

ECOLOGY AND BEHAVIOUR OF THE  
SPOTTED-BACKED WEAVERBIRD  
IN THE KRUGER NATIONAL PARK

by

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and

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*Abstract*—Spotted-backed Weaverbirds were studied during September-December, 1969 in the Transvaal, chiefly in the Kruger National Park, and observations were made on their distribution, ecology and behaviour. Territorial behaviour, nest-building, pair formation displays, vocalizations and food habits are described as well as the division of labour between male and female in care of the young. Attacks by snakes and hawks are described as well as responses of the birds to their enemies. Behavioural relations to another species of weaver were also observed.

*Introduction*

The purpose of this report is to describe some observations on the distribution and behaviour of *Ploceus cucullatus spilnotus* Vigors which we made in the Kruger National Park, primarily during the breeding season of 1969, but also during the month preceding the breeding season. Some observations were also made in the Austin Roberts Bird Sanctuary in Pretoria, and near Vaalwater, north-central Transvaal. This paper presents a basic description of the life history of the Spotted-backed Weaver. Specific comparisons with the behaviour of other races of the species are the subject of a separate report (Collias and Collias, *in press*).

*Pre-breeding season behaviour*

Like weaverbirds generally, the Spotted-backed Weaver breeds during the rainy season. Dr. U. de V. Pienaar, Nature Conservator, Kruger National Park, informed us that in the southern part of the park this

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species was especially likely to be found breeding during November to February. Our arrival on 8 September at Skukuza Rest Camp, where we based our study, afforded us an opportunity to see the behaviour of the Spotted-backed Weaver during the latter, more critical part of the dry season before breeding colonies were established.

We were able to watch the process of assembling by the birds before they went to roost for the night. On the evening we arrived, a flock of some 80 *splonotus*, were singing and calling together in an Umbrella Thorn *Acacia tortilis* near our hut. As it subsequently turned out, Spotted-backed Weavers often assembled in this tree each evening prior to flying across the nearby Sabie River to roost in the dense reed *Phragmites* beds along the north bank of this river by our camp. Most of the birds in the first flock seen were in the non-breeding plumage, in which the male resembles the female particularly in lacking the black breeding colouration of the throat and face. Some males, however, were already in full breeding plumage and many were in various grades of intermediate plumage between the winter and spring conditions. By the end of the month more males were in full breeding plumage than were intermediate.

Each evening different flocks arrived at the camp site from south to easterly directions in flocks of five to over 100 birds. Often there were only a dozen birds or fewer birds in a flock. The birds began to assemble in trees about one-half hour before sunset and departed for the roost about sunset. The same trees were quite often used for assembly but a disturbance near a favoured tree would cause the birds to shift to another tree for a night or two.

Vocalizations are important to flock integration. Brief, light pleasant notes are used as flock contact notes and as a greeting when one flock joins another in a tree. They were uttered from time to time by birds perched in the tree and were given in the air, especially just after a flock took off. In general, an evening song period of swizzling sounds ensued during the period that the birds were assembling or sitting in the tree. This sound carries a long distance, much farther than do the brief flock contact notes, and undoubtedly helps to guide later arriving flocks to the assembly trees. Not all males sang, in fact, singing males may be a minority in the flock and were usually those in breeding plumage. However, we have seen a male sing which was in complete winter plumage, but with an all-black bill (the breeding colouration). Frequently, these singing parties consist very largely of male birds. Singing is especially heard in the early part of the assembly period, then many periods of silence may ensue, followed by periods during which the birds would give the light, flock contact notes. Such a "conversational period" followed by silence was quite likely to precede the departure of one subsidiary flock after another from the assembly group to the roost, but often such departures were merely preceded by a period of quiet alertness. We were unable to decide exactly what cues triggered the departure flight to the roost even though the birds were directly over our head in the tree. When

a large flock would pass by on its way to the roost, some of the birds might leave the assembly tree and join the large flock. Occasionally, a high pitched "chirp" was heard to be given by some of the birds that remained behind in the tree right after departure of a flock for the roost. Possibly this was a separation or alarm type call, since we have noted it being given by a single bird left all alone in the tree.

At the roosting place in the reeds, judging by the sound and numbers of small flocks that flew there, hundreds of birds were present. Many of these birds would continue to sing until dark in their characteristic swizzling way. This sound must help guide late coming flocks to the roost. The precise area occupied in the reed beds was usually quite consistent but varied to some degree up and down the north side of the river which was covered with extensive reed beds as far as the eye could see.

During the day Spotted-backed Weavers moved about in rather small flocks, frequently foraging for food on the ground or among leaves and blossoms of various flowering trees *Acacia robusta*, *A. nigrescens*, *Cassia abbreviata*, *Grevillea*, *Erythrina*. The Tree Fuchsia *Schotia brachypetala* was especially popular for nectar. These flocks seemed to be somewhat nomadic, and we were not able to follow any for the whole day. Besides nectar, the Spotted-backed Weavers may feed on blossoms themselves. They would bite off a yellow flower bud of *Cassia abbreviata* hold it beneath one foot and apparently eat out the interior. Examination of crops from seven birds revealed in each the remains of many tiny insects, especially beetles. Mealy meal and flower stamens were also present in some. Remains of any large insects such as grasshoppers were absent. On the ground the birds feed in close compact flocks, sometimes drifting along in one direction, with the rear birds flying up toward the front of the flock. The feeding situation is probably somewhat difficult during the dry season, and the birds seem to spend more time foraging for food for themselves than they do in the rainy season.

On 10 September we saw some early signs of breeding behaviour when about 100 Spotted-backed Weavers assembled in a large *Acacia robusta* on the south bank of the Sabie in the evening prior to roosting. About half of the males were in full breeding plumage and about half were in winter plumage, or partly so. Not only were many of the males singing, but also they hung upside down from twigs in incipient display, but without opening or beating the wings in full display. Quite often the males squabbled over these tentative nest sites with one another. We discovered a green pad in one place that was obviously the start of a nest. To demonstrate the temporary and erratic nature of the whole procedure the following evening in the very same tree and under very similar weather conditions not a single Spotted-backed Weaver was seen. However, a small flock of perhaps 50 birds did assemble in a small tree across the river directly opposite.

### *Distribution of breeding colonies*

According to Skead (1967) the Spotted-backed Weaver is a coastal and subcoastal species, and in the Cape Province goes inland as far as Adelaide and Fort Beaufort, but does not go west of Port Elizabeth. Clancey (1964) describes *spilonotus* as the most common of the weavers occurring in Natal, being distributed from sea level to about 1 524 m. The scarcity of *spilonotus* in Rhodesia is indicated by the fact that as late as 1957, Smithers, et al., excluded it from their check-list on the grounds that the data were insufficiently substantiated for its admission. Mr. Donald W. Lamm wrote us he had seen large breeding colonies of *spilonotus* in southern Mozambique. In the Transvaal its distribution is decidedly local and restricted in the Witwatersrand area (Tarboton, 1968). In late October 1969 we drove east across the Transvaal from Schweizer-Reneke near the western border through Pretoria to the Kruger National Park, carefully looking for *spilonotus* colonies whenever we crossed a stream. Not until we reached Klerksdorp did we cross any permanent stream. Perusal of the nest record cards of the South African Ornithological Society combined with our own observations and those of Mr. Tarboton, Mr. A. C. Kemp and other members of the Witwatersrand Bird Club, suggest that *spilonotus* is uncommon and locally distributed in the central Transvaal (Fig. 1). It tends to breed earlier in the high veld correlated with the somewhat higher rainfall than in the low veld. West of Rustenburg breeding colonies soon disappear with increasing aridity of the country in the western Transvaal. Upon inquiring we found that neither Mr. R. Liversidge of the Kimberley Museum, nor Mr. P. le S. Milstein of the Barberspan Bird Sanctuary, knew of any colonies of Spotted-backed Weavers in their general areas in the western Transvaal.

It appears likely that almost the entire Transvaal is something of a suboptimal or peripheral habitat for *spilonotus*, and this fact makes it of interest to inquire more closely into the local factors limiting distribution. At or near the very edge of the geographic range rainfall may indirectly play a crucial role. Mr. Tarboton told us of a peripheral colony that he discovered near Naboomspruit about 160 km north-northeast of Pretoria. He had visited this area each year for ten years (27 trips) looking for birds, but the first time he saw a colony there of Spotted-backed Weavers was in 1966-67 during a season of exceptionally high rains, filling a usually dry pan, where he counted over 60 nests in a tree on 24 March 1967. In the following rainy season the pan was dry and there was no breeding.

The larger, more permanent streams in arid country may provide routes for invasion of new geographic areas by *spilonotus*, particularly if the margins of the stream are fringed with reeds providing a good source of nest materials. The most peripheral colony of *spilonotus* at the northwest edge of its range that we knew of was one discovered in August 1969 by Mr. Tarboton along a river at the Grewar Farm near Vaalwater some 186 km north of Pretoria. Here, on 5 October 1969, we counted 105

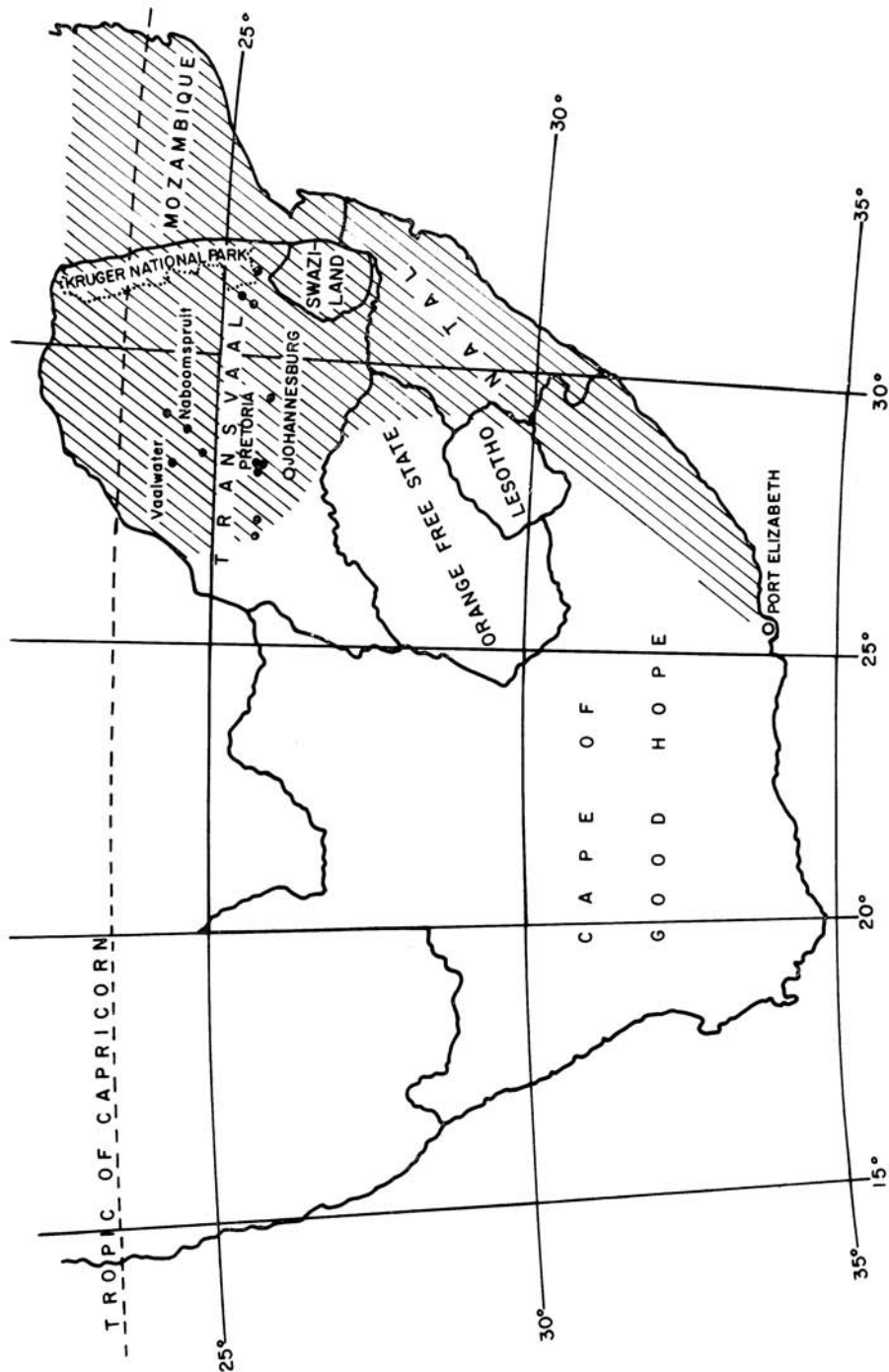


Fig. 1. Distribution of *Ploceus cucullatus sibilans* in South Africa, shaded (after McLachlan and Liversidge, 1969). Sites of known breeding colonies in the Transvaal shown by black dots, with exception of those in the Kruger National Park.

nests in the reeds. The nests were woven of leaf strips torn from new fresh green growth of *Phragmites*. Such new growth was not particularly abundant. Older reeds with faded or brown-tinged leaves were everywhere, but were not being used. About a mile away there was another colony of *spilonotus*, also along the same river, but this one was in trees.

We made two separate surveys of the distribution of breeding colonies of the Spotted-backed Weaver in the southern third of Kruger National Park (Fig. 2). The first survey was done during September at the height of the dry season. We visited almost all the streams, dams and waterholes visible from the tourist roads. The second survey was essentially a repeat of the first one, but was done during November after considerable rain had fallen and the breeding of the Spotted-backed Weavers was well under way. The object of these surveys was not to attempt to locate all active colonies of *spilonotus* in the southern part of the Park, but rather to compare habitat conditions in dry and wet seasons over the same general routes.

In this part of the Park there are only three permanent streams, the Sabie and Sand Rivers and the Crocodile River. By the end of September only five established nesting colonies were found, including four at these rivers (Fig. 2). One was in reeds (Sand River) and the other three were in fig trees. Reeds *Phragmites* were abundant along the rivers near all three of these colonies.

Although several waterholes still contained water by the end of the dry season, only one nest was discovered at a natural waterhole (along Faai Loop), a fresh nest on a palm tree at the edge of the water. Old nests from the preceding season were seen at some of the dams visited but no nesting or breeding was underway during the dry season at any of the dams we visited. One reason for the apparent delay of breeding at dams or waterholes, other than the earliness of the season, is that with concentration of game animals about these water sources in the dry season much of the fresh growth of reeds or grass that might otherwise occur at the margins of the pools of water is grazed away or trampled down.

During the wet season when previously dry water holes had filled in and the margins of pools and lakes at dams had spread, 24 active colonies of Spotted-backed Weavers were discovered in the southern third of the Park on resurvey of about the same routes as were covered earlier during the dry season (Fig. 2). Of these colonies, eight were at dams, eight were at natural water holes that had been dry but now had water, three at natural water holes that were relatively permanent, three were along the permanent rivers, one at a causeway and one in a pan that had been dry but was now filled with water. Fourteen of these colonies had been established at permanent water sources and only ten at places that had been dry. One other colony had been established at about the end of September in a garden at Skukuza and was not very near any pool of water.

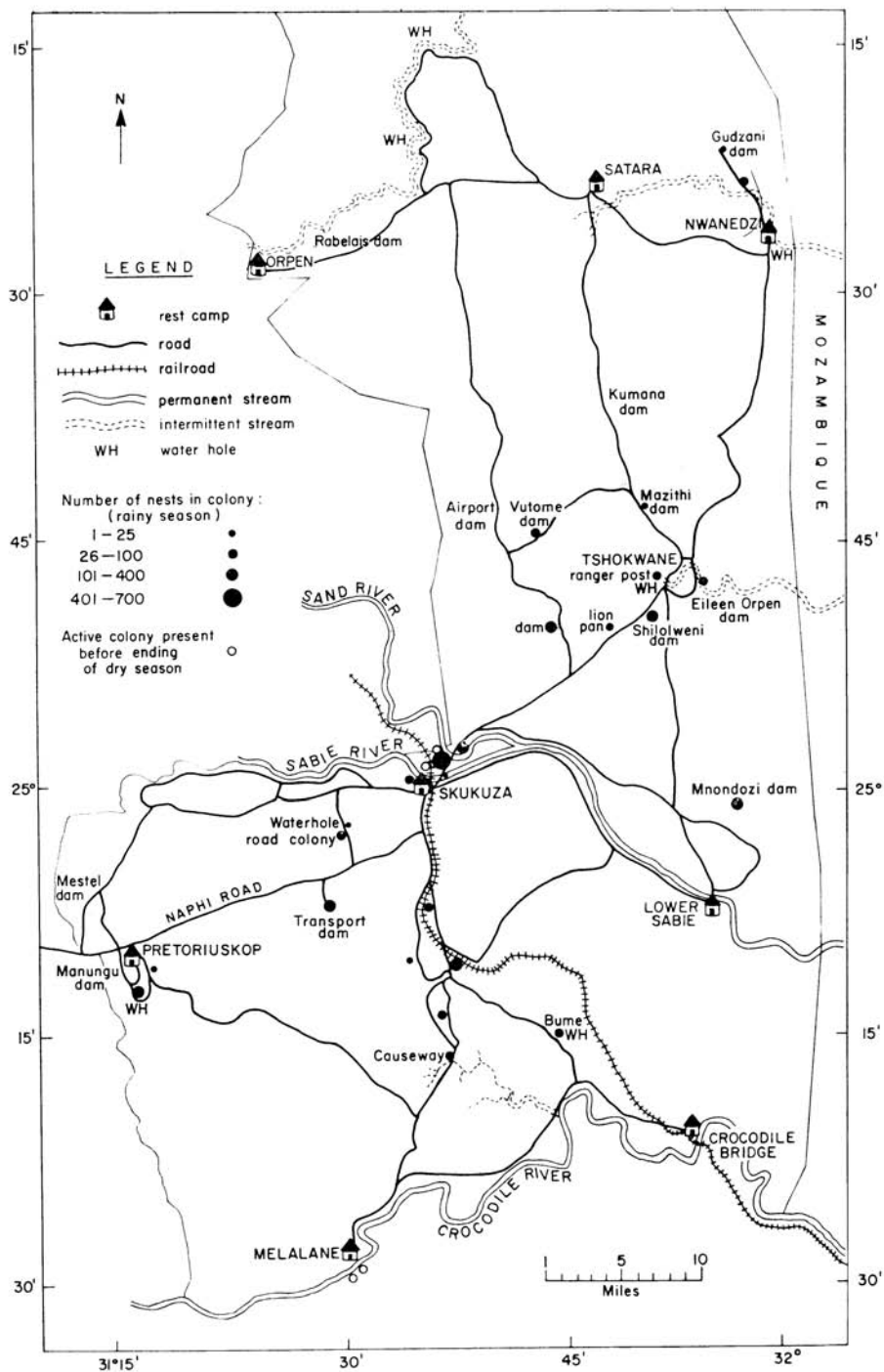


Fig. 2. Distribution of breeding colonies of *P.c. spilonotus* in the southern portion of the Kruger National Park, September-December, 1969. Eastern and western boundaries of the Park indicated by light lines.

Acacia trees *A. nigrescens*, *robusta* and *xanthophloea* were favoured nesting sites of the Spotted-backed Weaver, and 11 of the colonies had nests in these trees. There was a scattering of other species of trees that were used, including figs *Ficus sycomorus*, wild date palms *Phoenix reclinata*, *Zizyphus mucronata*, *Adina microcephala* var *galpinii*, *Combretum hereroense* and *Diospyros mespiliformis*. Four of the colonies were mostly in dead trees and three were largely in reeds *Phragmites communis*.

Summarizing the results of the distribution of colonies from the viewpoint of habitat analysis, we can see that the Spotted-backed Weaver, aside from food, needs three things when establishing its nesting colonies: water, suitable nest sites and a source of nest materials. Water is needed for drinking and bathing but specifications beyond these needs must be met. Water was present beneath all active colonies except one, but many places with water had no colonies. The available water was for some reason unsuitable if it was in a very narrow stream or rivulet such as a tiny pond, puddle or tank with cement walls, or in a heavily wooded ravine, or even a broad expanse of water with the shoreline more than a few meters distant from suitable trees.

At the Eileen Orpen Dam there was a small colony in the abundant reeds, but we saw no colonies in several trees overhanging the water. These trees seemed suitable for colonies except for limited visibility because of the density of the woods. In general, trees were preferred to reeds for nesting sites. At the same time it is often important for some reason, perhaps to enhance protection from predators, that the tree be actually overhanging the water, if not actually standing in the water. Boreholes with no trees along the edge of the water had no colonies. At the Mazithi Dam the one tree nearest the water contained many nests of *silonotus* that had quite recently been deserted, apparently coinciding with retreat of the water's edge from the tree to some 10 m distance after a spell of dry weather. Desertion of at least two other colonies with drying up of the nearby water was noted. That a position adjacent to or over water is not indispensable under all circumstances was shown by a thriving colony of Spotted-backed Weavers in a garden at Skukuza, a colony site more common in former years there and one that is quite frequent in Natal.

Colonies were absent if there were no suitable materials for weaving the nest, such as the leaves of fresh green reeds *Phragmites communis* or tall new grasses such as *Panicum maximum*. All active colonies had a plentiful supply of either reeds or some other quite tall grass nearby. During the dry season fresh green grasses were relatively scarce and in most places absent.

#### *Seasonal factors and breeding behaviour*

Seasonal factors that might be thought of as helping to bring the birds into breeding condition include changes in day-length, in temperature



and in rainfall. During the spring months (Oct–Nov) when the birds start breeding, the length of day is increasing, and we have found in experiments on the West African race, *P. c. cucullatus*, that increased day-length does have some stimulating effect on breeding condition (Collias and Collias, 1970). But no one has as yet done similar studies with *silonotus*.

The temperature at Skukuza is higher in the spring than in the winter, but variations in maxima and minima from day to day exceed the general seasonal trend in the spring, and furthermore, we found no close association between such variations in temperature and variations in numbers of nests built from day to day (Fig. 3).

Although the breeding season of the Spotted-backed Weaver in a general way coincides with the rainy season, the earliest signs of breeding behaviour and of nest-building were seen before the rains began. At Skukuza, we found at least two partially completed nests with birds working at them on 11 and 12 September near the end of the dry season. The first rains came 13 September when it rained all morning, but there was no immediate effect of the rain on the behaviour of the Spotted-backed Weavers. In fact, they showed less breeding behaviour than on the two preceding days, and we saw no weaving in camp that day nor were any of the partially built nests any farther along by the next morning. At the Sand River Bridge, about 5 km away, the Spotted-backed Weavers were building nests, but they had already built several nests in the preceding week, before this first rain of the season. This very early rain was exceptional, and there were no further rains until the very end of September. Nevertheless, the birds at the Sand River Bridge continued to build nests, and a total of 28 nests were present by 22 September and 44 by 29 September. Two colonies were started in fig trees at Skukuza, one on either side of the Sabie River, before the end of September.

The first complete woven nest at Skukuza was observed on 21 September in the Sycamore Fig *Ficus sycamorus* in front of the restaurant. A second nest soon followed. Repeated daily checking showed the males were adults, worked at these nests only in the morning, and did not sleep in them at night. They soon deserted this small colony, possibly to join a new colony with 20 nests we discovered in a fig tree just across the river and near the railroad bridge on 30 September, the day 0.5 mm of rain fell. As a rule, September is a very dry month in the Kruger National Park, and yet in our survey of the southern third of the park we found that at least five different colonies of Spotted-backed Weavers began in September. Far more rain fell in October and more colonies were started.

When we graphed the amount of rainfall that fell from day to day at Skukuza during a six-week period in November and December, we found no correspondence of rainfall with numbers of nests built for any given day in two different colonies in the same general area, showing

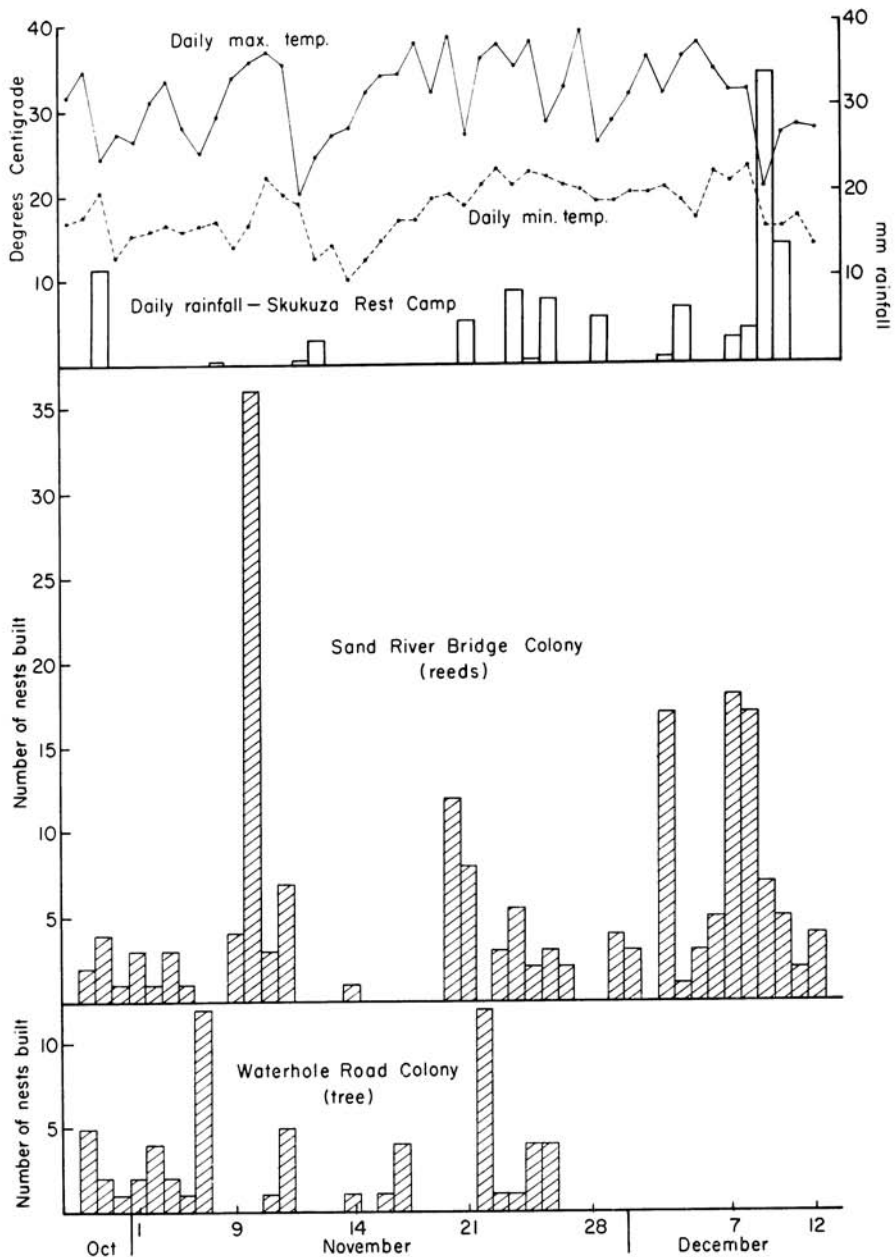


Fig. 3. Lack of any close relationship between numbers of Spotted-backed Weaver nests built each day and daily variations in rainfall or in temperature.

that there is no direct stimulation of nest-building activity by rainfall (Fig. 3). Rainfall no doubt stimulates breeding behaviour indirectly, as by leading to the increase of fresh green grasses used for nest-building and of insects that in turn provide a food supply for the birds. On 21 September, at Skukuza, we watched some adult males trying to build nests in an acacia tree, and one of their difficulties was a shortage of fresh reeds near the tree. The strips they were able to tear from the green leaves of the few new reeds growing close by were generally too short for effective weaving, and these nests were never completed. However, suitable nest materials probably do not function *per se* to bring the species into breeding conditions, as we have found by experiments on the West African subspecies described elsewhere (Collias and Collias, 1970).

The nestlings of the Spotted-backed Weaver are fed almost entirely on insects. Kemp (1969) has shown by means of regular net samples that there is a general correspondence of insect abundance and rainfall near Satara Rest Camp some 97 km north of Skukuza. He found that insect life begins increasing in abundance in October and November, the same months the Spotted-backed Weavers normally begin nesting in the park. Insects became far more abundant in December, and reached a peak in January and February. When we left the park toward the middle of December, the largest colony of weavers (at the Sand River Bridge) was still very active (Fig. 3).

During the breeding season, compared with the situation in the dry season, more and larger insects (caterpillars, grasshoppers, beetles) are readily available and such insects were present in the stomachs of all 20 adult specimens of *silonotus* collected at the Sand River Bridge, and usually were the predominant item, although seeds or mealy meal were present in 13 stomachs.

Although insect food is necessary for reproduction, none of our captive weavers *P. c. cucullatus* could be brought into breeding condition in the winter time merely by providing them with an abundance of insect food (mealworms). Fruits *Ehretia rigida* and nectar *Zizyphus mucronata* are also eaten by the adult *silonotus* during their breeding season.

Once they are predisposed to breed by such factors as increasing day-length, the breeding condition of the weavers may well be enhanced by social stimulation. As we have seen, singing parties of male Spotted-backed Weavers are common toward the end of the dry season. Vocalization by the male in other species has been shown to stimulate testis growth in shell parakeets *Melopsittacus undulatus* (Brockway, 1964) and ovulation in canaries (Mulligan, Neal and Nottebohm 1968). Very small colonies of male Village Weaverbirds *P. c. cucullatus* are not very effective in attracting females compared with moderate-sized to large colonies (Collias and Collias, 1969).

#### *Reproductive behaviour*

Breeding colonies are established in concert by a number of males

each of which selects a place in the tree or patch of reeds and commences building. We have seen colonies started by flocks ranging from about a dozen to over 50 males. The males are often only a few feet apart and each male defends the vicinity of his nest from other males by means of special displays, singing and pecking contests, and more rarely by fighting in which each male grasps the other with his claws and pecks at the head of the other while they flutter together to the ground or to the surface of the water below. In territorial display a male erects his back feathers and spreads his tail feathers increasing his apparent size. The yellow crown feathers are also erected and since the bird often faces his opponent directly, the black face mask is enhanced by contrast. Border disputes end when one bird faces away and returns to his territorial center. Territorial defence is similar to that seen in other races of the species, except that male *spilonotus* has less tendency to bow his head during territorial displays. Also the male *spilonotus* tends more often to rest outside his territory.

There is a marked degree of synchronization in nest-building and other breeding activities of Spotted-backed Weavers. spurts of nest-building come and go within different colonies, apparently independently of physical factors of the environment, and each colony is independent of other colonies in this respect (Fig. 3). Different parts of very large colonies (Sand River Bridge) may show periods of building independently of other parts of the same colony. At the same time there is some indication that small colonies located near large colonies are likely to desert their nest tree and attempt to join the larger colonies.

The race *spilonotus* builds its nest in almost exactly the same fashion as do other races. One rather minor difference is that the *spilonotus* male sometimes tears and carries more than one long strip (about 23-36 cm long) on the same trip in gathering materials from grass leaves with which to build his nest. This habit was seen in some colonies more than at others. Another difference is that one long strip is sometimes split about halfway and the split halves woven in different directions in the nest. The initial attachment, often in the fork of a twig or near the end of a twig, is woven by the male into a ring within which the male perches with his feet on the lower half, facing in a consistent orientation while he works. He weaves the roof and egg chamber in front of himself, then leans over backwards while he builds the antechamber from top to bottom, finally finishing off the entrance which opens directly downward. The threshold remains as a ridge that keeps the eggs from rolling out. He also thatches in a ceiling of short pieces of grass leaf and of tree leaves, such as acacia or willow. This ceiling helps rainproof the nest. The female lines the nest with some strips of grass leaf and many soft grass heads, and where available with feathers. While the female is incubating the male reinforces the nest on the outside and also adds a short entrance tube.

The female may use grass heads of many species in the bottom lining.

Mr. P. van Wyk, botanist at Skukuza, kindly identified the species of grasses for us. Those found most commonly included *Panicum maximum*, *P. coloratum*, *Eragrostis porosa*, *Sporobolus fimbriatus* and *Rhynchelytrum repens*. Grasses of irregular or occasional occurrence in the nests included many other species: *Phragmites communis*, *Bothriochloa insculpta*, *Erichloa borumensis*, *E. nubica*, *Setaria flabellata*, *Eragrostis superba*, *Alloteropsis cimicina*, *Microchloa caffra*, *Sporobolus festivus*, *Chloris virgata*, *Schmidtia bulbosa*, *Tetrapogon mossambicensis*, *Brachiaria serrata*, *Dichanthium papillosum*, *Rhynchelytrum setifolium*, *Panicum deustum*, *Aristida congesta*, *Tricholaena monachne* and *Pogonarthria squarrosa*. One nest contained 13 species of grasses in its bottom lining, another had 12 species but most nests had fewer. Local availability is important in determining the species of grasses used by a female *spilonotus* for her nest, but some grasses seem to be preferred.

Counts were made of pieces of materials present in nests that had contained eggs or nestlings (Table 1). In colonies located in reeds, males use more grass leaves in the nest and make thicker nests than do the males of colonies located in trees. In all localities, females generally use many more grass heads than pieces of grass leaf for lining the bottom of the nest, but we found no difference in the total pieces of nest-lining materials between reed and tree colony sites.

Table 1

*Average amounts of materials built into nests by male and female Spotted-backed Weavers in two different habitat types. Figures in parentheses refer to the number of nests on which the average is based.*

<u>Work of male</u>	<u>Nests in trees</u>	<u>Nests in reeds</u>
Outer, woven shell	319 (2)	427 (3)
Ceiling, grass leaves	176 (7)	207 (5)
Ceiling, tree leaves	105 (7)	182 (5)
Total pieces	600	816
 <u>Work of female (lining)</u>		
Grass leaves	20 (7)	48 (3)
Grass heads	214 (7)	160 (3)
Feathers	3 (3)	36 (3)
Total pieces	237	244

There is great variability in the total amount of the relative proportions of specific materials present in different individual nests. If a chicken run or other source of feathers is nearby the lining of nests in Spotted-backed Weaver colonies may contain many feathers, in other localities feathers may be largely or entirely absent from nests. In one nest the female