

at Balboa [Orange County] on several occasions. We counted about thirty."—CLINTON G. ABBOTT, *San Diego Society of Natural History, Balboa Park, San Diego, California, November 19, 1934.*

**Nesting Habits of Cormorants.**—On the cliffs above the famous Caves of La Jolla, California, there is a long established cormorant nesting ground. These cliffs rise almost sheer from the sea and are battered by the breaking surf along the base. Along the rough face of this cliff for a distance of perhaps 200 yards are niches, ledges, and projections which offer perching and nesting sites for the cormorants. When we first visited this rookery at the end of October, 1933, several hundred birds were present and every available perching site was in demand. Of the estimated 600 cormorants on the cliff 500 were Brandt Cormorants (*Phalacrocorax penicillatus*) and 100 were Farallon Cormorants (*Phalacrocorax auritus albociliatus*).

While all the cormorants perched on the same cliff, the birds of the two species did not mingle indiscriminately: the Farallons occupied the uppermost tiers of perches exclusively while the Brandts kept to the ledges below the two uppermost tiers. Each species recognized the rights of the other and there was never any apparent dispute between species. However, birds of the same species often dislodged one of their own kind to gain a favored perching site. As a matter of fact there were not enough perching sites to accommodate all the Brandt Cormorants, and as a consequence many were forced to do their resting on the surface of the sea. But nesting birds had well established rights, for they were never molested by birds who sought a foothold on the cliff.

At the time of our first visit and all through the month of November the cormorants were merely using the ledges as perching sites, but on the afternoon of December 21, on our visit to the rookery we discovered Brandt Cormorants just beginning to build nests. These birds were in breeding plumage and from the sides of the neck and from between the shoulders there extended long narrow plume-like feathers. Excited birds puffed out blue throat pouches.

The nest building activities of these cormorants was an elaborate ceremonial, and in two cases at least it seemed to be a three bird affair. Two birds stayed at the nest site to arrange the material which a third bird, the carrier, brought in from the sea. When the carrier came in from the sea with a billful of seaweed he came flying low over the water; with fast beating wings as he approached the cliff he lifted upward and then with an awkward flop he alighted clumsily on the nest ledge. When settled, he bows with grave dignity and places his offering of material at the feet of his lady. Now there is much politeness. The birds raise high their heads in turn, and bow to one another. This gesture is repeated many times. The third bird occasionally gets in a bow from the sidelines. The lady bows low and lies flat on her belly, she tilts her tail straight upward, she crooks back her neck and tilts upward her bill, and she quivers rapidly her partly spread wings. The carrier solemnly looks on, but makes no active response to this wanton gesture. Now the lady stands up and lifts high her head, the carrier follows suit and the birds twist and twine and rub necks in a most affectionate manner. It is a real "necking party" and the bills touch bills and pinch bills and tease one another cheek to cheek. Occasionally the female reaches down and pokes about the seaweed as though she thought she should cease such frivolous behavior and attend to her housekeeping.

In the course of thirty minutes the carrier made three trips for material which he evidently pulled up from the sea bottom about 200 yards off-shore. At each visit to the nest site he went through the same ceremony. In spite of the love making at the nest site the birds made progress and the nest soon took shape.

On December 31 we again visited the cormorant colony. The nests that were started on December 21 were apparently complete. Settled in each nest was a bird closely attended by a mate who stood just outside of the nest rim; there was no third bird in evidence.

The birds in the upper nest were performing in a weird manner. They squatted low, facing one another; their tails were erected at right angles to their bodies, and their necks were crooked into the form of a letter S with heads held low. Glistening blue throat pouches were puffed out in front. As the birds faced one another in this attitude the tips of their slightly spread wings vibrated rapidly. Occasionally they touched throat patches and then their bodies took on an added shiver. After several

minutes of this strange maneuver the birds lifted together until they stood tall and straight with their heads held high. Now starting at their heads a wave of vibrations shivered down their bodies and was flicked off from the ends of their tails. Both birds now assumed a natural pose as though all the ecstasy of love making had been shivered from their systems.

As the cormorants puffed out their gleaming throat pouches they seemed to show a relationship to the *Sceloporus* lizards, who have a similar habit of puffing out gleaming blue throat pouches.

The love making of the cormorants was all very public and it was of interest to note that near neighbors paid not the least attention to the antics of a lovelorn pair.

We were rather surprised to find both birds of the pair of Brandt Cormorants wearing the full nuptial plumage. Naturally we thought that those long feathery white filaments of the back and the flowing white side whiskers were adornments of the male alone.

Among the Farallon Cormorants who occupy the upper terraces of the area there was no evidence of sexual excitement. However, some of the Farallons were wearing the shaggy white "eyebrows" of the nuptial plumage.

On January 31, all of the completed nests that could be seen were occupied by sitting birds, and beside each nest a second bird stood guard. Four of the nests were so close together that the rims almost touched. There was nothing to indicate that young had come to any of the nests.

The completed nests were bulky, well built affairs, apparently made entirely of eel grass, well matted and firmly plastered to the rocky platforms on which they rested. All nests were inaccessibly situated on the face of the sheer cliff and so we could not examine them closely. But studying them through our field glasses from a distance of a hundred feet or so we judged the nest rim to be from four to eight inches in thickness. An outside measurement around the cup appeared from our observation to be somewhere close to three feet. An incubating bird could rest comfortably with bill on one side of the rim and tail on the other side.

On February 28, the behavior of one of the cormorants at the nest we saw started on December 21, led us to suspect that young had hatched; but it was not until the morning of March 6 that we actually saw young birds. On this date the young were quite active, poking their heads out from under the protecting wings of their parent, and occasionally a bird would squirm free from cover, stand up and stretch high its neck. During the hour we spent with the cormorants we saw no food passed to the young.

While we were watching the cormorants a man in a rowboat passed close below the cliff. All birds flew from the cliff and took to the sea, except the birds on nests. These nesting birds refused to budge and no doubt the ever watchful Western Gulls were disappointed.

On April 6, the young of the nest of December 21 were almost as large as their parents and they looked as though they might venture from the nest almost any day. There were still many occupied nests in all stages of development, from eggs to well grown young.

On April 12 the apparently full-grown young were still at the nest site and still being fed by their parents. Western Gulls were not nearly so numerous and now it looked as though most of the cormorants would successfully rear their broods. However, nests not protected from above by an overhang are in danger, for it is the sport of boys to throw branches and rubbish over the cliff in an effort to dislodge the birds.

On our last visit to the cormorant colony (April 12) some few birds were just laying the foundations of their nests. It would appear from this that the cormorants of this colony have a long nesting period.—CHAS. W. MICHAEL, *Yosemite, California, June 4, 1934.*

**Altitudinal Migration in Southern Utah.**—During September and October of 1934, I had opportunity to observe the downward progress of altitudinal migration from Cedar Breaks National Monument to lower Zion Canyon. Cedar Breaks, 10400 feet elevation, is the most southerly extension of a great Boreal plateau extending through central Utah from the Wasatch and Uinta ranges of the Rocky Mountain system. It is only 29 miles, air line, from Zion Canyon, 3700 to 4300 feet elevation, which is one of the most northerly extensions of the Lower Sonoran portion of the Colorado River drainage. This close proximity of two extensive winter and summer habitats results in an