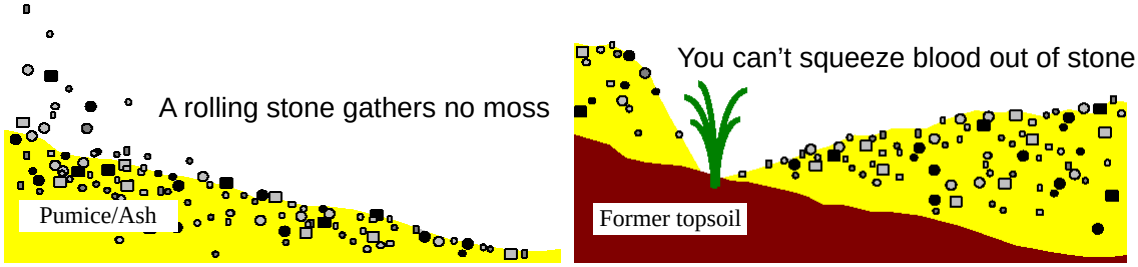
Vegetation changes on the volcano Mount Usu

Graduate School of Environmental Earth Science, Hokkaido University, Sapporo 0810 Japan
Shiro Tsuyuzaki

Mount Usu which is located between Funka Bay and Toya Lake, is an active volcano which erupts periodically every few decades. This volcano is famous in volcanology, and also gives us many new insights on the invasion and establishment patterns of plants after disturbances, including volcanic eruptions (Table 1).

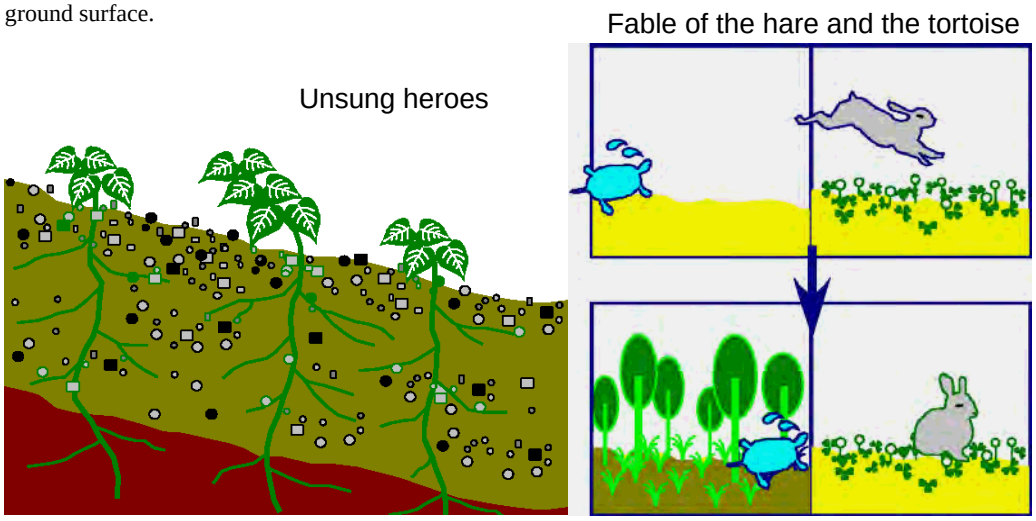
Table 1. Four proverbs for succession on Mount Usu (Shigesada & Tsuyuzaki 2008). The characteristics of early successional stages on Mount Usu are summarized by the following four proverbs.

1) **A rolling stone gathers no moss** Mosses and lichens do not develop large belowground organs and as a result they can not establish on rolling pumice and volcanic ash. Therefore, mosses and lichens do not dominate the ground surface before it becomes stable.



2) **You can't squeeze blood out of stone** When annual plants exist in the early stages of succession, the annuals immigrate to denuded area after disturbances. After the eruptions at Mount Usu there are few annuls left, except in the seedbank. Therefore, annuals do not dominate the plant communities.

3) **Unsung heroes** The only plants that can survive in areas covered by pumice and/or volcanic ash in the early stages of succession are large perennial herbaceous plants. The establishment of plants developing large belowground organs is faster on unstable ground surface. For example, *Polygonum sachalinense* (Giant Knotweed) recovers by the upward movements of rhizomes buried in the former topsoil which can be at depths of 1-2 m below the present ground surface.



4) **Fable of the hare and the tortoise** When the vegetation recovery is promoted by the dominance of fabaceous species in early successional stages, the fabaceous species may exclude the immigration of cohabitants (= Hare). However, bare ground in earlier stages can promote faster, forest recovery which includes trees with heights of more than 10 m and forest-typed herbaceous species on the forest floor (= Tortoise).

Reference: Shigesada N & Tsuyuzaki S (eds). 2008. Natural History of disturbance and succession. Hokkaido University Press (in Japanese)