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The terrestrial fauna of Apid Island, Inopacan, Leyte, Philippines

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ABSTRACT

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The terrestrial fauna of Apid Island in different types of habitat (mainly agricultural) was studied by sweep-netting of arthropods; hand sampling of species living on the ground and by visual observations. Results showed that the island is relatively species-poor compared to an area of the same size and habitat type on mainland Leyte. This is mainly due to (1) the small size of the island, (2) the lack of running waters, and (3) human activities which have removed most parts of the natural vegetation. As a common tendency, the most abundant faunal groups are those which show a preference for more open and dryer habitats than a tropical rainforest. The most abundant herbivores are grasshoppers, and the most abundant predators are spiders (in all habitat types). Land snails are the common group of species living in the soil, which is explained by the fact that Apid Island is built up of limestone.

Keywords: biodiversity. sweep-net sampling. terrestrial arthropods.

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INTRODUCTION

Half of all species in the world are found in tropical rainforests. The natural potential vegetation of the Philippines is tropical rainforest. The level of endemism among animal species is considered to be high due to the isolation of the Philippines from the Asian mainland during the Ice Age (except Palawan).

The species-richest group of all animal species worldwide are the insects. As it is not known how many species of this group actually are living in the remaining parts of the rainforest, the total number of species can only be estimated. The number ranges from 5 to 30 millions including animal and plant species. In the Philippines, the insects have been found to have about 20,000 species (Table 1).

Table 1. Vertebrates and invertebrates diversity of the Philippines

Vertebrates	Species	Endemic species
Mammals	179	110 (61%)
Birds	558	171 (31%)
Reptiles	252	159 (63%)
Amphibians	96	51 (53%)
Invertebrates		
Insects	20,000	
Spiders	341	
Millipedes	54	
Centipedes	44	
Mollusks	2,782	

Anonymous (1997)

The endemism of invertebrates is widely known. It is estimated to range between 44 to 87 percent. Biodiversity in this context refers to the number of animal and plant species living on earth. Which factors determine the species composition on an island? These are the following: evolution, immigration and human influence.

Evolution

The biodiversity of islands is of special interest particularly with respect to origin and species. Since islands are isolated, their populations start to differ from each other leading to the appearance of new species.

Immigration from the mainland

The theory of Island Biogeography by McArthur & Wilson (9176) states that an increase in distance (near to far) lowers the immigration curve, whereas an increase in island area (small to large) lowers the extinction curve (Fig. 1).

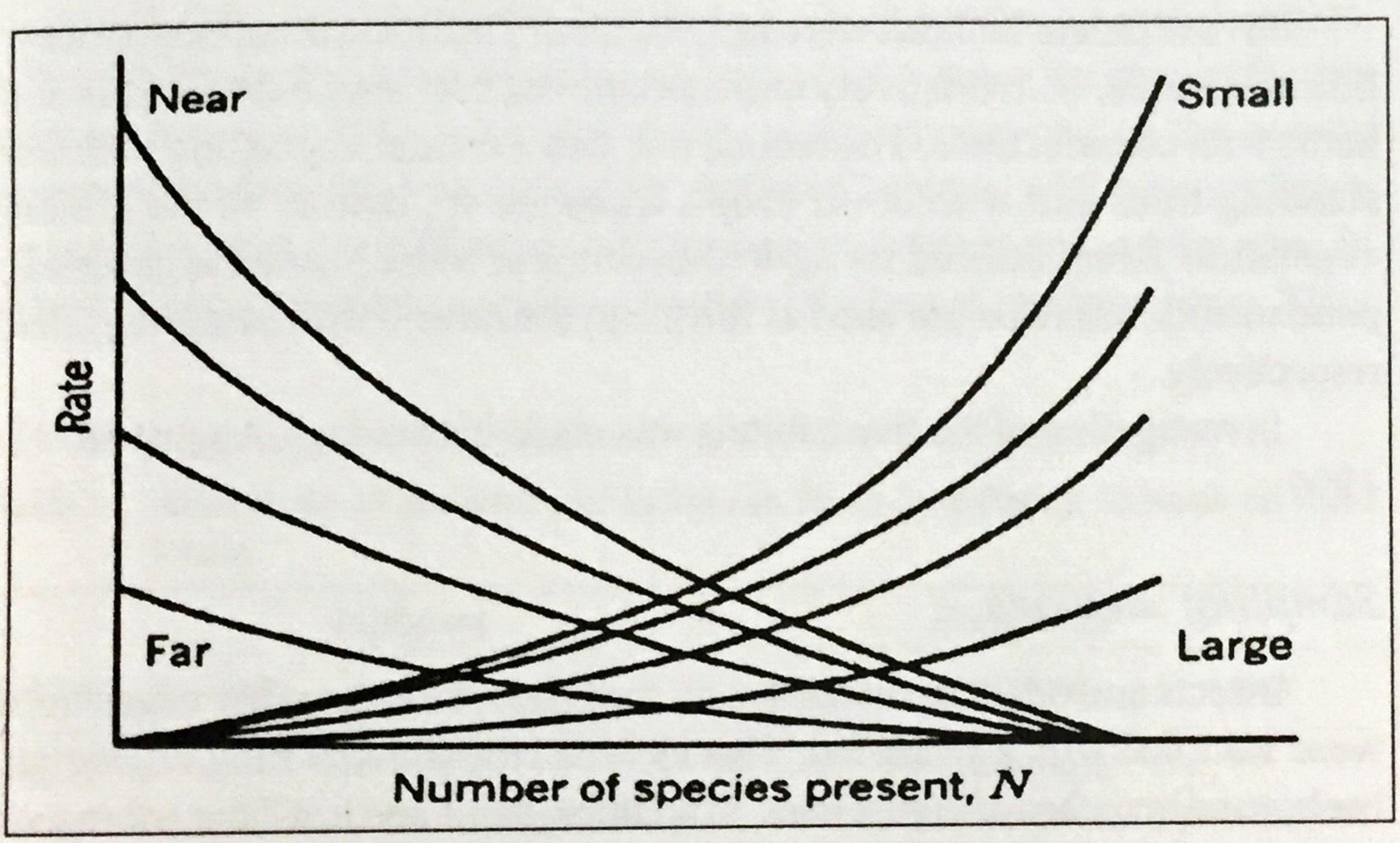

Figure 1. The effect of island size and distance on equilibrium number of species

The number of species on an island is a result of a dynamic balance. This can be predicted if two main factors are known: the rate of immigration and the rate of extinction. Big islands provide more species than smaller ones. The farther the distance of an island to the mainland, the smaller is the total number of species: The rate of extinction is the same; the immigration rate is smaller.

Human influence

Another important factor is human influence. Biodiversity on an island can be changed by hunting or agricultural production. On Apid Island, all habitats have been influenced by man. Only the rocky area is closest to natural ecosystem.

MATERIALS AND METHODS

Sampling sites

Five different habitats were investigated. The first habitat was a rocky, limestone area, with relatively undisturbed vegetation of bushes, trees and herbs with coconut trees. The second one was a coastal vegetation with few standing trees and with cover crops, *Ipomoea* sp. mainly as the ground vegetation. Areas utilized for agriculture such as those planted to coconuts, pandan and cassava were used as the third, fourth and fifth sampling sites, respectively.

Investigation of the five habitats was made in two days, August 30 -31, 1999.

Sampling methods

Insects and other invertebrates on the plants, crops or other vegetations were sampled with a sweep net. This included the soil-covering vegetation, bushes and branches of higher trees. In addition, stone and leaf-litter arthropods or animals were collected by hand picking and aspirator methods.

Collected invertebrates were killed in a plastic- box containing ethyl-acetate. They were brought to the laboratory for identification using appropriate references and taxonomic keys. Those invertebrates which were too fast to be caught were identified instantly in the sampling site based on visual observation.

RESULTS AND DISCUSSION

Appendix Tables 1 and 2 list the animal fauna observed and recorded on Apid Island. This included vertebrates such as birds, mammals and reptiles and the invertebrates such as crustaceans and arthropods. However, for the selected habitats investigated and sampled, quantitative breakdown of animal fauna was done. These animals were grouped broadly into predators and herbivores and abundance and frequency were recorded based on the sweep net method. Table 1 shows the frequency and abundance of these animal fauna collected.

In the natural habitats, more species of the same predators and the herbivores were observed than in the more man-influenced habitats. However, it is very remarkable that there is a high number of grasshoppers, representing the main herbivores even in the rocky area. One reason for this phenomenon could be the small water-retaining capacity of the porous limestone-underground providing dry and open habitats, which are preferred by grasshoppers in addition to some ground vegetation around the area. In almost all habitats, hunting spiders comprised the largest predator group. They

Table 1. Abundance of predator and herbivore fauna in different habitats on Apid Island

	Predators			Herbivores		
Habitat	low	medium	high	low	medium	high
Natural vegetation			6 spiders		3 Lepidoptera 3 Heteroptera	5 grasshoppers
Beach-site	1 shrew mouse		6 spiders	2 Heteroptera	3 Gryllidae	6 grasshoppers
Pandanus		3 spiders		1 grasshopper		
Coconut	1 gecko			1 Rhino beetle		
Cassava	1 carabid			1 white fly	2 Tetrigidae 2 grasshoppers	

were even found sitting on pandanus plants which were the species-poorest areas on the island.

As to be expected in a calcium carbonate-rich underground, the number of landsnails living in the niches between the rocks, was relatively high. Dead shells are conserved for a certain time.

The species number recorded from the island during the study period of two days seems quite few compared to the species number on a similar area of the same size on larger islands such as Leyte. This can be explained by the type of habitat in the island. Two factors can be mentioned: first, the type of habitat without running waters excludes all species adapted to wetland; second, the distance to Leyte is too far to expect the migration of many species existing there. This was predicted by the theory of McArthur & Wilson (1976) and specially the small size of the island may prevent the constant existence of stable population, *i.e.*, extinction rate is expected to be high. Only the land snails probably have higher diversity which is explained by the geological characteristic of the island.

Another constraint which could explain the results would be the time and method of collection. The method and the time recording do not cover the requirements of sampling all types of habitats. For example, the night-trap-catching would have increased the number of species recorded significantly.

CONCLUSION

As a common tendency, it can be observed that species with preference for dry and open habitats are over represented in Apid Island compared to the fauna of a natural rainforest. Two factors contribute to this situation: first, is the water household of the island. The geological underground is unable to retain freshwater on the surface except in several small rockpools. Moist areas which are typical for the tropics, such as swamps or ricefields, can not be found on Apid Island. The existing open vegetation with bushes and some trees is a consequence of this limited water supply. Second, is human activity Obviously it has an impact on the vegetation. In areas where agricultural

production is done like planting pandanus or cassava, the vegetation is fundamentally changed into an open, light habitat. Moreover, on the rocky habitats where land use is not intensive, branches of trees or smaller plants are cut preventing the development towards a closed-canopy forest. A direct consequence of this vegetation structure is the large number of grasshopper species and salticid spiders representing a more thermophilous and dry resistant fauna.

LITERATURE CITED

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APPENDICES

Appendix Table 1. List fo fauna observed in Apid Island

Family	Species	Common Name
*Birds**		
Adeidae	*Ecretta sacra*	reef egret
	Butorides striatus	little magrove heron
Rallidae	Gen. sp.	
Scolopacidae	*Actitis hypolencos*	common sandpiper
Sternidae	*Sterna hirundo*	blackbilled common tern
	Sterna sumatrana	black-naped tern
Cuculidae	*Centropus* sp.	
Alcediinidae	*Halcyon chloris*	white-collared kingfisher
Hirundinidae	*Hirundo tahitica*	
Campephagidae	*Lalage nigra*	Pacific swallow
Laniidae	*Lanius cristatus*	pied triller
Monarchidae	*Rhipidura javanica*	brown shrike
Nectarinidae	*Nectarinia jugularis*	olive-back sunbird
Ploceidae	*Passer montanus*	tree sparron
Sturnidae	*Applonis panayensis*	Philippine glossy starling
Oriolidae	*Oriolus chinensis*	back naped oriole
Mammals		
Soricidae	Gen. sp.	
Pteropodidae	*Pteropus hypomeanus*	fruit bat
Unproofed rumor:		
Rodentia Muridae	*Rattus malayensis*	
Reptiles		
Lacertidae		
Geckos		
Crustacea		
Decapoda		hermit crabs (also in the middle of the island)
		coconut crabs

* identified by P. Widmann, compiled by S. Schoppe

Appendix Table 2. List of arthropod communities observed in the different habitats (sampling sites) in Apid Island

Order	Suborder	Family
Natural habitats:		
Insecta		
Orthoptera	Caelifera	4 Acrididae
Hemiptera	Heteroptera	1 Largidae
		1 Scutelleridae
		1 Scotinophora sp.
Blattodea		1 Blattidae
		1 Blattelidae
Coleoptera	Polyphaga	2 Cerambycidae
		1 Curculionidae
		1 Coccinellidae
Mantodea		1 Mantidae
Odonata	Anisoptera	2 Libellulidae
Lepidotera	Ditrysia	2 Psychidae
Chelicerata		Scorpiones 2 sp.
Myriapoda		1 sp. Diplopoda
Arachnida	Aranaeida	3 Heteropodidae
		3 Salticidae
Beach Site:		
Insecta		
Orthoptera	Caelifera	6 Acrididae
	Ensifera	3 Gryllidae
Hemiptera	Heteroptera	1 Largidae
		1 Prrrhocoridae
Coleoptera	Polyphaga	1 Chrysomelidae *Epilachna* sp.
		1 Chrysomelidae
		1 Cleridae
		2 Phalacridae
Lepidoptera	Ditrisya	1 Pterophoridae
		2 Psychidae
		1 Papilionidae
Diptera	Brachycera	1 Sarcophagidae
Arachnida	Aranaeida	1 Araneidae
		5 Salticidae

Appendix Table 2. *(continuation)*

Order	Suborder	Family
Pandanus Areas:		
Insecta		
Orthoptera	Caelifera	1 Acrididae
Arachnida	Aranaeida	3 Salticidae
Cassava Areas:		
Insecta		
Coleoptera	Aadephaga	1 Carabidae
Orthoptera	Caelifera	2 Acrididae
		2 Tetrigidae
		1 Blattelidae
Arachnida	Aranaeida	2 Salticidae
Coconut Areas:		
Insecta		
Coleoptera	Polyphaga	Scarabaeidae 1 *Ocrytes rhinoceros*
Litter and Soil:		
Mollusca		
Gastropoda	Pulmonata	6 species
Insecta		
Isoptera		