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Rise and fall of bat population induced from immobile elements and fossil helminth eggs of bat guano deposits, Korea

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Bat guano samples were collected from three carbonate caves located along the eastern coast of Korean Peninsula: Gossi Cave (40 cm high and 200 cm wide dome), Baegryong Cave (50 cm high and 100 cm wide dome), and Seongryu Cave (20 cm high platform). The guano deposits are rich in organic materials including undigested insect fragments, together with authigenic minerals and imported clastic sediments. The guano profiles were calculated to have been deposited 1) from 3097 to 4200 BP yrs in Gossi guano, 2) from 3650 to 7150 BP yrs in Baegryong guano, and 3) from 150 to 6000 BP yrs in Seongryu guano. Among the immobile elements identified, three immobile elements including $Al2O_3$, SiO_2, and TiO_2 were detected from all the bat guano profiles. Distributional pattern of these elements throughout each guano profile also shows a close similarity. Such immobile elements are those of clastic sediments blown into the caves as dust. The amount of such immobile elements is closely related with deposition rate of the bat guano; low concentration of those elements implies rapid deposition rate while high concentration represents slow deposition rate of bat guano profiles. Basically, deposition rate of bat guano is controlled by the population density of bat lived in the cave. The amount of immobile elements of the Gossi Cave, for example, tends to increase toward top layer with a sudden decrease at the middle-upper layer (4,000 BP yr). It is, thus be concluded that bat population experienced fluctuation showing an decrease from 6150 to 4150 BP yr and sudden increase at 4000 BP yr, followed by constant decrease to 3150 BP yr. Fossil parasite eggs were also found from the guano deposits, and the number of parasite eggs show similar trend to that of immobile elements.