1056-83-1022 **Alexander Afriat*** (afriat@gmail.com), Departement de Philosophie, Universite de Bretagne Occidentale, 20 rue Duquesne (campus Segalen), 29285 Brest, France. *Weyl and the foundations (1918, 1929) of gauge theory.*

In 1917 Levi-Civita noted that the parallel transport determined by Einstein's covariant derivative was not integrable—while length, far from depending on the path taken, remained unaltered. For Weyl this was unfair: both features deserved the same treatment. He remedied in 1918 with a connection that made congruent transport (of length) just as path-dependent as parallel transport. This 'total' connection restored justice through a length connection it included, an inexact one-form Weyl couldn't help identifying with the electromagnetic four-potential A, whose four-curl $F = dA$, being closed (for $dF = d^2A$ vanishes identically), provides Maxwell's two homogeneous equations. Source-free electromagnetism (up to Hodge duality at any rate) thus came out of Weyl's unusual sense of mathematical justice. Unexpected but admirable (and inaccurate) synthesis of a world that was then made of matter and electromagnetism in curved spacetime. The appearance of a further element, the quantum-mechanical wavefunction, would—by adding an 'ontic' inadequacy to the inaccuracy Einstein had already pointed out—call for another synthesis (of wavefunctions and electromagnetism in curved spacetime), which Weyl undertook in 1929. I consider both theories and the transition between them. (Received September 20, 2009)