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Sommario/riassunto	The physics of porous media is, when taking a broad view, the physics of multinary mixtures of immiscible solid and fluid constituents. Its relevance to society echoes in numerous engineering disciplines such as chemical engineering, soil mechanics, petroleum engineering, groundwater engineering, geothermics, fuel cell technology… It is also at the core of many scientific disciplines ranging from hydrogeology to pulmonology. Perhaps one may affix a starting point for the study of porous media as the year 1794 when Reinhard Woltman introduced the concept of volume fractions when trying to understand mud. In 1856, Henry Darcy published his findings on the flow of water through sand packed columns and the first constitutive relation was born. Wyckoff and Botset proposed in 1936 a generalization of the Darcy approach to deal with several immiscible fluids flowing simultaneously in a rigid matrix. This effective medium theory assigns to each fluid a relative permeability, i.e. a constitutive law for each fluid species. It remains to this day the standard framework for handling the motion of two or more immiscible fluids in a rigid porous matrix even though there have been many attempts at moving beyond it. When the solid constituent is not rigid, forces in the fluids and the solid phase influence each other. von Terzaghi realized the importance of capillary forces in such systems in the thirties. An effective medium theory of poroelasticity was subsequently developend by Biot in the mid fifties. Biot theory

remains to date state of the art for handling matrix-fluid interactions when the deformations of the solid phase remain small. For large deformations, e.g. when the solid phase is unconsolidated, no effective medium theory exists.