Molt Pattern as a Clue to San Blas Jay Ancestry

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In June 1970, while studying the San Blas Jay (*Cyanocorax sanblasiana nelsoni*) near Las Varas, Nayarit, Mexico (Hardy 1976, Wilson Bull. 88: 96–120), I caught two fledgling jays and brought them to an aviary in Los Angeles, California for study of ontogeny of plumage and softpart color (Hardy 1973, Bird-Banding 44: 81–90). They passed through the partial first prebasic molt, and assumed the typical first-year plumage. In corvids, the first prebasic molt involves only body and head feathers, and even on these parts is often partial, occurring in a complex, variable pattern. In the San Blas Jay most if not all body feathers are molted during the August–October period, and in wild birds, judging from skins, there is a head molt. The peculiar molt of these head feathers in my two captives that occurred in the spring of the first year of life, from late April to mid-May, was seemingly part of a protracted first prebasic molt. (Circumstances of captivity, such as diet, must have prolonged their fall molt.) An intriguing aspect of this head molt was its pattern. Unprecedented though it seems to be, its differential character may be phylogenetically significant.

In my earlier papers (Hardy 1961, Kansas Sci. Bull. 42: 13–49; 1969, Condor 71: 360–375) discussing phylogeny and systematics of the New World jays, I proposed the existence of two lines, the ornate and the inornate. The former consists mostly of lowland tropical species of the genus *Cyanocorax* plus, largely in temperate latitudes, *Cyanocitta*, the Blue and Steller's Jays. I showed how evolution in the ornate line had seemingly taken a course of simplification, producing in the highly derived forms of the line species superficially resembling the derived species of the inornate line. The ornate pattern is not found in other living corvids or presumably closely related families; therefore this pattern can be used to define the ornate line. On the other hand, as Joel Cracraft (a reviewer for this paper) pointed out, the ornate plumage is primitive within the lineage, and thus the loss of that plumage is a derived condition defining certain subgroups. The more primitive species of the ornate line, presumed to resemble most closely its ancestral forms, have prominent crests, bold markings on the face, including a triangular cheek patch and supraorbital spot, and pale tips on the rectrices (e.g. *C. dickeyi*, the Tufted Jay). Intermediate stages of derivation show reduction of the crest and pale tail tips or their loss after early ontogenetic stages, and an obfuscation of this bold pattern by increasing concentrations of melanin. As a result of this trend the pattern, rather than being represented by, for example, blue and white, is seen only in subtle contrast of black and dark blue or purple (*C. cayanus*). The furthest derived jays of the ornate line are dark brown or black and blue with only a trace here and there of pattern and essentially no crest (e.g. *C. morio* and *heilprini*).

In the two captive first year San Blas Jays, the spring molt of head feathers at the age of 10 months involved only a triangular malar-cheek patch and a supraorbital spot (Fig. 1) almost perfectly duplicating the primitive pattern as seen, for example, in the White-naped Jay, *Cyanocorax cyanopogon* (see Goodwin 1976, Crows of the World, Ithaca, New York, Cornell Univ. Press, p. 304). (It has been my fond hope since 1956 that some genius of a biochemist would discover a method for activating and diluting that most inert of substances, the pigment melanin, allowing the primitive head coloration pattern to be seen in the black-headed derived species of ornate line jays. The differential molt is an unforeseen answer to that hope.) Conservatively based on Haeckel's Law that ontogeny recapitulates phylogeny, the pattern revealed by this molt supports the idea that the bold plumage and ornamentation are primitive, not derived. This correlates with other expressions of Haeckel's Law in these jays; for example prominent crests only in subadult stages in the San Blas Jay, and white-tipped rectrices only through the first year plumage in the Yucatan Jay, *C. yucatanica*. Even among those who may view invocation of Haeckel's Law dimly, it surely will be seen that at the very least the facts do not correlate with complexity of ornamentation and plumage pattern being the derived state in this assemblage of bird species.

At the suggestion of Kenneth C. Parkes (another reviewer), I examined museum skins of many New World jays in search of further evidence of the molt. The search produced several instructive specimens. One skin of *C. sanblasiana nelsoni*, LSU 46226, essentially duplicates the molt character of the captives. A first-year bird, it was taken on 4 October 1958 at Agua Zarca, 6 Km N Puebla Juarez, Colima, by W. J. Schaldach, Jr. A molting adult specimen of the Brown Jay, *Cyanocorax (Psilorhinus) morio*, shows a similar pattern. It is LSU 48679, collected at Rancho Cielito, 2 mi. S Encino, Tamaulipas on 3 September 1965, by J. P. O'Neill. In this species the color pattern described is evident even in some non-molting birds in different shades of brown, rare specimens having the patches colored dull silver. In the present specimen the chin and throat feathers and the malar, post- and supraorbital feathers are

Fig. 1. Differential molt pattern of captive first year San Blas Jay. The paler cheek patch and supraorbital spot are in heavy molt, the color being the result of feather sheaths. Drawing from a 35 mm color slide.

ensheathed basally, accentuating the characters. Perhaps most intriguing of all is a molting specimen of the Tufted Jay, *C. dickeyi,* LSU 41147. An adult, it was collected at Rancho Telgas, N. of Rancho de los Orcones, E. of Huajacori, Nayarit, on 25 August 1963. Adults of this species have the bold putatively primitive pattern expressed in black and white. The molt at time of collection of this LSU specimen involved the chin and throat, a bar from front to back across the cheek patch and a spot on the posterior portion of the supraorbital patch. The San Blas Jay specimen confirms the non-anomalous character of the molt in that species but also shows that its occurrence in May in the captives represented abnormal prolongation of the first prebasic molt. The Brown and Tufted Jay specimens, in precisely the correct time of molt, reveal that differential timing of feather replacement in a peculiar pattern in species not having the ornate line plumage pattern hidden by melanic infusion matches that pattern found in the black-headed San Blas Jay.

In summary, a molt pattern found in the head color pattern of species thought to be less derived in an evolutionary line has been detected in the San Blas Jay, considered to be a derived form in which the color pattern is hidden. The molt thus correlates with other plumage and ornamentation features suggesting the evolutionary trend in phenotype change in the ornate line of New World jays.

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