development from more general to more specialized forms during geological history by a supposed tendency of *natural selection to preserve ever more highly specialized organisms.

Evolutionists after 1859 like Ernst Haeckel (1834–1919) devoted much energy to morphological (particularly embryological) studies designed to trace the ancestral history of major animal groups. But by 1900 biologists like Wilhelm Roux (1850–1924) had begun to create a causal science of morphology, using experimental approaches to *developmental mechanics. Only in palaeontology did the older, non-experimental morphology remain central.

See also form and function; fossils; correlation of parts; monsters.

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DO

mosaic theory of development. In embryology, the supposition that inherited *germ particles contained in the *cell nucleus are distributed differentially to individual *cells in the process of cell division. Germ particles for, say, ectoderm and endoderm are distributed to different cells, thereby initiating and regulating the differentiation of the embryo. First proposed in 1888 by Wilhelm Roux (1850–1924), it furthered the idea that cells were early earmarked for some specific organ or part [cf. *cell lineage] and that at least some *development proceeds independent of the local environment. The fertilized *egg could produce a 'mosaic' of different structures out of this 'mosaic' of germ particles. Roux's theory aroused considerable interest, although problematic (viz. how did the germ material sort itself out into different cells), particularly in the light of August Weismann's (1834–1914) contemporaneous discussion of the role of *germ plasm in development.

JM

motion. *See* absolute space and time; Aristotelian physics; energy; force; mechanics; relativity; *vis viva*.

motion of the Earth. *See* aberration of light; Copernican revolution.

motion of the Solar System. Late 17th-century astronomers accepted the Sun is a star and the stars are free to move; this implied that the entire Solar System may be moving through space. In 1760, Tobias Mayer (1723–62) explained how such a motion would result in a pattern of (apparent) individual or 'proper' motions of the stars. He provided the first extensive list of such motions, but could find no such pattern in them. William Herschel (1738–1822), however, in 1783, did find the desired pattern in the data available to him, proposing the Solar System was moving towards the constellation Hercules. Others confirmed this general conclusion, but in 1818 the number of reliable proper motions increased sharply with Bessel's (1784–1846) *Fundamenta astronomiae*. Bessel could find no such pattern in his data, casting serious doubt on Herschel's conclusion; but in 1837 F. W. A. Argelander (1799–1875) analyzed 390 proper motions to support Herschel's result, subsequently further confirmed and refined.

MAH

motivation. *See* experimental psychology; Gestalt; hypnotism; Nature.

motor car. *See* technology.

mountains. Sixteenth and 17th century writers regarded mountains as ugly, useless parts of the *Earth's physical geography, akin to boils or pimples, and evidence of some former gigantic *catastrophe. Many, such as Thomas Burnet (1635–1715), believed the Earth had originally been created flat and smooth. Opinion began to change during the 17th century. Amongst other things, the vital role of mountains in the hydrological *cycle was grasped; it became widely accepted that mountains caused moisture in clouds to condense into rainfall, and that rainfall was the water source for *rivers. No mountains: no rivers.

Orogenesis (the origin of mountains) came to be studied. It had been commonly believed that upland regions were those left standing when other parts of the crust had collapsed [*cosmogony]. But geologists such as Hooke (1635–1702) and Hutton (1726–97) were concerned to show how deep structural forces, activated by the Earth's central heat, were in fact responsible for thrusting newly formed *strata