

before for fear of mutilating what was presumed to be an absolutely unique specimen). The chemical and spectrographic analyses demonstrated beyond doubt that the jaw was a modern jaw which had been deliberately stained with iron and chromate salts to match the discoloration to be expected for fossils in the Piltdown gravels.

At this stage, we did not suspect that the other finds at Piltdown might also have been fraudulent. But our discovery of the fraudulent nature of the jaw led to an intensive study of all the other Piltdown finds, with the startling result that every one of them proved to have been 'planted' in order (evidently) to provide a complex framework of complementary evidence for the supposed antiquity of the skull and jaw. The so-called 'secondary dentine' in the canine tooth was found to be a plastic material (probably Vandyke brown paint) which had served to plug an opening inadvertently made into the pulp cavity during the process of artificial abrasion, the skull bones had been artificially stained, the geological evidence for the supposed antiquity of the Piltdown gravels was shown to be faulty, the remains of extinct mammals reputed to have come from the gravels had obviously been derived from other sources, and, finally, the acidity of the gravels was found to be such that it was difficult to suppose that any bony remains deposited in them would have been preserved for any considerable length of time.

The flint implements also showed conclusive evidence of having been artificially stained to match the deposits in which they were alleged to have been discovered. The forger had certainly shown considerable skill in forging his evidence, but he also made some serious mistakes—particularly by overdoing some of the faking. A professional anatomist, for example, could have faked the teeth much more skilfully; but, even so, the modern methods of detection now developed could easily have exposed the fake. It is only fair to the original investigators of 'Piltdown man' to point out that if these modern methods had been available forty years ago, they themselves would not have been misled in the way they were. The fact is that the investigation of the Piltdown remains, altogether apart from the exposure of a remarkable forgery, has proved a most profitable investigation, for it has led to the development and perfection of a whole battery of techniques which will not only make it virtually impossible for anyone to repeat such a deception, but which will in the future be of the greatest use in estimating the antiquity of genuine fossils.

OBITUARIES

Dr. Thomas Royds

DR. THOMAS ROYDS died after a short illness on May 1 at Southport at the age of seventy-one. He was born at Oldham on April 11, 1884. He studied physics at the University of Manchester under Schuster and Rutherford, working especially on the constitution of the electric spark and on the spectrum of radon and the identification of α -particles as helium atoms. With an 1851 Exhibition he went to Germany, carrying out infra-red spectroscopy under Paschen in Tübingen and Rubens in Berlin. He graduated as doctor of science in Manchester in 1912.

Royds had therefore a wide knowledge and experience of spectroscopic technique when he was

appointed assistant director of Kodaikanal Observatory in India in 1911. He remained there until 1939, succeeding Mr. J. Evershed as director in 1923. Here the major part of his scientific work was done. It fell into two main sections. Exact measurements were made of the wave-lengths of lines in the solar spectrum and in the electric arc under varying conditions, to study the causes of observed displacements. Perhaps his most important contribution in this subject was his measurements of the displacements of lines to the red at the extreme limb of the sun, as studied at the total eclipse which he observed at Kamishari in the island of Hokkaido on June 19, 1936. He found that differences of shift for lines of different intensity, such as had been observed without eclipse, were maintained right up to totality and could not be ascribed to scattered light from the centre of the disk. Relativity theory was not adequate to give a complete explanation of the displacements observed. His other investigations at Kodaikanal were largely concerned with dark markings given by spectroheliograms of the sun's disk, their distribution, motions and progressive changes of inclination to the solar meridians. Other studies were made on prominences, unusual bright filaments, radiation pressure and oxygen in the chromosphere.

On his retirement from Kodaikanal, Royds went to live at Southport; but in 1942 he accepted an invitation to go to Istanbul as professor of astronomy, having to travel there by sea around the Cape under war-time conditions. He learnt in a few months to lecture in Turkish and remained in Istanbul until 1947, when he finally retired. He leaves a widow, two daughters and a son. F. J. M. STRATTON

Dr. G. H. Miles

GEORGE HERBERT MILES, a former director of the National Institute of Industrial Psychology, died on April 4, at the age of seventy-four.

The son of a Sussex village schoolmaster who delighted in making electrical gadgets, he followed quickly and closely in his father's footsteps. He became a teacher at the age of seventeen, and at twenty entered the Westminster Training College. Here he had his introduction to psychology; and his interest in it led him, when he had secured another teaching appointment, in Hull, to study the subject (together with physics and physiology) for a London external degree. Lacking facilities for instruction in psychology and physiology, he made his own apparatus and conducted his own courses in the practical work required. His examiners, who included Sherrington and Leonard Hill, seemed satisfied.

The inventiveness and self-reliance suggested by Miles's achievements in these early years were characteristic of him throughout his life. But they were combined with some ambivalence in his attitude to science on one hand and industry on the other. That he was capable of good scientific work was clear from his D.Sc. thesis, on immediate visual memory; but at the same time he had a strong desire to be 'practical', and an inclination to be highly critical of academics. It is significant, perhaps, that in his autobiography (*Occupational Psychology*, 23, 193, and 24, 31) he records a remark made to him by Munsterberg, whom he visited at Harvard in his late twenties: "I am glad you came to see me. What psychology wants now is the middleman".

A middleman he became. After service in the Royal Navy during the First World War, which gave him