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Bower of the Spotted Bower Bird.

Photo—Elizabeth Kennedy

THE BUILDING OF A BOWER

J. J. SELVAGE, Townsville.

Beneath the pendulous branches of a shrub in the Stuart State School grounds, near Townsville, a pair of Spotted Bower Birds decided to build a bower or play house. The space was cleared of debris and the foundation laid. It consisted of dry sticks about the thickness of a slate pencil and was laid in the form of two crescents, almost meeting at the ends, with the concave portions facing each other. Each crescent was fifteen inches long when measured along the arc and about three inches wide in the middle, tapering towards the end. These crescents were built up to about half an inch in height and by working the sticks in among each other and walking over them a fairly compact mass was formed. The sticks were mostly about a foot in length.

The sides were then commenced. Sticks to fifteen inches in length and of similar thickness to those in the base were used. One end was pushed down among those on the ground and those of one crescent inclined slightly to those on the other crescent. A doorway was left at each end.

As the walls were being erected the birds further strengthened the foundations by twisting and turning more sticks in among those forming the sides until the base was three inches in height and six inches in width at the middle of each crescent. The foundations were very firm and the sides rigid as the upright sticks were

packed more closely. The walls had a decided concave curve from top to bottom on the inside. The floor of the inside portion between the crescents was built up but kept with a disc-like hollow inside.

The birds worked for about a month on this bower before decorating, but it was another month before the bower was completed with the decorations, and with fine twigs placed across the top making it form a tunnel. Bleached snail shells, bones, pieces of coloured china and glass, pebbles and bottle stoppers were heaped inside and at the entrance. Every morning fresh green berries and leaves and pods from the acacia trees were added to the decorations about the doorways.

During the whole of the building the two birds were chattering to and scolding each other, now and then leaving off work to play, chasing each other through and around the bower, then up through the branches of the overhead shrub. If a stick or an ornament was out of position play would stop until the damage was repaired.

Although but two birds were noticed during the building as many as six have been seen playing together. Of the children attending the school the birds took but little notice; if a stranger should enter the school gate 'cease play' was the cry and off flew the players for a meal in the trees along the creek.

BIRDS OF TOWNSVILLE AND DISTRICT

By H. E. TARR, Melbourne.

(Concluded)

119. Banded Finch, *Steganopleura bichenovii*, B. and C. Very common.
120. Chestnut-breasted Finch, *Donacola castaneothorax*, B. and C. Common.
121. Plum-headed Finch, *Aidemosyne modesta*, B. Seldom recorded.
122. Crimson Finch, *Neechmia phaeton*, B., X. Noted only once, 1944 in this district, but found breeding nearby, 1947.
123. Black-throated Finch, *Poephila cineta*, B., X. Recorded 1943.
124. Olive-backed Oriole, *Oriolus sagittatus*, C. Occasionally.
125. Spangled Dronko, *Chiblia bracteata*, B., X. 1944.
126. Australian Crow, *Corvus ceellae*, C. Common. Nesting here.
127. Pied Currawong, *Strepera graculina*, E. Common. Breeding.
128. Pied Butcher Bird, *Cracticus nigrogularis*, B., C. and E. Common. Breeding here.
129. Black-backed Magpie, *Gymnorhina tibicen*, A., B. and C. Common. Breeding here.
130. Little Lorikeet, *Glossopsitta pusilla*, C. Observed once in company with Rainbow Lorikeet in numbers.

THE CROCODILE AT THE NEST

Notes by ST. JOHN ROBINSON, Townsville.

The following notes are contained in letters written by Mr. St. John Robinson at his Sanctuary at Mount Saint John, about four miles north of Townsville. They are of special interest as they concern the nesting habits of the crocodile, *Crocodilus porosus*. The notes explain much of the method in which the nesting is carried out.

13th January 1943. "At the zoo I built a natural pond with a large mound in the centre, and planted grass and trees. In this enclosure I have six large crocodiles. This evening, when I paid a visit to the zoo, I noticed a large nest built, about six feet broad and four feet high. The crocodiles have scratched up all the leaves and grass and tops of overhanging branches and placed them in a heap on the mound. This crocodile's nest has been built during the night, and it looks as if she is going to lay her eggs. This is the first instance to my knowledge of breeding in captivity. It will be interesting to watch."

22nd January, 1943. "On Friday night (14th) the caretaker went into the zoo and he put the torch on the nest and noted the crocodile had a heap of grass in her mouth, placing it on the nest. On Saturday night the 15th, she completed her task of building, and by near observations, appears to have laid her eggs. I cannot say definitely if she has done so, but she remains constantly near her nest. There are six crocodiles in the enclosure. Further notes will be given when I get a boat to cross."

29th January, 1943. "When visiting my zoo this afternoon I noticed that the crocodile had been working last night on her nest. The addition was clearly noticed by her building of a large heap of grass high above the nest on the side. I also noticed that she had made a depression in the centre of the nest as though she intends laying her eggs therein to-night. She has the hole made in the centre and the grass in readiness as though to cover the eggs. It is interesting to watch the progress of the nest and I am sure that when I visit the zoo tomorrow the eggs will have been laid

and the nest straightened up. The nest is about four feet in the water, and she constantly lies near it, so I shall have to get a boat to cross."

31st January, 1943. "Visiting the zoo this evening I find that she had covered the nest and built on to it. I am sure that she had laid either Friday night (29th) or last night, by the appearance of the heap of debris which she has placed on top. I intend during the week to bring a boat out, perhaps on Sunday next (7th February), and inspect the nest across thirty feet of water, although the crocodile is always lying there between the bank and the nest."

Early February, 1943. "I have definitely fixed next Sunday, 7th February, to look at the nest and examine it. I might mention that there is a large crocodile between the nest and where the boat will be launched. It is very savage and remains there under water. If anything is thrown into the water he immediately jumps right out of the water at the splash. Being half civilised I expect him to attack the boat but that will not prevent me getting over to investigate. This act should be worth filming as one will be able to get facts."

7th February, 1943. "The robbing of the crocodile's nest at my zoo was accomplished by crossing to the nest in a boat after driving her back with a long stick to the other end of the nest. When I was taking the debris away from the nest she charged at me with open mouth and drove me into the boat. One second later and I would have been in her jaws. She came right out of the water and on to the nest, in clear view of the crowd looking on, and only for my having a long stick to jab into her mouth I believe she would have come into the boat. I drove her back into the water and with my son and a Kodak movie man went back. We pulled off further debris and grass and then came to the eggs. After counting them—78 in all—pictures were taken and the grass put back on to the nest. Thus ended the robbery of a captive crocodile's nest."

This completes the record for the 1943 season. Whether young croco-

diles were hatched, or whether the nest was deserted after the interference has not been recorded. Probably war-time conditions prevented the keeping of further close observation.

The next observation was made in 1946—one only—but in 1948 a further series of observations successfully completed the breeding record of the crocodile.

9th January, 1946. "Do crocodiles know when the wet season is about to commence? Townsville has been stricken with drought for many months, with no sign of rain. However, last Sunday morning, 6th January, I noticed at my zoo that the crocodiles had started to build their nest in the pond, and they completed it yesterday morning (Tuesday). Monday night it commenced to rain; two inches fell on Tuesday, and it has been raining ever since. This news was printed in last Monday's Brisbane "Courier." The paper expressed a wish that the forecast of rain would be correct. Evidently it is a record which should be kept."

"Also, which of the crocodiles builds the nest? I was of the opinion that the female does all the work. However, last morning I visited the zoo and noticed the male crocodile working overtime scratching up grass and leaves around the nest. He would crawl over the nest leaving his tail on same and with his front claws gather all the leaves, push them back to his hind legs, then the hind legs would push them back on to the nest. He took no notice of our watching and a movie picture could easily have been taken. Usually they build at night. I have prepared a nest similar to his in an enclosed pond and intend transferring the eggs to same and then

will be able to note the time of incubation."

21st February, 1948. My crocodiles have made their nest on one of the mounds and the female laid her eggs on 2nd February. I have not disturbed the nest, but have wired it off securely so the eggs should hatch. I will build in their enclosure a concrete pool to hold water so they can swim."

10th May, 1948. A telegram reported—"Visited nest thirty minutes ago, three baby crocodiles hatched out, many others breaking through shell."

18th May, 1948. "First I noticed a nest being formed in my large natural pool where I have two males and one female, on 1st February. When the nest was completed a two feet trench was made through the centre; on 3rd February, this trench was filled in, thus I knew she had laid. A few days later I built a strong enclosure around the nest which I watched for hatchings. On 10th May my manager informed me that there were a lot of frogs in the heaped up nest and I immediately went over. Lifting the grass from the nest two young crocodiles were observed crawling there, and several other eggs with the ends broken and little crocodiles with their noses poking out. There were the frogs making all the noise. Thirty came out in two days and others have come out since, and as I have a pool with running water enclosed, and food such as fish, shrimps and chopped-up meat, they are all doing very well. I estimate during the week they have grown two inches, and I will continue to watch their growth. They are a very lively lot and can remain under the water for long periods."

THE MANGROVE WARBLER.

NANCY HOPKINS, Townsville

During the Townsville Naturalists' Club's recent Field Day at Kissing Point Mrs. Kennedy located for me a bird she had been watching on a tidal stream near her home, and sometimes in her garden, which she believed to be a Mangrove Warbler. *Gerygone cantator*. We located the pair far out in the middle of the mangroves, maintaining a regular traffic

to and from a certain point. I suspected that young birds were being fed, and, on wading in and stalking closely, I discovered a family group of four or five in all and saw the parents carrying tiny caterpillars to the fully fledged youngsters.

I had seen and heard the bird on previous occasions near mangroves and creeks, but never so perfectly,

CARVED BOOMERANGS FROM NORTH QUEENSLAND

KEITH KENNEDY

President, Townsville and District Naturalists' Club. Past President Anthropological Society of N.S.W.

In parts of Queensland and New South Wales boomerangs incised with ornamental designs are occasionally found. The accompanying illustration shows two such weapons which I obtained in Townsville. Both are obviously old, and are of the non-returnable kind.

Fig. 1 measures around the convex curve 80 cm.; from apex to apex 74 cm.; width across centre 7 cm.; weight 1 lb. 5½ ozs. The two surfaces are as usual, plane and convex, and the latter surface alone is ornamented. This ornamentation consists of incised designs of two rows of elongated ovals, seven in both rows; seven half ovals festooned on the convex margin, and the same number on the concave margin. The ovals are incised with longitudinal grooves, and the half ovals on the margins are incised with oblique grooves.

Fig. 2 is slightly smaller. It measures 78 cm. around the convex curve and 72.5 cm. from apex to apex. Width across the centre is 6.25 cm., and weight 1 lb. 4 ozs. The designs are similar in shape and number to Fig. 1, except that the grooves on the marginal half ovals are not so oblique, but are almost parallel to the edges.

The ornamentation on these two specimens seems to be typical of North Queensland, but whether it originated on the coast or inland is yet to be decided. Roth, in his North Queensland Ethnological Notes does not mention them but he does in his work on North West Central Queensland,

MANGROVE WARBLER (Contd.)

and I had not identified it, largely owing to the fact that it is listed in both Leach's and Cayley's books as from South East Queensland, while an article by K. A. Hindwood in *The Emu*, vol. 45, page 311, suggests that it is not found north of Mackay. We are convinced, however, that the bird observed by us is the Mangrove Warbler, as all details of appearance, song, and habits seem to agree with published data.

where he says that the festoons on the edges are only found on implements made in and to the south of the Boulia district (1). He figures examples with both mucronate and obtuse



Fig. 1 Fig. 2
Photo—K. Kennedy

apices. Lumholz figures an incised boomerang decorated with festoons and elongated ovals from Coomoooolaroo, Central Queensland, and adds a footnote "On the Herbert River I never saw boomerangs ornamented with engraved lines like those further south and west in Queensland" (2).

In a paper read before the Linnean Society of New South Wales, R. Etheridge, Jun., described two specimens supplied by Mr. J. A. Boyd of Ripple

SPIDERS' WEBS AND THEIR USES IN PRECISION INSTRUMENTS

H. O. BARKUS, Cairns.

The Spider said as he spun and spun, -
"I've made this web since the World
begun,
But science will someday find a use
And the purpose won't be too obtuse.
A single web shall be conceded
For instruments to be most needed.
Vast distances will be aligned
My ugly body then not maligned."

There have been varied uses for spiders webs. Surgeons of days gone by used them in attempts to arrest bleeding. Our Australian Aborigines have used them for baiting fish, rolling a collection of webs into balls the

CARVED BOOMERANGS (Contd.)

Creek near Ingham, who also supplied the information that they were procured from the Herbert River blacks who obtained them from the natives living further south near Townsville (3). Both are of almost similar design to the implements described above. In another paper read before the same Society (4) he describes two smaller boomerangs with similar ornamentation from the same source, and adds that these also probably came from the neighbourhood of Townsville.

In the south-eastern part of Queensland ornamentation consisted of loops, half loops, zig-zags and other patterns, and the apices were definitely mucronate; whereas in the North only occasionally is the mucronate apex found.

From the scant information we have it seems that the aborigines of the Townsville district carved some of their boomerangs, but it must not be lost sight of that the carved boomerangs might have been traded from the West.

References

- (1) Roth, W. E. "Ethnological Studies of N.W. Central Queensland Aborigines." Brisbane 1897. p. 144: pl. XIX.
- (2) Lumholz, C. "Among Cannibals." London 1889. p. 51.
- (3) Etheridge, R., Junr. "Two Ornate Boomerangs from North Queensland." Proc. Linn. Soc. N.S.W., 1897: part 2: July 28.
- (4) Etheridge, R., Junr. "Further Carved Boomerangs from North Queensland." Proc. Linn. Soc. N.S.W., 1898: part 4: Nov. 30.

size of a golf ball and attaching them to lines made of fibres. The fish got his jaws glued to this luscious looking object and so was caught. The bait was retrieved if loosened, being of some real value. In instruments of observation such as theodolites and telescopes, their use is of paramount importance. In this article spiders webs are discussed in relation to observation instruments.

In the study of surveying and astronomical observation, the first known date was 1400 B.C. Mention is made of the use of a sighting stick similar to our present mapping alidade where the means of sighting was the human hair or a strand from the silkworm. Evidently some need for finer means of measurement was required, for in 140 B.C. the Chinese had dropped the idea of the silkworm and used spiders webs instead. However, it seems that the webs used were too thick and so human hair was reverted to.

Much later, in 1570 A.D., during the advancement of measuring observations, it was discovered that certain spiders, at seasonal times, spun webs of various thicknesses. By experiment, depending on the condition of the eyes of the observer, some standards were reached which were used in 1700 A.D. when scientists were experimenting with the achromatic telescope. About this time surveyors began to reach out for finer standards and during the beginning of the 19th century some semblance of the present theodolite started to evolve. Spiders webs then appeared to come into their own as a means of measuring observations, but the webs being then obtained were not of uniform thickness through their length and the then instrument makers found that only certain spiders spun webs suitable for their requirements and those had to be gathered in the early morning hours, and then only from certain districts. At that time several families were employed in this work, one family going to the South of France every year during the spring to gather them from grape vines and rose trees. In the late spring they were garnered from the pine trees. Forked pieces of wood were cut from

the trees, peeled and dried, and whilst the dew was on the webs, they were wound in a cross fashion until the fork was full. It was then put to one side to dry, sheltered from dust. Mention of the family doing this work was quoted in the Wide World Magazine in one of the issues of 1904 and in two months time another family was reported as being in the same industry. Towards the end of the 19th century when optical systems of telescopes were being improved, the use of spiders webs was of a wider scope. Then it was found that the webs being used previously were too thick, and naturalists were being included in exploratory parties, in the hopes of finding webs suitable for finer measurements. As the optical systems of eyepieces of telescopes were increased in magnification, even finer webs could be used until a stage was reached where fractions of seconds of arc were readable.

The technique of gathering webs from trees was slow. Experience found that a spider kept in confinement for two or three days began to spin a web immediately on being released. The spider was placed on a frame about 8" x 4", the frame given a slight knock to dislodge the spider, and the spider, feeling it was going to fall, immediately fixed a web to the frame and when falling the web was drawn out of its spinnerets. The operator wound up the web keeping the spider from falling to the ground. According to the dexterity of the operator a large number of frames were able to be wound from the one spider. This method has been improved upon. The spider after being caught is kept in a box for a day then placed in a bowl.

On placing a stick against the spinnerets, the spider fixes the web on to the stick and then the web can be pulled, fastened to a frame, as previously, and so wound as in the former instance. This procedure is repeated until the required number of frames are filled. At the beginning of the operation yards of web are often pulled out before it becomes clear and fine. A spider, to produce good clean webs, has to be treated gently and

the operator must go about his work quietly. The spider can be "difficult," and then the web produced is flat. This is caused by the spinnerets being contracted together until they form a narrow slit. From *Argiope aetherea*, a species commonly known as the St. Andrew's Cross Spider, so named because the stabilimentum in the centre of its web is invariably in the form of a St. Andrew's Cross, as much as 1,000 yds. can be pulled and even then its sac is not fully depleted. The keeping of spiders in captivity is quite simple. They like a few flies but some kinds can live on a plain thin syrup made of sugar and water. The syrup has to be changed every day.

Web spinning is interesting both from an engineering and scientific view point. The spider senses the direction of the wind, always choosing a gentle one, and pays out an aerial until it fastens on to an object. The webs are spun in a very sticky condition and on touching an object they fasten immediately. The spider knows by a sense of feeling that the web is fastened. Pulling the web tight to a certain tension it then starts to lay another web alongside the first aerial and because of its stickiness they weld together. From this point it places other aerials until it has a base to spin its web upon. Some spiders spin their webs from the centre outwards and others vice versa, spacing of the web being determined by the spacing of the feet as it treads round and round. Other types spin a web of a cloudy mass forming a mat effect between trees, and these, best known as Colony spiders, usually choose citrus trees in which to build. Both male and female live in close proximity. In some varieties, the males are as small as a pin's head, others may be nearly as big as the female, but the female always is larger.

The housewife considers these numerous creatures a menace, but it is generally agreed that they certainly have a place in science, and a most useful and important one at that.

At a later date it is proposed to deal more fully with individual species of spiders and their web characteristics.

Townsville and District Naturalists' Club

President: K. Kennedy, Esplanade & Rose St., Kissing Point.
 Hon. Secretary: J. H. Holliday, P.O. Box 456, Townsville.
 The Club meets usually on the first Friday of the month.

MEETINGS

Meetings of the Townsville and District Naturalists' Club were held as usual at the Adult Education Centre Lecture Hall.

At the May meeting the speaker for the evening was Miss Nancy Hopkins who described the habits of the koel, spangled drongo, lotus bird, the stilt and other birds of the Townsville district. She also exhibited the nests of the fig-bird and that of a finch. Exhibits by other members were a stone axe-head from Stuart, two spear-heads from Western Australia and a Chinese brooch made from kingfisher feathers. The following Sunday, members made an expedition to the Townsville Common to study the bird life of the lagoons.

The June meeting of the Club was favoured with a talk by Mr. W. H. Mumford, who told of a crocodile hunt near the mouth of the Haughton River. He gave a vivid description of the preparations and events leading up to the capture of a 15 foot crocodile, which was eventually delivered to Mt. St. John Zoo. By invitation of Mr. J. J. Selvage the June outing of the Club was to Stuart to inspect a bower

bird playground or playhouse in the school yard.

For July the lecturer was Mr. J. J. Selvage who spoke on Bird Life of the Stuart Creek district. He listed 112 different species he had observed, and gave descriptions of their habits. It is interesting to know that on rare occasions he has seen emus and plain turkeys (bustards) there. He also told how a flock of ibis successfully dealt with a grasshopper invasion in that locality. For many years he had impressed on the school children of Stuart the necessity of preserving bird life to keep down insect pests, and his efforts in that direction have been very successful. The monthly expedition was to the Black River and in spite of wet weather, field work was carried out. The river was running due to the recent rain, and on the banks two species of wattle were in flower. Birds observed were, black-faced cuckoo-shrike, black-fronted dotterel, red-backed wren, mangrove kingfisher and rainbow lorikeet. A few miles on the Townsville side a very rare bird, the pied heron, was seen.

—KEITH KENNEDY.

NORTH QUEENSLAND NATURALISTS' CLUB

Hon. Secretary: J. Wyer, "Lochinvar," 253 Sheridan St., Cairns.
 Meets at School of Arts, Shields Street, Cairns, usually on second Tuesday in each month, at 8 p.m.

Annual Meeting, Tuesday, 14th September, 1948.

MEETINGS

8th June, 1948: Lecture by Mr. E. Edward: "Shells and Shell Collecting."

13th July, 1948: Symposium by Section Leaders:—"Natural Features of Kamberunga Island."

10th August, 1948: Adoption of new Constitution and Rules.

NEW MEMBERS ELECTED

8th June: Mr. L. J. Jones, Lolaki Nursery, Port Moresby, Papua; Miss M. O'Rourke, 157 Lake Street, Cairns.

13th July: Mrs. E. Llewellyn, Esplanade, Cairns; Master R. J. McLoughlin, Earlville.

FIELD ACTIVITIES FOR THE QUARTER

Apart from several small expeditions conducted privately by various club members, three official field days have been organised by the North Queensland Naturalists' Club, and to say the least have yielded a wealth of scientific interest in all branches. With the introduction of specialised parties each led by expert Section Leaders field activities are becoming more specific in application and far more productive of results.

To examine the correctness of the report that trout existed in Owens Creek, where they were reported to have been introduced in past years, the Club conducted a survey of that stream in the Myola area, near Kuranda, during May. Although the aquatic life seems quite profuse, no trout were either taken or observed, though fine specimens of several other fish were caught.

The June field day was incorporated in a major operation which club executives

have had in mind for some time. An organised natural history survey of Kamberunga Island in the mouth of the Barron Gorge, was undertaken over a period of two days, during which a party of seven members probed every aspect of the island's flora and fauna as well as some of its geo-physical aspects. Further observations are planned for this area, to be conducted seasonally in each quarter.

In July we were honoured to have with us nine members of the Royal Society of South Australia to take part in an outing to Campbell's Creek in the Malbon Thompson Range near Alomba. This area was selected especially to permit the visitors to see at close range a section of typical rain forest; to observe some of its features, attractive and otherwise. Bird life exists there in profusion, honey-eaters and flycatchers of several species being included in a list of observed kinds of some thirty or more.

—R. E. WILLIAMS.

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