attacking my finger for the first time. Her abdomen was no longer distended. There was no trace of her having laid an egg and I presumed that she had either laid one and eaten it or that it had broken inside. I now took her back to the swamp. She was barely able to flutter to a tree where she remained clinging to the bark without further efforts to move.

By afternoon a second female with different head markings (Kilham, Condor, 64:126, 1962) and habits, had arrived by the nest stub. She engaged the attentions of the male Downy Woodpecker on this and throughout the following day. On 11 May, the original female re-appeared. She was now in excellent condition and after further copulations she must have laid at least four eggs, for on 21 June I watched three fledglings fly from the nest, leaving a fourth one still looking out.—LAWRENCE KILHAM, *Department of Microbiology, Dartmouth Medical School, Hanover, New Hampshire 03755, 1 March 1972.*

The use of sawdust piles by nesting Bank Swallows.—The Bank Swallow (*Riparia riparia*) generally digs its burrows in banks of sand, gravel, or clay along inland bodies of water and marine coastlines. Rarely, it employs such unusual man-made substrates as drain holes in concrete banks (Hollom, Auk, 60:270–271, 1943) or a pile of iron ore "tailings" (Van Deusen, Auk, 64:624–625, 1947). Sawdust heaps in abandoned mill yards are used also as colony sites by the Bank Swallow (Torrey, Auk, 20:436–437, 1903; Barrows, Michigan Bird Life, 1912; Norton, Bird-Lore, 29:117, 1927; Brewster in Griscom, Bull. Mus. Comp. Zool., 66:554, 1938; and Palmer and Taber, Auk, 63:299–314, 1946).

The colonies in sawdust heaps reported by the above authors occur in northern lumbering regions from Michigan to Maine. These occurrences, together with additional ones discovered by the present author in Maine and northern New York, suggest that the use of this substrate in the north may not be altogether unusual. Few of the above authors provided much more than a simple notice of the location of such a colony.

In this paper, I present information on two colonies of Bank Swallows in old sawdust piles along the Aroostook River near Ashland, Aroostook County, Maine. Both colonies (about 600 m apart) were discovered in 1962 shortly after the mill sites were abandoned. To my knowledge, there had not been any colonies in the immediate area before 1962, apparently because of the absence of suitable natural or man-made banks. Both colonies were still active in 1970 when one of them was bulldozed out of existence. In the late 1960's swallows established a few burrows in narrow veins of sand in a new gravel pit nearby.

Burrows in the sawdust piles.—Repeated visits to the colonies from 1962 to 1970 revealed that slumping, erosion, and perhaps human disturbance changed the total amount of bank surface available to the Bank Swallows as burrow sites from one year to the next. The size of the colonies varied accordingly from ca. 50 to 100 active burrows in each sawdust heap.

Some swallows apparently faced local slumping problems on the steep banks as they dug fresh burrows into the compact, weathered sawdust (Fig. 1). Partly excavated burrows with severe slumping around their entrance, forming large, irregular depressed areas in the side of the bank, were abandoned. Other burrows with only slightly or moderately enlarged entrances contained active nests. The entrances to still other burrows, especially those near the rim of the banks, retained a compact, elliptical shape. Norton (op. cit.) and Brewster (op. cit.) also reported compact, horizontally elliptical entrances to burrows in other sawdust piles in Maine.

FIG. 1. Bank Swallow colony in an old bank of sawdust at Ashland, Maine. See the text for comments. Photograph by Stanley H. Greenlaw.

The problems of slumping and wearing of the sawdust around the entrances to burrows is in part a function of age of the burrow and perhaps age of the bank (time since formed) as well. Entrances to active burrows which were compact early in the breeding cycle, often showed wear and sometimes moderate slumping later in the cycle. Also, most entrances in freshly formed vertical banks were compact but those in older banks (such as in Fig. 1) were more often enlarged and irregular in shape.

In old banks of sawdust, erosion and local slumping created variation in the angle of exposure of adjacent "faces" (Fig. 1). Some of the tunnels in one face converged and joined tunnels in an adjacent face situated at an oblique angle to the first. Thus an active burrow sometimes had two entrances. Other tunnels passed from one face to an adjacent one and were open at both ends. This was not a problem in the smooth, newly formed banks.

Burrows in low sawdust banks 1.5 to 3 m high were placed at all heights from top to the bottom. But in two apparently freshly formed banks 6 to 8 m high, one sparsely and the other moderately occupied by burrows, the burrows were concentrated near the rim. The texture and compactness of the sawdust in all faces seemed to vary little from top to bottom. Evidently there is a behavioral tendency for Bank Swallows to dig their burrows as high as bank conditions permit. Burrows excavated early tend to be situated high on the bank and those dug later perforce must be lower as the higher sites are occupied (cf. Peterson, Wilson Bull., 67:246, 1955).

Tunnel orientation relative to the horizontal was variable. Some tunnels slanted upward then leveled off at the nest. Other tunnels dipped downwards to the nest or were horizontal. A few even slanted upwards then downwards. Such variability in tunnel

orientation, though perhaps not this extreme, has been noted in natural substrates elsewhere (Stoner, Roosevelt Wild Life Annals, 4:126–233, 1936; Beyer, Wilson Bull., 50: 122–137, 1938).

The length of completed burrows in the sawdust piles also varied, usually from 47 to 60 cm (ca. 18–24 inches). A few were up to 120 cm in depth. Thus, burrow depths in the sawdust banks correspond in general to depths recorded for burrows in easily excavated natural substrates such as sand (Stoner, op. cit.; Gross *in* Bent, U.S. Natl. Mus. Bull., 179:405, 1942).

Importance of sawdust as a nesting substrate.—Forbush (Birds of Massachusetts and other New England States, Part III, p. 160, 1929) and Gross (*In* Bent, op. cit.:404) speculated that sawdust is likely to be an unsuitable if not precarious nesting substrate for Bank Swallows because of the problems of erosion and slumping. Contrary to this view, I am unable to conclude that the erosion and slumping faced by Bank Swallows in sawdust heaps within a given breeding season are substantially more severe or prevalent than in certain natural substrates, especially in sand banks exposed to wave and current action, and spring flooding, along streams (cf. Stoner, op. cit.; Beyer, op. cit.). The large size of the colonies in the sawdust piles at Ashland (among the largest in northeastern Maine [unpubl. data]) suggests that over-all nesting was fairly successful. Burrows destroyed in the sawdust heaps are probably replaced by re-nesting attempts (Stoner, op. cit.).

The biggest disadvantage of the sawdust pile as a nesting substrate is its relatively short life. The old piles slowly wear down or are mined by local residents. Otherwise, within the short term, old sawdust heaps seem to offer both a suitable and perhaps an important local substrate for nesting Bank Swallows. Holes are readily dug in the compact sawdust. And the problems of slumping, wear, erosion, and even total bank destruction in natural substrates probably have provided important sources of selection in the evolution of ground-burrowing behavior in this species.

I gratefully acknowledge the help of S. H. Greenlaw, B. A. Greenlaw, and I. Currie in obtaining information on the colonies at Ashland.—Jon S. Greenlaw, *Biology Department, C. W. Post College, Greenvale, New York 11548, 12 April 1972.*

Additional vertebrate prey of the Loggerhead Shrike.—On 4 April 1970 Casto and Dr. R. W. Strandtmann observed an adult Loggerhead Shrike (*Lanius ludovicianus*) flying 20 to 30 feet above the ground carrying a snake in its bill. The pair startled the bird which immediately dropped the dead reptile and flew on to alight on a nearby wire. The snake, a desert massasauga rattlesnake (*Sistrurus catenatus*) measured 0.41 m in total length. After preservation in formalin for over a year, the snake weighed 33 g (probably less than the living weight due to tissue dehydration by the preservative). This would represent a considerable burden for a bird that weighs a maximum of 49 g (Miller, Univ. Calif. Publ. Zool., 38:11–242, 1931). The ability of Loggerhead Shrikes to fly while carrying heavy prey has also been documented by Vaiden (*In* Bent, U.S. Natl. Mus. Bull., 197:142, 1950).

Later examination of the snake demonstrated a puncture wound in the neck and damage to the region behind the postocular scales. Thielcke (Z. Tierpsychol., 13:272–277, 1956) noted that the Northern Shrike (*Lanius excubitor*) always kills its prey with a bite, or series of bites behind the head. The Loggerhead Shrike also punctures prey in the neck region by striking the prey repeatedly with the point of the bill (Wemmer, Z. Tierpsychol., 26:208–224, 1970).