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PHOTOREFRACTORINESS IN PINEALECTOMIZED HARRIS' SPARROWS

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Exposure to long daily photoperiods induces testicular growth in photosensitive passerine species and, if prolonged, inevitably causes testicular regression. The latter signals the onset of refractoriness which, under natural conditions, is not eliminated without the effect of short daily photoperiods (for reviews see Farner 1959, 1964, 1967; Farner and Follett 1966). Since the pineal body has an antagonodotropic function in the golden hamster (Reiter et al. 1966; Reiter 1967) and perhaps in the rat (Wurtman et al. 1959; Reiter et al. 1968), the possibility exists that this organ plays a role in refractoriness in photoperiodic passerine species. To test this possibility, we examined the effect of pinealectomy on testicular regression in photostimulated Harris' Sparrows (*Zonotrichia querula*) and on testicular quiescence in refractory Harris' Sparrows retained on long daily photoperiods.

Birds captured with mist nets near Manhattan, Kansas, were housed, several per cage, in Hendryx breeding cages. Illumination was provided by fluorescent lamps at an intensity of at least 375 lux. Ambient temperature ranged between 18° and 24°C. At autopsy, testes were removed and fixed for 5 days in AFA; after 5 additional days in 70 per cent ethanol, they were debrided and weighed on a torsion balance. Statistical analysis of testicular weights was by Student's *t*-test. The region of the pineal body was inspected microscopically to verify operational success.

Harris' Sparrows captured between 17 December 1966 and 4 February 1967 were held on 8-hr daily photoperiods (08:30-16:30 CST) until 27 February 1967, when testicular growth was induced by lengthening the daily photoperiod to 20 hr (08:30-04:30 CST). Twenty days later, i.e., near the end of the logarithmic growth phase (Wilson 1968), pinealectomy or sham pinealectomy (for procedures see Donham 1968) was performed and the birds returned to long daily photoperiods. They were sacrificed 54 or 79 days postoperatively. The data in table 1 show that pinealectomy neither prevented testicular regression nor altered its course. Both pinealectomized and sham-pinealectomized Harris'

TABLE 1. Failure of pinealectomy to prevent testicular regression in photostimulated Harris' Sparrows.

Group	Operational procedure ^a	Days on 20-hr daily photo-periods after operation	Testicular weight	
			\bar{x} mg \pm SE	(n)
1	P	54	39.60 \pm 8.101 (4)	
	S		23.28 \pm 5.778 (5)	
2	P	79	6.91 \pm 0.963 (4)	
	S		4.91 \pm 0.473 (6)	

^a P = pinealectomy; S = sham pinealectomy. Both were performed on day 20 of exposure to 20-hr daily photoperiods.

Sparrows had smaller testes after 99 days than after 74 days of photostimulation. Moreover, testicular weights of pinealectomized birds were not significantly different from those of sham-pinealectomized birds at either killing date.

In another experiment, male Harris' Sparrows captured between 12 March and 16 April 1966 were held on 13-hr daily photoperiods (08:30-21:30 CST) until 2 May 1966 when the daily photoperiod was increased to 20 hr (08:30-04:30 CST). About 5 months later (during refractoriness), pinealectomy or sham pinealectomy was performed and the birds returned to long days. Birds were killed either 1.5 or 3 months later. As in the previous experiment, pinealectomy did not eliminate photorefractoriness. Testes of pinealectomized and of sham-pinealectomized birds were small at both killing dates (table 2).

Our observations suggest that the pineal body plays no role in the natural termination of reproductive activity in male Harris' Sparrows and, further, that the insensitivity of refractory birds to photoperiodic

TABLE 2. Failure of pinealectomy to induce testicular growth in refractory Harris' Sparrows held on 20-hr daily photoperiods.

Group	Operational procedure ^a	Months on 20-hr daily photo-periods after operation	Testicular weight	
			\bar{x} mg \pm SE	(n)
1	P	1.5	1.97 \pm 0.229 (7)	
	S		2.10 \pm 0.020 (2)	
2	P	3	2.30 \pm 0.507 (5)	
	S		2.45 \pm 0.659 (4)	

^a P = pinealectomy; S = sham pinealectomy. Both were performed after approximately 5 months of daily 20-hr photoperiods.

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stimulation is not mediated by the pineal body. This conclusion is supported by results of an independent investigation on the House Finch, *Carpodacus mexicanus* (Hamner and Barfield 1970), in which testicular growth was also photoperiodically controlled. In that species, electrolytic destruction of the pineal body eliminated neither photorefractoriness nor the gonadosuppressive effect of short daily photoperiods (see also Donham and Wilson 1969).

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BIRDS OF THE CHIGNIK RIVER DRAINAGE, ALASKA

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Comprehensive field records exist of the avifauna of the Aleutian Islands southwest of Chignik (Gabrielson and Lincoln 1959; Murie 1959; U. S. Fish and Wildlife Service 1963), and the base of the Alaska Peninsula northeast of Chignik (Osgood 1904; Gabrielson and Lincoln, loc. cit.; Cahalane 1959; Murie, loc. cit.; Williamson and Peyton 1962). There are, however, few and incomplete records of the avifauna of the Chignik River drainage on the south side of the Alaska Peninsula (fig. 1).

I made observations on birds in the summers of 1960-63 during the course of sockeye salmon studies in the watershed for the Fisheries Research Institute, University of Washington. Parts of the watershed, except the open coastal region adjacent to the lagoon, were visited by a field party of two or three men, of which I was one, at intervals of 10 days from mid-June to mid-September. About one-half of the season was spent on the lakes, one-fourth on the rivers and streams, one-eighth on the plains and hills surrounding the lakes, and one-eighth in the estuary. Observations were extensive in the vicinity of the primary field stations at the outlet of Chignik Lake and opposite

Alec River on Black Lake, but were very limited in the estuary (fig. 1).

The watershed consists of a trunk stream, numerous tributaries, and two lakes (fig. 1). It drains into Chignik Bay and the North Pacific Ocean by an estuary, Chignik Lagoon. Since it forms the only low pass through the Aleutian Mountain Range, it is probably an important bird migration route. Chignik is about 180 miles west of the limit of the coniferous forest near the western border of the Katmai National Monument. The two lakes of the system are very different in morphology and terrain (Knappen 1929:161-227). Black Lake (elev. 50 ft) is shallow, situated north of the mountains on an extensive glacial moraine, and bordered by plains of muskeg, marsh, and grass and low hills covered with willow and tundra. Chignik Lake (elev. 10 ft) is deep and fringed by mountains, some of which rise abruptly, and the lower slopes of which, to about 700 ft, are covered with stunted alder and small patches of tundra and grass. Chignik Lagoon is shallow, nearly enclosed, and covered with extensive growths of *Zostera*.

Observations of seven species represent an extension or confirmation of the reported range.

Barrow's Goldeneye (*Bucephala islandica*). One drake, accompanied by several male Common Goldeneyes (*B. clangula*) and unidentified goldeneye females, was observed at close range on 21, 22, and 23 June 1963 near the outlet of Chignik Lake. Murie (1959:87) reports that the Barrow's Goldeneye is confined mainly to the base of the Alaska Peninsula. It is most plentiful in the Katmai National Monument (Cahalane 1959:96), common in the Bristol Bay

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