Differentiation of Song Patterns of the Cicada Meimuna opalifera: Possible Effects of Ancient Pyroclastic Flow

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Meimuna opalifera, with its characteristic song, is a well-known cicada in Japan. On the mainland of Japan, we always hear its song composed of 4 phrases, while in some isles of the Osumi Islands we hear the song of 3 phrases. In order to clarify whether differentiation occurs between these types, we precisely compared the body morphology, song structure, and the DNA of cicadas among several isles of the Osumi Islands and the other places. Cicadas that sing 3-phrases song were found in 5 out of 7 islands examined. Morphologically, there were no differences between any of the island populations. Male cicadas naturally exhibit “disrupting singing” towards other males. In order to examine whether cross-breeding occur between these two types, “play back experiments” were conducted. The percentage of disrupting singing to the same type was significantly larger than to the different type. It was thus evident that the two populations distinguished each other by their song. DNA analyses clearly showed that populations of 3-phrases songs differed from the populations of 4-phrases songs. It is highly probable that the Kohya Pyroclastic flow which occurred over the Osumi islands area about 7,300 years ago almost completely exterminated the pre-existed cicada populations, except for the southern part of the Yakushima Is. The populations of 3-phrases songs evolved from the standard 4-phrases song population on Yakushima Is., survived and could extend their distribution to blank islands.

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