PIED SHAG — Only birds seen were 4 on rocks by Square Top Island on 27/8/62.

SPOTTED SHAG — 4 off Noises on 7/9/62.

ARCTIC SKUA — At least one chasing terns east of Kennedy Bay on 6/9/62.

WHITE-FRONTED TERN — At this time of year curiously scarce in the Waitemata Harbour. Only 2 seen before we reached Waiheke Island on 27/8/62, but opposite Waiheke a flock of c. 2000 were seen with Fluttering Shearwaters. Flock of 600 in same area on 7/9/62. Occasional birds seen rest of way.

ACKNOWLEDGEMENTS

This paper is based mainly on the observations of the various members of the August-September party, and their co-operation has been invaluable. Particular thanks are tended to Mr. I. A. E. Atkinson for information concerning the flora, and Mr. R. B. Sibson for critically reading the manuscript.

Permission to camp on Great Mercury was kindly granted by Mr. Edward Mizen; and the Mizen and Delamore families gave us much useful information. In November the Delamores proved most hospitable hosts for a night.

In August, we were transported to the Mercury Islands by R.N.Z.A.F. "Arataki," which stayed with us for three days. The cheerful co-operation of captain and crew was much appreciated. We returned to Auckland on R.N.Z.A.F. "Hauraki," and they, too, made us welcome. The November expedition was possbile only through the assistance and generosity of our old friend, Mr. Jim Butterworth.

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STUDIES AT A KAKA'S NEST

By J. R JACKSON

In spring, 1955, Mr. K. Cooper, of Ngahere, found a Kaka *(Nestor meridionalis)* nest. That year four chicks were reared and fledged and in 1956-57 there were three chicks, but one died before fledging and in 1957-58 the Kakas did not nest; and in 1958-59 they successfully reared five chicks. Since then there has been no activity by the nest.

In August, 1957, Mr. Cooper showed me the nest and I have watched it since. With this experience I have been able to re-interpret earlier observations of Kakas and to compare with my much more extensive observations of Kea *(Nestor notabilis)* nesting (to be described elsewhere) This comparison has given me confidence to generalise, confidence that the behaviour seen was not the individual idiosyncrasy of a pair of Kakas but is typical of all nestorine parrots, and more specially of all Kakas.

THE NEST

The nest was twelve feet up in the hollow heart of a Rata *(Metrosideros lucida)* growing alongside a logging road near the crest of the spur between Kangaroo and Wallaby Creeks, Greymouth, and on a north east face over Kangaroo Creek. The main trunk of the Rata was dead and also the secondary trunk, but several smaller branches were still alive. Beyond the road was a slip covered in regrowth near the road but down near the creek open and active. The valley floor beside the creek was grassed and 100 yards across the valley was a steep 300 foot wall rising to a "terrace" (peneplain) level with the one above the nest. The valley sides carry heavy timber and on the terraces a gradation from Rimu *(Dacrydium cupressinum)* association to Silver Pine *(Dacrydium colensoi)* association, to the open pakihis with rushes and sedges depending on drainage and fertility.

The more accessible timber was cut twenty or thirty years ago; more recently the logging has been extended and new roads made. This road up the spur and beyond the rata tree was made in 1954 and 1955, the New Forest Sawmilling Co. Ltd. told me, and timber trucks were passing by several times each day in 1955. This intense activity about the tree in summer 1954-55 without the nest's being noticed suggests that either the Kakas did not nest that season or first selected the tree for the 1955-56 season.

When in the crown of the rata tree the Kakas would have a wide prospect over the terraces, up and down Kangaroo Creek and to a less extent along Wallaby Creek. The Kaka hen when away could easily watch the nest and see any large animals moving on the slip or road. On the southern side of the tree twenty feet away was a Kamahi *(Weinmannia racemosa)* tree which the hen herself used in approaching the nest and this offered the only covered approach.

The nest which Brunner (1952) found on 2/3/1848 was on the southern bank of the Buller River, so with a northerly aspect.

Mr. R. St. Paul, of Minginui, describes in a letter the two trees containing North Island Kaka *(Nestor septentrionalis)* nests which he found. Both nests were in healthy Matai *(Podocarpus spicatus)* trees in heavy forest. He describes the site — "The trees mentioned were on a fairly steep sidling about two chains from a small stony creek." And it is interesting to compare Cayley's (1938) description of the Red-tailed Black Cockatoo *(Calyphorhynchus banksii)* site, "usually a dead tree situated in a clearing is selected." The more southern cockatoos, the nestorine parrots, choose a warm northerly face.

THE NESTING

I first visited the nest on 29/8/57. The pair of Kakas returned at nightfall. The hen settled on a rata tree 50 yards away and immediately sang her yodelling song. She noticed me as she flew to

the nest tree and began ka-aa-ing. She would switch from the song to the harsh call. We could hear a second Kaka, calling occasionally 50 yards away and at all times the cock remained far more shy by the nest.

The nest itself, three feet down in the hollow heart, was of wood powder and small chips, as Guthrie-Smith (1914) describes, and quite dry.

When we left the Kakas were about, and later I found they often roosted in the rata trees where the hen first settled. I visited the nest again on 17/11/57 and 19/1/58 and found it had not been used. Only one Kaka was about on 17/11/57 and on 19/1/58 twelve Kakas in the nest tree and neighbouring trees and perhaps another dozen calling on the far side of Kangaroo Creek. One Kaka returned four times to the same roost on a small tree across the road from the nest tree.

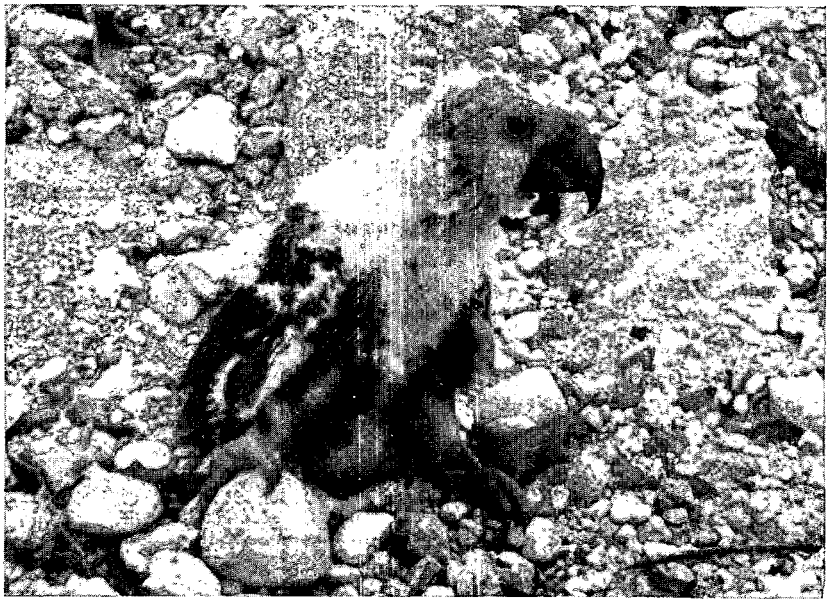
At 2 p.m. on 28/12/58 the hen was sitting on four eggs. She flushed at my approach but was back in the nest within five minutes, after first calling "quor-quor-quor" quietly in the Kamahi nearby. At 3 p.m. the cock came up and settled in the Kamahi but seemed nervous because of me. He remained about for the remainder of the day. She slipped off the nest after the cock at 6 p.m. and was back within five minutes; similarly at 6.30 p.m. and 7.30 p.m. At 7 p.m. there were four Kakas about the nest and all these birds roosted nearby and were there at 4.30 a.m. on 29/12/58. She left the nest at 4.30 a.m. and twice again before 6 p.m. At 6.15 p.m. I looked at the nest and there were five eggs. She was back in five minutes and was still on the nest when I left at 7.15 a.m.

On 14/2/59 there were five chicks, all vigorous and healthy, well fed with distended crops and of various sizes. Using my Kea experience I judged the largest chick four or five weeks old and the smallest two or three weeks old, two weeks less than the eldest. This estimate was confirmed by very similar photos of the largest on 8/3/59 and the small three weeks later, 29/3/59. This would give an incubation period of about three weeks.

The chicks were clothed in a grey down, already much of the first down was lost, and many of the first down feathers remained not yet broken off from the second down. Adult feathers were showing as the yellow and red feathers behind the eyes and the flight feathers. The upper mandible was black; much of the lower mandible and about the nostrils (though the nostrils were grey) was lemon yellow and also this pigment was deposited in subcutaneous fat all over the body. Inside the legs and to a less extent under the wings were lesions in which this pigment was concentrated.

In what were possibly the youngest lesions there was an eighth inch circle raised a sixteenth inch, with a velvety surface, perhaps a very fine mould and all coloured this yellow. Later the centre shrunk, the surface dried, hardened and remained yellow while a white ring had formed about the circumference. Below the white ring the consolidated yellow fat still remained. Then the skin broke about the ring, the centre became white and the lesion fell off with the chick's movements, or a feather could break through and distort the ring. A yellow mole would grow out with and faster than the feather. All the chicks had this condition and did not seem inconvenienced. Professor J. A. R. Miles, of Otago University, thinks it may have been a

XVI — (a) Largest Kaka **(Nestor meridionalis)** chick in brood at 4 - 5 weeks, Kangaroo Creek, Greymouth, 14/2/59.



[J. R. Jackson

(b) Smallest Kaka chick in brood at 6 - 7 weeks, Kangaroo Creek, 8/3/59 (v. p. 170).

bird pox but material sent to him was too dry on arrival and the pathogen not found. Besides there was a teaming nest fauna, some of which may have caused the condition.

On 8/3/59 the eldest chick was fully feathered and the youngest still with much down on the head and back. This youngest chick was slightly down at the wing though still vigorous. On 29/3/59 only one chick remained in the nest and was fully feathered, so the nestling period was about 9 or 10 weeks. The hen remained close to the nest and there were several other Kakas a little further away.

While watching the nest with chicks I several times saw the cock feed the hen. Usually the ceremonies would begin in the Kamahi next to the nest tree. The hen would flap her wings and move clumsily in the tree top and soon come to rest with her head down, shoulders hunched and her wings and tail spread under the cock on a branch above. Usually he would retreat though sometimes approach when she would rush snorting through her nose at him. Eventually he would take flight 50 yards down a gully to another tree. Soon she would follow and the same ceremonies continue. Then more firmly he would come up alongside her but now she would jump away. He would follow. For a peaceful moment he would preen her crown and then she would butt forward at him again. Eventually he would preen her crown, work down the left side of her face and manage to grasp her beak crosswise. Soon he would have moved so that their bodies and beaks were in line. His shoulders heaved as he regurgitated and her body quivered and tail wagged as she was fed. The whole ceremony would take five to ten minutes.

During the brief spells when the incubating hen was off the nest she would not usually be fed. A sitting hen seems to get impatient about daybreak and nightfall and leaves the nest several times to go and look where she expects the cock to arrive, or to go to a favourite perch and call for him. I did not identify such a perch for this Kaka hen. perhaps because the cock was close by at these times.

When the chicks are fledged the cock plays a greater part in their care. He feeds them while the hen still remains near the nest most of the time. With him they play flying fast, twisting and swerving through the forest; or the hen may come and lead them in a spiralling flight perhaps 2,000 feet up and a mile horizontally and after a quarter hour they return whence they took flight — a ceremony like that of the Gang-gang *(Callocephalon fimbriatus)*, Cayley (1938).

THE NEST FAUNA

Some of the dry nest material was collected on 17/11/57 and in it Dr. R. Pilgrim, of Canterbury University, found —

Histeridae ... ... *Saprinus latipes* (10 specimens)

Several collections were made of the damp material in 1959. That of 14/2/59 was typical when there were found the insects —

Histeridae ... ... *Saprinus latipes* (5 specimens)
Staphylinidae ... ... Several species
Diptera ... ... Several species identified by Dr. R. Pilgrim
the pseudoscorpions *(Chernetidae)* a new species *Apatochernes* to be described by Beier (1962) (47 specimens)
and the mites ... ... *Macrochelidae* and *Rhizoglyphinae*

The insects, dung beetles and flies are well known scavengers. The pseudoscorpions probably preyed on the other invertebrates. Without doubt the mites were most important. The macrochelid mites were very numerous and the rhizoglyphine mites ten to a hundred times more so, there being certainly millions in the nest. The mites swarmed all over the chicks. Your arm when you reached in the nest would get hundreds on. Their constant movement on the chicks may have caused failure in the search for lice and analgesid mites.

There were no fleas or flea larvae.

THE BREEDING SEASON OF KAKAS

The long breeding season of Keas which lay between July and the end of January is now known (McCaskill 1954) and the Duke of Bedford (1954) describes the Red-tailed Black Cockatoo — " Banksians may nest at any time of the year, but the majority lay in autumn and winter." The Kaka has a similar long season for:

This hen twice fledged chicks at the end of December and once at the end of March.

Stead found three Kaka nests in Codfish Island in early January, 1935, and presented the eggs to the Canterbury Museum.

Thomas Brunner found two nests in March, 1848, by the Waitahu and Buller rivers, with the chicks at about the same stage as this nest, and R. Henry found two eggs on 19/3/1895 at Dusky Bay. These eggs are now in the Canterbury Museum collection.

It is certain Kakas lay between September and March; and perhaps Stead's success indicates that at least in the south the peak of the laying season is in December. However, I have frequently seen flocks of six Kakas, or more, in January and think these may be family parties, with chicks recently fledged. Also in September I have had no difficulty in finding locations for Kakas. The hen remains close to the nest. The month when most nest must remain an open question.

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NESTING RECORD OF TUI

By A. BLACKBURN

From casual observations in the past, the period given in the literature between hatching of the eggs of the Tui *(Prosthemadera novaeseelandiae)* and departure of the young from the nest has to me always been suspect. There are not many available references. N.Z. Bird Notes I, 29, gives the period as "ten days" in a rather vague way;