

Vampires exist!

Models of the peaceful co-existence of vampires and humans based on the scenarios derived from fiction literature, comic books and films

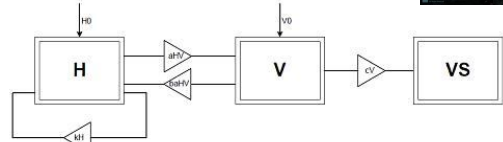


Based on the works of Emily Welkins: www.emilywelkins.com

Aims and objectives

If vampires were real and lived amongst us, would their existence be possible from the scientific point of view? This study presents a new approach to modeling inter-temporal interactions between vampires and humans based on several types of vampire behavior described in popular fiction literature, comic books, films and TV series. Several scenarios of vampire-human co-existence are drawn and mathematical models are applied to test whether vampires could have existed amongst us today and under what provisions. This research tackles a ridiculous subject using serious mathematical tools. It analyzes what is further called "The Stoker-King model" (based on Bram Stoker's "Dracula" and Stephen King's "Salem's Lot"), "The Rice model" (after Anne Rice's "Vampire Chronicles"), "The Harris-Meyer-Kostova model" (based on Charlaine Harris's "Southern Vampire Series", Stephanie Meyer's "Twilight saga" and Elizabeth Kostova's "The Historian"), "The Whedon model" (based on Joss Whedon's "Buffy the Vampire Slayer" TV series) and "The Blade model" (based on Marvel Comics' "Blade").

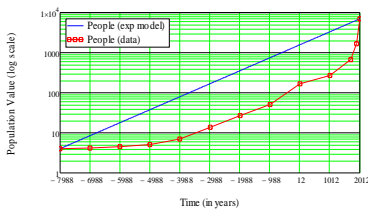
The Harris-Meyer-Kostova model



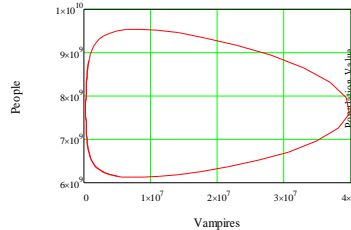
where H denotes humans, V denotes vampires and VS denotes vampire slayers. H0 is the initial state of human population, kH denotes the exponential growth of human population, aHV and baHV both describe interactions between a human and a vampire (with a as the coefficient of a lethal outcome for vampire-human interaction for humans and b as the coefficient describing the rate with which humans are turned into vampires) and cV denotes the death rate for vampires.



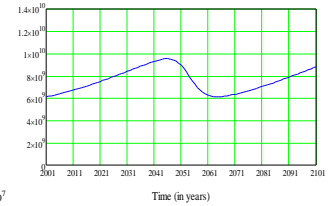
Growth of human population



Logarithmic scale of Earth's population growth (top line – exponential model of population growth, bottom line – actual model built using the values from Atlas of World Population History)

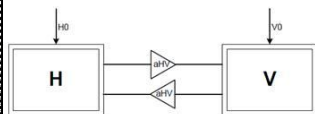


Phase diagram of vampire (V) and human (H) populations in the Harris-Meyer-Kostova model

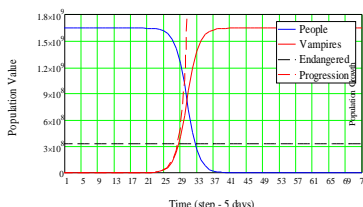


The change in the number of humans in the Harris-Meyer-Kostova model (cyclical nature)

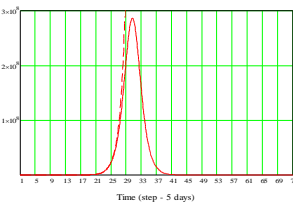
The Stoker-King model



where H denotes humans and V denotes vampires, H0 is the initial state of human population, v0 is the initial state of vampire population and the aHV describes an interaction between a human and a vampire (with a as the coefficient of a lethal outcome for vampire-human interaction for humans).



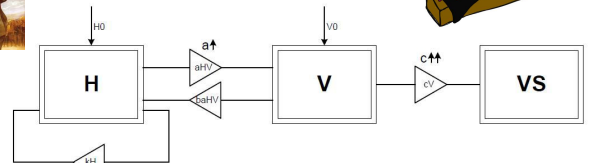
The change in the numbers of humans (left) and vampires (right) in time (1 step = 5 days) in the Stoker-King model



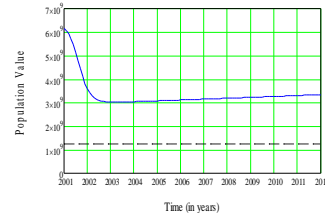
The change in vampires' growth dynamics (1 step = 5 days) in Stoker-King model



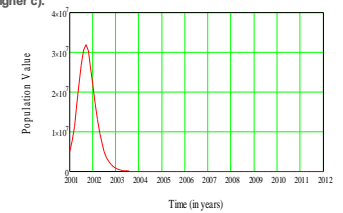
The Whedon model



where H denotes humans, V denotes vampires and VS denotes vampire slayers. H0 is the initial state of human population, kH denotes the exponential growth of human population, v0 is the initial state of vampire population, aHV and baHV both describe interactions between a human and a vampire (with a as the coefficient of a lethal outcome for vampire-human interaction for humans (which is higher this time) and b as the coefficient describing the rate with which humans are turned into vampires) and cV denotes the death rate for vampires (with a much more higher c).

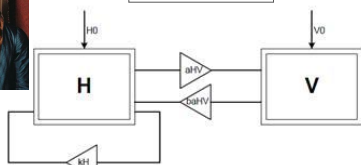


Changes in human population in the Whedon model (disbalance, human population recovers)

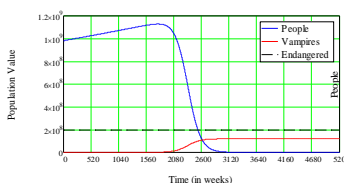


Changes in vampire population in the Whedon model (disbalance, vampires are exterminated)

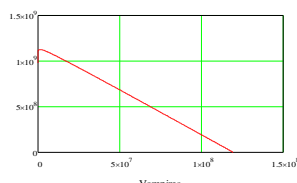
The Rice model



where H denotes humans and V denotes vampires, H0 is the initial state of human population, kH denotes the exponential growth of human population, v0 is the initial state of vampire population, aHV and baHV both describe interactions between a human and a vampire (with a as the coefficient of a lethal outcome for vampire-human interaction for humans and b as the coefficient describing the rate with which humans are turned into vampires).



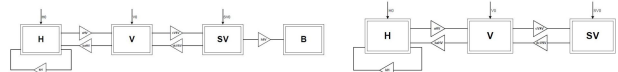
The change in the numbers of humans (top line) and vampires (bottom line) in time (1 step = 7 days) in the Rice model.



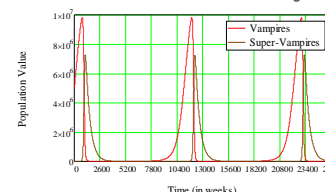
Phase diagram of vampire and human populations in the Rice model.



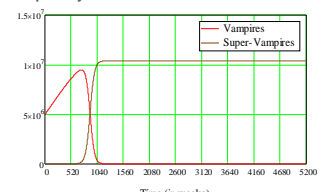
The Blade model



where H denotes humans, V denotes vampires, VS denotes vampire slayers, SV denotes super-vampires and B denotes a super-vampire slayer (Blade). H0 is the initial state of human population, kH denotes the exponential growth of human population, v0 is the initial state of vampire population, aHV and baHV both describe interactions between a human and a vampire (with a as the coefficient of a lethal outcome for vampire-human interaction for humans and b as the coefficient describing the rate with which humans are turned into vampires), cV denotes the death rate for vampires, SV0 is the initial state of super-vampire population, cVSV and dVSV both describe interactions between vampires and super-vampires with c being the coefficient of the lethal outcome for vampires and d being the coefficient of turn rate for vampires. hSV denotes the lethal outcome for super-vampires when meeting the super-vampire slayer.



Changes in vampire population (top line) and super-vampire population (bottom line) (cyclical nature)



The change in the vampire population (red line) and super-vampire population (brown line) (deviation)

Conclusions

It appears that although vampire-human interactions would in most cases lead to great disbalances in the ecosystems, there are several cases that might actually convey plausible models of co-existence between humans and vampires. In total, five different models were defined, calibrated and analysed. The model based on Bram Stoker's "Dracula" and Stephen King's "Salem's Lot" describes the "explosive" rate of growth in vampire population that would lead to exterminating 80% of the human population on the 165th day of the first vampire's arrival. The Rice model (based on Anne Rice's "Vampire Chronicles") would merely delay the total extinction of mankind by vampires by 48 years with respect to the first model and therefore cannot be considered as realistic. Unlike the previous two, the model based on Charlaine Harris's "Southern Vampire Series", Stephanie Meyer's "Twilight saga" and Elizabeth Kostova's "The Historian" allows for the peaceful existence of vampires in our world. However, the system is very fragile and some coordination is required to keep things in balance. The mode based on Joss Whedon's "Buffy the Vampire Slayer" TV series allows for the co-existence of humans and vampires, however in this case vampires become one of the endangered species due to the existence of super-effective vampire slayers. Unless the slayers calm their rigour, the vampire population would be soon extinct. The model based on Marvel Comics' "Blade" introduces the super-vampires and examines the balance in the new system. All three populations are in disbalance and the outcome largely depends on whether vampires and humans would join their forces to fight the super-vampires.