Special Issue

The Effect of Magnetic Fields on Living Organisms: Biomolecular and Cellular Mechanisms

Message from the Guest Editors

Earth magnetic field or geomagnetic field (GMF) is an environmental component, and changes in GMF intensity have been shown to influence many biological processes. Three different mechanisms of magnetoperception have been described: a mechanism involving radical pairs, which has been demonstrated both in animals and in plants; the presence of MF sensory receptors present in cells containing ferromagnetic particles, as has been shown in magnetotactic bacteria; and the detection of minute electric fields by electroreceptors in the ampullae of Lorenzini in elasmobranch animals. The theory underlying the radical pair mechanism predicts that MFs similar in strength to the GMF are too weak to trigger cellular biochemical reactions; however, these MFs are able to interact with short-lived reaction intermediates that affect the reaction rates of biochemical reactions. The primary aims of this Issue are to present information on magnetoreception and magnetoperception by exploring biochemical, molecular and physiological aspects of living organisms responses to varying MF: from below the GMF values to high-intensity MFs.

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