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**Gene regulatory networks: what is still missing?**

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Gene regulatory networks have evolved to respond to a changing environment, serving the survival of the biological population. The topology of these networks has been investigated with the hope of gaining insight into their function or identifying the factors shaping their evolution. Recent studies have shown that gene regulatory networks have different in-degree and out-degree distribution, contain network motifs and are organized in a hierarchical set of layers. However, important pieces of information are still needed before the topological features of these networks can be correctly determined and their response to environmental changes can be modeled at increasingly large scale.