.
[14] Short, *J. Soc. Chem. Ind.*, 1935, **54**, 874, 946.
[15] Jackson and Short, *J.*, 1937, 513.
[16] Briggs, Penfold, and Short, *J.*, 1935, 1193; Briggs, Hassall, and Short, *J.*, 1945, 706.
[17] Briggs and Short, *J.*, 1928, 3118.
[18] Short, *J.*, 1927, 961.
[19] Sherwood and Short, *Rep. Austral. New Zealand Assoc. Adv. Sci.*, 1933, **31**, 38; *J.*, 1938, 1006.
[20] Short and Stromberg, *J.*, 1937, 516; Short and Wang, *J.*, 1951, 2979.
[21] Radcliffe, Sherwood, and Short, *J.*, 1931, 2293; Hill, Short, and Higginbottom, *J.*, 1936, 317; Short, Stromberg, and Wiles, *J.*, 1936, 319; Sherwood, Short, and Woodcock, *J.*, 1936, 322; Hill and Short, *J.*, 1937, 260; Higginbottom, Hill, and Short, *J.*, 1937, 263; Hill, Short, Stromberg, and Wiles, *J.*, 1937, 510; *J.*, 1937, 937, 1619; Plimmer, Short, and Hill, *J.*, 1938, 694; Lockert and Short, *J.*, 1939, 787.
[22] Short and Stewart, *J.*, 1929, 553; Short, *J.*, 1928, 528.
[23] *Chem. News*, 1923, **126**, 100.
[24] Franklin and Short, *J.*, 1928, 591.
[25] Short and (Mrs.) Short, *Biochem. J.*, 1924, **18**, 1330.
[26] Hosking and Short, *J. Soc. Chem. Ind.*, 1926, **45**, 89T.
[27] Short, *Chem. News*, 1926, **133**, 145.

administration. His advanced lectures, usually lasting two hours, were eagerly attended. Most of the coveted prizes and scholarships were won by his pupils, and a succession of young chemists made the pilgrimage to work with Professor Robert Robinson at Manchester, and later at Oxford. He found time to serve on the Council of the Royal New Zealand Institute.

The desire to be at the hub of things eventually proved too strong for Short himself and, in 1933, he resigned his Lectureship and Acting-Professorship at Auckland in order to work in England. After a stay in the Dyson Perrins Laboratory where he tackled the synthesis of carpaine [28] he was appointed Senior Lecturer in Organic Chemistry in the Faculty of Technology of the University of Manchester. There he continued his work on terpenes and terpenoids, and syntheses in the phenanthrene series.

In 1938 he joined the Research Dept. of Boots Pure Drug Co. Ltd., Nottingham, as Assistant to Dr. F. L. Pyman. He gathered a first-class team of workers for the difficult tasks laid on the department by the war effort and, after Pyman's death in 1944, directed all the chemical research. Throughout the war he carried a heavy load of responsibility and his untiring example inspired his devoted band of chemists.

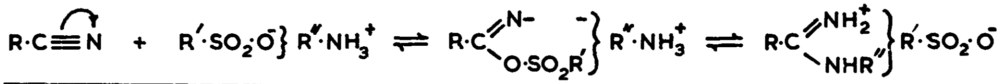
In the air-raids on Nottingham he lost a large collection of notes, gathered over a period of 20 years, for a treatise on the methods of organic chemistry. It was characteristic of the man that he began immediately on the charred remains and steadily made good the loss. He answered every call for a new process for making this or that, and his range of research topics expanded at an astonishing rate. Sound work and an extraordinarily keen insight allowed him to throw light on every problem which he tackled. His knowledge of the chemical literature was phenomenal and was constantly increasing in the effort of collecting data for his treatise (66,000 references were dealt with; it is hoped that this work will eventually be published). Short was also an excellent organiser, building up staff, library, and laboratories to a high level of efficiency. His work at Boots, merely as shown by patents and published papers, ranged over a wide field: hexœstrol, dienœstrol, resazurin, 7-oxocholesteryl acetate, sulphonamides, sulphones, amidines, glyoxaline, guanidine, diguanides, phenanthridines, iodine contrast-agents, antitubercular compounds, to name a few of the topics. Nor were his interests purely chemical; his incursions into biochemical fields were responsible for major improvements in the isolation and purification of insulin and heparin. Investigations into the anti-anæmic factor in liver led to the early recognition of active pink fractions which, with more facilities for adequate clinical testing, might well have resulted in the earlier discovery of vitamin B_{12}. This period also saw the isolation of notatin and the recognition of its enzymic nature.

One of his first successes in Nottingham was the preparation of the outstanding œstrogen, hexœstrol, from anethole by a simple reaction sequence: [29]

$$p\text{-MeO}\cdot C_6H_4\cdot CH{:}CHMe \longrightarrow p\text{-MeO}\cdot C_6H_4\cdot CHBr\cdot Et \longrightarrow$$
$$p\text{-MeO}\cdot C_6H_4\cdot CHEt\cdot CHEt\cdot C_6H_4\cdot OMe \longrightarrow p\text{-HO}\cdot C_6H_4\cdot CHEt\cdot CHEt\cdot C_6H_4\cdot OH\text{-}p$$

This work almost completely escaped notice in the literature.[30] There followed investigations into *iso*hexœstrol [31] and dienœstrol.[32]

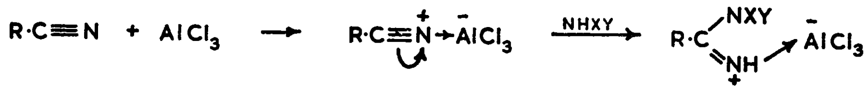
Short's researches on amidines have made these versatile compounds readily available and have necessitated the rewriting of a chapter of organic chemistry. The position up to 1946 was that amidines could generally be obtained from cyanides *via* the imidoyl chloride and imidoic ester,[33] also by two much less general methods, and not at all by the text-book process of heating cyanides with ammonium chloride. The fact that trichloromethyl cyanide adds ammonia and amines at a low temperature [34] indicates that an increase in cationoid properties of the carbon atom of the cyanide group is needed for the addition of NH_2. This effect might also be produced by an "imported" stimulus. When Oxley and Short (Amidines, Part I) [35] discovered that heating an ammonium (or alkyl- or aryl-ammonium) salt of an aromatic or aliphatic sulphonic acid with a cyanide at 180—300° gave excellent yields of amidines a mechanism was postulated which has stood the test of much investigation:



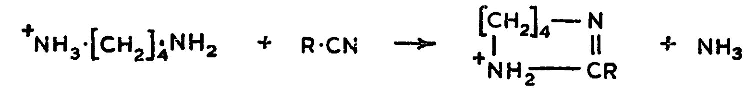
[28] Barger, Robinson, and Short, *J.*, 1937, 717.
[29] B.P. 523,320/1938.
[30] Bernstein and Wallis, *J. Amer. Chem. Soc.*, 1940, **62**, 2871.
[31] Peak and Short, *J.*, 1943, 232.
[32] Hobday and Short, *J.*, 1943, 609.
[33] Pinner, *Ber.*, 1877, **10**, 1889.
[34] G.P. 671,785.
[35] Oxley and Short, *J.*, 1946, 147.

The salient features are the production of (i) a complex ion capable of degrading the ammonium ion (cf. the decomposition of ammonium nitrite), probably by hydrogen-bond formation between the nitrogen atoms, and (ii) the amidine salt of a strong acid. Some thirty examples of the reaction which is, in practice, a one-stage process not requiring a solvent, are listed in Part I,[35] including the preparation of amidines from α-naphthyl cyanide and from *ortho*-substituted phenyl cyanides (not available by the Pinner method [33]).

In Part VII of the series [36] it was shown that good yields of amidines and of *NN*-dialkylamidines could be obtained from cyanides, aluminium chloride, and ammonia or an amine. Here the aluminium chloride is acting as a stimulator of cationoid activity in the CN group :

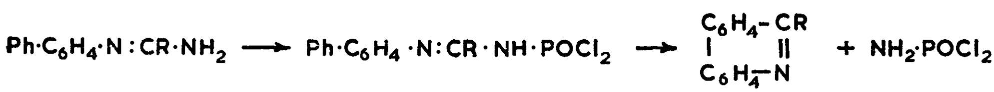


In other Parts of the series the use of ammonium thiocyanate, aminomagnesium halides, and ketoxime sulphonates was investigated. An interesting extension of the reaction of alkylenediamines showed that a cyanide, when heated with an ethylenediamine basic salt, yielded a 2-substituted 4 : 5-dihydroglyoxaline. From a trimethylenediamine salt a tetrahydropyrimidine was obtained; from tetramethylenediamine a diaza*cyclo*heptene :[37]



Further developments were the preparation of Δ^2-oxazolines (from 2-hydroxyethylamines), diguanides, and guanidines.[38] There followed a period of intensive exploitation of these methods for the preparation of chemotherapeutic substances which resulted in improved processes for for known drugs, *e.g.*, stilbamidine, naphazoline, and the independent discovery of the important antihistamine, antazoline.

The ready availability of amidines as intermediates led to the development of new routes to phenanthridines [39] and 1-alkyl-3 : 4-dihydro*iso*quinolines [40] by a modified Bischler–Napieralski reaction, *e.g.* :



Interest in phenanthridines, which had seen the development of the valuable trypanocide, Ethidium, led to the investigation of the related 1 : 6-diazapyrenes [41] and heterocyclic derivatives of 1 : 2-5 : 6-dibenzo*cyclo*hepta-1 : 3 : 5-triene.[42]

His wide knowledge and his interest in nomenclature made him a valued member of the Publication Committee of the Chemical Society, and he served on the Research Committee of the Nottingham and District Technical College.

At school he was a keen footballer and a sprint runner; he became interested in music in his early Manchester days and, in the last ten years of his life, Mozart was his passion : year after year he and his wife made the pilgrimage to Glyndebourne. Mozart had for him the perfection which he always sought in his beloved chemistry. Short was the epitome of good sense, honesty, and justice. He had a long memory, a lively wit, and the gift of friendship : his pupils became his friends for life and relied on him for help and inspiration in their daily tasks. His passing has been keenly felt in the many laboratories where his example and influence have spread. It is a great loss to British chemistry that he was not spared to complete his major tasks.

He is survived by his wife who so fully shared his interests and devotedly helped him through his long illness, and by a son and a daughter.

J. C. SMITH.

[36] Oxley, Partridge, and Short, *J.*, 1947, 1110.
[37] Oxley and Short, *J.*, 1947, 497.
[38] Oxley and Short, *J.*, 1950, 1110, 1252.
[39] Cymerman and Short, *J.*, 1949, 703.
[40] Brodrick and Short, *J.*, 1951, 1343.
[41] Fairfull, Peak, Short, and Watkins, *J.*, 1952, 4700.
[42] Brodrick, Donaldson, Nicholson, Short, and Wibberley, *J.*, 1953, 1079; Brodrick, Nicholson, and Short, *J.*, 1954, 3857.