

## Obituary.

DR. HORACE T. BROWN, F.R.S.

A PENALTY of living is to outlast one's friends, especially the oldest, earliest and most esteemed. Not long ago, I engaged in the impossible task of painting a picture of James Dewar, whom I first met in 1875. Now, the call comes for a portrait of Horace Brown, my fellow-student in 1865, the last of the great Burtonian chemical quartette—Peter Griess, Cornelius O'Sullivan and the brothers Brown. My palette must be cleaned and charged anew with very different colours—the lights and shades to be depicted are of another order. No two persons stand in greater contrast. The one a man of fire and fury, a volcano of surging impetuosity, astounding in his individuality—the other, one of Nature's gentlest men, though adamant in purpose, gifted with a placid personality and a refined urbanity and charm of manner which won for him a large circle of devoted friends, scarce a detractor. Both were philosophers but the one was a consummate artist and actor, the other a naturalist from birth and, though not born to blush unseen, sparing in criticism, reticent and retiring, a conformist in most matters.

Horace Brown was congenitally fitted to walk the paths of chemistry on vital territory. Few are, strange to say: the mentality of most chemists being definitely mechanical and physical; only the elect seem to be able to sit quietly on "the dear old Nurse's knee." He was pre-eminently happy when wandering in her company, whether in the open field or in the laboratory—unveiling the activities of micro-organisms and separating the sheep from the goats, wet-nursing the barley-embryo or tracking the nimble molecules of carbon dioxide, through the stomatal openings, on their way to destruction and burial as sugar and starch in the vegetable cell. The secret of his success lay, I think, in his great powers of application and concentration and the faculty he had of getting up the subject he wished to explore, by prolonged preparatory study.

I have told the story of the family in my notice of Adrian Brown, his half-brother. He was a posthumous child, born July 20, 1848. His father began life as a farmer, so he came from the soil, as he once said to me. His mother's remarriage, to Edwin Brown, brought him under the care of a man of high attainments and wide culture, an ardent naturalist—so he grew up under most favourable conditions. His scientific leanings were such that he began to study the stars seriously in his out-of-school hours when only twelve years old. A year or so later, electricity caught his fancy. Following a book which he found in his stepfather's library, he made a frictional machine and a Leyden jar, which gave him great joy; he even went so far, that he constructed a galvanic battery, with which he studied electrotyping. The fortunate gift of a microscope, when he was twelve or thirteen, made him an ardent and systematic microscopist—thus qualifying him to use the instrument with facility and success in his later technical career. When about fourteen, the discovery of a retort and pneumatic trough among his stepfather's possessions led to his preparing oxygen. This he regarded as the turning point in his career. He then came to the conclusion that he must be a chemist:

in early life he had aspired to be a railway signalman. Beginning his experimental work in the kitchen, he soon came to regard a whiff of sulphuretted hydrogen as more precious than the odour of violets—but not so the cook: so he migrated to a store-room. He left school at sixteen and a half. By then, in his attic workshop, quite unaided, he had mastered simple qualitative analysis, with the help of Fresenius. He also did a little quantitative work, under guidance of the great Peter Griess, in the laboratory at Allsopp's brewery.

Contrast Brown's training with that of the public schoolboy of to-day—who is not allowed to do anything of his own accord but constantly drilled into dull habits of conformity and helpless thoughtlessness: moreover, there are no waste places in the Flat-land of to-day. Where then is the "Dear Old Thing" to find followers in our times? Even country schoolboys are forced to play games and be examined by literary Dryasdusts, instead of willingly wooing and examining her. Little wonder that we complain that we no longer have leaders. The made-blind will never lead.

Horace Brown left school at the end of 1864, in the Sixth. In April 1865 he passed from Burton-on-Trent to the Royal College of Chemistry, Oxford St., London, to become a student first under Hofmann, then under Frankland. He left at the close of the year, however, to enter the brewery of Worthington and Co. at Burton, as an apprentice, the youngest of three assistant brewers. He was to receive 5*ol.* the first year and only 9*ol.* in the fifth. The young chemist to-day grumbles at 25*ol.*-30*ol.* There was no brewing chemistry in those days, even a prejudice against it; the brewer, in fact, was an empiric. Brown could only work in his scanty leisure hours, *sub rosa, privatim*, in a garden laboratory, which his stepfather had built for him, in 1866. He here began some research work, at Griess's suggestion. It took him nearly two years to persuade the authorities to purchase a balance and apparatus with which he might determine the original gravities of beers but this was installed in the office. Then came an opportunity which he at once took. In those days, liquor (water) was the dominant spirit in beer—everything that happened—every bad thing—was set down to water. So when Frankland and I, early in 1868, made known our method of determining organic matter in water, he readily obtained leave to spend the slack summer period in London, in Frankland's private laboratory. Having learnt to use the special appliances our method involved; among others, the Sprengel pump—which we were the first, after Graham, to adapt to practical purposes—and its tricks, he returned to the brewery and was allowed to fit up a laboratory. What that laboratory has been worth indirectly to the industry, it would be difficult to say—certainly a good round number of millions.

Brown forthwith made a survey of the Burton water supply, including the river. He thus became an authority on the subject and was instrumental in securing the abolition of the parish pumps, veritable cesspools—although only of age. As the ills that beer was heir to could not be traced to the water, he now devoted himself to the microscopic study of yeasts and soon became aware of their "mixed" character. At this period,



though not until 1870, Pasteur's great work, perhaps his greatest, "Études sur le vin" (1866), came into his possession and the already loosened scales soon fell from his eyes. It became clear that the souring of stock ales was comparable with the souring of wines. When Pasteur's "Études sur la bière" was published in 1876, he had little to learn from its microscopy. Meanwhile, he had perfected a method of "forcing" beers. This involved the use of a rectangular copper box or tray containing water, kept at a regulated temperature, considerably above the average atmospheric ( $80^{\circ}$ - $85^{\circ}$  F.). Samples of the beers, in small closed flasks, provided with a side tube dipping into a mercury seal, were kept on the tray during several days; the deposit was then examined with the microscope and the extent determined to which pirate organisms had developed. It was then easy to forecast the behaviour of the beers in store and so determine the order in which they should be put on the market. The monetary value of the method to the industry was very great.

Largely owing to Horace Brown's work and influence, brewers quickly learnt to appreciate the value of Pasteur's teachings and soon began to put their houses in order. The progress of bacteriology in Great Britain, especially its application to water supply, was also hastened. Horace Brown, in fact, played the same part in brewing, in leading brewers to clean up their plant and adopt aseptic methods, that Lister played in surgery—he was even in advance of Lister in appreciation of Pasteur, though a much younger man. He became manager of the whole of the manufacturing department of Worthington's in 1873, at the age of twenty-five, and occupied this responsible post until 1889, when he became one of two managing directors on the incorporation of the firm as a limited liability company. He resigned in 1893 and left Burton for London, after which time his work was done privately.

What more Horace Brown accomplished before and after he left the brewery cannot usefully be told here. Suffice it to say that he was recipient in succession of the Chemical Society's Longstaff Medal, of a Royal Medal and eventually of the Copley Medal of the Royal Society—only given in recognition of outstanding service to science. His work is noteworthy on account of its thoroughness, the elegance of his methods and the philosophical manner in which he discussed the fundamental problems which engaged his attention. He was one of the few chemists who have done pioneering work of real importance in the biological field, notably in botany.

In the interval since Brown and I became friends, science is certainly risen: its power is certainly proven. Still, it is in some measure fallen—the public effect is not that anticipated by Huxley, Tyndall and others. The clerics openly scoff at our failure and do not sense our one supreme object—the discovery of truth, how infinitely superior belief through such discovery must be to all belief through mere faith, how perfect a religion must eventually be framed through it.

The lesson of Horace Brown's education and life is to be pondered by those who realise how complete a failure is the teaching of "science" in our schools and even in our universities, as a means of inculcating in the community an appreciation of its method and majesty and its usefulness.

HENRY E. ARMSTRONG.

DR. E. KLEIN, F.R.S.

WITH the death of Dr. E. Klein at Hove on February 9, one passed away who had played an important part in English medical science for more than half a century. It is not an easy thing to give a complete account of him or to estimate accurately the value of his work. He had been with us so long that but few of his early contemporaries survive, while the younger workers from whose lives the War subtracted years knew him merely as a name, and had probably never seen him. Indeed, he was a somewhat elusive personality to all of us, as he kept a good deal to himself. The present writer knew him as a fellow-worker in the same branch of study, and had also dealings with him of a scientific kind. Much of what has been written of him since his death will be found to be incomplete and inaccurate. Our claims to write of him rest on information derived from two friends who knew him intimately half a century ago, on a personal acquaintance with him for half this time, and on an intimate study of almost all his works, a study with which we have refreshed our memory since his death.

Emanuel Klein (the name Edward was assumed only after his arrival in England) was born in 1844 at Osijek (Essek), the chief town of Slavonia, situated near the junction of the Drave and Danube. His father was a tanner of Russian leather. Nothing is known of his early years, but he related himself that he was in London when about eighteen—possibly in the capacity of a tutor. His medical education was in Vienna, and after graduation he carried out original investigations, chiefly embryological, in the laboratory of Salomon Stricker (1834-98), at that time professor of general and experimental pathology in the University. In 1871-73 Stricker was publishing his great "Handbuch der Lehre von den Geweben des Menschen und der Tiere," and for this work Klein wrote the articles on the thymus gland, the external generative organs, the serous membranes, and, in collaboration with Verson, the article on the histology of the intestinal canal, and, with Stricker and Stieda, on the conjunctiva and sclerotic. Klein's original work was, however, mainly embryological in connexion with the development of the vascular system of the chick. Stricker's Handbuch was translated into English by Henry Power for the New Sydenham Society, and Klein came into contact with several English workers.

When the Brown Institution was started in 1871-2 by the purchase of two houses in Wandsworth Road, Burdon-Sanderson applied to Stricker for a suitable resident assistant director, and Klein being recommended, he came to England and lived in one of the houses (now turned into shops). He was well received, and proved a *persona grata* from the start. In those days a number of the more ardent young consultants, such as J. F. Payne, Cavafy, and Pye-Smith, used to forgather at his house to discuss science, and incidentally to play whist. Klein had also some private pupils, among whom were Francis Darwin, Frederick Treves, Jeremiah MacCarthy, and James Adams. In 1873 he was appointed to give a course of lectures on histology in Morratt Baker's physiological course at St. Bartholomew's Hospital, and thus began his long association with this ancient and noble institution, first