I will start first by explaining the word adaptation as I understand it. Adaptation is the mechanism whereby a bird (or any other organism) can increase its survival value. In other words it is some sort of trick, or tricks, that the bird uses in order to increase its chance of survival in the environment. This comes about through evolutionary mechanism, of course, and certainly not conscious effort on the birds' part! Most of the adaptations about which I will be talking are adaptations to rainfall regimes; others I will mention because they are rather interesting examples illustrating evolutionary theory.

For three years I was engaged in a comparative bird breeding biology study in the Namib Desert Park and four other study areas in slightly higher rainfall country, with different topography, different altitudes and different distances from the sea. One was near Gamsberg on a farm called "Djab" which is about 14 000 ha, situated at the base of the Gamsberg Pass. Secondly, Daan Viljoen Park just to the west of Windhoek which was the smallest study area, only 4 000 ha. Djab is about 180 km inland, Daan Viljoen Park about 255 km, windhoek about 265 km. The third study area was "Ameib", about 14 000 ha and the fourth comprised Klein and Groot Spitzkop, an area of about 12 000 ha.

B. Description of Study Areas

The rainfall in the Namib Desert Park varies from about an average of 15 mm to 100 mm in the northeastern corner. I have no accurate record from the latter part but there are recording stations at Gobabeb and Ganab, and sub-stations nearer to the coast at Swartbank and Rooibank. Swakopmund has a 40-year-record. I want to mention the rainfalls here because they are rather important to the bird biology of this region. At Spitzkoppe I have no accurate records over a long period but it is around 120-130 mm. At Ameib it is 248 mm, averaged over a period of 18 years. In the Gamsberg region it is approx. 215 mm, somewhat less than at Ameib. At Daan Viljoen it is the same as in Windhoek, namely 367 mm average (Windhoek is 366 mm). In the case of Daan Viljoen the records stretch over 9 years, in the case of Windhoek over 60 years.
The Namib Desert Park is about 5 067 sq. miles in extent, and it was the main study area. I spent approximately equal time in all the study areas as far as I was able to, but there were exceptions at certain times of the year; for example when birds of prey were breeding I spent more time in the Namib Park and less in the other areas because there were not as many birds of prey breeding in those particular areas.

There is a tremendous range in the rainfall within the Namib Park, and falls are highly erratic. For example, in 1969-70, the driest of my three years, no measurable rain fell at Gobabeb at all. The highest recorded year's total in 9 years has been 26 mm. At Garub the probable average is around 60 mm (only three years' records so far), but the recorded range already is between 6 and 105 mm.

There are three main habitats in the Namib Desert Park: The dune area is found in the south, part of the so-called Southern Namib according to Giess (1971). Then there is the Kuiseb River which is an oasis that runs from the inland right down to the sea, and it harbours a tremendous number of bird species which cannot exist in the desert otherwise. The Swakop and Khan with their larger tributaries form a similar continuous oasis in the north of the Park. Between these rivers are the gravel plains. The fauna of the plains and the dunes is quite distinct in all cases: birds, mammals, lizards and insects. I will not say much about the dune habitat in this report because the bird life is rather limited, and it is difficult of access. The only bird which lives (and breeds) in the dunes throughout the year is the Dune Lark which is a race of the Karoo Lark (Certhilauda albscens). It breeds under tufts of grass. There is another resident here, the Namib Chat which utilizes only rock outcrops; it cannot exist in the dunes themselves.

A phenomenon peculiar to the Namib is the strong winter East wind. It is one of the governing factors of life in the Namib during the winter time because anything that lives there has to adjust to this wind. Many insects have cycles which are carefully calculated to correlate, either positively or negatively with the wind, and because the insects form the basic food for many of the birds, the birds of course have to adjust to this cycle as well. The East wind seems to exert a particularly strong influence on the dune organisms.

An important event in the life of the desert is the occurrence of floods in the main rivers. The floods come from rain inland and not from rains in the Namib itself, and for this reason you find a very interesting phenomenon. The birds that occur along the rivers generally do not have the same breeding cycles as the birds in the plains or even further inland. Their cycle is governed by the rivers, the blooming cycle of the plants along the rivers and the cycle of the insects. So you can have the same species, for example the Masked Weaver, Ploceus velatus, which may breed in the Kuiseb in June/July/August, while inland in SWA it breeds during the rains (November - April).

In the vicinity of Gobabeb and lower, the Kuiseb river is rather broad, with only isolated cliffs, and extensive riverine forest composed mainly of giant acacias, A. albida and A. giraffae. A little further up the river the canyon starts forming. The riverine forest is still quite extensive here but there are broken canyon formations coming down to the river already, and this harbours a fauna of its own. In some places the dunes come down to the river whereas in other places they are held back by cliffs. Some animals utilize the river on a temporary basis; they use it for food but they shelter out in the dunes. The ostriches are a good example, although most of the others in this category are mammals like the Gemsbok.
The canyon about 20 miles up from Gobabeb has in places quite tremendous cliffs in which the Black Stork and the Black Eagle breed.

In the area at the Gamsberg road across the Kuiseb the canyon country has broken down into low hills rather than cliffs, and these have a rainfall of about 50-75 mm. They support quite a number of different flowering shrubs and have a different bird fauna from the plains themselves.

The gravel plains in the bend of the Kuiseb river near Zebra Pan in the southern portion of the Namib Desert Park are very bare. In this area there is a characteristic small pan which I call Corner Pan. It has about a dozen trees, mostly Acacia reficiens, and serves as a refuge for many animals including birds which use it for shelter and quite often to breed in, while they forage in the plains around. The eastern plains of the park have a rainfall between 50 and 70 mm per year, and they support most of the game which is found in the Park, and they also support most of the birds which do not occur in the rivers. The plains together with the fringing hills are a very important habitat. The hills are actually a higher rainfall region than the plains adjacent because the weather tends to come from the north in this part travelling along the hills and mountain ranges. This is why the northeastern corner of the Park which is very mountainous has a much higher rainfall than any other part (the rainfall becomes progressively less the further south you travel in the Park). The hills have quite a number of interesting birds which are not found elsewhere in the Park. The hills and the Northeastern Corner have a bird fauna and vegetation much the same. It is basically a Commiphora-Acacia community, and birds which you get here and not elsewhere are for example the Herero Chat(Namibornis herero), Plum-coloured Starling(Cinnyris inclinatus leucoaster) and Klaas's Cuckoo (Chrysococcyx klaas).

A fairly good shower of rain of about 30 mm causes the trees to leaf out and the grass to come out. As there is, however, not enough moisture to sustain the grass it quickly dies back for which reason the birds that had moved in to take advantage of this brief blooming period will have to move on to another place.

The trees, however, remain green for longer and birds which utilise the hills are then able to continue breeding because their food sources are sustained whereas that in the plains is very quickly gone.

It is very dry in winter. The trees have lost their leaves by June as well. The main grasses seeding here are the Stipagrostis spp., the Enneapogon spp. and a few others. The feathery seed heads of Stipagrostis are used by most birds for constructing their nests. At a place in the Northeastern Corner known as Van der Merwe Valley, I was able to establish records of a number of birds and plants which occur nowhere else in the Park. This is also the primary breeding ground of the Herero Chat in the Park.

Moving to the Klein and Groot Spitzkop, the plains here look much the same as they do in the eastern Namib Park. At West Camp, Groot Spitzkop, you find optimal habitat of the Dusky Sunbird as well as of other species. A very interesting species here is Klaas's Cuckoo. Feathery-topped grasses such as Stipagrostis uniplumus are the main grass species here as well. Around Spitzkoppe you find transition mixed bushveld which can exist there mainly because of the tremendous run-off from the bare granite of the mountains which allows the area below to support a richer vegetation than it otherwise could. The rest of the plains are shrub-covered, progressively sparser as one travels west from Groot Spitzkop to Klein Spitzkop.
Looking east from the Spitzkoppe you see the Erongo mountains, at the foot of which lies Ameib, my next study area. The Erongo mountains are a much higher rainfall area, although only approx. 40 km further east. The habitat of the Erongo is quite varied. The vegetation here is much more diverse than in the previously mentioned areas. Granite mountains compose the Erongo. Very characteristic are the large spaces of bare rock, shrubs in between and small plateaus of coarse gravel which support quite a remarkable bushveld and of course a great bird and animal fauna. Alsogame in the Erongo is concentrated on the plateaus during the day: zebra, warthog and cheetah may all be found together resting on one plateau. At a place I call New Camp at the foot of the Erongo mountains the bushveld is very thick; much thicker than it would be from the rainfall alone. It is that way because of the run-off. The rocks themselves are quite spectacular, and they house quite a unique fauna as well. Many Pale-winged Starlings breed on them, and Black Eagles and lovebirds amongst others are found here. When the rain has been good there are streams in these mountains which run for perhaps one, two or three month. There is of course permanent water as well in some of the bigger kloofs.

The western part of Ameib is covered with acacia scrub. It is quit arid and dry, much drier than the previously-mentioned area. The rainfall is probably as much as 30 to 60 mm less per year, perhaps even more on occasion. Another major habitat of Ameib is the Khan river with tremendous trees, the Anaboom (Acacia albida) and Hardekoel (Combretum imberbe) being the two dominants.

Moving on to Gamsberg, this area is classified by Giess (1971) in his "Vegetation Map" as the same as the Erongo mountains, but from the habitat point of view it differs quite a bit. It is more of a transition to the Windhoek highlands, and the vegetation and topography is quite different from the granite of the Erongo. The vegetation here consists mainly of savannah with Acacia erubescens as dominant, but one gets slopes which have Commiphorae predominating, as well as slopes which have the Kokerboom, Aloe dichotoma as the dominant tree. Finally Daan Viljoen is typical Khomas Highland veld, again a mixed savannah community with species different from those found at Gamsberg. The Gamsberg vegetation is by and large just a poor version of the Windhoek highlands flora; there are fewer tree species. In the case of Daan Viljoen Park tree density is also somewhat higher on average and there are many more perennial grasses (grasses which last more than one year) than is the case on the escarpment. The main dam and rest camp is an important habitat at Daan Viljoen also.

**C. The Bird-Life**

The Namib Desert Park has the highest total of bird species, about 195 recorded so far. It is of course much the biggest of the study areas as well. (Costal species have not been included, they number an additional 50 or so). The second-largest total (181) comes from Ameib and Daan Viljoen Park, while Spitzkoppe and Djab with 128 and 105 species respectively, are the poorest in total species number. However, if waterbirds and "accidental species" are ingnored, the largest regular avifauna is that of Ameib with 132 species followed by the Namib Park with 127, Daan Viljoen with 118, Spitzkoppe with 91 and Djab with 84. Perhaps the most striking conclusion is that there is no correlation between rainfall above a certain level per se and species diversity. Obviously the birds have adapted themselves therefore to the wide range of erratic rainfall in central S.W.A., and are using the full range of habitat niches outside of the driest (under 50 mm) desert.
D. Specific Cases

1. Ostrich Struthio camelus: Sauer and Sauer (1959, 1966) have given excellent accounts of the biology and particularly ethology of the Southern Ostrich, which they studied mainly in the same region of SWA. I propose here only to give additional information regarding the timing of breeding in the Namib Desert.

In general, most breeding records came from the Namib's eastern plains, in the 1960-1969 year. Many young were also observed later, during the '69 winter. In '69-'70 no young were seen following the extremely dry summer while in 1970-'71 no nests were found but some nestling obviously occurred since a few young were seen that winter. This pattern correlates very well with the Ganab rainfall figures which were highest in the first year, lowest in the second and intermediate in the third. Another point of interest was the carry-over effect observed, when ostriches continued nesting after the good '68-'69 rains through to November.

From this it seems clear that ostriches are indeed opportunist breeders which depend on the rainfall.

A few records from the Kuseb river which came at different times of the year did not conform to the pattern. That is explicable because the Kuseb river is an oasis and it has quite a different cycle from the desert itself. Birds which are using it as a food source can in fact breed at quite different times than birds which are not.

2. Black Vulture Torgos tracheliotus: During the three-year study 65 nests of this species were found in occupation. Table 1 gives the breakdown by years (six nests from 1968 are not included).

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<tr>
<th>Year</th>
<th>1969</th>
<th>1970</th>
<th>1971</th>
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<tr>
<td>Nests to large yng. stage</td>
<td>19</td>
<td>22</td>
<td>18</td>
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<tr>
<td>(35%)</td>
<td>(59%)</td>
<td>(39%)</td>
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The table suggests that 1970 was an exceptionally favourable year. Since this was a desperately dry winter, one is tempted to suggest that the vultures did exceptionally well because of the poor condition of the game animals.

The Black Vulture is beautifully adapted in terms of its breeding ecology. Generally it nests out in the desert near the tree-line. The nest is a massive structure always on top of trees or bushes and therefore completely exposed. Both parents incubate, apparently changing daily around noon. The egg is sun-sensitive and takes 53±1 day to hatch. Breeding is initiated in May, egg-laying can continue into July. During incubation the egg is almost never left uncovered, probably because of the possible sun-damage and also because crows have been seen trying to steal vulture eggs.

The chick is at first cream- or buffy-white with rather sparse down. By 10 days the second coat is well advanced; it is thicker, "woollier" and grey.

About 32 days the humeral feathers emerge to signal the onset of feathering. Up to this time the chick is constantly attended by a parent. After 35 days the chick is suddenly left alone for increasing periods. At about 70 days, feedings may be 2 or 3 days apart. In the only closely-watched nest (the birds are very shy), the feeding parent arrived around midday, to be greeted with the ritual
begging display from the chick. Food is vomited up, to be reswallowed by the chick.

The chick's dorsum feathers rapidly. When hot, the chick positions himself on the edge of the nest, back into wind. He can hang his bare head between his legs, in his own shadow, to avoid "sunburn".

At about 120-140 days of age (apparently depending on availability of food), the chick leaves the nest. It remains dependent for food at least 3 months and probably much longer, on its parents. My studies suggest that it nests only every 2nd year.

The nest cycle of this bird shows its excellent adaptation to its desert home: avoidance of predation, thermo regulation, utilization of scattered food resources, etc.

3. Greater Kestrel Falco rupicoloides: In the Namib Park this is the commonest raptor. In 1969, 23 nests were found, all the egg dates falling between July and October. The later dates (September-October) undoubtedly represent second clutches following failure of the first nesting. In 1970 however, no active nests whatsoever were found, nor were flying young seen at any time. In 1971, three nests were found with egg dates in March-April, immediately after the main rains.

Several nests were studied in 1969. Invariably crow or old vulture nests are used. The food of the nestlings included insects, scorpions and young larks, but the staple appeared to be lizards.

Although the lack of nesting in 1970 must be linked with the drought, I was unable to discern any change in the lizard populations, which might have suggested food scarcity for the kestrels. However, the obvious correlation of the 1971 dates with the rain after a year-long drought suggests that this species also is an opportunist breeder whose cycle is intimately linked with rainfall in the desert.

4. Red-necked Falcon Falco chicquera: Four nests of this bird, not common but not a rarity either, were observed in 1969. In 1970, seven were found, and four again in 1971 when however all the possible sites were not covered. It seems from this that, unlike the Greater Kestrel, the species, whose main prey during the nesting cycle consists of small birds such as larks, was not affected negatively by the drought.

The habitat preference of this species appears to be large shady trees isolated on grassy surrounding plains. Unlike the Greater Kestrel which will nest in the open, the Red-neck's sensitive to sun, usually perching inside trees, and in all except one case, shaded nests were chosen. The sole exception came to grief shortly after incubation started, for reasons unknown. Both Falcos use nests of the Black Crow Corvus capensis, with only two recorded cases of F. chicquera using a vulture nest, whereas Greater Kestrels nested with equal readiness in both.

For experimental purposes I raised a male Red-necked Falcon at Gobabeb in 1969 to study some of its behaviour and growth patterns. It has rather short wings and a long tail, and it is not a bird which soars (unlike the Lanner Falco biarmicus). It sits inside a tree usually, never on the top when it is hunting, and dashes out with a very, very fast flight to catch birds mainly by speed over the open plains. So its ecological requirement is large shade trees surrounded by treeless plains, a very definite set of conditions. In Bots-

wana it is reversed, the falcon hunting from the edge of woodland over bare pans. The Red-necked Falcon is interesting in respect of the size difference between male and female, this being greater than
with most other falcons. The male weighs about 170 g and the female about 240 g. They have another interesting adaptation for their bird-catching, and that is the exceedingly long middle toe. Relatively speaking this toe is much longer in the Red-necked Falcon than in the Lanner Falcon.

5. Burchell's Courser Curorus rufus and Double-banded Courser
   Rhinoptilus africanus: A different type of the adaptation altogether is shown by the eggs of the Burchell's Courser, a typical nomad of the Namib Desert which moves to wherever there is rain, breeds there and then moves on. The eggs resemble the dried dung of zebras quite exactly, and the coursers quite often lay their eggs next to zebra dung. The chick is very cryptically coloured.

   The other common courser of the Namib is the Double-banded Courser, a cryptic bird with colours matching the background because it lives in such a completely open and arid environment. It lays just one egg. One of the interesting facts regarding these coursers is that Burchell's lays two eggs, the Double-banded just one. The reason for this has not been determined. They do of course have different ecological requirements; the Burchell's is a complete nomad, the Double-banded is more or less resident but it moves around locally in the Namib Desert. The chicks of both coursers are very well camouflaged.

6. Namagua and Double-banded Sandgrouse Pterocles namaque and P. bicinctus: The Namaqua Sandgrouse or Keikiewyn occurs regularly in numbers in the Namib Park. However, I had the impression that numbers fluctuated widely according to local conditions. Table 2 summarizes the recorded breeding activity over the study period within the Park.

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<td>2</td>
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<td>A</td>
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<td>N</td>
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<tr>
<td>J</td>
<td>5</td>
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   It seems clear again from this table that the exceptional rains of the 1968-69 season had a protracted effect on breeding in the Namaqua Sandgrouse throughout the winter and spring following. It is possible that there was some limited breeding after the March-April rains in 1971, since a few males were seen soaking breast feathers in that winter. However, the breeding density was clearly insufficient to be registered with my sampling methods.

   The Double-banded Sandgrouse occurs only marginally in the eastern and north-eastern areas of the Park. It is however, commoner inland, for example at Ameib. There were eight eggs dates in May 1969 from Ameib, none in June, one each in July and August, and two others in October and December 1969. All the records except the latter two were in the Khan river biotope. The latter could therefore be ignored as atypical, especially since they apparently represented repeat nesting attempts after failure of the first and second nestings.
In 1970 no sign of nesting at Ameib could be found at all, and no juveniles were seen. In 1971 also no nesting could be traced, certainly not in the Khan biotope. These observations are difficult to explain although the rainfall pattern in the three years of the study follows that of the Namib Park.

Table 3

<table>
<thead>
<tr>
<th>Rainfall at Ameib July 1968 – June 1971</th>
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<td>349 mm</td>
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</table>

One must conclude that the drought of '69-'70 exerted such a crippling effect that the birds had not recovered even by the 1971 winter when presumably they should have nested, after a rather average rainy season. The evidence also suggests that this species is yet another opportunist breeder, nesting when conditions are favourable.

It is interesting to note that the female Double-banded Sandgrouse is quite cryptic, whereas the male is by contrast quite strikingly coloured. In this case the male may do most of the night incubation.

7. Gray's Lark Ammomanes grayi: This endemic species of the Namib plains is one of the most interesting desert birds. It shows a number of adaptations to its relatively harsh environment, and it is clearly an opportunist breeder. Its food during nesting is exclusively insects. It is preyed on by Lanners Falco biarmicus and Red-necked Falcons F. chicquera. Since it lives in the barest gravel flats of the Namib, even at the coast or near it, it must obviously be vulnerable to aerial predation. It is very cryptic in dorsal colour, and takes refuge, both from sun and predators, in gerbille burrows. Its courtship flights and song are performed in the dark, usually in the early morning hours before the first light of dawn. His flight performance was independently discovered by Willoughby in 1965-66 (published 1968, 1971) and myself in 1968. It is a remarkable performance, and as far as known, unique among the diurnal Alaudidae.

Willoughby discovered two nests of Gray's Lark, and Niethammer published a note on another nest in 1969. Both Willoughby and Niethammer (operibus citatis) have drawn attention to the erroneous record of Hoesch (1958) whose nest, attributed to this species, belonged without question to Hira rasa (Certhilauda) albescens, the Karoo or June Lark.

This species bred in good numbers in 1969 (7 records); in 1970, a dry year, no breeding took place and in 1971 I had 6 records of breeding. It is quite obvious that this species is geared to the rainfall. In 1971, for example I kept a closer check on the local conditions and found that a place near Hira rasa in the middle of the Namib Park, 30 km east of Gobabeb, a local shower fell in March and brought up a good cover of grasses, and immediately Gray's Lark came into the area and started displaying. Subsequently several nests were found but it seemed that many of the larks which had displayed did not in fact nest there presumably because there was insufficient space and food available in that grass patch which was some 2 km square in extent and well isolated by at least 12 km from the next nearest grass patch.

The nest is very thick walled and, therefore, much better insulated than other lark nests, and it is also much deeper. The eggs are thus reached by the sun, although the nest is often completely unsheltered in the plains. The adult is very cryptically coloured, but the downy chick with its bright orange beak and skin, is not.
8. Stark's Lark and Grey-backed Finch-lark (Calandrella starki and Eremopterix verticalis): These two species are typical nomads. After the good rains of March-April 1969 they nested in unbelievable numbers in the eastern Namib Park, and the plain at Spitzkoppe.

<table>
<thead>
<tr>
<th>Year</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
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<tbody>
<tr>
<td>1969</td>
<td>0</td>
<td>1</td>
<td>19</td>
<td>34</td>
<td>8</td>
<td>0</td>
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<tr>
<td>1970</td>
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<td>0</td>
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<tr>
<td>1971</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>1</td>
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Table 4

Nest records of Calandrella starki and Eremopterix verticalis in the eastern Namib Park and Spitzkoppe.

Once again it is clear that breeding came in direct response to the ultra-favourable rains of March 1969. In 1971 the lower rainfall came earlier, in February, and the far smaller numbers of nests seem to show a shift of the peak to correspond with the earlier rainfall. A very similar pattern was shown by the Lark-like Bunting Fringilla ria impetuani in these two areas.

9. Namib Chat Cercomela trachrac albicans: This subspecies of the Tractrac Chat is endemic to the central Namib area and, like Gray's Lark, penetrates the driest parts of the desert. It is even found in the interdune plains south of the Kuiseb River. Its only habitat requirement appears to be the presence of rock on the plains. These are used as shelter, as look-outs and for nesting.

Few breeding records of the Namib Chat came to hand during the three-year study, but the birds appeared to breed after any local showers which produced sufficient food.

10. Herero Chat Namibornis herero: This true endemic of SWA is confined to the semi-desert zone of the escarpment regions. It breeds in response to the rainfall regime of any given year, usually in the latter half of summer, but if conditions are right it can apparently breed any time between spring and early winter. The clutch was previously thought to number two, but clutches of three and four were recorded in 1971 after good rains at Spitzkop and in the Namib Park. During the dry year 1969-70 no breeding was detected in any of the three study areas where this species regularly occurs.

11. White-tailed Shrike-Plycatcher Lanioturdus torquatus: Since this bird is another south-west arid zone endemic it is appropriate to say something of it. It breeds during the rains, and is confined to the higher rainfall (100 mm to 360 mm) areas of central SWA. Apart from this synchrony with the rains, it appears to have no outstanding adaptations for life in its semi-arid habitats.

12. Crimson-breasted Shrike Laniarius atrocoecineus and Black Cuckoo cuculus clamosus: The crimson-breasted Shrike is a widespread bird of the Semi-arid bushveld and is included here as an example of such a generalised and adapted form. Breeding takes place before, during and after the rains. Before the rains the birds apparently take advantage of insect-blooms induced by rising temperatures of early summer. This, however, takes place only if there were good rains late in the previous summer. After the dry year 1968-69 in Daan Viljoen, no early breeding took place.

A particularly interesting aspect of this situation is the relationship of the shrike with its parasite, the Black Cuckoo. L. atrocoecineus is as far as known the only host of this cuckoo in central SWA.
This cuckoo is fairly common and arrives after the first good rains. This means, in effect, that the shrikes have a chance to raise an early brood before the cuckoo is able to begin laying, in a favourable year. No less than 10 records of parasitism were obtained, all from Daan Viljoen Game Park. Of great interest also is the fact that the eggs of this cuckoo are exceptionally well-matched to those of its host—a situation which in itself implies a delicate balanced system.

13. Pririt Batis Batis pririt, Dusky Sunbird Nectarinia fusca and Klaas's Cuckoo Chrysococcyx klaas: The Pririt Batis is another very common bird in central S.W.A. and is not confined to any specific habitat or rainfall zone. It is abundant all along the Kuiseb and Swakop Rivers, and in the Namib also occurs in the Commiphora associations of the eastern hills (about 75-100 mm rain per annum), as well as in the Acacia giralldae wadis.

On the Kuiseb the batis breeds quite early in the summer, and breeding is apparently somewhat dependent on floods in the previous rainseasons. Further inland, the Batis breeds partly before but mainly during the rains. Here we will concern ourselves only with the situation at Spitzkop, where the batis is a primary host of Klaas's Cuckoo.

The cuckoo arrives after the first good rains in the area, as late as December. Batises may or may not have raised a brood by then, depending on the carry-over effect of the previous season, and the amount of early rain. One genus of the cockoo parasitises the later nests (up to March in 1971).

The Dusky Sunbird is also a very common species, and particularly at Spitzkop, where it also serves as a primary host to Klaas's Cuckoo, in this case to a genus quite distinct in egg colouring from the batis gens. Since the sunbirds breed later than the batises, so do the sunbird cuckoos. In 1971 the last egg date for Klaas's Cuckoo from Klein Spitzkop was in the last half of April.

REFERENCES


