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Ruijun Zhao* (rzhao@purdue.edu), Department of Mathematics, Purdue University, 150 North University Street, West Lafayette, IN 47906. *A new mathematical model of syphilis.*

In the United States, health officials reported over 36,000 cases of syphilis in 2006, including 9,756 cases of primary and secondary (P&S) syphilis. In this paper, we will propose a new mathematical model that features the backward bifurcation by reinfection and partial protection of vaccinations. Moreover, the vertical transmission from infected mothers to new-born babies is emphasized in the model.

In the model, we treat the infection as first time or reinfection. We found that the longer and harder treatment/recovering by reinfection is the key for a backward bifurcation, which may explain the reoccurrence of syphilis and some other diseases. Our model can be applied to many other cases. (Received February 03, 2008)