Bernard Cracroft Aston, C.B.E., F.R.S.N.Z., F.R.I.C.

BY the death of B. C. Aston on May 31, 1951, New Zealand has lost another of her rapidly thinning band of pioneer scientists. Agricultural Chemistry was virtually a one-man job when Aston was appointed Chemist to the Department of Agriculture in 1899. To-day dozens of chemists in various institutions throughout New Zealand are engaged in its many ramifications.

Aston was born at Beckenham, Kent, England, in 1871, son of M. Aston, of a family well known in the Home Counties. He was educated at Christchurch Boys' High School, Dunedin Technical College, and Otago University. At Otago University, Aston was considerably influenced by Professor Black, and was also a contemporary and friend of J. W. Mellor, the celebrated ceramic chemist. Aston's first chemical appointment was as chemist to a cement company, but he was soon afterwards appointed a consulting analyst to the Government, with accommodation at the University.

On his appointment as Chemist to the Department of Agriculture, in 1899, Aston moved to Wellington, which thereafter remained his home. His earliest investigations were largely influenced by the researches of Chief Veterinarian J. A. Gilruth on ailments of livestock in New Zealand, particularly in relation to poisonous plants. Together with Easterfield, he isolated and described "tutin", the principal toxic glucoside of the New Zealand species of *Coriaria*. Other native poisonous plants investigated included the Karaka, Ngaio, *Pimelia*, Rangiora, and Pukatea, from the last of which a series of alkaloids was isolated.

While pursuing these researches Aston was also actively building up a service laboratory for the Department and in his first year personally analysed and reported on some ninety-three samples of the most varied nature. He also introduced and tested the use of Dyer's method for available plant food—phosphate and potash—in soils. In this and the following few years Aston laid the foundations of most lines of agricultural analysis practised in New Zealand during the next thirty-five years.

In 1903 Aston visited Britain, Canada, U.S A. and Australia. He made other trips abroad in 1914 and 1926. The years 1906 to 1909 are especially noteworthy for the expansion of the Chemical Laboratory under Aston, both in personnel and equipment, and in services performed and lines of research inaugurated.

During this period Aston published important papers concerned with the objectives and methods of field experimentation, the need for a soil survey, and the possibility of establishing a beet sugar industry in New Zealand. In his annual reports is recorded a wealth of data on the soils of New Zealand, accumulated from flying surveys and investigations of agricultural problems. Results of many field experiments with fertilizers and crops, undertaken jointly with district officers of the Department are presented, and doubtless influenced subsequent fertilizer practice in the areas concerned.

Following much exploratory work, Aston established the first district testing laboratory for export butter in New Plymouth in 1908. Such laboratories are now an essential feature of the dairy industry.

The retrenchment of 1910 and the repercussions of the First World War permitted little more than routine servicing during the second decade of the agricultural chemical laboratory's establishment. Towards the end of this period a number of investigations were commenced, some of which showed rapid development.

Aston was greatly interested in native plant products and an acute shortage of imported dyes provided him with an opportunity to study the dyeing properties of the native Coprosmas. His findings have since been of considerable interest to home dyers.

The testing of wheat for milling and baking qualities, and of dairy products and requisites were two lines of chemical service to agricultural industries whose early development in Aston's laboratory was followed by the setting up of separate organisations—the Wheat Research and Dairy Research Institutes.

During the third decade, investigations in Aston's laboratory became more specialized along lines of plant and animal nutrition and their dependence on soil conditions.

In particular, the problem of "bush sickness" in ruminants depastured on the pumice lands was the object of research, both by field experimentation and by chemical analyses. It proved unexpectedly complex and baffling in the light of existing knowledge. Practical remedies were however found in certain iron compounds used either as medicaments or licks. Although Aston put forward the hypothesis that iron deficiency in the pasture and the animal was the cause of the disease, he realised that many anomalies existed. He investigated alternative possibilities such as the animal's ability to utilise iron in certain states of combination only, or that a contaminating element in the crude iron compounds used might be responsible for the curative effect.

In 1931 limonite was found by Aston to be a practical remedy when used as a lick, but was soon shown to vary greatly in curative value. Shortly afterwards Filmer and Underwood of Western Australia began the researches on the fractionation of limonite which led ultimately to the identification of cobalt as the curative element.

When in 1926 Aston visited Britain, he was invited to deliver a paper on "Bush Sickness" to the British Association for the Advancement of Science. Here and subsequently at the Rowett Institute, he and his work met with an enthusiastic reception from Sir John Orr. Largely as a result of this contact, the Empire Marketing Board in the following year decided to make an annual grant to the New Zealand Government for research on problems of animal nutrition, Aston being appointed to direct the use of the funds During the next four or five years, until the Empire Marketing Board scheme was discontinued as a result of the financial depression, an extensive programme of work on aspects of the mineral contents of pasture in relation to the nutrition of grazing livestock was carried out in Aston's laboratory. Phosphorus, calcium, nitrogen, iodine, iron and manganese were the elements on which greatest emphasis was placed, but many others were determined during investigations of various suspected deficiency diseases. Most use has perhaps subsequently been made of the data from the iodine and phosphorus surveys, but the Quarterly Reports (unpublished) to the Empire Marketing Board contain a wealth of material for future reference.

Aston's greatest contribution to agricultural science is probably his recognition and demonstration that a widespread ailment of livestock, so severe as to make pastoral farming precarious if not impossible, was due to deficiency of a "minor" mineral element, not itself required, at least in comparable amount, for pasture production. The further demonstration that limonite as a lick could cure or prevent the disease was the primary stimulus to the great and successful development of huge tracts of pumice lands into profitable dairy and sheep farms which has since taken place. The subsequent identification by other workers of cobalt as the trace element concerned has had far-reaching effects in nutritional theory and has further simplified and cheapened the practical remedy.

Seldom has the life of a chemist been so closely identified with the institution he created as in Aston's case. The laboratory was in a large measure himself. His colleagues and those that worked under him seldom failed to be infected by his enthusiasm. Many of the chemists now in senior positions in research institutions or chemical laboratories in New Zealand received their early training under Aston. Others have taken up similar positions abroad. His influence on agricultural chemistry has thus been far reaching.

As a man, Aston was direct in approach and staunch in friendship. Foolishness was apt to arouse his ire, but intelligent interest and honest work received ready recognition.

None could have been a more agreeable companion for a tramp or an expedition, and few had command of so much bush lore and knowledge of general natural history. Aston had a great love for New Zealand—mountains, farmlands, plants and animals—and the few honours he received were far from adequate recognition of a life spent in her service.

R. E. R. G.

Although Aston was by profession a chemist, he was also a botanist, and over a period of about forty years an exceedingly active collector of plants. With more than an average amount of physical strength, he was able to cross mountain ranges and ascend their highest peaks with little apparent fatigue. His botanical investigations in Otago began about 1890 and continued until his removal to Wellington nine years later. He explored many parts of the province, some as far away from his place of residence, Dunedin, as Clifden and Colac Bay, and he visited Stewart Island.

Soon after his arrival in Wellington in 1899 he became interested in the plants of the Tararua Range which, at that time, was unknown botanically. In four years he made ten ascents of peaks in the southern portion of the range. His crossing from the Hutt Valley to the Otaki River in December, 1907, with A. M. Jones and W. B. Aston was among the earliest made. His route led over the Quoin, Alpha and Hector summits.

Aston next turned his attention to the southern parts of New Zealand. In November, 1907, he was a member of the expedition to the Subantarctic Islands organized by the Philosophical Institute of Canterbury. The party left the Bluff in the Government steamer *Hinemoa* on November 14. A day was spent on the Snares, where soil samples and plants were collected. At the Auckland Islands most of the party, including Aston, landed at Camp Cove in Carnley Harbour,