ATOLL RESEARCH BULLETIN

No. 56

Atolls visited during the first year of the Pacific Islands Rat Ecology Project

by

J. T. Marshall, Jr.

Issued by

THE PACIFIC SCIENCE BOARD

National Academy of Sciences—National Research Council

Washington, D. C.

September 15, 1957

Atolls Visited During the First Year of the Pacific Islands Rat Ecology Project

by
J. T. Marshall, Jr.

I. Acknowledgments

In connection with studies of rats on a typical Pacific high island, Ponape, comparative observations were made on outlying atolls. The Pacific Islands Rat Ecology project, supported by the National Science Foundation and the U. S. Public Health Service, is administered by the Pacific Science Board, with transportation provided by the Office of Naval Research and the U. S. Trust Territory of the Pacific Islands. These notes do not include definitive information on the rats, which will be treated in the official reports of the Pirate Project. Rather, they are intended to give a general impression of the little-known animal life of the atolls. I thank Mr. Del H. Nucker, High Commissioner of the Trust Territory, and his staff for innumerable courtesies and assistance which made this work possible and a pleasure; I thank also Mr. Henry Hedges, Ponape District Administrator, and his staff for facilities and for transportation. I am indebted to Oliver Nampei and C. E. Howell for hospitality and passage to and from Ant Atoll, and to Yeswo and Peter Marshall for assistance in the field work. I am grateful to the residents of the various islands for their hospitality.

II. General Remarks

In contrast with Arno Atoll in the Marshall Islands, the atolls of the Ponape District have a richer flora, providing a greater variety in the shapes and sizes of the plants. The vegetation is denser, the trees are taller, the undergrowth is luxuriant, and there are more epiphytes - all indicating a much more humid climate. There are more nesting sea birds. Because of their nearness to high islands such as Ponape, Kusaie, and Truk, there is a greater chance for the occurrence on them of land birds. The usual resident noddy terns (two species), black-naped tern, crested tern, and fairy tern were seen on high and low islands alike. Non-breeding shorebirds were generally distributed: Pluvialis dominica, Numenius tahitiensis (rare), Heteroscelus incanus, Arenaria interpres; on the other hand wintering Actitis hypoleucos and Calidris acuminata were seen only on Ponape. The toad Bufo marinus was found only on Guam, Ponape and Lele I., Kusaie. The land snail Achatina fulica was seen only at Ponape, Truk and Guam.

III. Descriptions of Certain Caroline Atolls

Mokil Atoll

I visited Kalap Island from 8 a. m. to 4 p. m. of November 29, 1955. Mokil Village is arresting in the beauty of its blue and white wooden houses on stilts, the orderliness of its coral pavements, the precise con-

struction of its stone landing piers and beautifully thatched boat houses and cooking houses (the same community organization and pride is reflected in the Mokil homesteading area at Ponape). For an atoll islet, Kalap is unusual in its great width, high elevations (hills of perhaps 25 feet), and enormous taro swamp, with the huge taros planted in rows.

In the tall forest, coconut husks, fronds and branches, though neatly piled at intervals, provided habitat for rats. One Rattus exulans was shot as it climbed a tree. About the town were domestic cats, pigs, ducks, and chickens. Reef herons (Demigretta sacra) are kept as pets, and are venerated (as the species name implies) as symbols or "ancestors" of certain families.

Carl Dannis, an educated Mokilese with extensive training as a sanitarian and as an assistant to the Rat Ecology project, stated that the Japanese used Manton Islet as a wharf and warehouse area, and that it was still over-run with large rats, presumably Rattus rattus; whereas he suspected that Kalap had possibly only R. exulans. He stated that the white-browed rail (Poliolimnas cinereus), which he well knew from live trapping at Ponape (specimens, not previously recorded from Ponape) occurred in the taro swamp. Although I saw none in the few minutes I looked there, I consider his report reliable.

Pingelap Atoll

Like Mokil, Pingelap has a tiny lagoon and broad land area for an atoll. There is a mangrove swamp in the lagoon. Huge pandanus trees lining the shore screen the village. During my visit from 1:30 to 5:00 p. m. on November 28, 1955, which was sunny and clear, there was a strong breeze. But the air was dead still in the tall jungle of huge coconut palms, breadfruits, pandanus and bananas of the interior. Ferns abounded both on the ground and up the trunks of the trees. There was much clearing of undergrowth, with the brush, logs, and husks piled in long rows. Again this neat arrangement offered better hiding-places for rats than if the material had been left scattered. A fairly large rat, possibly Rattus rattus, ran along such a wall of branches; and a young R. exulans was taken from a nest in a coconut stump. As at Mokil, huge skinks (Riopa albofasciolata) prowled among the pigs in their penned areas. A tame reef heron and a pet booby (Sula) were seen in the village. Anous tenuirostris and Gygis alba were nesting in the breadfruit trees at the outskirts of town.

"Atoll Strand" of Kusaie

Around the south and east border of Kusaie is a narrow coral strand with coconut palms, piles of coconut husks, Scaevola, tall pandanus, vines, and rank undergrowth. It is exactly like an atoll therefore, and I mention it here to show what land animals and birds can occur in a typical atoll environment which is very close to a source of colonists. My visit at this "coral strand" was only during November 25-26, 1955, and I cannot be certain that all the land birds live permanently there. All are species which made

long flights over the lagoon. Yeswo and I trapped and collected on a part of this strand connected to Lele Islet by a rock causeway. On the ocean side of the strand is a sand beach, then a lagoon, then an outer reef; on its inner border is mangrove swamp, then a rushing tidal river, then the steep forested mountains of Kusaie proper.

On Kusaie itself a richly tawny or reddish form of Rattus rattus occurs. But the Rattus rattus collected on the strand were predominately the black or plain brown varieties which prevail on Lele, the port; these were seen crossing the causeway in broad daylight. This means that the rat population of the strand is considerably isolated from that of the mainland.

Ant Atoll; Southern Portion

Peter Marshall and I stayed at Pohn Sanghi Village on the islet called Pukennge (Nikalap Aru I. on hydrographic chart) from December 9 to 12, 1955. We visited Imuntiati Village and hiked to the western extremity of this islet, Panmuk. Coconut palms are throughout planted in rows with varying heights of undergrowth according to the time since trimming. At intervals along the shore, every 50 yards or so, are large native trees, in which most of the land birds were found. Breadfruits and tall symetrical pandanus trees are present. The smallest islets, with beautiful sand beaches, have denser stands with more native trees such as Scaevola and Messerschmidia, and there are Pemphis and a few Sonneratia along the lagoon beach. At the broad west portion of Panmuk was a dense jungle, overgrown from former coconut plantings, with large remaining forest trees (with holes in which lorries were evidently nesting), a lush undergrowth including ferns and a taro swamp. There was much rain during our stay. Doubtless Ant gets much rain from the clouds which concentrate at windward Ponape.

Roof rats (R. rattus) raided copra drying sheds by day; these and R. exulans were trapped in abundance. None was seen in trees during night hunting. Domestic cats, dogs, pigs, and chickens occur. A school of porpoises played at the entrance to the lagoon; these animals performed double flips and double twists with ease in their jumps out of the water.

Ant Atoll, Alona (Wolauna) Islet

This remote islet at the northwest corner of the atoll was visited from May 14 to 16, 1956 by Peter Marshall, Yeswo and myself, in order to see what animals might occur in the untouched natural vegetation. All kinds of vascular plants that I could see were collected, and identified by F. R. Fosberg (I inadvertently missed Morinda, which was common, judging from fruit lying on the ground). The configuration of the vegetation may be judged from the following notes on the plant collections:

No. 153 Derris trifoliata Lour.
Small seedling growing in coral sand just within woodland edge at shore. No others seen.

No. 154 Terminalia samoensis Rech.
Large tree, shiny leaves, trunk 2 feet in diameter. Abundant at periphery of islet, but back of Messerschmidia.

155 Polypodium scolopendria Burm. f.
Growing from rhizomes in patches in shade on coral ground. Also on large horizontal trunks of Messerschmidia. Common.

156 Cenchrus echinatus L.
Creeping and erect on coral ground at edge of woods just behind usual camp ground. Only the one patch, 10 feet across.

157 Pisonia grandis R. Br.
Smooth pale bark, roots sprawl over coral, many vertical shoots from big trunks. Abundant in interior.

158 Messerschmidia argentea (L.f.) Johnst.
Large tree in bloom, flowers white, and small green berries. Checkered dark bark. Abundant just along shore.

159 Pandanus tectorius Park.
Only one individual present. Few prop roots, just about 8 inches off the ground. Tree 12 feet tall, single trunk pale, bulges above ground. Leaf 6½ feet long.

160 Asplenium nidus L.
Huge plant growing on coral ground in shade. Leaves 4½ feet long. Only 2 others seen, both near this one; one of them was dwarfed and was growing out of a half coconut shell.

161 Cocos nucifera L.
Four or 5 old trees in center of islet, other seedlings planted and ringed with coral walls; other seedlings at far shore look as though the nuts have washed ashore and grown.

Note: No Scaevola sericea was seen on this islet.

The nearly elliptical islet is about 400 feet long. It is composed of jagged coral boulders built up to a peripheral rim with gravel and sand, but sunken and exposed in the interior sink. The shore is of coarse sand and gravel surrounded by a hard coral pavement covered at high tide and strewn with black coral boulders. A long white coarse sand spit extends southward about 200 yards. On it a large colony of Thalasseus bergii had abandoned their fresh eggs, which seemed to have been rolled by a high tide. The birds protested our presence and dived at us but never returned to their eggs.

Gygis alba and Anous tenuirostris nested in the trees; many of the latter's dense population were dead and dying. Droppings were profuse but I saw no actual deposits of guano; the material seems to drain out from the coral interior, though it must contribute to the raised dark sandy border. The

dominant vegetation is the dense closed canopy of Terminalia, Pisonia, and Messerschmidia about 30 feet high. All other plants seem to be accidental or local. Part of the raised loamy border is clear and park-like beneath the canopy; either bare or with "lawns" of Polypodium.

In late afternoon hundreds of frigate birds (Fregata minor) and boobies (specimen sent to USNM) gathered, circling overhead, and after dark they began to land in the trees, all coming in from the same direction.

Five or six reed warblers (Acrocephalus luscinia), a large population for so small an islet, sang constantly in the trees. Only a couple of house flies were noted despite the numerous dead noddies. We were bitten by long-legged delicate flies a little smaller than the house fly. Cockroaches and ants (including a biting kind) swarmed over the whole islet. One earthworm was seen. Small crabs set off most of the rat traps and tiny hermit crabs abounded. No herons, rats, bats, toads or snails were found.

Oroluk Atoll

Yeswo and I visited Oroluk on June 5-6, 1956. This huge atoll is mostly an elliptical reef, with only a small islet at one end. This has a natural forest with Pandanus understory at the west end, open plantings of coconut palms in the central part, and a large papaya garden with taros and dense weeds. At the edge of the beach is Messerschmidia and some dense grass. Pisonia grandis, Morinda, Calophyllum and Asplenium nidus were seen. The ground is of white sand at the beach, followed inland by larger coral fragments, and the interior has stinking black mud from bird droppings. Three men from Kapingamarangi were staying at the island; they had captured 27 adult female green tortoises, which were taken back to Ponape. These had been laying eggs in the beach sand. Others were seen in pairs in the lagoon. Domestic pigs and chickens were present. Eleven roof rats (R. rattus) were trapped, mostly in the thatched buildings. These were all remarkably alike in color even to a white spot on the chest. This gives the impression of inbreeding within the progeny of perhaps a single recently-introduced pregnant female -- in marked contrast to the heterogeneity typical of all other rat populations I have trapped in Micronesia.

Invertebrates noted were small day-biting mosquitoes, large coconut crabs (which carried off the rat traps), purple square land crabs, ghost crabs on the sand, hermit crabs, katydids. There was a large nesting colony of Fregata minor and boobies (Sula -- apparently both S. sula and S. leucogaster) in the native trees to the north.

I estimated the dense population of starlings (Aplonis opacus) at about 400, 95% adults. They differed visibly in size and color, suggesting a mixed stock. Families of juveniles begging food from their parents were dusky ventrally with indistinct streaking. But I saw at least one grown bird whose ventral color was white with clear black streaks. Some of the calls of these starlings differed from those on Ponape. They were shabby as if heavily parasitized (as were my specimens with mites).

These tame birds entered the houses. They spent much of their time in the very large papaya gardens and left none of the fruit for human consumption. The Kapingamarangi people used a slingshot against the birds, with which I collected two. Both had mended serious bone fractures yet were of normal behavior. This starling also occurs on Kapingamarangi Atoll, reported by Niering in Atoll Res. Bull. No. 49.

Conclusions on nesting and roosting oceanic birds. --

Unlike the small noddy terns and fairy terns (which roost and nest successfully on inhabited atoll islets) the large boobies, frigates, and terns are limited to seldom visited islets such as Alona and Oroluk. Native policies of preserving nesting sanctuaries for turtles and large oceanic birds should be encouraged.

IV. Distribution of Resident Land Vertebrates on Caroline Atolls, 1955-56.

On the accompanying table the fauna of the high islands, presumably the source of some of the animals of atolls, is entered for comparison as is that of Arno Atoll, Marshall Islands. Kusaie was visited November 23-27, 1955, Ponape from August 1955 to July 1956; Moen I., Truk from June 20 to 28, 1956. All the following were observed in numbers and are presumed to be permanently established and able to carry out their entire life cycle on the island indicated. The Ponape mountain starling is still established over a large area of forest, but is very rare.

Table 1.
Distribution of resident land vertebrates.

(Islands are arranged from west to east, distances apart in miles entered between their names).

Animals	Islands / Distances in miles, approx.	Truk	235	Oroluk	185	Ant, Wolauna I.	Ant, Pukennge I.	10	Ponape	100	Mokil	65	Pingelap	165	Kusaie (coral strand)	Kusaie	600	Arno
Rattus rattus		*		*			*		*				?		*	*		*
Rattus exulans		*					*		*		*		*			*		*
Rattus norvegicus									*									
Mus musculus		*							*									
Pteropus (large, not molossinus)		0					0		*							0		
Emballonura									*									
Deer (2 species)									*									
Cat, feral									0									
Pig, feral																		
Dasia smaragdina		0		*			*		*		*		*		*	0		*
Emoia of Truk		*																
Emoia boettgeri				*			*		*		*		*		*	0		*
Emoia arnoensis																		*
Emoia cyanura		0		*			0		*		*		*		*	*		*
Striped bronze Emoia		0					*		*		*		*			*		
Leiolopisma noctua ?		0							*		0							*

* Specimens collected and deposited in U. S. National Museum, some duplicate bird skins are in the collection of the Southwestern Foundation of Vertebrate Zoology, Los Angeles.

0 Observed but not collected

Table 1. (cont'd)

Animals	Islands	Truk	Oroluk	Ant, Wolauna I.	Ant, Pukenngе I.	Ponape	Mokil	Pingelap	Kusaie (coral strand)	Kusaie	Arno
	Distances in miles, approx.	235	185		10	100	65	165		600	
Riopa albofasciata		O	O		*	*	O	*			*
Gehyra oceanica		O			*	*	*	*		O	*
Perochirus articulatus					*	*					*
Lepidodactylus lugubris		O		*	O	*	*	O		O	*
Gymnodactylus pelagicus						*					*
Demigretta sacra		O			O	O			O	O	*
Nycticorax caledonicus		O									
Ixobrychus sinensis		O									
Anas superciliosa		O									
Gallus gallus, feral in jungle		O				*				O	
Poliolimnas cinereus						*	?				
Ptilinopus porphyraceus		O				*				O	
Ducula oceanica					O	*				O	*
Gallicolomba xanthonura		O				*					
Trichoglossus rubiginosus					O	*					
Asio flammeus						*					
Collocalia inquieta		O				*			*	*	

Table 1. (cont'd)

Animals	Islands	Truk	Oroluk	Ant, Wolauna I.	Ant, Pugennge I.	Ponape	Mokil	Pingelap	Kusaie (coral strand)	Kusaie	Arno
	Distances in miles, approx.	235	185		10	100	65	165		600	
Halcyon cinnamomina					O	*					
Edolisoma tenuirostre						*					
Acrocephalus luscinia		O		O	*	*					
Rhipidura rufifrons						*					
Myiagra oceanica		O				*					
Metabolus rugensis		O									
Aplonis opacus		O	*		*	*	*			*	
Aplonis pelzelni						*					
Myzomela cardinalis		O			*	*			*	*	
Zosterops conspicillata		O				*					
Zosterops cinerea						*			*	O	
Rukia sanfordi						*					
Erythrura trichroa		O				*					
Lonchura nigerrima						*					

* Specimens collected and deposited in U. S. National Museum, some duplicatesbird skins are in the collection of the Southwestern Foundation of Vertebrate Zoology, Los Angeles.

O Observed but not collected.

Conclusions on reptiles. — There is no impoverishment of the lizard fauna on sizeable atolls remote from the high islands; for instance, the faunas of Ponape and Arno (Atoll Res. Bull. #3) are practically identical, and have the same number of species, though each has one species not found on the other. Therefore the lizard faunas of atolls are independent of proximity to high islands.

Inasmuch as the 1955-56 lizard collections have not yet been identified by experts, I merely assume, through familiarity in the field, their identity with species on Arno. In case my suppositions are wrong, the following descriptions are offered for provisional identification:

Diurnal Skinks

Dasia smaragdina large, green (with color polymorphism: olive, brown, black); trees.

Truk Emoia medium-small, brown above, light gray beneath; ground and vines.

Emoia boettgeri medium, brown above, yellow below; ground.

Emoia arnoensis medium, black; ground.

Emoia cyanura small, dorsally striped, bluish tail.

Striped Emoia small, bronze back, striped sides, pale venter; ground.

Leiolopisma noctua? small, bronze back, blackish sides, pink beneath; under leaf litter.

Riopa albofasciolata very large, dusky above, pink beneath, black hash-marks along lower jaw distinguish even the juveniles; ground.

Nocturnal Geckos

Gehyra oceanica large, tail narrow; arboreal.

Perochirus articulatus medium, tail like arrow-head; houses.

Lepidodactylus lugubris small, tail like arrow-head; houses, trees.

Gymnodactylus pelagicus medium, no frills on toes; ground.

Tentative conclusion on birds.— Several kinds of land birds can occupy the atoll environment where a high island is a nearby source of replenishment (within sight, as at Ant).

V. Non-native birds on atolls

Kwajalein I., Kwajalein Atoll, Marshall Islands.— On June 11, 1950 I saw a mynah (Acridotheres tristis) perched on the main airport building. During several days' stay in July 1956, I noted at least a half-dozen at the gardens around this same building, now used as a nursery. They were eating papayas.

Wake Island.— During a sojourn on July 19-21, 1955 I saw a male English sparrow, Passer domesticus, alight on the quonset at the west end of the Transocean Airlines BOQ area on July 20th.

The ease with which non-native animals are now being transported is illustrated at Guam, where the following were unheard-of in 1945. I saw at the U. S. Naval Hospital (June 28-July 15, 1956) several pairs of tree sparrows, Passer montanus, and a small flock of rice birds, Munia oryzivora. In addition the musk shrew, Suncus murinus, is now common, and there are reliable reports from sanitation officials of a large green snake and an anopheline mosquito.