

complex radicles, as distinguished from the elements, were produced mainly—if not exclusively—in the organism of the plant or of the animal. Liebig himself, who favoured this view, and who first brought organic chemistry in its application to agriculture and physiology under the notice of a large circle of readers, introduced this branch of the subject with the designation of the chemistry of compound radicles, inorganic or mineral chemistry being termed the chemistry of simple radicles. The radicles were, according to Liebig, the true elements of organic chemistry. The binary system of Berzelius received another attack led by the celebrated French chemists Laurent and Gerhardt, with whom Dumas temporarily allied himself. It was about the year 1840 that the idea of “substitution” entered the list of formulæ by which chemical philosophers attempted to systematise and simplify the ever-growing number of definite compounds, supplied mainly by organic analysis.¹ It was

18.
Liebig's de-
finition of
organic
chemistry.

19.
Substitu-
tion.

zelius and with Dumas, established what is now called the older radicle-theory of organic compounds. As Kopp has shown ('Entwickelung der Chemie, p. 576, &c.), it remained undecided at that time whether these organic radicles had actual existence, or whether they were merely a convenient symbolism,—whether they could be isolated, like cyanogen, or whether they existed only in combinations,—whether they were fixed and unchangeable, or whether they could themselves be converted one into another,—whether the same compound could be referred—for convenience sake—to more than one constituent radicle. “By most chemists the definition of organic chemistry given by Liebig ('Organic Chemistry,' 1843)

was adopted, that it was the chemistry of compound radicles; . . . that these radicles really existed in the compounds as definite constituents; and if it was then said that these radicles were mostly hypothetical, this was understood as meaning that some of them were known in the free state, others not” (p. 581).

¹ Even before that time the views of many eminent chemists had been greatly influenced by the discoveries and experiments of two great natural philosophers of this country who kept themselves free from the theoretical considerations which had led Berzelius in the elaboration of his electro-chemical and binary system. These were the researches of Davy regarding the so-called hydro-