

3. Die unterschiedliche Gefiederquantität des Adultgefieders wird hauptsächlich als Adaptation an die klimatischen Verhältnisse des Winterquartiers gedeutet: *S. atricapilla* sucht ihr relativ kaltes Winterquartier mit einem schwereren Gefieder als besserem Kälteschutz auf als *S. borin* ihr relativ wärmeres Winterquartier.

#### 6. Summary

On seasonal changes in plumage quantity in relation to the winter quarters in *Sylvia atricapilla* and *S. borin*<sup>6</sup>

1. In both species the weight of the body feathers is higher in the first adult plumage than in the juvenile plumage (absolutely as well as relative to lean dry weight).
2. In the juvenile plumage, there are no interspecific differences with respect to the weight of the body feathers and the number of these feathers. In the first adult plumage, however, the weight of the body feathers and the mean weight of a single feather are about 21 and 18% higher in *S. atricapilla* than in *S. borin*.
3. These differences are interpreted chiefly in terms of adaptations to the climatic conditions of the winter quarters: *S. atricapilla* migrates to its relatively cold winter quarters with a heavier plumage as a better cold insulator than *S. borin* to its relatively warmer winter quarters.

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## White Storks breeding in the Bredasdorp District, most southern Part of the Wintering Quarters

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### 1. Introduction

Since 1960 White Storks *Ciconia ciconia* have been breeding in the Bredasdorp District on the most southern tip of the African continent (MARTIN & ROBINSON, 1962; BROEKHUYSEN, 1965; BROEKHUYSEN & UYS, 1966; BROEKHUYSEN, 1967). In addition there have been two other cases of a solitary nest about 190 km more east (BROEKHUYSEN, 1965; SCHÜZ, 1963, 1967; UYS, 1968).

<sup>6</sup> 5th paper on the warbler program of the Max-Planck-Institut für Verhaltensphysiologie.

A close watch is being kept on the development of the colony in the Bredasdorp District. In the present paper the position, up to date, is summarised.

The fact that these storks breed in what is generally considered to be their wintering quarters imposes the interesting question of how their young behave. Have they also lost the migratory urge, or do they retain it? What is their nesting and breeding rhythm? Is it the normal one, i. e. does the reproductive behaviour gets activated in May to July or is it adjusted to the spring and summer months south of the equator? By keeping young, taken from a nest in the Bredasdorp District in captivity and keeping them under close observation for a whole year, it is hoped to answer these questions, and these will be published in due course. In the present paper, a summary is given of the nesting success during the period 1961–1970.

## 2. Nest sites

During the period 1961–1970 a total of seven different nest sites have been used at one time or another. Three were in *Acacia cyclops* bushes, one was in a melkbos tree *Calvaria intermis*, a bushy tree, common in coastal areas, and the other four were in *Eucalyptus* trees. The nest in the melkbos tree has been artificially supported by a wagonwheel on a long pole placed under it as the branch on which the nest has been built, is dying off.

In Table 1, the distances between the different nest sites have been tabulated. They vary from 714 to 2284 metres and in all cases except one the distance is more than one kilometre.

Table 1. Distance between the Different Nest Sites.

Rooikrans I	Kleigatheuwel III =	714 m	2355 ft.
Grootvlakte I	Kleigatheuwel III =	1692 m	5583 ft.
Grootvlakte I	Prinskraal II =	1468 m	4845 ft.
Grootvlakte I	Prinskraal I =	2284 m	7536 ft.
Kleigatheuwel III	Prinskraal II =	1211 m	3996 ft.
Prinskraal I	Prinskraal II =	1524 m	5028 ft.

## 3. Occupation of the nests

Never were all seven nest sites used at the same time. The largest number of nest sites occupied in the same season was four and that was in 1963 and 1967. Table 2, first column, gives the number of times each of the nest sites was occupied during the nine years. From this table, it is clear that the nest sites Prinskraal I and Prinskraal II are the most important ones; they were occupied at least eight of the ten years.

## 4. Eggs and fledglings

In Table 2, second and third column, the total known number of eggs and fledglings produced in each of the nest sites during the ten years of observation has been tabulated. From this table, it is also quite clear that Prinskraal I and Prinskraal II, and especially the former, are the most important nest sites.

The breeding success of the colony in the different years has been summarised in Table 3. The figures indicate that 1963, probably 1964 and 1967 were the best years, but from Table 4 it is also clear that the colony is only just holding its own and not developing very much. What is the reason for this lack of further increase?

## Different Nest Positions and Nests →

Upper left: (1) Rooikrans I used in 1961 and 1962 – Upper right: (2) Prinskraal I used in 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970.

Centre left: (3) Prinskraal II used in 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970 (Nests were in 3 different positions as indicated by arrows) – Centre right: (4) Kleigatheuwel II used in 1964. Kleigatheuwel I was in the tree on the left and was occupied in 1963 but was blown out.

Lower left: (5) Grootvlakte used in 1967. – Lower right: (6) Kleigatheuwel III used in 1967

Table 2. Times that the different Nests were occupied and the Minimum \* total number of Eggs and Fledglings produced from 1961–70.

Nest site	Times occupied	No. eggs	No. fledglings
Prinskraal I	9 ×	34	15**
Prinskraal II***	8 ×	23	10
Rooikrans I	2 ×	8	3
Kleigatheuwel I	1 ×	0	0
Kleigatheuwel II	1 ×	2	2
Kleigatheuwel III	1 ×	2	0
Grootvlakte I	1 ×	3	2

\* Due to the relatively long distance from Cape Town number of visits were limited and this may have caused a few oversights.

\*\* Not included a second young which was taken from the nest and reared in captivity for observation purposes.

\*\*\* Prinskraal II nest in 1970 was a new nest in a small tree quite close to the tree used in previous years (cf. fig. 3).

Table 3. Breeding Success in the Different Years during 1961 to 1970 (e = eggs – n = young in nest – fl. = young which left nest).

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Rooikrans I	3 n.	5 e. 0 n.	Nest comes to grief	–	–	–	–	–	–	–
Kleigatheuwel I	–	–	occupied, blown out	–	–	–	–	–	–	–
Kleigatheuwel II	–	–	–	2 n.	blown out	–	–	–	–	–
Kleigatheuwel III	–	–	–	–	–	–	2 n.	–	–	–
Prinskraal I	–	3 n.	2 n.	1 e. 3 n.	4 e. 1 n.	3 n.	5 e. 4 n.	5 e. 3 n.	4 e. 1 n.	4 e. 1 n.*
Prinskraal II	–	–	3 n.	4 e. 1 n.	occupied	2 n.	3 n.	4 e.	3 e.	4 e. 1 n.
Grootvlakte	–	–	–	–	–	–	3 n.	–	–	–
Total eggs and total Young which left Nest	3 e. 3 fl.	8 e. 3 fl.	5 e. 5 fl.	9 e. 3–6 fl.	4 e. 0 fl.	4 e. 1 or. 2 fl.	14 e. 8 fl.	9 e. 2 fl.	7 e. 0 fl.	8 e. 2 fl.*

\* cf. footnote \*\* to table 2.

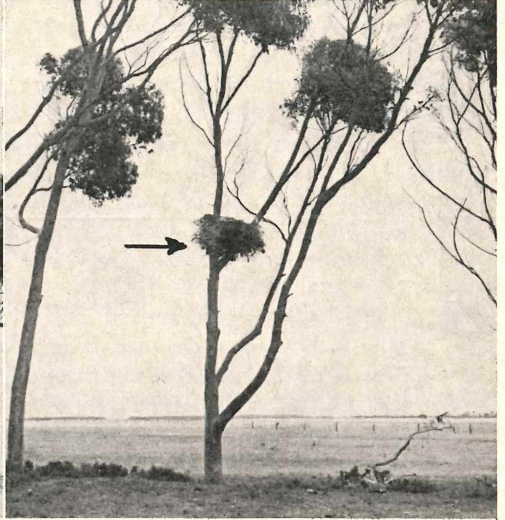
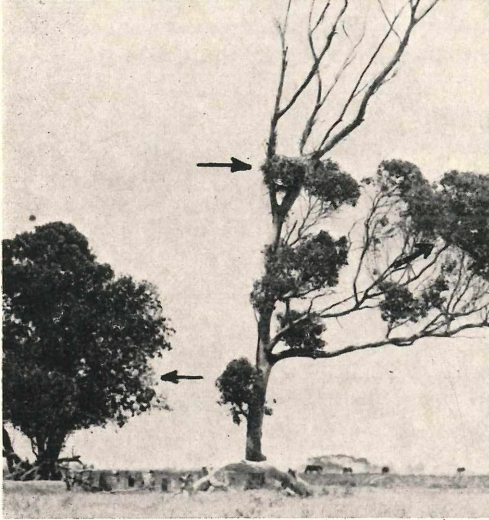
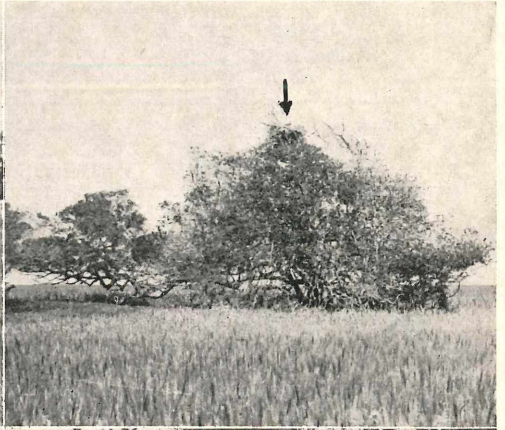
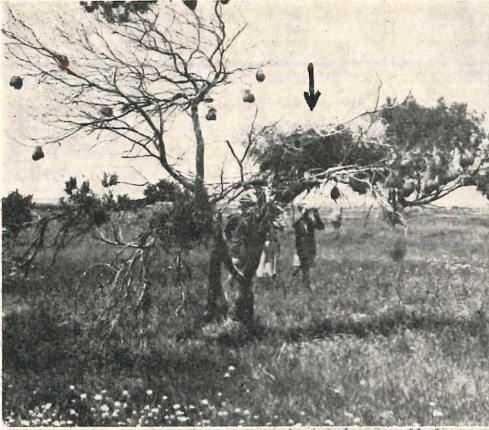


Table 4. Rainfall at Cape Agulhas expressed in percentages, plus or minus of the normal rainfall figure for the period from 1961 to 1970.

1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
For the winter period April – October									
+ 20%	+ 1%	- 28%	+ 11%	- 26%	- 8%	- 2%	+ 7%	- 19%	+ 2%
For the spring and early summer period September – December									
- 20%	- 6%	- 1%	+ 47%	- 22%	- 48%	- 11%	- 14%	- 30%	- 7%

### 5. Adverse Factors limiting the Nesting Success

An analysis of the conditions prevailing in the breeding area suggests a number of adverse factors which act on the birds breeding in the Bredasdorp area and which apply to a lesser extend to the storks breeding in their normal breeding quarters on the European continent. These are:

**A. Periods of Drought:** Rainfall figures, based on records from Cape Agulhas (about 30 kilometres from where the storks breed) taken from the monthly weather reports of the Weather Bureau, Department of Transport, have been tabulated in Table 4. In this table the plus/minus of the actual rainfall in comparison with the „normal“ rainfall, expressed as percentage of the normal rainfall is given for (a) the total winter period (April–October) and (b) the spring and early summer period (September–December), for the ten years from 1961–1970.

Table 4 shows that the winters in 1963, 1965 and 1969 and the springs in 1961, 1965, 1966, 1968 and 1969 were particularly dry. If these rainfall figures are compared with the number of fledglings produced in the different years, it can be seen that there is a correlation, and it is suggested that drought has a detrimental effect on the breeding success of the storks. This undoubtedly may be linked up with available food supply, which was found to be very low during drought conditions.

**B. Strong Winds.** The area is known for the windy conditions. Occasionally the wind reaches gale-force and as the habitat is on the whole a rather open one, the impact is strong. These exceptionally strong winds damage and even destroy the stork nests which are not sufficiently firmly secured. There is also strong evidence that nestlings get blown out, especially towards the end of breeding when the nest cup has virtually disappeared and the nest has been flattened.

Probably drought conditions and strong wind have a very detrimental effect and no doubt slow down, if not prevent, the development of this unique breeding colony of *Ciconia ciconia* in the south.

Another point which may strongly affect the development and increase of the colony is the behaviour of the young birds. If the fledglings would lack the migratory urge and stay the whole year in the district where they hatched, as presumably their parents do, then a sturdy increase in the number of breeding storks could be expected. If, however, these birds would still have an innate migratory urge and, therefore, migrate to the north, and would not return to nest, the colony would show no substantial gain. Recoveries of two of the three ringed nestlings in the first nest, found in 1961 (McLACHLAN, 1963) strongly indicated that these young did migrate.

By keeping young storks from nests in the Bredasdorp District in captivity and by recording their behaviour, it is hoped that more information on the presence or absence of migratory behaviour will become available.

## 6. Summary

An up to date account is given of the *Ciconia ciconia* breeding colony in the Bredasdorp district at the most southern tip of Africa, covering a period of ten years.

Points dealt with are position of nests and distances between different nests (Table 1), number of times the different individual nests were occupied, total number of eggs, nestlings and fledglings produced by each of the nesting sites (Table 2) and the breeding success in the different years (Table 3). Close observation has shown that the „colony“ is not increasing, but just holding its own against adverse conditions like drought (Table 4) and very strong winds. It seems that only two pairs regularly each year attempt to nest.

## Zusammenfassung

Brüten des Weißstorchs im Distrikt Bredasdorp, dem südlichsten Teil des Winterquartiers. — Unter den drei Kolonisationsversuchen in Südafrika ist derjenige bei Bredasdorp (seit 1960) der erfolgreichste, die Neststände und Bruterfolge werden bis 1969/70 beschrieben und in Tabellen dargestellt. Der Nachwuchs leidet sichtlich unter zeitweiliger Trockenheit im Südsommer und auch unter Stürmen, die sowohl Nester wie Junge vom Baum fegen können. Es ist, wenigstens für einen Fall, erwiesen, daß die Jungen äquatorwärts wegziehen können. Die Frage ihrer Zugunruhe ist Gegenstand weiterer Untersuchungen.

## Acknowledgements

The following have co-operated in the checking up on the breeding colony in the Bredasdorp district; Dr. ROY SEGFRIED, Rev. DAVID LOW, Messrs. JOHN and ROBERT MARTIN, PETER FROST and PAUL BROEKHUYSEN.

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Über die Rufe des Ortolans (*Emberiza hortulana* L.)

Von Klaus Conrads, Bielefeld

## 1. Einleitung

Die Rufe des Ortolans sind bisher nicht geschlossen dargestellt worden. Die vorliegende Studie erhebt ebenfalls keinen Anspruch auf Vollständigkeit, insbesondere nicht in bezug auf die nuancenreichen Kurzrufe („Rufartikel“, Abb. 4), zu deren Erfassung schon der z. T. geringen Lautstärke wegen Gefangenschaftsaufnahmen mit herangezogen werden müßten.

Sämtliche Rufe wurden in den Jahren 1964 bis 1968 innerhalb eines Gruppenvorkommens des Ortolans in Ostwestfalen aufgenommen (Ortsbeschreibung vgl. CONRADS 1968 und 1969). Zur Aufnahme diente ein Batterie-Tonbandgerät, Typ Uher 4000 Report S in Verbindung mit einem Parabolreflektor aus Polyester (Spiegeldurchmesser 470 mm) und einem Bändchenmikrofon, Typ Beyer M 260. Herr WÜSTENBERG, Vogelwarte Radolfzell in Möggingen, hatte die Freundlichkeit, Sonagramme aus-

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