

who did more than any other naturalist to base zoology, anatomy, and physiology on the foundation of the exact sciences, physics and chemistry, "assumed the existence of a vital force which, differing from physical and chemical forces, enters into conflict with them, and which in organisms acts the part of a supreme regulator of all phenomena according to a definite plan."<sup>1</sup>

50.  
Insufficiency  
of the mor-  
phological  
view.

The insufficiency of a purely morphological description of living beings, the unsuccessful search for the morphological elements out of which organisms are built up, as crystals are formed out of the *molécules intégrantes* of Häüy, led thinkers (up to the middle of the century) to have recourse to older and vaguer conceptions, which, under the name of archetypes, formative influences, vital forces, &c., were destined to help where the purely mechanical view would not suffice. This dilemma was appropriately described somewhat later by one who had—earlier, perhaps, than any other thinker—emancipated himself from the influence of these fanciful conceptions. Herbert Spencer in his 'Principles of Biology,' published in 1863, expresses it in the following words:<sup>2</sup>—

"If we accept the word 'polarity' as a name for the force by which inorganic units are aggregated into

<sup>1</sup> See Du Bois-Reymond, "Gedächtnissrede auf Johannes Müller" ('Reden,' vol. ii. p. 217).

<sup>2</sup> The 'Principles of Biology,' from which this extract is quoted, appeared in successive instalments, beginning in January 1863. It is well to note that this was before the appearance of Haeckel's 'Generelle Morphologie,' which bears the date 1866. It does not appear that

Spencer has had any influence on German science, though no doubt many of the conceptions put forward in the numerous treatises of German biologists are anticipated in Spencer's 'Biology,' notably in his conception of the physiological units as intermediate between compound chemical molecules and crystals on the one side, and cells on the other. In the exhaustive