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Vertical distribution of flora and fauna in Changbaishan

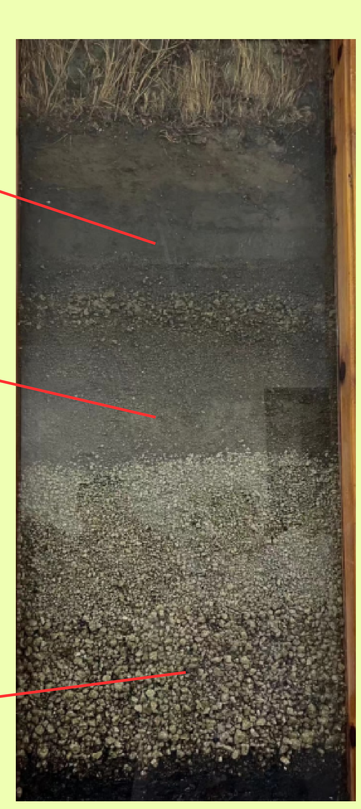
Abstract

Changbaishan Nature Reserve is located in the southeastern part of Jilin Province, belonging to the temperate continental mountain climate, with the most well-preserved and representative temperate primary forest ecosystem in the world. This poster will introduce the natural environment of Changbaishan from geological, vegetation and biological aspects, and present our observations and some academic opinions.

1 Geological Description

Changbaishan is a volcanic landscape located on the edge of the East Asian continental plate. Since 600,000 years ago, the Changbaishan volcano has erupted seven times, as the picture on the right shows , after each eruption, soil and volcanic ash formed a new surface, and through the continuous stacking, the shape of Changbaishan became what it is today.

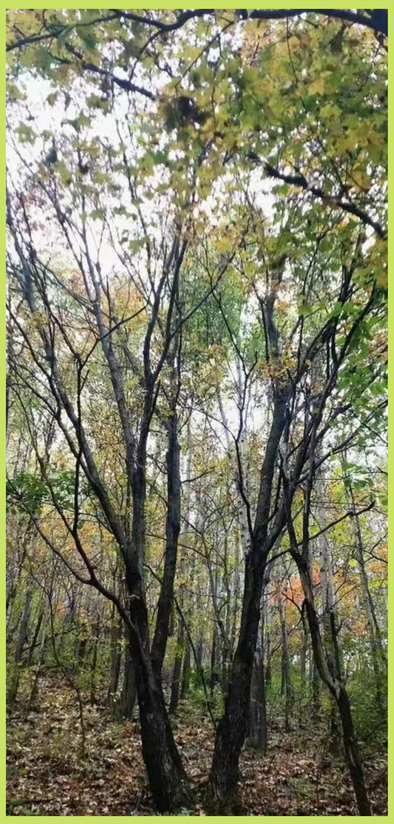
The volcanic landscapes of Changbaishan can be divided into two main types: lava plateaus and volcanic cones. The lava plateau is located 700-1100 metres above sea level. Volcanic cones are located above 1,200 metres above sea level, with a total height of about 1,500 metres, and the cone of the volcano is tall and located in the centre of the lava plateau.



2 Vegetation Description

The vegetation of Changbaishan Nature Reserve can be categorized into five levels, from low to high altitude areas: broadleaf forest area, mixed broadleaf-coniferous forest area, coniferous forest area, dwarf forest and shrub forest area.

Broad-leaved forests: Broad-leaved forests are mainly distributed at an altitude of 500-700 metres, with a warmer climate, and the main tree species are poplar birch and Mongolian oak forests, with plenty of light in the forests.



(Mongolian oak fores)

Coniferous broad-leaved mixed forests: the forest type with the largest number of vegetation types in Changbaishan. It is mainly distributed at an altitude of 700-1100 metres, with a gentle slope, and the soil is forest soil and volcanic ash sand and gravel soil, which is suitable for the growth of all kinds of trees.

(Changbai Scotch Pine)

Coniferous forests: Coniferous forests are found in temperate sub-alpine areas, located at an altitude of 1100-1750 metres. Coniferous forests occupy half of the Changbaishan Nature Reserve, and the main vegetation is spruce and fir.

(Larix olgensis)

Chaparral: Chaparral forests are mainly located at 1700-1050 metres above sea level, distributed in the lower part of the volcanic ash cone, and are characterised by large slopes, low temperatures, high precipitation, high humidity and strong winds. The main tree species is Yue Birch Forest, the plant is low and curved.

(Betula ermanii Cham)

Low Shrub Forest: The low shrub forest is mainly distributed in the alpine tundra zone located in the upper part of the volcanic cone above 1900 metres above sea level, with shrubs and tundra as the main species, and it is the ecosystem with the highest altitude.

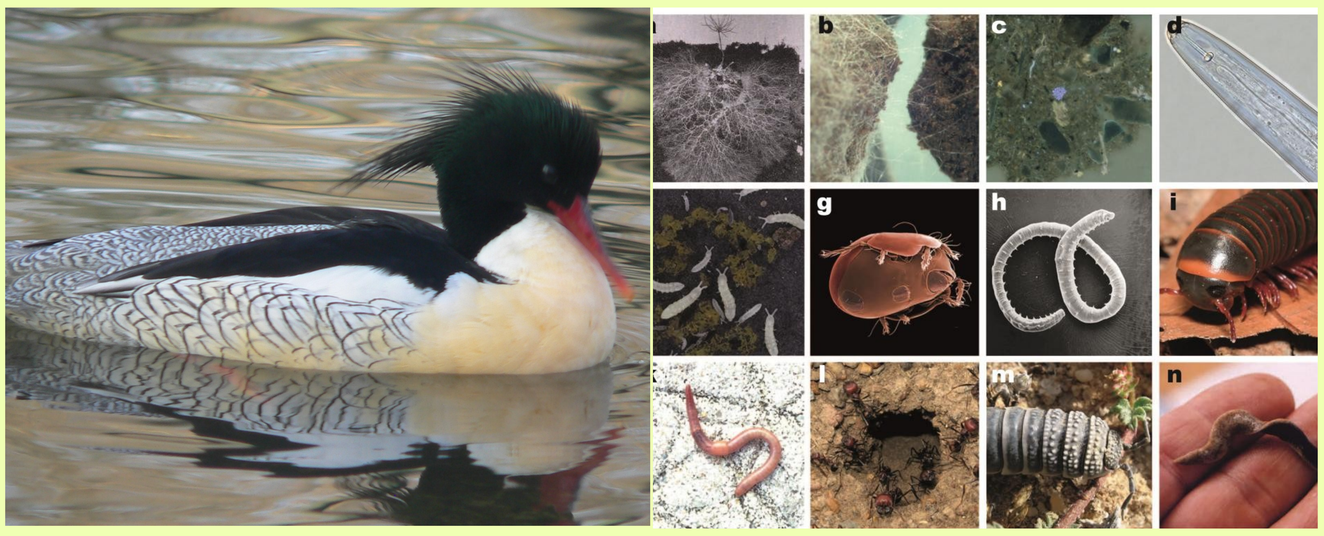
(Tundra)

3 "Alpine ice-edge environment"

The Changbaishan are often known for their rich flora and fauna, many of which are endemic to the region. The main contributors to this uniqueness are its high altitude and relatively low temperatures. The main peaks of the Changbaishan, for example, are more than 2,000 meters above sea level, which ultimately creates the "alpine ice-edge environment" that is unique to the Changbaishan.

4 More common creatures on Changbaishan

If you put your eyes back to the Changbaishan area above 2000 meters, the species of living things, in fact, are not completely limited to those that can fly or run. The vast majority of creatures are actually soil organisms. But even so, the monotonous and barren soil is not enough to support a rich population of soil organisms. In the sunny Changbaishan, there are often only about ten species of soil organisms, while at higher altitudes, the species of soil organisms will be reduced to two to three. Among these, the more common creatures include spiders and weevils.



5 From our group's perspective

When we conduct expeditions, it is common to see different distributions of organisms at different altitudes in the Changbaishan region. For example, the distribution of species in Dalong Lake and Dry Dragon Bay (i.e. the foot of Changbai Mountain) is very rich. Under the observation of our group members, both soil animals and large vertebrates are very abundant. Fish could also be seen in the lake, organisms like earthworms and spiders could be seen in the soil, and endemic species of the local body could be seen in the forest area. This landscape continues into the Changbai Mountain area below 2,000 meters, which includes Changbai Scotch Pine Park and others. However, in the mountains above 2,000 meters, the landscape made up of tundra and volcanic rocks is very unsuitable for the survival and feeding of large animals, as are the gusty winds and lower temperatures. The creatures that can be seen in the area from Tianchi to Changbaishan are extremely limited.

表 6　土壤有机质含量与土壤动物个体密度随海拔高度的变化

Table 6　The change of content of organic matter in soil and individual density of soil animals with different elevation

海　拔　高　度（米）	2100	2200	2300	2400	2500	2600
土壤有机质（%）	14.6	11.4	11.1	8.7	3.6	1.3
大型土壤动物（个/m^2）	399	290	212	209.5	168	62
中型土壤动物（个/m^2）	105600	88480	74080	77280	69440	37600

It can be seen from this chart that in the Changbaishan above 2000 meters, soil organisms become extremely scarce because of the sharp decline in soil organic matter content (which has a lot to do with soil composition). During the field trip, it could be seen that the soil in the mountains around 2000 meters was already very sparse, and was replaced by a large number of volcanic rocks.

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