The two branches of dynamical systems, continuous and discrete, correspond to the study of differential equations (vector fields) and iteration of mappings respectively. In holomorphic dynamics, the systems studied are restricted to those described by holomorphic (complex analytic) functions or meromorphic (allowing poles as singularities) functions. There already exists a well-developed theory for iterative holomorphic dynamical systems, and successful relations found between iteration theory and flows of vector fields have been one of the main motivations for the recent interest in holomorphic vector fields. Since the class of complex polynomial vector fields in the plane is natural to consider, it is remarkable that its study has only begun very recently. There are numerous fundamental questions that are still open, both in the general classification of these vector fields, the decomposition of parameter spaces into structurally stable domains, and a description of the bifurcations. For this reason, the talk will focus on these questions for complex polynomial vector fields.