LIFE ZONES AND ZONE INDICATORS IN OKLAHOMA

R. O. Whitenton, 1917.

During the past summer (1917) it was my privilege to study in detail the Life Zones and their indicators, in Colorado from the Continental Divide to and including the plains of eastern Colorado. The interest aroused in the subject led me to investigate the zones and their indicators in Oklahoma. At present this investigation is far from complete and the conclusions reached are necessari'y rather general and subject to correction. But it is my hope that others will take sufficient interest in the subject so that enough data may be brought together to place the distribution of animals and plants in the State on a scientific basis.

Life Zones are trans-continental belts characterized by particular associations of animals and plants. According to Merriam. "The northward distribution of terrestrial animals and plants is governed by the sum of the positive temperatures (mean daily temperature above 60°c.) for the entire season of growth and reproduction, and the southward distribution is governed by the mean temperature of a brief period (about six weeks) of the hottest part of the year.

The zones outlined by Merriam seem to have more merit than any classification brought to our attention. His seven zones are: Artic, or Artic-Alpine, Tropical, the upper and lower Austral and upper and lower Sonoran respectively.

In order to see the relations between the zones in Oklahoma and those of the rest of North America we shall discuss the zones

from the Divide in Colorado to the eastern border of this State. In doing this we will include all the zones except the Tropical.

The Artic-Alpine zone is the entire area above the isotherm 10°C. (50°F.) for the hottest consecutive six weeks. This isotherm corresponds remarkably well with the timber line. The best plant indicators are an alpine willow *(Salix petrophila)*, a stemless catchfly *(Silene acaulis)* and a rather conspicuous composite herb, *Rybergia grandifolia.* Among the animal indicators we find the white-tailed ptarmigan (A. O. U. No. 304), the brown-capped rosy finch (No. 526) and the pipit (No. 697). The rock cony, or pika *(Ochotona saxatilis Bangs)* breeds commonly but not exclusively in this zone.

Beginning at timberline the Hudsonia zones extend to the isotherm 14°C. (57.2° F.) for the six weeks. Engelman spruce *(Picea engelmanni)* and balsam fir *(Abies lasiocarpa)* are the most conspicuous plant indicators while the Rocky Mountain pine grosbeak (No. 515a) and Clarke Nutcracker (No. 491) are animals restricted to this zone during breeding.

The lodgepole pine belt lies within the Canadian zone, the lower limit of which is the isotherm 18°C. (64.4°F). In addition to the lodgepole pine *(Pinus Murrayana)* the aspen *(Populus termuloides)* the Rocky Mountain jay (No. 484) and the Alpine three-toed woodpecker (No. 401B) and the broad-tailed beaver *(Castor canadensis trondator)* are good indicators.

The Transitional zone, or foothill belt, includes the rock pine *(Pinus ponderosa)* and the Douglas fir *(Pseudotsuga taxifolia)* forests, and its southern limit is the isotherm 22°C. (71.6°F). This zone almost reaches the panhandle of Oklahoma on the west.

The Upper Austral, or Upper Sonoran, includes the grassy plains of the middle west and much of the timber land farther east down to isotherm 26°C. (78.8°F). This is the great wheat belt where there is a sufficient amount of moisture.

The panhandle of Oklahoma and a narrow strip of Harper and Ellis counties are considered by Merriam to be within the Upper Sonoran. The pinyon pine *(Pinus edulia)*, the tree cactus *(Opuntia arborescens)*, the chesnut-faced pocket gopher *(Cratogeomys castanops)*, the black-tail jack rabbit *(Lepus californicus melanotis,)* the burrowing owl (No. 378) and the Bullock oriole (508) are the most conspicuous indicators.

The rest of the Upper Austral includes those areas in the Ozarks, Ouachita, and Wichita mountains which lies above isotherm 2[illegible]°C. The short leaf pine *(Pinus echinata)* makes its appearance

in this zone but probably is not restric ted to the Upper Austral. Most of the hard wood trees are absent but certain species of oak are found where soil and moisture conditions are favorable.

The rest of Oklahoma is within the Lower Austral zone. This is primarily the land of cotton. The pecan *(Hicoria pecan)*, the loblolly pine *(Pinus taeda)*, the magnolia *(Species?)* the live oak *(Quercus virginiana)* and several other species of oak, and the cypress in the swamps are indicators in the more moist area of this zone. In the less humid area (west of the 98° meridian) there is an intermingling of indicators of the Upper Sonoran and Lower Austral with some Lower Sonoran indicators, such as the mesquite and road runner (No. 385) in the southern part.

Isotherm 26°., which divides Upper and Lower Austral zones, has probably never been determined very accurately in Oklahoma. Thru western Oklahoma these zones merge into each other so gradually and the isotherm is so variable annually that there probably is a belt to limit this isotherm, within which one might expect an intermingling of indicators. In like manner the division between the Sonoran and Austral areas is much less definite. When these limits are more or less accurately established they will be very irregular lines and probably will vary considerably from their location as indicated by Merriam.