II. Abstract

Reindeer, of which the binomial name is *Rangifer Tarandus* or also known as *caribou*, are well known for their remarkable survival ability in harsh environment conditions. Along with the insulation by thick fur covering its body, heat and water exchange inside a reindeer's nasal turbinate allows the minimization of heat and water loss to ambient air during respiration. Its double scrolled shape that maximizes the surface area between the inhaled air and nasal mucosa and counter-current blood flow were considered as two key factors in the reindeer's effective nasal heat and water exchange. In this study, a 3D model of a reindeer nasal turbinate was created and simulated using COMSOL Multiphysics. Heat and water transfer phenomena during inhalation was studied to observe temperature and water concentration changes at various locations in the air and the nasal mucosa. The study shows that the model is an effective heat and mass exchanger with a heat transfer effectiveness of 75.55 % and a mass transfer effectiveness of 45.55 %.