ıto mechanics during
1807 Thomas Young
gy' for *vis viva*, a sug-
ɜd.
'correlation of forces'
ıry theories of a single
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ove useful; and at the
cists relied on several
fluids that submitted
on. But the discovery
800 brought to light
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ɜ forces or powers as-
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ɜd the transformation.
ıted heat and light; in
–1851) demonstrated
force, and in 1831
rted the induction. A
heat and light was
hel (1738–1822) and
-1854). Finally, a cor-
ıemical activity and
ɜloped in studies of
Liebig (1803–73) and
8). By 1840 several
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.e from engineering.
n every-day example
ical affinity, heat and
arnot's (1796–1832)
, based upon the con-
ıid caloric, came into
mes Joule (1818–89)
on the efficiency of
ıtion of the conflict
ɔrinciples of ther-
ion of energy and its
ɜrmodynamics]. The
ics or 'energetics',
William Thomson
Rankine (1820–72),
ıew vocabulary en-
y' was reintroduced
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l energy were dis-
ɔwer' made precise,
ıajor branches of
ɜd by Thomson,
elmholtz (1821–94)
(1831–79) to allow

energetics an important place in their foundations. Around 1890 Wilhelm Ostwald (1853–1922) advocated that energetics be substituted for the * kinetic and * atomic theories as the foundation for all physics. Not matter, he claimed, but energy was the sole real substance in * Nature. Ostwald's claims were viewed with suspicion by most physicists. But the question was made moot by the theory of * relativity, which established the equivalence of matter and energy, and by the direct detection of molecular activity in Brownian motion.

See also black-body law; cycle.

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TSF

energy (biology). *See* animal heat; metabolism.

engineering. *See* energy; geometry; heat and thermodynamics; man-machine; technology.

entelechy. For Aristotle (384–322 BC), entelechy was the principle of * life, identified with the * soul. The soul represented the formal cause but also the final cause of the body, so that there was always an internalized purpose in life. The soul as entelechy provided the * vitalism which made life different from non-life [* Aristotle's theory of cause].

After Aristotle, interest in entelechy waned. Other vitalistic ideas emerged, and concern with entelechy reappeared only with Hans Driesch (1867–1941). Driesch began as a * mechanist, trying to provide a causal analysis of embryonic * development, as was current. Although a successful experimenter, by 1894 he could not answer the key questions about development of the whole organism. He concluded there must be some special internalized directive * teleological or final cause producing a harmonious developmental process. Drawing on Aristotle and on his understanding of Immanuel Kant's (1724–1804) *Critique of Teleological Judgment* (1790), he termed this non-material vital factor the entelechy. The idea never won favour among biologists, however, as not subject to the accepted causal analysis of * experimental science.

JM

entrenchment. Goodman (*b* 1906) first posed the * new riddle of induction, and propounded his own solution to it. The new riddle was developed by defining a set of predicates relating to some normal type of description we use, in such a way that if things continue to possess predicates from the new set, then they change in the respects we normally describe; and so they continue to satisfy the defined predicates. Our conviction that only our normal descriptions give respects in which things will remain the same (are 'projectible') is explained by the simple historical fact that those predicates alone have been used by us in making predictions which have turned out true. This is expressed by saying that those predicates are entrenched. To Goodman, a traditional * nominalist about classification, there is nothing but historical familiarity, underpinning our preference for one descriptive scheme. His critics have tried to show that there is indeed more than historical accident, since the alleged rival scheme of description involves predicates which either we could not use, or could not imagine being used, in ways parallel to our own.

SB

entropy. *See* black-body law; energy; heat and thermodynamics; Plutonism; statistical mechanics.

Entwicklung. *See* evolution.

Entwicklungsmechanik. *See* developmental mechanics; mosaic theory.

enumerative induction. Induction by simple enumeration is the process, distinguished by Francis Bacon (1561–1626) and then J. S. Mill (1806–73), of amassing support for a generalization simply by increasing the sheer number of favourable instances. It is natural to view this with some scepticism. The problem of * induction shows us that there will be no way of deducing a higher probability for a universal law from the discovery that it holds in some cases, unless we can find some *a priori* reason in favour of the general uniformity of Nature. Furthermore the mere increase in number of favourable instances seems to add nothing or little to the credibility of a generalization: the evidence which does count arises with new instances from widely different circumstances, preferably circumstances where counterexamples might be expected to be found, since surviving in circumstances where it might be expected to break