foothills." These have hardly been explored, though roughly mapped on geological maps of India as belonging to a "Transition Series." The whole area is rich in minerals. The author gives a brief description of various rocks, met with mainly in this third belt. They include slates with vein quartz; mica and graphite schists; dykes of dolerite; granites; clay-slates, sandstones, and schists, with copper, lead, and tin; limestones, serpentines, and hornblendic rocks, with talc, steatite, etc.; various schists, quartzites, and limestones. The summary of the author's observations leads him to "suppose that there are at least three distinct limestone or calcareous series in Kumaon and Garhwal, and that schists and quartzites, with several isolated patches of granitic rock, form a large part of the remaining formations."

3. "Tin and Tourmaline." By Donald A. MacAlister, Esq., F.G.S.

Cassiterite hardly ever occurs without tourmaline, though the latter is found without the former; hence it appears that tourmaline-producing constituents and influences are of wider range than are those of cassiterite. Boron-trioxide is an extremely common accompaniment of volcanic action, and there can be no doubt that it has acted powerfully in changing such original minerals as the micaceous and felspathic ingredients of crystalline rocks. From a comparison of formulæ representing tourmaline and felspar, it is evident that the act of tourmalinization has been accompanied by a loss of soda. The excess of this soda will combine with boric acid, forming metaborate and pyroborate of soda. The former, acting on disseminated tin-ore, might result in the production of sodium-metastannate and borax. The metastannate is soluble and capable of being leached out of the magma, and, by a new reaction, tin-oxide may be precipitated and concentrated, while sodium-metaborate may be liberated. According to the cooling-curve of solutions, in all probability deposition of the oxide of tin would take place more rapidly at a certain stage in the process of cooling than at others.

OBITUARY.

THE REV. THOMAS WILTSHIRE, M.A., D.Sc., F.L.S., F.G.S., F.R.A.S.,

EMERITUS PROFESSOR OF GEOLOGY, ETC., KING'S COLLEGE, LONDON.

BORN APRIL 21, 1826. DIED OCTOBER 27, 1902.

THOMAS WILTSHIRE was born in the City of London 21st April, 1826, and was the son of Mr. Sampson Coysgarne Wiltshire and of Sarah his wife (*née* Sarah Goodchild). He was educated at home by a private tutor, Mr. Burtt, and spent much of his spare time when a boy, as well as his pocket-money, in technical pursuits, being very skilful in all mechanical work and in the use of tools and apparatus of all kinds. He afterwards commenced as a student at

King's College, London, but at 19 he entered Trinity College, Cambridge, where he did well in Classics and Mathematics. Here, attending Professor Sedgwick's lectures, he developed a taste for geology, which continued to be the dominating pursuit of his after life. In 1849 he was duly elected on the Livery of the 'Clothworkers,' to which City Company he had been apprenticed seven years previously. He took his B.A. degree with honours on the 26th January, 1850, and in the following June was ordained a Deacon and became Curate of Riddings, Derbyshire. On the 22nd October, 1850, the young Deacon married Miss H. Hudson. His eldest son—Thomas Pemberton Wiltshire—was born on November 15th, 1851.

He took his M.A. degree in July, 1853, and on the 18th December of that year he was ordained a Priest. In 1855 the Rev. Thomas Wiltshire was appointed Sunday Evening Lecturer at the united parishes of St. Matthew's, Friday Street and St. Peter's, West Cheap. For many years he spent his Summer holidays at Folkestone, where he assiduously collected the fossils of the Gault and Grey Chalk, assisted in his labours by Griffith, the well-known collector. In other years he stayed at Niton and Ventnor, in the Isle of Wight, collecting from the Hard Chalk, Chloritic Marl, and Upper Greensand with Mr. Mark Norman; or working at the Red Chalk of Hunstanton with Westmoreland, the old lighthouse-keeper, or at the Chalk of Filey, in Yorkshire. From these historical localities, either with his own hands or aided by the local collectors, and likewise from that well-known old explorer of the Upper Chalk of Bromley, Kent, Jeremiah Simmonds, Mr. Wiltshire gradually accumulated a very fine collection of Cretaceous fossils, which about five or six years ago he presented to the Woodwardian Museum, Cambridge, where they are now preserved, together with the portrait of the donor.

In 1856 Mr. Wiltshire took his first scientific degree, by being elected a Fellow of the Geological Society of London, and in that year he, with other members, presented an address from the University of Cambridge to Her Majesty Queen Victoria at Buckingham Palace.

In 1857 he opened the first Sunday-school in the City of London at St. Nicholas Cole Abbey. On February 8th, 1859, Mr. Wiltshire was elected President of the newly-formed Geologists' Association, in succession to Toulmin Smith, Esq., its first President and one of the founders of the Association, which now numbers nearly 600 members, and was one of the first scientific societies to admit lady members and to accord to them equal privileges with the male sex. He was elected a Fellow of the Royal Astronomical Society in 1860, and of the Linnean Society in 1861. On the 4th April, 1859, Mr. Wiltshire read an excellent paper "On the Red Chalk of England" (see Proc. Geol. Assoc., vol. i, 1859–1865, p. 3, and *Geologist*, vol. ii, July, 1859, pp. 214 and 261–278). Mr. Wiltshire remained President of the Association from 1859 to 1862, and was re-elected and served from 1871 to 1873, when he was succeeded by Dr. Henry Woodward, F.R.S. In January, 1862, Mr. Wiltshire read

a paper "On the Ancient Flint Implements of Yorkshire, and the modern fabrication of similar specimens" (see Proc. Geol. Assoc., vol. i, pp. 215–226).

His friend Dr. J. S. Bowerbank, F.R.S., relinquished the Secretaryship of the Palæontographical Society in 1863, which he had held for 15 years, and the Rev. T. Wiltshire, M.A., F.G.S., was appointed in his stead, an office which he held until 1899, a period of 36 years, when he was followed by Dr. A. Smith Woodward, F.R.S. Mr. Wiltshire was also elected Secretary of the Ray Society in 1872, and continued to hold that post up to the time of his death. On his retirement from the Palæontographical Society, the two Societies presented him with an illuminated address, executed by Miss G. M. Woodward, his portrait in oil, by Miss Atkinson, and a cheque.

From his first home in Brompton he removed with his family to the Rectory, Bread Street Hill, E.C., in 1864, where he resided till about 1869, when, on its demolition, for City improvements, he migrated to 25, Granville Park, Lewisham, where he remained up to his death. In 1872 he acted as Lecturer in Geology for Professor Tennant at King's College for eight years. In 1880 Mr. Wiltshire filled the office of Dean for Evening Instruction; and on Professor Tennant's death in 1881 he was appointed Assistant Professor, and in 1890 Professor of Geology and Mineralogy, a post which he held until 1896, when upon his retirement, he was duly elected a Fellow and Emeritus Professor of King's College.

Mr. Wiltshire was one of the Honorary Secretaries of the Geological Society in 1874, an office which he filled until 1878. In 1882 he was selected for Treasurer to that Society, a post which he continued to hold until 1895, a period of 13 years.

In 1888 (following the order of succession after his election to the Livery in 1849, a period of 39 years) he became Master of the Clothworkers Company, the fifth most opulent Company in the City of London. Not only during his year of office, but when serving on the Court of Assistants, he frequently selected his geological and scientific associates to be the guests of the Company. He also assisted in distributing its numerous Charities.

After Mr. Wiltshire ceased his geological work, he spent his vacations in visiting Algiers, Iceland, Norway, and the Swiss Alps. In Switzerland, indeed, he spent several of his long Summer vacations. On four occasions he went to North America, taking in Canada, the United States, the Yellowstone Park, and the Rocky Mountains. On 27th April, 1899, the University of Cambridge conferred upon him the honorary degree of Doctor in Science (see GEOL. MAG., June, 1899).

The Rev. Dr. Wiltshire performed the service and delivered his last Sunday evening lecture at St. Clement's, East Cheap, on the 26th October, returning home cheerfully to supper, his duty ended. The same night he passed quietly away from heart failure, after a busy life of 76 years. He now rests peacefully from his labours, leaving his widow, two sons and one daughter to mourn his loss.

H. W.

Albert Gaudry

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