4. Foreseen by Lord Bacon.

picture of this latest stage of culture lived in the prophetic but essentially unscientific mind of Lord Bacon. But he did not sufficiently allow for the amount of patient scientific toil that was needed, nor for the time which the preparation of the instruments of research would require, nor for the necessity of destroying existing superstition and accumulated errors. All that has since been done by Newton and the great Continental mathematicians in the former, and by Bayle and Voltaire in the latter sense, Bacon had hoped to achieve at once by the new philosophy of fruit and progress. Such expectations were inevitably doomed to disappointment, though posterity has made amends by all but universally referring to him as the pioneer of modern thought,—as the herald of a new era of human civilisation.[1]

making artificially the fertilising compounds required in common agriculture which followed on the publication of Liebig's famous work on 'Chemistry in its applications to Agriculture and Physiology' in 1840 (see Hofmann's Faraday Lecture of 1875, 'The Lifework of Liebig,' p. 15, &c.) Liebig also discovered and described in 1832 the properties of chloroform and chloral, fifteen years before Simpson introduced the first as an anæsthetic and twenty years before Oscar Liebreich discovered the physiological action of chloral (ibid., p. 101, &c.) Sir Lowthian Bell calculated, many years before the invention of the so-called basic process of making steel, the fertilising value of the phosphorus which was contained in the ironstone of Cleveland, and which then made it useless for the manufacture of high-class iron and steel. The great revolution in the theory of the steam-engine embodied in the work of Macquorn Rankine is to be traced back to the patient measurements by Joule of the mechanical equivalent of heat.

[1] A great controversy arose on this subject through the publication of Liebig's pamphlet in 1862, entitled, 'Francis Bacon von Verulam und die Methode der Naturforschung.' It was directed mostly against the exaggerated view taken by Macaulay in his celebrated essay. The fact is that Bacon, like Voltaire after him, was much more of an essayist and a man of the world than a patient labourer in any special field of research; he was more of a philosopher in a worldly sense (what the Germans call "ein Weltweiser") than a profound thinker. He misunderstood many of the great discoveries of his age, though he prophetically foresaw the great change in the spirit of inquiry. He did not appreciate