

These Supplementary Materials relate to the preprint

Global Bee Decline

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Supplementary Figures

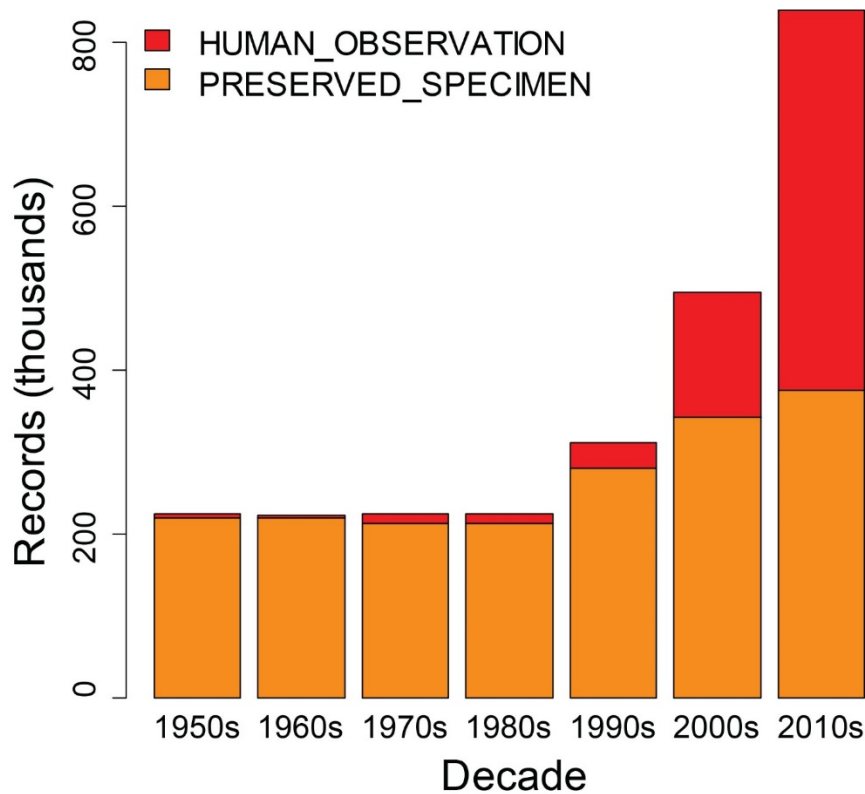


Figure S1

Number of “PRESERVED SPECIMEN” or “HUMAN OBSERVATION” records in GBIF by decade since the 1950’s. Notice the exponential increase of human observation records during the last two decades.

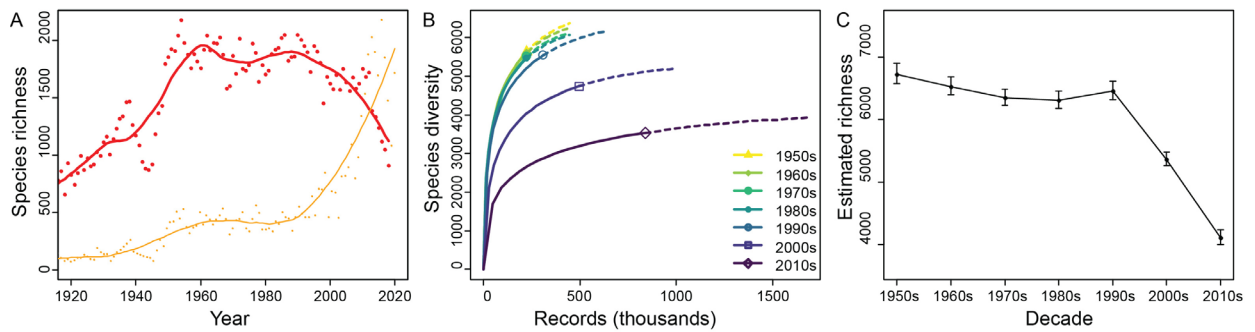


Figure S2.

Adding “human observation” records greatly expands the dataset, yet this extended dataset shows the same trend in species richness seen for “preserved specimen”-only records. (A) Number of species (red dots and line, left axis) and specimens (orange dots and line, right axis) of worldwide Anthophila (bees) GBIF records of the expanded dataset. (B) Chao’s interpolation/extrapolation (iNEXT) curves based on the dataset. See Figure 1 legend. (C) Asymptotic richness estimator for each decade based on the dataset.

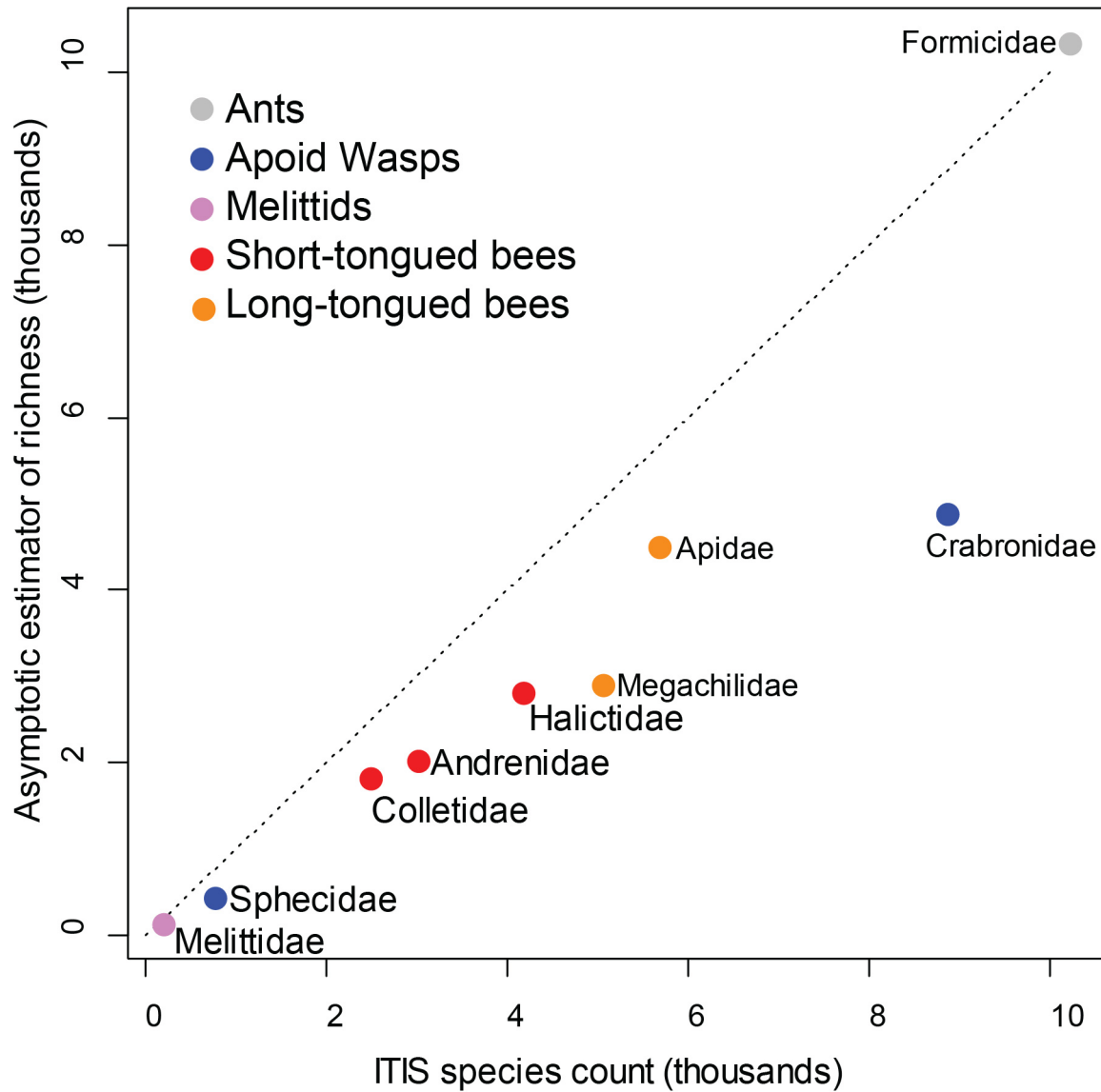


Figure S3.

While likely underestimating the known richness of each family, Chao's asymptotic

estimators of species richness based on GBIF global records of preserved specimens show a

linear correlation with actual species diversity. The dotted line shows the identity diagonal.

ITIS stands for Integrated Taxonomic Information System (www.itis.gov).

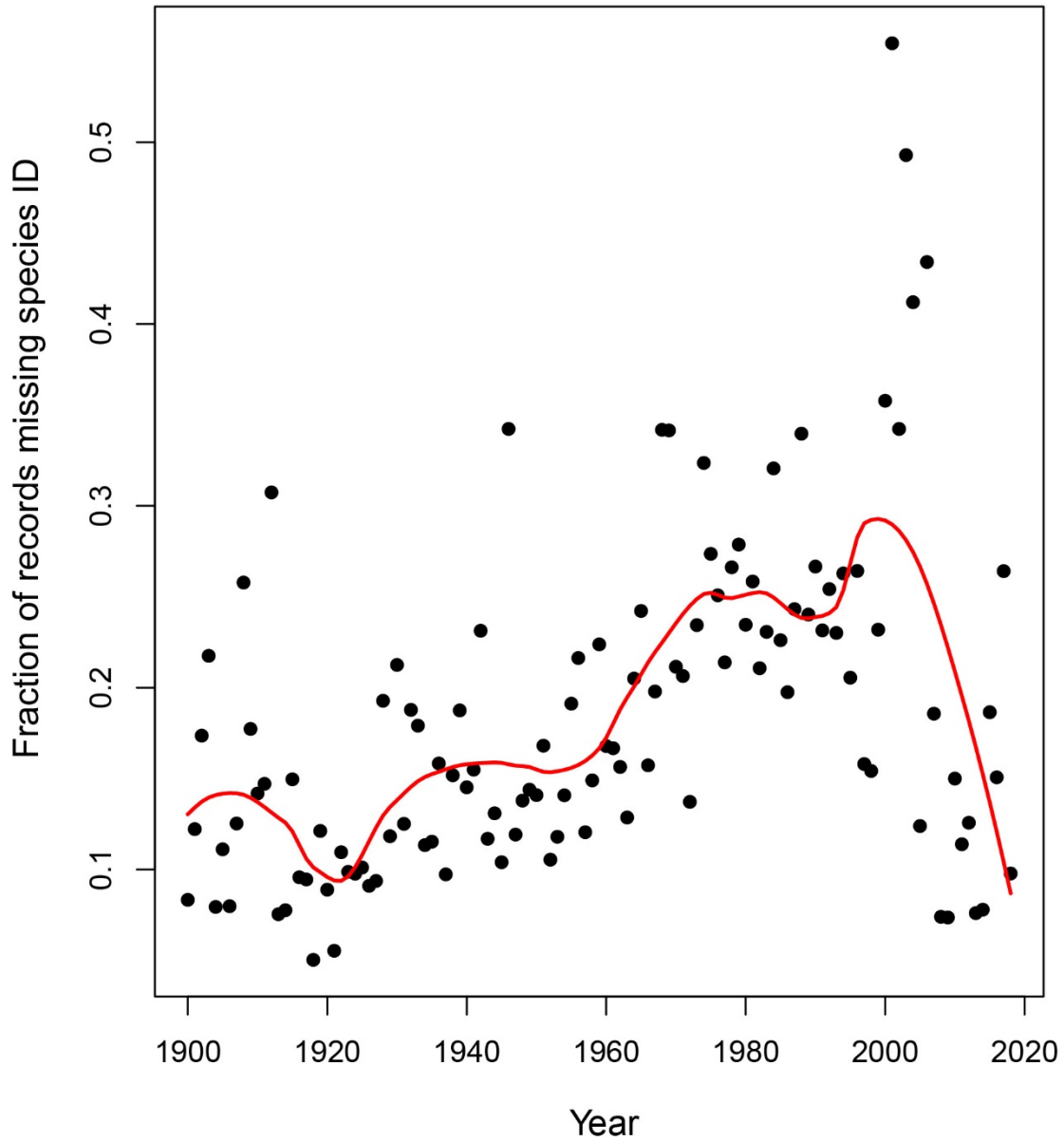


Figure S4.

Fraction of the dataset records that lack a species ID. Points show the proportion of records unidentified at the species level in a given year, relative to the total number of records for that year, and the curve shows a loess-smoothed trend line.

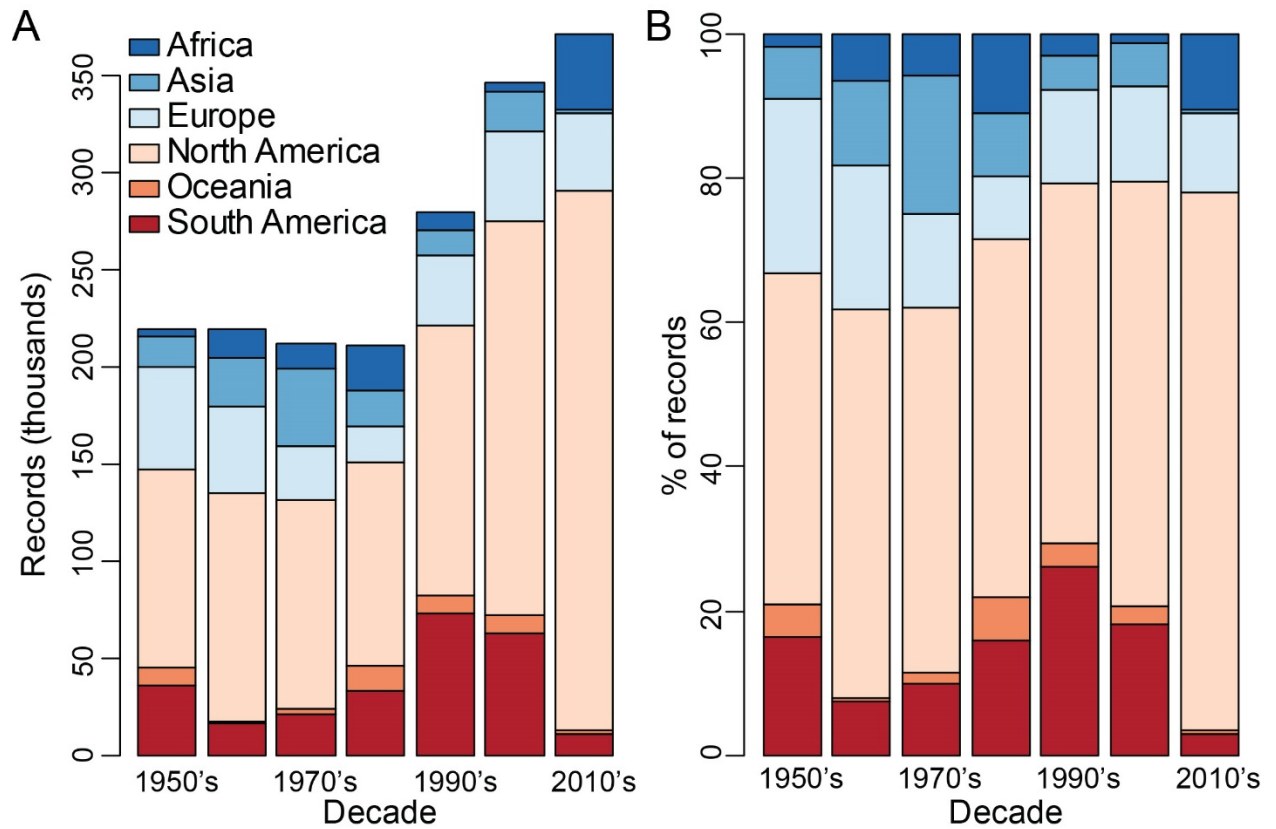


Figure S5.

Contribution by decade of each continent (Antarctica excluded) to the bee record dataset. (A)

Absolute number of GBIF records with a species ID for each continent, grouped by decade

since the 1950's. (B) Relative contribution of each continent to worldwide decadal GBIF

records with a species ID.

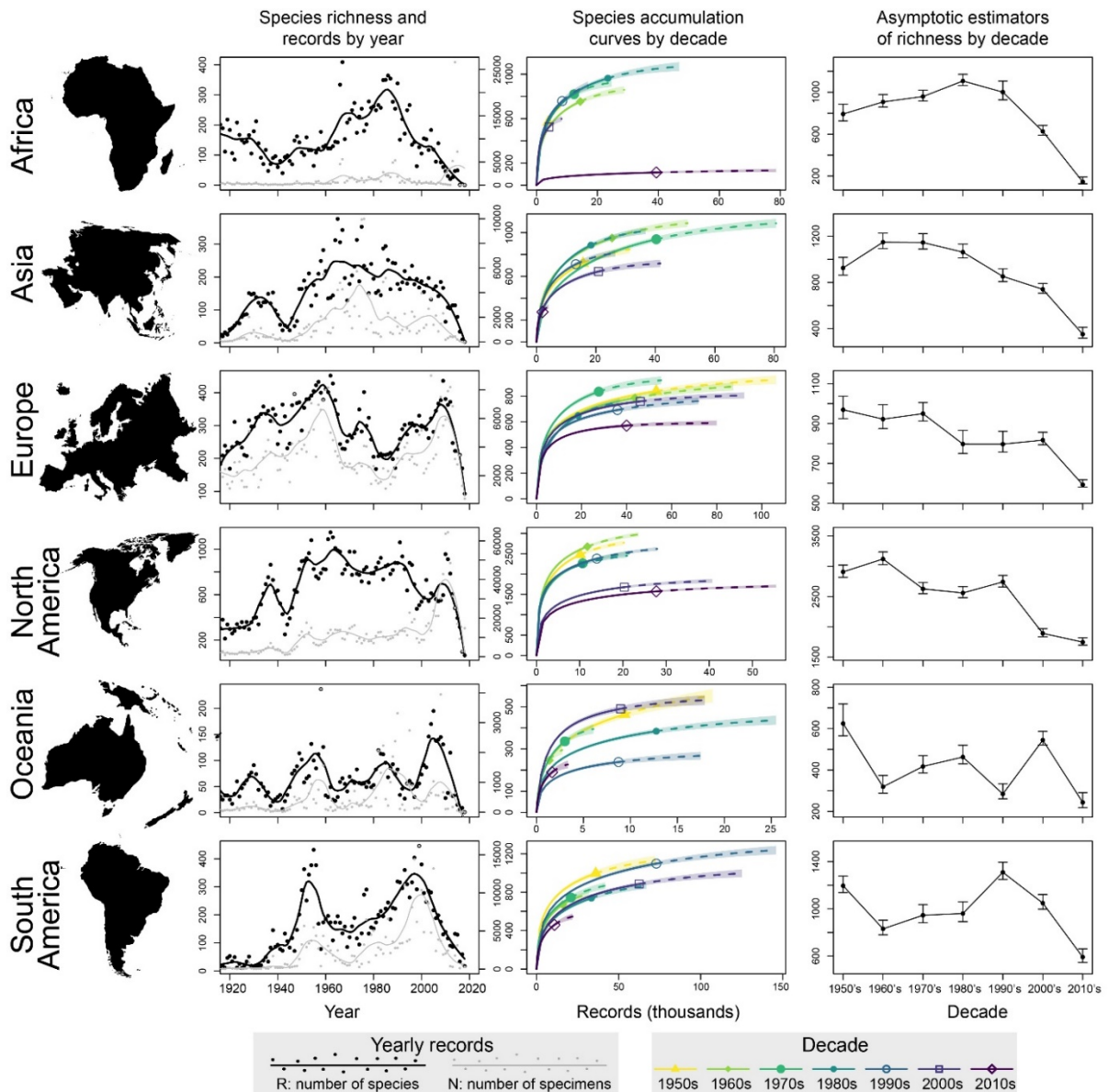


Figure S6.

Trends shown in records of GBIF preserved specimens for each continent. The left row of plots shows number of species (black dots and line, left axis) and specimens (gray dots and line, right axis) in GBIF records; the middle row of plots shows Chao's interpolation/extrapolation curves based on records grouped by decade for the period 1950-2019; plots on the right row show asymptotic estimates of richness by decade for the same period (error bars mark upper and lower 95% confidence intervals).

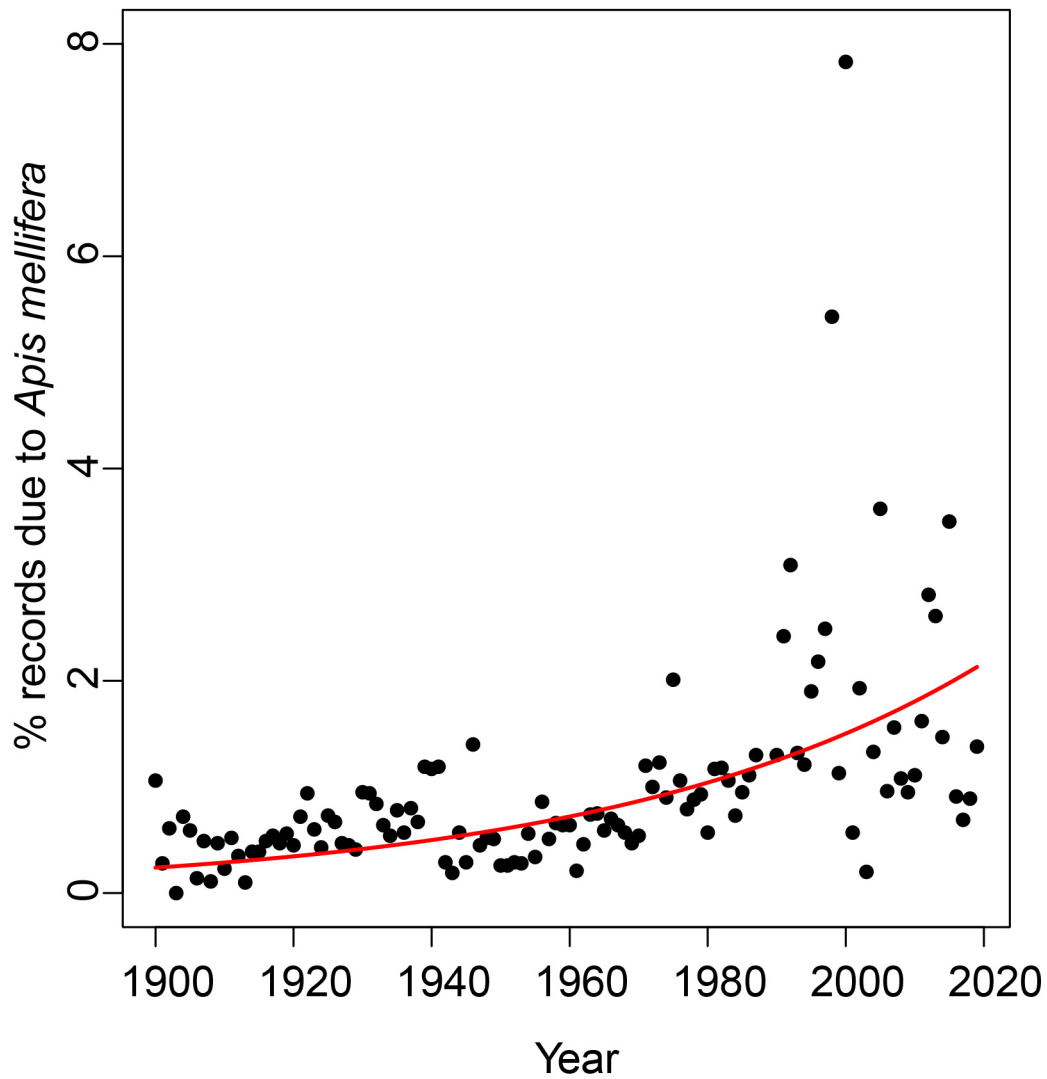


Figure S7.

Increase in the fraction of global records of preserved specimens at GBIF represented by the honeybee *Apis mellifera* since the year 1900. Points represent yearly proportion of total records belonging to *A. mellifera*; the red line shows an exponential fit curve.