

to glance summarily at these revolutions in the domain of scientific thought which the physical view, by regarding nature as the playground of the transformations of energy, has brought about. What I have just indicated will suffice to bring some order into the account I propose to give. There are four distinct directions in which we have to look. *Firstly*, there is the clearer definition of the new ideas laid down in the new vocabulary of scientific and popular language during the second half of the century. *Secondly*, there is the revision and recasting of the whole body of physical and chemical knowledge in the light of the new insight which had been attained. *Thirdly*, there is the criticism of existing theories from the new points of view; and *lastly*, there are the fresh departures which these novel ideas have suggested.

27.
Revolutions
brought
about by
idea of
energy.

The first definite use of the new conceptions of power and work, and of a scale of mechanical value, were contained in the writings of Poncelet and Sadi Carnot in France during the first quarter of the century. The first philosophical generalisations were given by Mohr and Mayer; the first mathematical treatment was given by Helmholtz; the first satisfactory experimental verification by Joule, during the second quarter of the century. The practical elaboration of the whole system following upon Joule's and Regnault's experiments belongs, through Thomson and Rankine in this country, and through Clausius in Germany, to the third quarter of the century. Students in our age entering on the study of mechanical, physical, chemical, and even physiological processes, reap the benefit of these labours by at once grasping the