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## Simulations of induced transmembrane potentials of tilapia's egg using Hen egg RC-model

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The present study proposes another alternative approach to model the geometry of Nile tilapia egg for evaluation of the induced transmembrane potential. The actual shape of tilapia egg is an asymmetrical prolate spheroid with a short prolate spheroid bottom and a more elongate prolate spheroid at the top with a common equator rather than a symmetrical prolate spheroid. Unfortunately, the precise model of such non-spherical bioparticle does not exist as yet. In the past, the closest available model was as a shelled symmetrical prolate-spheroid which gave the large error to calculate transmembrane potential. This work proposes the complete "hen egg RC-model" to analyze the implicit value of electrical breakdown transmembrane potential. The two semi-minor axes are set to equal one another. The ratio between the semi-major and semi-minor axes is 1.0-1.5. We keep the volume of the egg constant throughout our analysis which is equivalent to that of the "hen-egg model" possessing the effective values of the semi-major and the semi-minor axes so that the polarization of the egg can be assumed to be the same over the whole egg volume. In the case of the egg possessing a single dielectric shell, it was also analyzed as the equivalent tri-phases of RC-circuit using three pairs of resistors and capacitors to represent the conductive and capacitive properties of the egg's shell, the inner part of the egg and the suspending medium, respectively. The complex specific impedances of each compartment and induced transmembrane potentials of tilapia's egg were finally analyzed.

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