

In order to enable my readers to comprehend clearly the great change which has come over biological thought through Darwin's writings and reasonings, I must now introduce an idea which I have so far intentionally avoided in discussing the various scientific views of nature. This is the idea of final causes, the apparent existence of a purpose (in German *Zweck*), or an end (in German *Ziel*) in all processes of nature, but pre-eminently in those of the living portion of creation. In all writings prior to Darwin a great deal is made of final causes in nature, of the teleology of living processes. The phenomena of life seemed safely intrenched in the citadel of final causes: no mechanism could explain them away. The very fact that organisms were compared with machines, admitted the existence of a definite end and purpose; for it is the peculiarity of every humanly constructed machine or instrument that it serves a definite purpose which, in the mind of the inventor or maker, suggested the peculiar arrangement or organisation which we behold. The criticisms of Lotze¹

ches,' &c. : "Les esprits sévères et amis des progrès des sciences . . . ont regretté que l'auteur opposât sans cesse la vie aux lois physiques, comme si les êtres vivans n'étaient pas de corps, avant d'être des végétaux ou des animaux" ("avertissement" to the 4th ed. of Bichat's 'Recherches,' &c., 1822).

¹ The lengthy discussions of Lotze contained in the writings quoted above are not easy to understand, and it is not surprising that, beyond the elimination of the conception of vital force as useless to the purely scientific student, his real meaning was at the time not grasped at all. In fact, we may

say that Lotze, though ceasing to be a vitalist, remained an animist. Discarding vital force, he retained the conception of a soul in a manner which drew upon him the ridicule of those whom, like Carl Vogt, he had converted to pure materialism. This has had the consequence, that in more recent times his whole philosophy has been stigmatised as dualistic, and that he has been accused of having halted half-way. His real meaning can be gathered more easily from his later and more mature writings: for his contemporaries it must have remained to a great extent enigmatical. See C. Haupt-