RELATION OF SOUTHERN PINE CONE SPIRALS TO THE FIBONACCI SERIES

HARRY V. WIANT, JR.*

Patterns in nature, indicative of the existence of a Creator-God, are evident in the spiralling of pine cones. That spiralling, as many other natural phenomena, fits the mathematical abstraction known as the Fibonacci series. Pine cones display numbers of right and left spirals which are adjacent numbers in the Fibonacci series, 8 and 5 for the major southern pines. Approximately 50% of the cones will show maximum spiral counts to the right, and 50% to the left.

Introduction

As reported in a recent popular publication,[1] a curious, but seldom observed, pattern runs through much of nature. The reproduction of male bees, the number of spiral floret formations visible in many sunflowers, spiraled scales on pine cones and pineapples, the arrangement of leaves on twigs, and many other structures fit the Fibonacci series. That series, developed by the Italian mathematician Leonardo of Pisa, nicknamed Fibonacci (circa 1170-1230), is 0,1,1,2,3,5, 8,13,21 . . ., with each number the sum of the previous two numbers.[2] This paper reports the relation of pine cone scales of the major southern pines to the Fibonacci series.

Counting Pine Cone Spirals

The number of spirals to the right and to the left around a cone at any point will be adjacent numbers in the Fibonacci series, although the counts may vary on top, middle, and bottom portions of the cone. Consistency within a species is detected if counts are made around the middle of cones.

To observe this, one should use a closed pine cone. (Open cones will close after soaking in water for an hour or so.) Selecting the exposed portion of a centrally located scale, note that it is part of a spiral to the right and left, with adjacent sides of scales meeting for one-half or more of their length (Figure 1).

The number of spirals around the cone at this point, to the right and left, is counted. Almost without fail, counts may be observed which are adjacent numbers in the Fibonacci series (e.g., 5 right, 8 left).

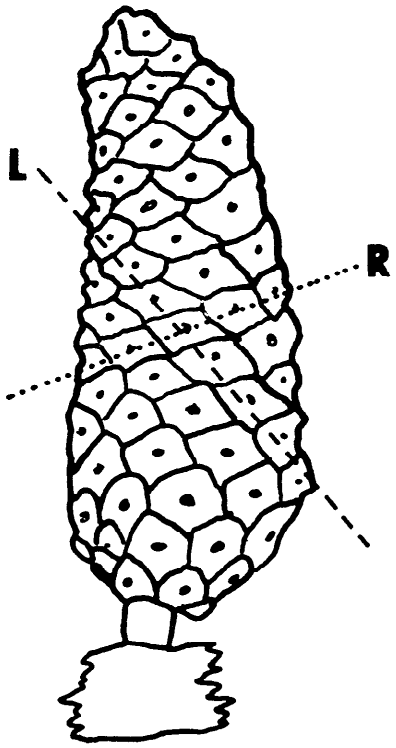

Figure 1. Pine cone spirals to the right (R) and left (L).

Methods

Cones of the major southern pines, loblolly pine (*Pinus taeda* L.), shortleaf pine (*P. echinata* Mill.), longleaf pine (*P. palustris* Mill.), and slash pine (*P. elliottii* Engelm.), have 8, 5 spiral counts. Other species may exhibit different counts. For example, counts for eastern and western white pines (*P. strobus* L. and *P. monticola* Dougl.) are 3 and 5.

Preliminary studies indicate approximately 50% of the cones give the maximum count of 8 to the right and 50% show that maximum to the left. Collections were made from single trees and from young and mature stands to test the 50:50 hypothetical ratio using chi-square analysis corrected for continuity. Significance was tested at the 5% level of probability with 1 degree of freedom.

*Harry V. Wiant, Jr., Ph.D., is professor of forestry and assistant dean, School of Forestry, Stephen F. Austin State University, Nacogdoches, TX 75961.

Table 1. Spiral counts of cones from individual trees.

Species of pine	Tree	Number of cones with maximum counts to the Right	Left	Chi-square value
Loblolly	A	39	57	3.01 n.s.
	B	5	5	—
	C	4	6	0.10 n.s.
	D	7	3	0.90 n.s.
	E	6	4	0.10 n.s.
	F	5	3	0.12 n.s.
	total	66	78	0.84 n.s.
Shortleaf	A	5	5	—
	B	8	2	2.50 n.s.
	C	4	6	0.10 n.s.
	D	7	3	0.90 n.s.
	E	7	3	0.90 n.s.
	total	31	19	2.42 n.s.

n.s. = not significant at the 5% level of probability.

Note: Tests for heterogeneity of proportions, as outlined by Snedecor and Cochran,[3] of right and left spirals were not significant for either species, indicating no real differences in proportions among samples.

Table 2. Spiral counts of cones from young and mature southern pine stands.

Species of pine	Stand condition	Number of cones with maximum counts to the Right	Left	Chi-square value
Loblolly	Young	11	14	0.16 n.s.
	Mature	13	12	0 n.s.
	total	24	26	0.02 n.s.
Shortleaf	Young	15	10	0.64 n.s.
	Mature	12	13	0 n.s.
	total	27	23	0.18 n.s.
Longleaf	Young	12	13	0 n.s.
	Mature	10	15	0.64 n.s.
	total	22	28	0.50 n.s.
Slash	Young	12	13	0 n.s.
	Mature	15	10	0.64 n.s.
	total	27	23	0.18 n.s.

n.s. = not significant at the 5% level of probability.

Results

Cones collected from individual loblolly and shortleaf pine trees showed no significant departures from the 50:50 hypothetical ratio (Table 1). Results from collections in stands of young and mature southern pines are shown in Table 2. Again, in no case was there a significant departure from the 50:50 hypothetical ratio.

It appears, then, that the genetic factors causing maximum spiral counts to the right or left operate in a completely random fashion. Molberg[4] recently suggested that such spiralling may be related to the spiral nature of the D.N.A. molecule. The creationist, again, is impressed with the patterns of nature which speak eloquently of our Creator-God.

References

[1]April 4, 1969. *Time*, pp. 48, 50.
[2]Vorob'ev, N. N. 1961. Fibonacci numbers. Blaisdell Pub. Co., N. Y., 66 pp.
[3]Snedecor, G. W., and W. G. Cochran. 1967. Statistical methods. Iowa State University Press, Ames, pp. 248-249.
[4]Molberg, J. M. 1968. Calluses from double spirality? *Journal of Forestry*, 66:651.