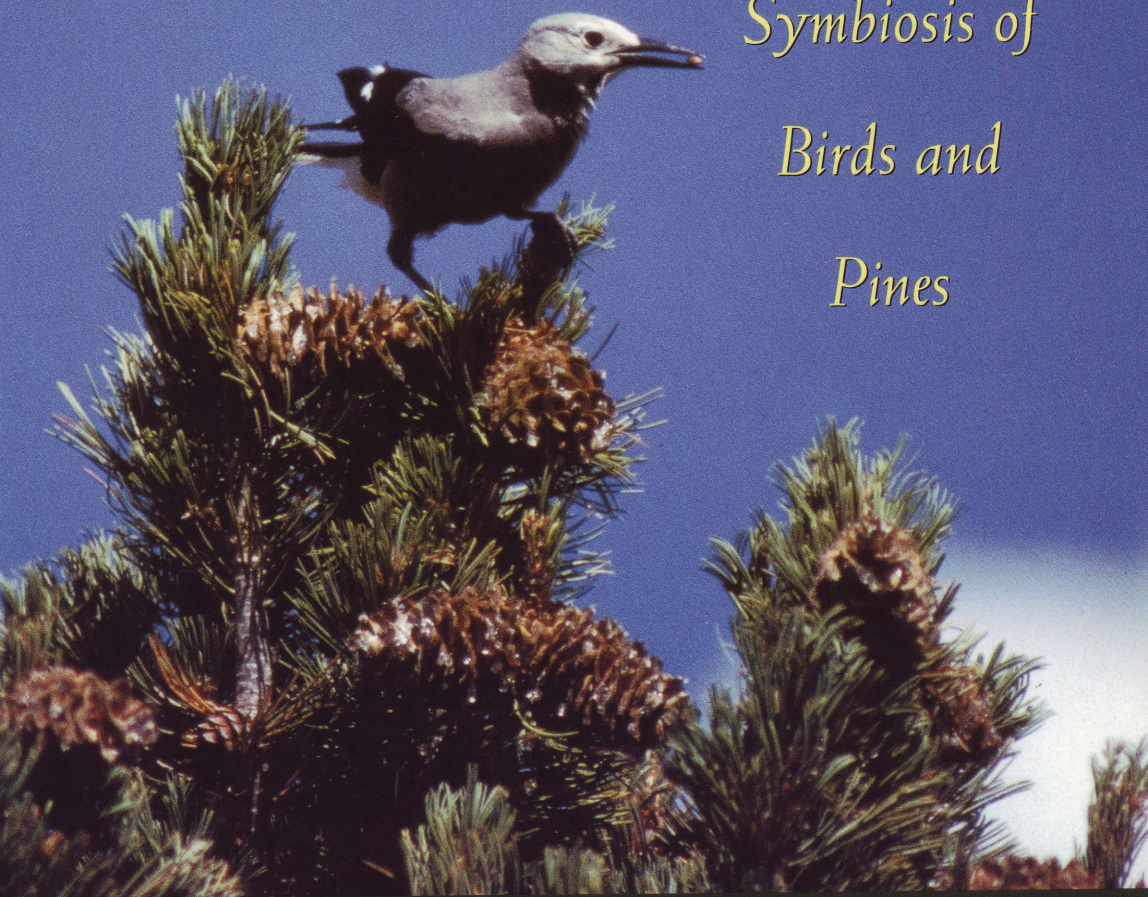


MADE
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A

*Symbiosis of
Birds and
Pines*



RONALD M. LANNER

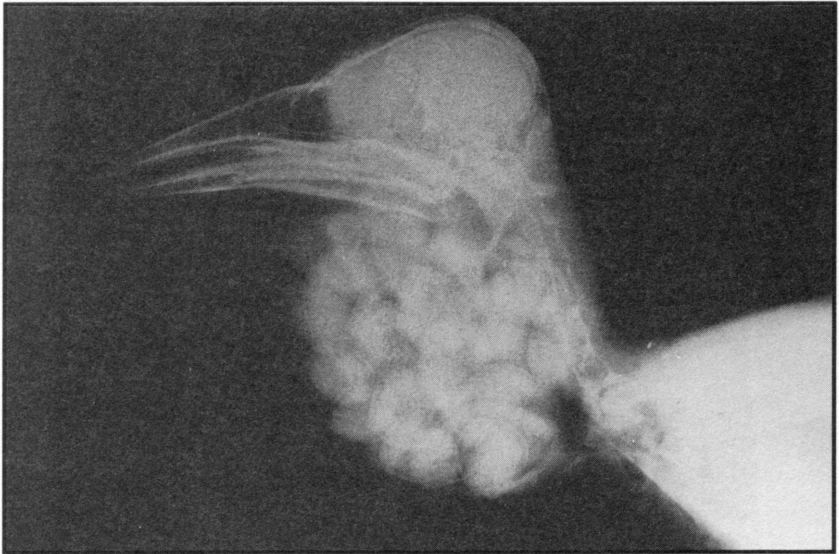




FIG. 5.3 X-ray image of Clark's Nutcracker with 28 singleleaf pinyon seeds in its sublingual pouch. The seeds weigh 31 grams; the bird weighs 141 grams. These seeds are about twice the size of whitebark pine seeds. Photo courtesy of S. B. Vander Wall.

Combined Ranges
of Five Wingless-
Seeded North
American Pines and
the Four Corvids
that Cache Pine
Seeds



LEGEND

-  Combined ranges of Clark's Nutcracker, Pinyon Jay, Scrub Jay, and Steller's Jay
-  Combined ranges of Whitebark Pine, Limber Pine, Southwestern White Pine, Colorado Pinyon, and Singleleaf Pinyon

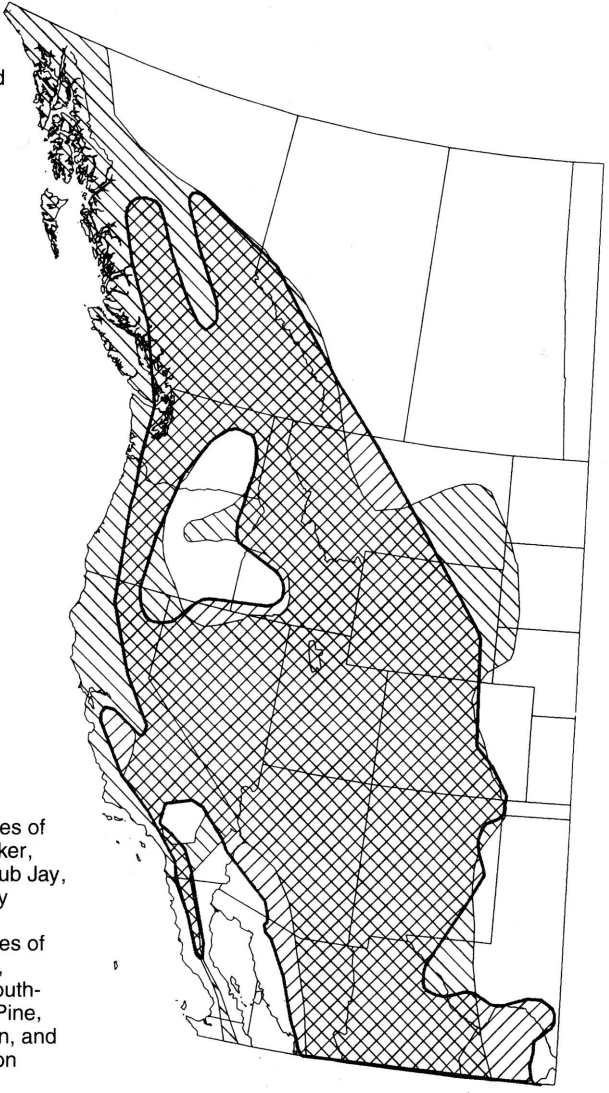


FIG. 1.1 There is a close correspondence between the ranges of the wingless-seeded soft pines of western North America and the corvids known to harvest, disperse, and cache their seeds.

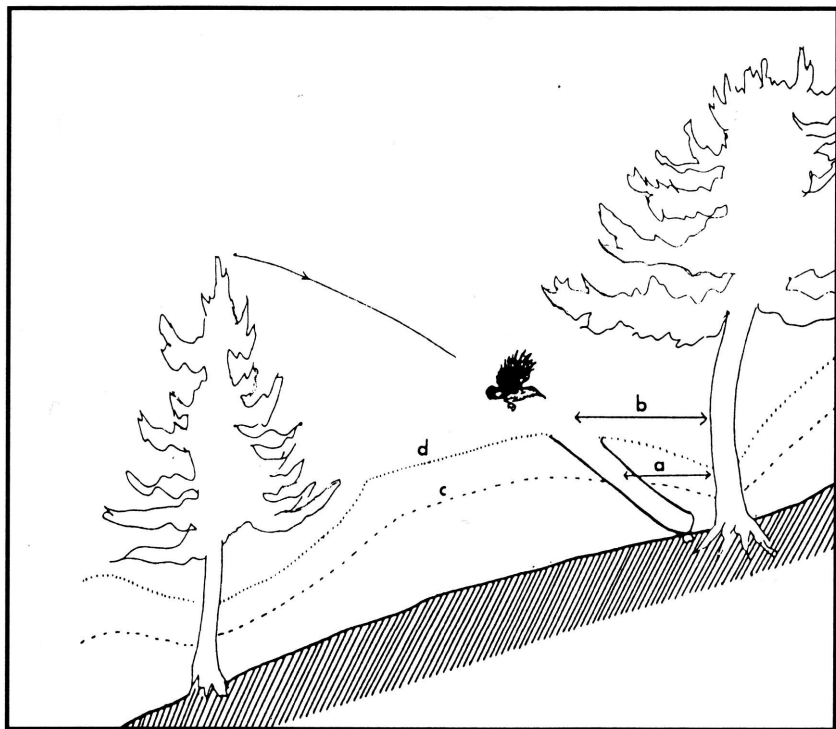


FIG. 6.1 This nutcracker made its seed cache close to the base of a tree, which serves as a visual landmark. But to recover the seeds it must start its tunnel at distance a from the tree if the snow is shallow (c); or at distance b if the snow is deep (d). Sketch by Claude Crocq.