PREFACE

What follows consists of systematic and annotated lists of categories applied to fauna by the Nuaulu people of eastern Indonesia, the phylogenetic glosses for these categories, plus notes on the uses and cultural associations of the animals concerned. In other words, it is a kind of ethnographic *inventorum natura*. It is designed to complement *The cultural relations of classification: an analysis of Nuaulu animal categories from central Seram*, (published by Cambridge University Press), in which the main arguments, findings and implications of the work undertaken are discussed. The detached presentation of the documents here has been dictated only by their extrinsic character, and by the exigencies of academic publishing. There is also the added advantage of enabling ready reference for those who may wish to use the material for comparison or re-analysis. Each of the chapters group animals in a pragmatic way: in some they are grouped in a way which Nuaulu would recognise as plausible (bats, birds, turtles, snakes, frogs, fish and molluscs), in others the grouping follows Western and scientific convention (lizards, insects, crustacea), in others still the criteria are mixed (land mammals). Throughout this monograph, the guiding principle has been to provide an arrangement and sequence which will be most useful to those who are most likely to want to consult it.

Some of the material included here has previously been published elsewhere, though it generally appears in a revised and modified form. For permission to reproduce copyrighted text, I would like to thank my co-authors, and the editors and publishers of the journals in which the following articles were printed. Chapters 4 and 5 first appeared as 'The content of categories and experience: the case for some Nuaulu reptiles' (with A. F. Stimson and J. Menzies) in *Journal d'Agriculture Tropicale et Botanique Appliquée* (1976, 24: 3-22); and Chapter 7 as 'Structure and inconsistency in Nuaulu categories for amphibians' (with A. F. Stimson and J. Menzies), also in *Journal d'Agriculture Tropicale et Botanique Appliquée* (1976, 23: 125-38). Parts of this Preface and the Introduction also appear in *The cultural relations of classification*, and I am grateful to the Syndics of Cambridge University Press for allowing me to incorporate the text here.

The various periods of fieldwork upon which the study is based have been conducted under the auspices of the Lembaga Ilmu Pengetahuan Indonesia (the Indonesian Academy of Sciences) in Jakarta, the staff of which have always been most generous and cooperative. The 1975 season

was also conducted in cooperation with the Lembaga Biologi Nasional (The National Institute of Biology) and the Museum Zoologicum Bogoriense in Bogor, and I am particularly grateful for the sponsorship of Dr. S. Kadarsan in this respect.

Financial support during 1969-71 came from a Social Science Research Council Studentship (No. S68.8243), augmented by grants from the London-Cornell Scheme for research in South and Southeast Asia and the Central Research Fund of the University of London. The 1973 phase was supported mainly by a Hayter Travel Grant. In 1975 I received a Social Science Research Council Award (HR3410.2) for research on 'Nuaulu ethnobiology and ecology', covering the period 1975-77. In both 1969-71 and 1973 audio-visual equipment was provided by the Central Research Fund of the University of London. Acknowledgements are also due to the British Academy, Nuffield Foundation and University of Kent at Canterbury whose assistance on a different project in the same area permitted three further brief visits to south Seram, in January 1981, June 1986 and February-March 1990.

Over the years my ethnozoological work has relied upon the generous help of a large number of specialists. Such support is still unusual in ethnographic research, although very necessary and relatively frequent in ethnobiology. In particular, I have been able to benefit from the expertise of the following staff of the Natural History Museum in London:

Department of Zoology: Mr. John Edwards Hill and Mr. P. D. Jenkins (Mammalia); Miss A. Grandison and Mr. A. F. Stimson (Amphibia, Reptilia); Dr. Alwyne Wheeler, Dr. P. J. P. Whitehead and Mr. O. A. Crimmen (Fish); Mr. K. H. Hyatt, Mr. F. R. Wanless, Mr. Paul D. Hillyard (Arachnida and Myriapoda); F. G. Easton (Annelida); Mr. R. W. Ingle and Dr. Anthony A. Fincham (Crustacea); Ms. K. M. Way, Mr. F. Naggs and Mr. J. F. Peake (Mollusca); and Dr. E. N. Arnold.

Department of Entomology: David R. Ragge, Mrs. Judith A. Marshall (Orthoptera), W. R. Dalling (Heteroptera), R. T. Thompson (Coleoptera), Kenneth G. V. Smith (Diptera), D. Morgan (Hymenoptera), Dr. W. J. Knight (Hemiptera), Ms Julie Harvey (Library), and Ms Theresa Clay.

Sub-Department of Ornithology (Tring): Dr. D. W. Snow, Dr. P. J. K. Burton and Mr. G. Galbraith.

Other specimens were identified for me by the late Dr. Serene in Paris, Mr. J. Menzies and the staff of the Department of Biology at the University of Papua New Guinea in Port Moresby, and Dr. Soenartono Adisoemato in Bogor. I am also grateful to the British Museum (Natural History) and the

Biology Department of the University of Kent at Canterbury for the provision of collecting equipment and preservatives. Dr. J. D. Kesby of the University of Kent and the late Dr. C. M. N. White of Lytham St. Annes were most helpful in providing informed comment on a number of queries. While this monograph is not an account of Nuaulu ethnobotany, the identification of plant species has been a necessary part of a broader understanding of Nuaulu relations with their fauna. I am consequently also indebted to Mr. L. L. Forman of the Royal Botanic Gardens at Kew, and Dr. Chang Kiaw Lan of the Botanic Gardens in Singapore.

Finally, I would like to thank all those who have supported me during various fieldwork phases: in Amboina, Sepa and the Nuaulu villages of Hahuwalan, Watane, Aihisuru, Bunara and Rohua. Since 1988 I have been able to draw on the work of Rosemary Bolton of the Summer Institute of Linguistics; it is her orthography which I adopt here in almost every instance, while her clarification of various details of nomenclature, semantics and grammar have been invaluable. Jane Pugh kindly modified some existing maps, Brian Durrans of the Museum of Mankind in London has facilitated access to Nuaulu artifacts, while G. A. Nagelkerke, Mrs. L. van der Spree-Annyas and Gerrit Knaap have courteously handled a number of queries. For expert editing assistance in producing camera-ready copy I am indebted to Barbara Delaney, Michael Fischer and Jan Horn. Various chapters have benefitted from the critical comments of the late Ralph Bulmer and Paul Taylor, though neither would necessarily approve of the final product in its entirety.

R. F. Ellen,
Crockshard Farmhouse, Wingham

A NOTE ON ORTHOGRAPHY

As so much of my argument here hinges on the form and meaning of Nuaulu words, orthography is no insignificant matter. My own language materials are extensive, but unsystematic and linguistically unsophisticated. It is therefore a great pleasure, and something of a relief, to be able to draw upon the recent work of Rosemary Bolton [1990], work which at the time of writing is still in progress. The letters which she uses to represent Nuaulu speech sounds are phonemic, and include 11 consonants and five vowels composed of the following phonetic features:

Consonants

Glottal				
Voiceless stops	p	t	k	
Fricatives		s		h
Nasals	m	n		
Flaps		r		
Laterals		l		
Semi-vowels	w	y		

Vowels

		Front Unrounded		Back Rounded
High	close	i		u
Mid	half open	e		o
	open		a	

The Indonesian alphabet includes all Nuaulu phonemes and is used here without modification. Stress is unmarked in most regular cases and normally occurs on the penultimate syllable. Indigenous words appear in **boldface**. One consequence of my adopting this revised phonology and orthography, as alert readers may notice, are certain changes in the written appearance of some Nuaulu words (e.g. **totuwe** becomes **totue**). There is not as yet any Nuaulu consensus as to the proper way to write personal names, clans and places. To avoid confusion they usually appear here as in earlier publications by me.

CHAPTER ONE
INTRODUCTION

This monograph provides much of the data upon which the arguments contained in *The Cultural Relations of Classification* rest. As I have explained in the Preface, it cannot be considered independent of this and for reasons of economy much background data are omitted here: data on the Nuaulu language, particularly on the structure of animal nomenclature, and on various procedural matters. Those who wish to make fuller sense of what is here presented are strongly advised to consult that work. On the other hand, some basic ethnographic orientation is essential, and this accounts - for example - for the reproduction of maps which appear in the companion volume. The main purpose of this introduction is to provide this orientation, to say something about the history of ethnozoological studies on Seram, my own fieldwork and the methods employed, and to explain the technical conventions adopted in the chapters which follow.

1.1 The Nuaulu: culture, society and environmental context

The island of Seram lies in the central Moluccas (figure 1), part of the modern Indonesian province of Maluku. It is, therefore, part of the biogeographic region of Wallacea, a term used here to conveniently designate those islands lying between the Sunda and Sahul continental shelves [Darlington, 1957: 462-73; Ellen, 1978b; White, 1973: 175]. In biogeographic terms, it marks a zone of transition between the oriental biota of southeast Asia and that of Melanesia, Australia and beyond. Its western boundary is marked by Wallace's faunal line, its eastern boundary by Lydekker's line. Because it is a transitional zone of small islands the fauna is, for many land-based groups, a relatively depauperate one.

The larger islands of the Moluccas (Seram, Halmahera, Buru) are still dominated by tropical rain forest, although most of the smaller ones are now denuded and extensively planted with clove, nutmeg, coconut palms and other useful trees, and subjected to forms of dryfield cultivation, especially along level coastal land.

Seram itself (figure 2, plate 1) can be usefully divided into about ten terrestrial biotopes [see also Ellen, 1984: 177-9]: (1) montane forest, (2) mature

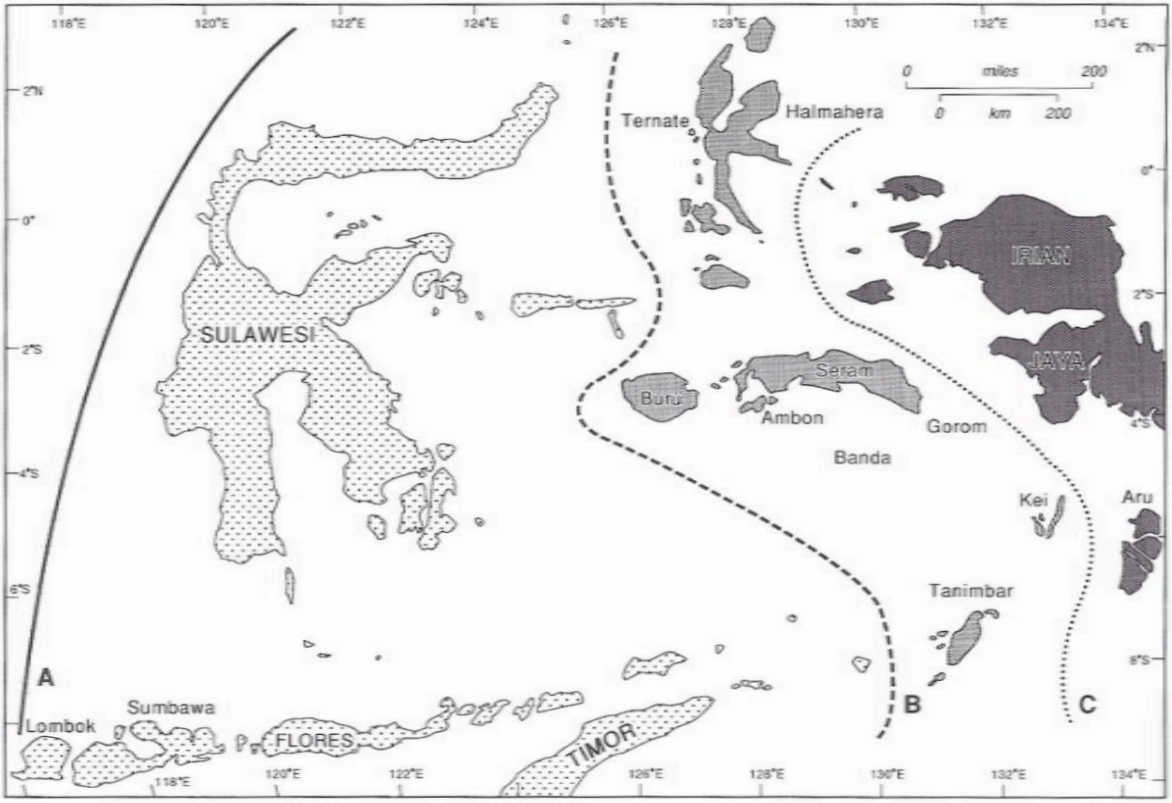


FIGURE 1: The Moluccan islands in relation to Sulawesi and Irian Jaya, showing (a) Wallace's line of faunal balance, (b) Weber's line and (c) the western boundary of the Australian biogeographic region. Wallacea is the aera between lines *a* and *c*. The modern Indonesian province of Maluku includes all islands between lines *b* and *c*, plus the Aru archipelago to the southwest, Sula to the west and Wetar to the southwest. Note: Unless otherwise stated, the orientation of all maps is identical to fiure 1

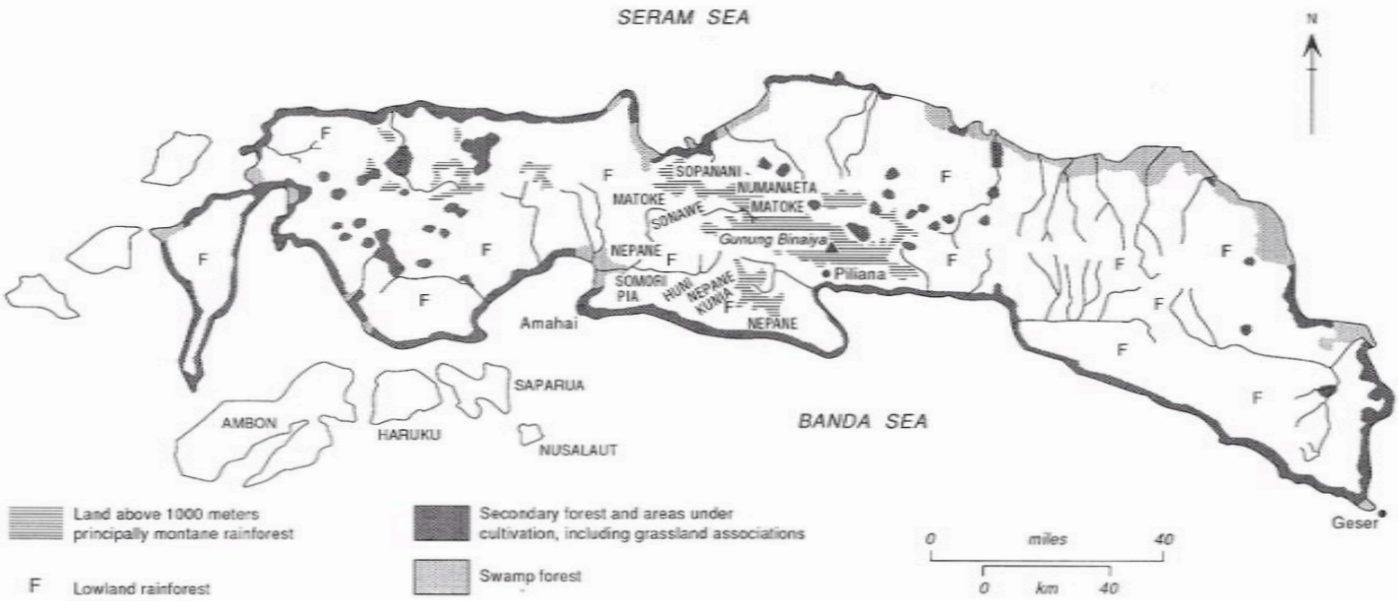


FIGURE 2: The island of Seram and adjacent areas, showing population distribution and principal environmental zones. Elpaputih Bay lies W of Amahai, Teluti Bay SE of Piliana and Seleman Bay half way along the north coast. Adopted from Topographische Dienst 1921, *Eiland Seran en omliggende eilanden* (Scale 1: 5000 000), The Netherlands. The approximate location of Nuaulu clans prior to their movement to the coast, and as elicited from informants, has been superimposed (e.g. MATOKE). Square brackets indicate the bottom corners of the area enlarged in figure 3.

lowland rain forest, (3) mixed secondary forest, (4) bamboo brush, (5) sago swamp forest, (6) swidden and dryfield cultivated areas, (7) planted groveland, (8) freshwater rivers, streams and pools, (9) grassland, and (10) settlement sites. To this we can add a further four coastal and marine biotopes: (11) the littoral, (12) rocky shores, (13) sandy shores, (14) muddy shores, mangrove swamps and estuaries, (15) coral reefs, banks and atolls, (16) deep sea waters. These variations in the environment with which Nuaulu interact are illustrated in plates 2 - 5 here, and also in plates 1.1 - 1.6 of *The Cultural Relations*.

The Nuaulu are a people of the south central part of the island. They inhabited, during the period of my research, five settlements along the narrow coastal strip, in the vicinity of the old Muslim domain of Sepa (figures 2 - 3). This is approximately where longitude 129 5' East meets the south coast of the island, in the Amahai kecamatan (administrative sub-district), between the bays of Elpaputih and Teluti. In 1971 they numbered some 500 individuals, and formed approximately half of the speakers of the 'Nuaulu' language group; the remainder living in and around the villages of Oping and Rumaolat on the north coast at Seleman Bay. The population has almost doubled in the two decades since then.

Before the middle of the nineteenth century Nuaulu clans occupied separate hamlets in the highlands around the drainage systems of the rivers Ruatan and Nua (figure 3). At this time there had been relations between coastal Muslim settlements for at least two hundred years, and the Nuaulu were clearly engaged in intermittent relations of enmity (head-hunting and warfare), alliance, and probably trade [1]. In this respect the situation must have been similar to that of other highland peoples on Seram at that time. Towards the end of the nineteenth century the Nuaulu began to occupy sites near to Sepa, apparently under pressure from the Dutch and the coastal rajas. This movement is significant because it provides us with a shift in environmental and economic conditions which might be hypothesized to have had radical implications for their knowledge, classification and use of local fauna. At the present time, Nuaulu ecological and economic relations remain, significantly, oriented to the mountainous interior of the island, rather than to the coast. The most important starch staple is *Metroxylon* sago. This is largely extracted from forest palms, though is sometimes planted. The forest is also the source of most animal protein, much vegetable food and materials for manufacturing and other technical purposes. Swiddens are cut each year within a four kilometer radius of the village, are energy intensive, but contribute a disproportionately small amount to the total diet [Ellen, 1988a]. Garden crops are varied, but with manioc, taro, sweet potatoes, yams, bananas and plantains predominating. Prior to the

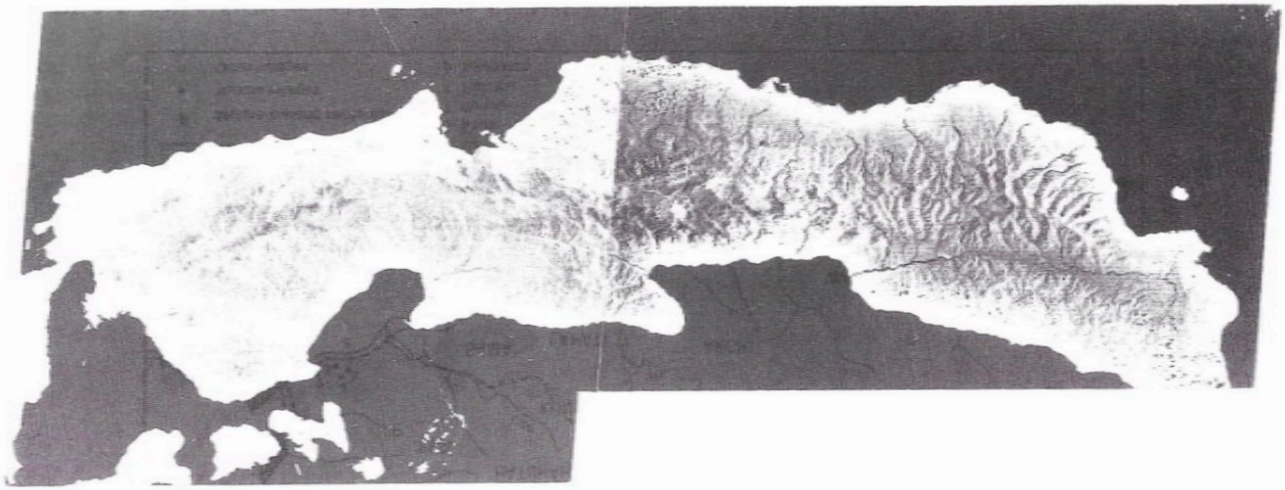


PLATE 1: NASA Landsat image of Seram for the months September-November. The image for the western half of the island is dated 4 October 1972, that for the eastern half 24 January 1979. Scale 1:1 000. I would like to thank Mr J R Marshall of Clyde Surveys for his help in obtaing this print.

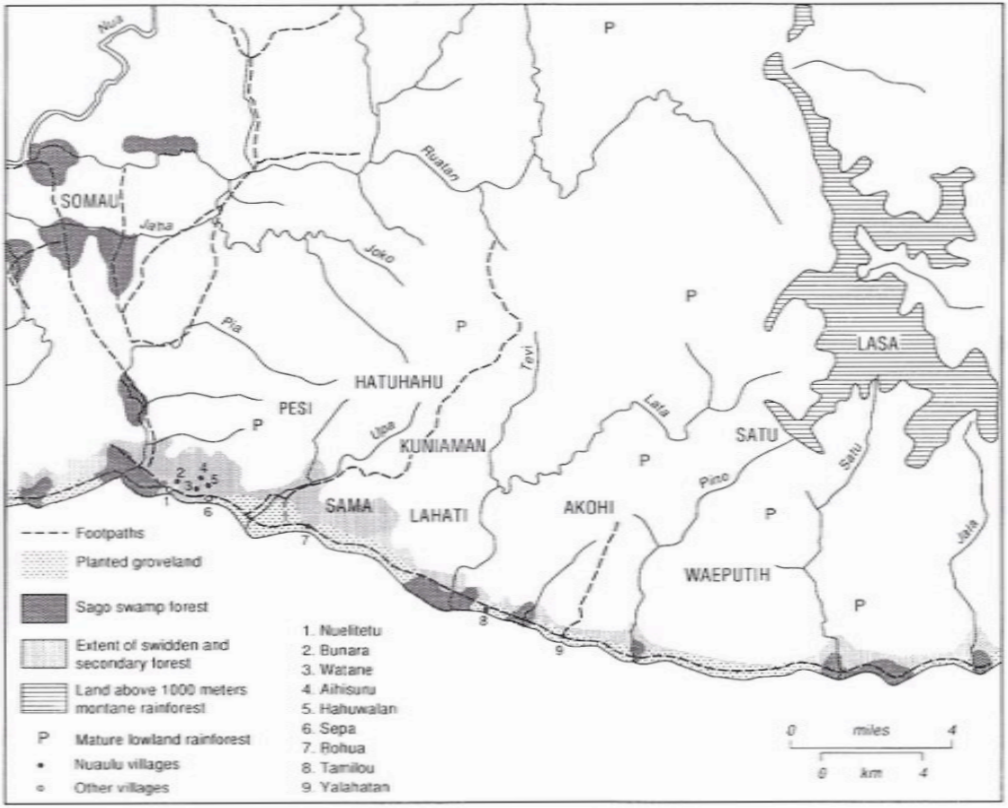


FIGURE 3: Location of villages and approximate distribution of major terrestrial biotopes in the Nuaulu extractive area, as of 1971. Names in upper case lettering indicate specific areas of forest distinguished and used by the Rohua Nuaulu. It should be noted that commercial lumbering activities and government resettlement schemes from 1975 onwards have now considerably modified the pattern of land use. Adopted from Topographische Inrichting 1919, *Schetskaart van Ceram* (Scale 1:100 000), Batavia; modified on the basis of field cartographic data and notes.

1939-45 war most cash was obtained by the Nuaulu through the collection and trade of forest products, such as dammar resin (*Agathis dammara*), but since Indonesian independence Nuaulu have become increasingly involved in the growing of clove and coconut palms for copra. Animal domestication for food (mainly fowl) is virtually non-existent, though dogs are kept for hunting.

Prior to resettlement, the Nuaulu clan (**ipan**; alt. **ipa, ipane**) was an autonomous patrilineal and exogamous descent group occupying a single hamlet. The **ipan** still retains considerable independence in ritual, political and economic matters, but except for the village of Hahuwalan all villages in 1971 consisted of five or more clans. The Nuaulu first became incorporated within the administrative structure of Sepa, as a separate 'soa', for a period under their own raja, and around 1882 became part of the 'Onderafdeeling' of Amahai. By the time of Indonesian independence there were three Nuaulu administrative units, though five physically-distinct hamlets. Each of the administrative villages of Bunara, Niamonae (in Malay, 'Nuaulu Lama', containing the separate hamlets of Watane, Hahuwalan and Aihisuru) and Rohua[2], were accorded a permanent government head (' kepala pemerintah') in a state-imposed scheme.

Each **ipan** is divided into two **numa,** descent groups focussed on a ritual house and headed by either an **ia onate ipan** or **kapitane.** The **numa** of each clan are in ritual opposition to each other [Ellen, 1986: 7-8]. Marriage is ideally between bilateral cross-cousins, and therefore functionally consistent with relationships between pairs of clans which may endure over many generations. However, any one clan is likely to have relations of marital alliance with many others, while marriage with actual classificatory cross cousins is rare. Clans are theoretically equal in their status, an arrangement which matches an ideology of prescriptive bilateral cousin marriage, traditional clan autonomy and the absence of an overarching indigenous political authority. The clan Matoke, nevertheless, is a ritual *primus inter pares,* providing as its headman what in Ambonese Malay is known as the 'tuan tanah', or Lord of the land.

During the periods of fieldwork on which this monograph is based, research has been centred on the village of Rohua, which in 1971 had a population of 180. The area from which the Rohua Nuaulu extracted during these times - some 900 square kilometers - broadly coincides with the drainage basins of three major watercourse systems: the Ruatan, Pia and Lata-Tevi (figure 3). It is to this which I refer when I speak of 'the Nuaulu area': the greater part of the land mass between Elpaputih Bay in the west and Teluti Bay in the east, south of the watershed formed by the central

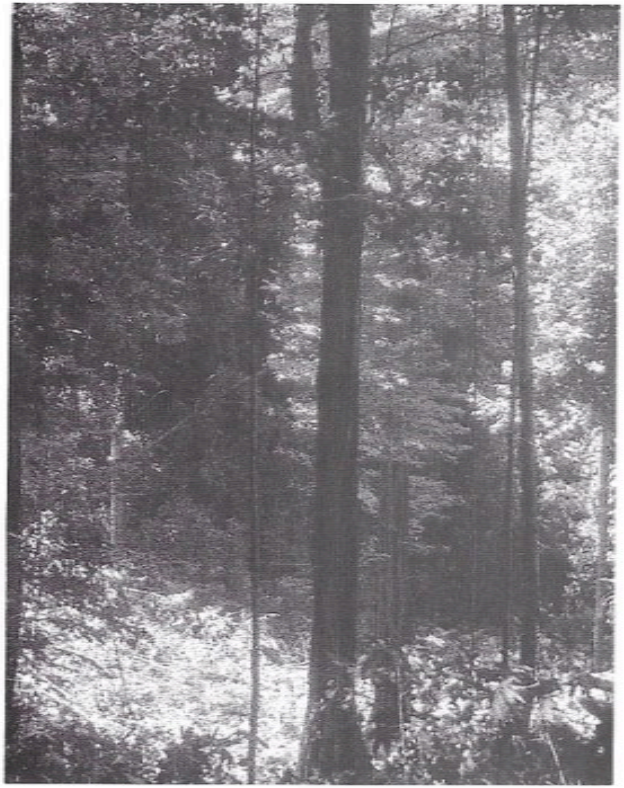


PLATE 2: Young primary forest on the river Usa, just prior to clearing: 28 January 1971 (neg. 71-17-25). The dense ground cover is an indication of recent thinning.

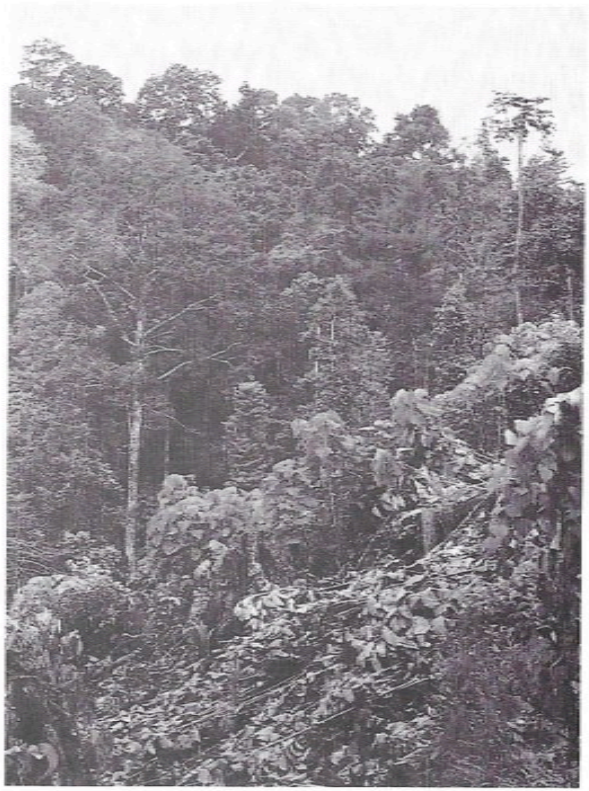


PLATE 3: Cultivated land of two years standing near the river Usa, showing secondary forest in background and recent regrowth of **hunua** in mid-ground: 22 August 1973 (neg. 73-5-19).

PLATE 4: Groveland owned by Inane Matoke on the river Awau and planted with mature coconut palms: 9 August 1973 (neg. 73-3-4).

mountainous spine of the island. All of the terrestrial biotopes described earlier are found in this area and their composition is familiar to the Nuaulu. The area includes the heavily populated and cultivated coastal strip, secondary forest surrounding areas of settlement, mature lowland rainforest and swamp forest. Typical lowland rain forest stretches from sea level mountainwards, and dominates the overall ecology of the area. Montane and submontane rain forest, is found above 1000 m., but the only occasions on which this zone is traversed by Nuaulu is during journeys to north Seram, on the longer hunting expeditions to the headwaters of the Nua, Ruatan, Kawa or Lata, or in collecting resin from the conifer *Agathis*, a particularly prominent feature of higher areas on the southern slopes of central Seram.

In composition and structure lowland evergreen forest (mostly on low hill land) is typical of adjacent afforested areas of Southeast Asia and New Guinea, though species diversity is low, 10 - 30 species per hectare not being uncommon. In the south central part of the island the dominants of the more inland and highland areas, representatives of the families Fagaceae, Lauraceae, Icanaceae, Ericaceae (rhododendrons), together with *Agathis*, are replaced towards the coast by *Shorea*, *Canarium sylvestre*, *C. indicum*, species of *Terminalia*, *Calophyllum*, *Myristica*, and hardwoods such as *Pterocarpus* and *Diospyros*. Up to 50 percent of the volume over 35 cm diameter are Dipterocarps. There is one species of Eucalyptus, *Eucalypt deglucta*. In favourable localities the giant *Melaleuca cajuputi (= leucodendra)*, and *Melastoma (Malabathricum?)*, are common, as are stands of *Ficus* and *Casuarina* in riverine areas. These same lowland areas contain both permanent and seasonal swamp forest, providing a valuable source of naturally-propagating *Metroxylon*[3].

The human population density of Seram is low - about 0.07 persons per hectare. As a result there has been relatively little succession to anthropogenic grasslands, particularly in the Nuaulu area. Level coastal land is heavily cultivated with a considerable proportion devoted to cash-cropping of cloves and coconuts. The land rapidly steepens away from the shoreline and even coastal populations such as the Nuaulu are forced to cultivate gardens on the steep valley walls of the short rivers descending to the sea. In some localities there are more extensive areas of low-lying land, such as around the mouth of the Ruatan river on Elpaputih Bay. Some of this has been used for garden land and in places has succeeded to grassland. Other areas are too swampy. Of the marine biotopes, the Nuaulu have an intimate knowledge of only the littoral and rocky and sandy shores characteristic of the coastline immediately adjacent to their villages, and no firsthand knowledge whatever of deep sea.

PLATE 5: River Lata between Rohua and Tamilou, at the height of the rainy season: 17 July 1975. Note the tall stems of the *Saccahrum* grass along the banks (neg. 75-1-33).

PLATE 6: Women collecting small fish and molluscs in rock pools as the high tide recedes. Mouth of river Mon, 1 km. east of Rohua: 2 September 1973 (neg. 73-6-21).

1.2 The descriptive ethnozoology of Seram: an historical prolegomenon

The first and most celebrated non-native naturalist of the Moluccas was Georgius Everhardus Rumphius (1627-1702). Rumphius discusses Seramese animals in his two major posthumously published works: *D'Amboinsche Rariteitamer* (which first appeared in 1705), and *Het Amboinsche Kruid-Boek* (which first appeared between 1741 and 1755, and is often known as the *Herbarium Amboinense*). The first of these covered crustacea, echinoderms, corals and molluscs; the second (although ostensibly a treatise on plants) contains many stray notes and observations on animals, particularly insects. In these works he provides some excellent descriptions and illustrations based on observations of species in the field, together with accurate provenances for the animals reported. Although Rumphius completed a further major manuscript on animals (the *Amboinsch Dier(en)boek*), it was subsequently lost, though not before François Valentijn had been able to draw upon it extensively for his *Oud en Nieuw Oost-Indiën.* To say that Valentijn was 'able to draw upon it', may, however, be misleading, since there is substantial evidence that he reproduced sections more-or-less verbatim. Perhaps unfortunately for us he did so with some carelessness, while sometimes altering the wording to suit his biases. The most important section in the *Dier(en)boek* appears to have been that on birds, although there are also descriptions of mammals, fishes, amphibia and reptiles.

More than 150 years separate Rumphius and the next important naturalist of the Moluccas, Alfred Russel Wallace, who travelled and collected in the region during the mid-nineteenth century. His *The Malay Archipelago* [1869] contains a large section on Seram and its offshore islands. Henry Ogg Forbes [Ellen, 1978a; Forbes, 1885], who traced Wallace's footsteps some years later, has a few notes on central Moluccan natural history, but his most important work was conducted on Tanimbar to the southeast. Between 1852 and 1873 the Dutch scientist P. Bleeker published 26 papers on the fish fauna of Ambon [Weber and Beaufort, 1913-1922], and collected some 78 species. From the middle of the nineteenth century to the early years of the twentieth century many books and papers were published on Moluccan avifauna. Wallace, of course, was a notable contributor in this respect, but except for Sieber's treatise on the birds of Buru [1930], and some brief papers by other authors, not a single overview of Moluccan ornithology appeared until the publication of Van Bemmel's list in 1948. Salvadori had published a classic handbook [1880-1882], but this covered a much wider area and he had no firsthand experience of the Moluccas. The Siboga expedition, in 1899-1900, assembled an impressive collection of zoological data on eastern Indonesia, and after 1901 a large number of monographs appeared

by authors of different nationalities arising from that expedition. Professor Dr. L. F. de Beaufort edited, and partly wrote, a series of articles dealing with several classes of animal collected during the years 1904-10 on Seram and elsewhere, appearing in 1913. Together with Max Weber (and latterly other collaborators), he wrote the classic *The fishes of the Indo-Australian Archipelago* [11 volumes, 1911-1962], dealing with many fishes of the Moluccas[4].

From 1970 onwards I have spent an increasing proportion of my Nuaulu fieldwork assembling ethnobiological data. All told, this has been spread over three main research periods: 18 months between December 1969 and June 1971, three months in 1973, a further three months in 1975, plus a short two-week visit in January 1981, ten days in June 1986 and three weeks in February-March 1990[5]. The 1975 season was a particularly decisive one since part of my time was spent working with James Menzies, an academic zoologist, who had already cooperated extensively with Ralph Bulmer [e.g. Bulmer and Menzies, 1972-3b; Bulmer et al, 1975]. By June 1971 it was already clear to me that I should concentrate on an examination of Nuaulu knowledge, uses and classification of animals. The decision was made for essentially practical reasons: the corpus had to be limited in some way in order to permit as full and detailed a study as possible, and it seemed to me at that stage that I was in a better position to provide complete and accurate identifications and information on animals than on plants.

The present work lists systematically animals reported for Seram in the Nuaulu area and (for the most part) of which the Nuaulu claim some knowledge. Here it is only necessary to note two general features of the zoology. The first is that, for geographic reasons, the land vertebrates of Seram and the Moluccas in general are surprisingly little differentiated, with the possible exception of birds and murids. This is certainly so when compared with New Guinea. The frogs include no endemic genera and few endemic species. Reptiles, murids, bats and also birds seem to include more distinct endemics. This comparison is in part subjective, being based on our rather limited current knowledge of this area, but there can be little doubt about the low level of endemism for the non-murid terrestrial mammals of the lesser Sundas [Ellen, 1978b: 1.4-7]. Such a low species diversity index has obvious implications for understanding Nuaulu classification of animals, and I shall return to it in a discussion of the relationship of Nuaulu categories to biological species, and in the systematic accounts of the knowledge for each faunal group. The second feature is that in comparing lists for definitely recorded genera and species on Seram as a whole with the equivalent lists for the Nuaulu area in particular [*ibid.*: tables 1 and 2], the number of lizards, snakes, marsupials, bats, even-toed ungulates and rodents

recorded for the Nuaulu area is less than the number for Seram as a whole, in some cases strikingly so. It may be that certain species are actually unrepresented in the Nuaulu area, or that provenances given in the older literature and museum collections are doubtful, while older and poorly-known species often turn out to be only subspecies or varieties. For these and other reasons - including the very arbitrariness of the species concept - competent zoologists are justifiably circumspect in the reliance they attach to 'number clues' to evolution and dispersion obtained through quantifying taxa [Darlington, 1957: 31-2]. However, these things are unlikely to explain satisfactorily wide discrepancies, as in the case of bats. In this and other cases it is probably simply that collections have been insufficiently exhaustive. Animals in niches only rarely visited by the Nuaulu are less likely to come to light during the course of fieldwork, and some species present in the area may well be unknown to informants. There is, for example, the Seram island bandicoot (*Rhynochomeles prattorum*) which occurs in the upper limits of the Nuaulu extractive environment, above an altitude of 1000 meters. Although it is allegedly known to, and hunted by, the mountain villagers of the Manusela area, from where it was first recorded. I have no conclusive evidence that it is known to the Nuaulu, despite repeated enquiries during six stretches of fieldwork.

All word lists collected on Seram have, from the earliest times, contained some terms for animals. Likewise, most accounts of fauna have also contained information on local names, uses and beliefs. Rumphius, for example, must be counted as an important source for Ambonese ethnobiology. Not only does he provide us with early Ambonese Malay and other local terms, but he also gives details on animals as pests and as sources of economic products, on veterinary science, on their medical uses, and local beliefs concerning them. But the ethnobiological interest in Rumphius' work lies not only in what he reports concerning the Ambonese, but in the way in which Ambonese and Malay conceptions of knowledge influenced his own ideas, and through them the subsequent development of scientific nomenclature and taxonomy [Peeters, 1979].

For the most part, word-lists collected by naturalists rather than linguists have been the more extensive, more accurately glossed and more ethnobiologically informative. Wallace, 1962 (1869) includes many useful folk biological observations and word lists. Ribbe, who is mostly noted for his 1884 entomological work on Seram [Ribbe, 1889], recognised the crucial adaptive significance of native knowledge of indigenous fauna [Ribbe, 1892: 175-6], as well as continuing the tradition of inter-meshing ethnographic observations with a more general description of his visit. The combination of zoological and linguistic competence is rare enough, but when it occurs the

results are generally immensely fruitful. From a folk-zoological point of view, the ornithological work of Edwin Stresemann is important [Stresemann, 1914], almost certainly because of his complementary linguistic interests [Stresemann, 1927]. For the first time we are provided with a large number of local Seramese terms for different kinds of bird, accompanied by specific provenances and careful taxonomic identifications. Among Stresemann's terms are 19 for the Nuaulu.

1.3 Obtaining zoological data

It is no longer excusable for ethnographers to collect local animal terminologies without having taken all reasonable steps to establish their accurate scientific glosses. Without such information, the value of detailed data on their habits, uses, ritual aspects and general folklore is diminished, and may sometimes be quite useless for subsequent workers. Even if we conclude that phylogenetic categories[6] are no more 'real', and as much a part of a folk traditions as those of the Tzeltal, Kalam or Nuaulu, they still provide a baseline for ethno-linguistic description and analysis, an indispensible 'etic grid' [Hunn, 1975: 309] for cross-cultural comparison. The importance of this exercise is not simply to highlight curious contrasts with the 'scientific' view of the universe, or to amaze ourselves with the similarities between folk and phylogenetic models, but because biological taxonomy provides a highly convenient and (ideally) a universally consistent reference plane which can be applied cross-culturally and through which one folk practice can be compared with another. It allows the analyst to avoid the hopeless relativism associated with the view that because our minds are socially-constructed, objective knowledge can be no more than a chimera [Ellen, 1978b: 142]. Furthermore, there is no economical way of glossing folk categories *except* by using scientific zoological identifications [Bulmer, 1969: 4].

Provision of actual specimens adds vital stimulus material when discussing ethnozoological matters. One can no more think of studying animal classification without animals than one might study colour classification with descriptions of colour rather than examples. Thus, questions in the abstract will seldom elicit more than a basic set of widely-shared terms, and will be particularly poor in terminal categories. The presentation of actual specimens invites detailed examination and identification. Moreover, if - as happened to me on many occasions - you repeatedly obtain just one common species of a genus more widely represented, you may equally be given 'generic' terms by an informant. Only when a different species is presented are names for terminal categories revealed for both types. This was the case with Nuaulu **makasisi popole,** a term used for various genera of robust dragon-flies and related forms. Similarly, it is common to initially obtain a

list of names for terminal categories which are clearly closely related, but whose relationship only becomes disentangled when actual specimens begin to turn up; while synonyms may be treated as referring to separate categories unless linked to actual specimens. The careful collection, identification and full documentation of animal specimens has, throughout, been the most important and time-consuming aspect of my ethnozoological work.

Specimens were mostly obtained in the vicinity of Rohua, at sea-level. They seldom came from outside the area demarcated by the borders of the most distant gardens, that is from the *inner* area of the Nuaulu extractive environment. However, during late July 1975 small collections were made near the Jala river estuary at sea-level and at nearby Tohai, in the non-Nuaulu village of Piliana at an altitude of 700 m in the central highlands north of Teluti Bay, and at Somau (Tihun), an area of swamp forest towards the mouth of the Ruatan river frequented by the Nuaulu for the purpose of collecting wild sago. Jala, Tohai and Piliana are well-outside the Nuaulu extractive environment (figure 2), and specimens collected by Menzies, with the help of local assistants, were only later discussed with Nuaulu informants in Rohua.

Most of the procedures adopted for the collection of specimens have followed the recommendations laid down by Bulmer [Bulmer and Tyler, 1968: 335-7; Bulmer, 1969], and I have tried to emulate and adapt the rigorous data production techniques used by Berlin et al, 1974 in their study of Tenjapa Tzeltal ethnobotany. I have also added to the repertoire of techniques discussed by Bulmer, but have only modified them when special interests and local conditions have made it imperative that I should do so.

Whenever conditions permitted, and when equipment was available, animal specimens were collected. Most were obtained for me by informants in the course of their normal daily activities. In some cases I was present when an animal was caught, and in such situations was able to make detailed notes on habitat and behaviour. When this was not possible, informants had to be relied upon for information regarding the context of capture, and in some cases of killing. Nuaulu collectors were asked to provide information on the location, behaviour and habitat of animals. I have no reason to believe that this was a particularly unreliable procedure, and in many cases I was able to visit the site of capture afterwards to check up on the circumstances of encounter and other contextual information. The conditions of fieldwork, and perhaps also my own preferences, have resulted in more complete documentation for (as far as vertebrates are concerned) reptiles, amphibians and mammals, than for birds and fish. Consequently, the accompanying ethnozoological data are better for the first three groups than

for the rest, something which is inevitably reflected in the weight of illustrations employed.

Most animals were live when brought to me by informants, but a proportion were damaged, and some already dead (either on discovery or by the time they reached me). In 1975 small mammals (primarily murid rats) were obtained by setting baited live and break-back traps overnight, while lamps and mist nets of fine nylon stretched across entrances to caves were used to collect bats and swiftlets. As it happens, the traps did not prove very effective. Other animals, such as frogs, were caught live by hand or with hand-held nets, by both Ellen and Menzies, and subsequently discussed with informants.

Although some small specimens were killed in the field by body compression, most larger specimens were killed by injecting 100 percent Euthatal or MS 222-Sandoz into the heart and then fixed and preserved in a 10 percent solution of formalin through injection and immersion. Wet specimens were usually wrapped in muslin dampened with preservative and stored in polythene bags, small glass phials (in the case of larger insects) or plastic containers in which they were despatched to identifying institutions. Some birds and small mammals were preserved dry as skins by Menzies, and a number of larger specimens were prepared as skeletal material, either as skulls or in their entirety. Before skeletal material was prepared measurements of the full carcass were made. Some crania and mandibles (mainly deer and pig, but also cuscus, cassowary and some fish) kept by the Nuaulu as trophies were obtained where possible (plate 14; also Ellen 1993: plate 1.7), and several hundreds more measured. Most small invertebrates were preserved partially or wholly in 15:1 formalin or (by preference) in 70 percent alcohol. Most Lepidoptera, Coleoptera and other insects were preserved dry, and in the case of molluscs only shells were retained for subsequent identification. A few endo- and ecto-parasites of larger species were collected separately in formalin. The specimens were identified at the Natural History Museum in London, the Biology Department of the University of Papua New Guinea in Port Moresby and at the National Institute of Biology in Bogor, in which institutions they are also deposited.

Photographic records and sound recordings were obtained whenever practicable, and for some groups (e.g. fishes, large mammals and birds) these have been important for subsequent identification and analysis. Many more specimens were examined and then discarded or released than were preserved. In particular, I was not willing to entertain large collections of Seramese avifauna which might involve the gratuitous destruction of an environment which is already threatened by excessive logging and

indiscriminate commercial bird-hunting. Though officially protected, the salmon-crested cockatoo, *Cacatua moluccensis,* is actively hunted for sale, as are black-capped or purple-naped lories (*Lorius domicella*). The endemic long-crested myna, *Basilornis corythaix,* and Forsten's oriole, *Oriolus forsteni,* are uncommon to rare, and probably endangered [Amir and Wind, 1978]; while the Moluccan scrubfowl, *Megapodius wallacei*, and the the Nicobar pigeon, *Caloenas nicobarica*, are seemingly also threatened [White and Bruce, 1986: 170].

Table 1 shows the total number of specimens examined from various phylogenetic groups collected in the field. A relatively small number of specimens were retained for later examination and identification outside the fieldwork locality. Most were released live, some were retained in preservative and later discarded because they represented superfluous duplicates of common and easily identifiable species (e.g. *Litoria infrafrenata, Mus musculus, Hemidactylus frenatus*), or because particular species were felt to be endangered. Still others were rejected on the grounds that they were so mutilated or decomposed as to be unsuitable for further use. Also, many specimens were unfortunately lost in transit, or have since gone astray at their institutions of deposit. The figures include duplicates where earlier specimens were considered to be in poor condition, where there was a presumption of significant racial or other taxonomic variation or where Nuaulu informants provided different terms. Small insects such as flies, bugs and beetles were often collected in multiples at a time, and given a single serial number. Consequently, the figures for smaller invertebrates are for 'lots' rather than for individual organisms. Other specimens consisted of parts of larger animals, mainly crania.

1.4 Ethnographic research procedures

Basic guidance on both the biological and ethnographic aspects of ethnozoological research procedures is provided by Bulmer [Bulmer, 1969; Bulmer, 1974]. I have been very much influenced by his sound empiricism, but have tried to augment this with the introduction of some more formal techniques. During 1969-71 the elicitation of data was prolific, but frankly haphazard and opportunistic. In the 1975 season methods employed were more systematic. Informants were first asked to name all animal categories that they knew, irrespective of degree of inclusiveness. Both systematic zoological and cultural data were transferred to edged punch-cards (Copeland-Chatterson Paramount form CC1, 102 mm, 155 mm) prepared for each specimen, and further information added as this became available (fig. 4). This stored it in a way which made it compact and easily retrievable for subsequent sorting and analysis. Cards were coded directly to assist cross-

TABLE 1 Total number of animal specimens collected and examined listed according to major phylogenetic groups and periods of fieldwork

	1969-71[1]	1973	1975	1981	1986, 1990	Cumulative total
MAMMALS	33(20)[2]	2	8	-	-	43(20)
BIRDS	3(53)	-(48)	3(57)	-(6)	-(8)	6(172)
REPTILES	73(10)	-(11)	45(1)	-(2)	-(1)	118(25)
AMPHIBIANS	38(6)	-(6)	14(27)	-(1)	-	52(40)
FISH	-(31)	-(7)	-(6)	-(2)	2(40)	2(86)
Total vertebrates	147(120)	2(72)	70(91)	-(11)	2(49)	221(343)
CRUSTACEANS	-	-	3	-	7	10(0)
INSECTS	55(23)	22(-)	139(-)	2(-)	26(-)	244(23)
MOLLUSCS	17(7)	2	21	-	2	42(7)
OTHER INVERTEBRATES	-(26)	-(3)	3(32)	-	2	5(61)
Cumulative total	219(176)	26(75)	236(123)	2(11)	39(49)	522(434)

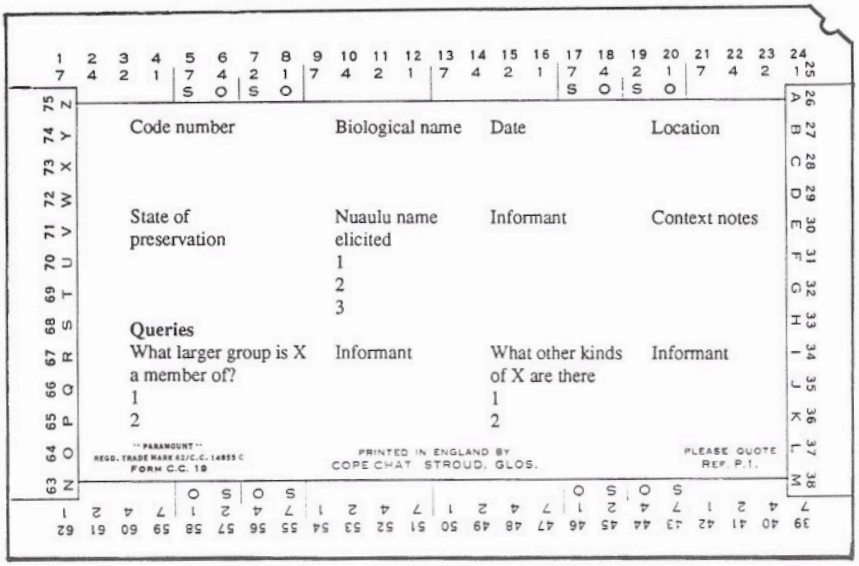
Notes: 1. The first figures in each column refer to actual specimens collected, preserved and deposited in reference collections. The figures in parentheses refer to all additional specimens (approximate numbers only) examined and then released, or discarded, or observed at close quarters in their natural habitat. 2. Mainly captured as game in traps or during hunting.

checking, reference and preliminary hypothesis-testing while still in the field. The main disadvantage of these cards is that they provide no duplicate record in the event of damage and are bulky, while preparation and sorting are both time-consuming and tedious. If I were embarking on this work now I would use a lap-top computer with back-up files on separate disks or cassettes, and enter data directly in the field.

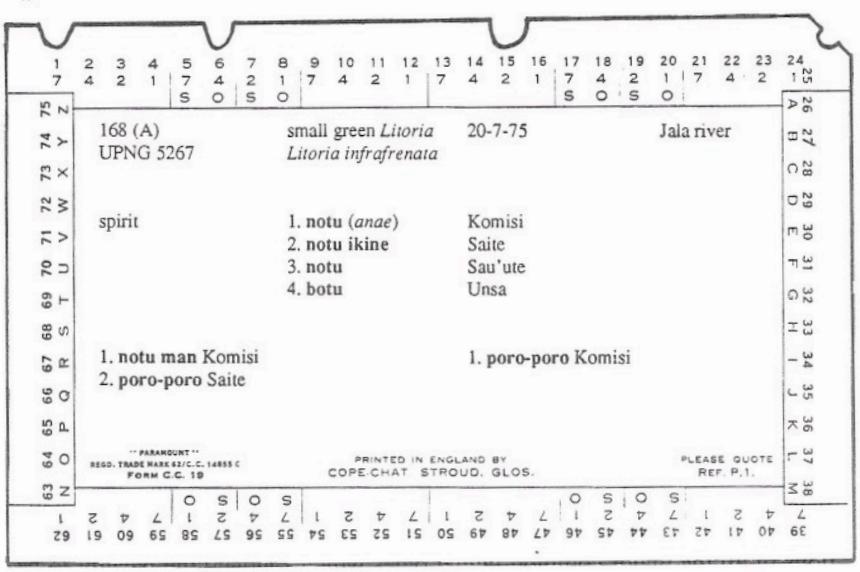
Each specimen was identified individually with waterproof ink on parchment and the label attached physically to the specimen, or in the case of small invertebrates, placed in the glass phial (if wet), or written on the envelope (if dry). Eight fields of zoological information were recorded on the upper half of the front of each accompanying specimen card: (a) specimen number, (b) english name or appropriate taxonomic status, (c), scientific name (usually added after formal identification by receiving institution) (d) form and condition of preservation; or if discarded reason for doing so, (e) date and approximate time of collection, (f) location and elevation, (g) short description if to be discarded, or if features are likely to alter on preservation (e.g. coloration, critical measurements, life posture, live weight), and (h) means of acquisition (e.g. trapped, live gift). Additionally, five fields of ethnographic information were recorded on the lower half of the front of each card: (i) vernacular name of animal (if any), (j) name of informant, and (k) context of elicitation (e.g. ethnographers house, bush). Information i-k was recorded independently for as many individual informants as possible, and in most cases for at least more than one. In over 50 percent of cases I was also able to record responses to variations on the standard question frames [c.f. Berlin et al, 1974: 52]: (l) 'what is X a kind of?' and (m) 'how many kinds of X are there?', though I discuss in *The Cultural Relations of Classification* my reservations with such formulae. Any additional explanatory notes relating to data on the front of the card were placed on the reverse. Here also were written references to relevant data on this and related specimens documented elsewhere: on magnetic tape, film or in chronological field notebooks. Coding was accomplished in the usual way by punching combinations of holes along the edge of the card. Most of the analysis has been conducted on data in this form, although in 1987 all existing card records where transferred to a computer database using the same number of fields. This has permitted a final checking of the data which appear here in tabular form.

My Nuaulu work has involved a strategic combination of formal methods of elicitation and an observational and conversational approach in as near as possible natural settings. While I have always tried to be systematic wherever possible, I have also been blatantly opportunistic when I have felt that the occasion has merited it. I have experimented with more formal approaches using a relatively small number of informants in Rohua

FIGURE 4: Display of data on punched specimen cards used during field-work: *a* showing designated fields, and *b* illustrating a completed entry.



a



b

village, but have throughout put great emphasis on interpreting results contextually. Although systematic responses and specimens were obtained from only a relatively small number of Nuaulu informants, general ethnozoological data arose from interactions with numerous individuals in Watane, Bunara, Aihisuru and Hahuwalan, as well as Rohua. Data on the identification of specimens and discussions of classification and zoological knowledge were also accumulated on photographic film and sound-recording tape. The latter included conversations about animals, classification, behaviour, uses and general lore, verbatim records of identifying sessions, song, myths and stories, and other information relating to zoological knowledge. In some cases such conversations involved the ethnographer as a participant; others consist of long stretches of uncontrolled discourse about animals. Some recordings are of calls for different species made in natural habitats and imitation calls and decoys produced by Nuaulu informants. Permanent records of interviews were put on tape wherever this was physically possible. Information which could not be obtained during the examination of specimens or through general conversations with informants was committed to page-numbered duplicate notebooks in the usual way. As well as obtaining whole zoological specimens, artifacts manufactured from animal parts or associated with social and economic uses of animals were collected for subsequent analysis.

I found it useful to employ a number of simple introductory picture books [e.g. Tweedie, 1970] to stimulate talk and to compile initial lists. Even pictures of quite unfamiliar animals proved helpful in setting-up hypothetical tests to highlight significant criteria and configurations used to assign animals to particular categories and the extent to which particular categories could be manipulated. Thus, the rhinoceros hornbill of Malaya and the Sunda islands (*Buceros rhinoceros*), quite different from the species found of Seram was still, without any doubts, assigned the term **sopite** applied to the local hornbill (*Rhyticeros plicatus*). It was with more uncertainty that the Malayan tapir was labelled **maisan** (variously lion, tiger, elephant); none of which Nuaulu had ever seen.

In 1975 150x100 mm picture cards were prepared of animals with which the Nuaulu were known to be familiar from earlier fieldwork. Each card featured a clear and detailed illustration of one representative of a species reproduced from various studies of regional fauna (fig 5). This was accorded a code number (top right) and in the top left hand corner was placed the English gloss, scientific name, Nuaulu name, Ambonese Malay or standard Indonesian equivalent and the scientific name. The cards were divided into two series. Series 1 contained 42 cards with coloured illustrations of all the major common faunal types which I judged the Nuaulu to be

familiar with. Series 2 contained 40 cards with mostly black-and-white illustrations of less familiar (but nevertheless common forms), for the most part consisting of invertebrates. The types varied from representatives of particular species known from the Nuaulu area (e.g. *Felis catus*, the domesticated cat) to generalised life-forms distinguished at the level of phylogenetic order or above (e.g. star-fish, butterfly). Like the picture-books, these cards served as useful stimulation for discussion and for informal and critical demonstrations of how Nuaulu principles of classification operated, with respect to hypothetical cases presented by unfamiliar species. They were also used as indicators of the kinds of specimens which the investigators were interested in collecting, and were employed on a limited and controlled basis in tests on more inclusive categories.

The drawback of using cards or other pictures as stimulus materials, and for tests, is in the use of representations of animals rather than the real thing, which means that occasionally the cultural images projected may be quite misleading. Pictures, for example, do not show motion (an often critical feature), colours are often 'unnatural', and animals are seldom the correct size, even relative to one another. In other words, the images have been decontextualised. Furthermore, the criteria used by informants are often not those employed by the informants themselves. Since the work of Heider, 1972 and others we have hopefully become more aware of the considerable problems of using card tests with unsophisticated and often illiterate informants.

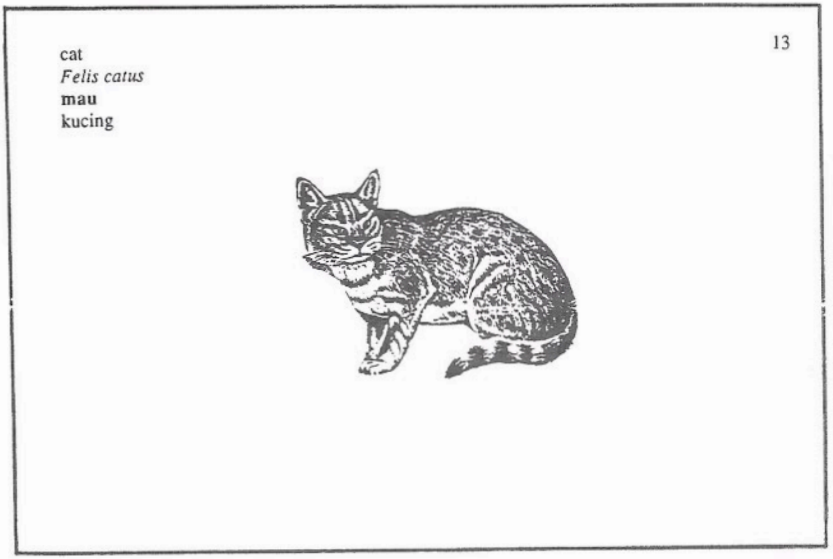
I discuss in more detail the whole question of the relationship between techniques of elicitation and results in *The Cultural Relations of Classification*, particularly the use of formal question frames, formal tests of classifying behaviour, the role of the literate mode in both the offerings of those interrogated and in the interpretations of the interrogator, and the different ways of presenting data. It is to this work that those interested in pursuing these issues should turn.

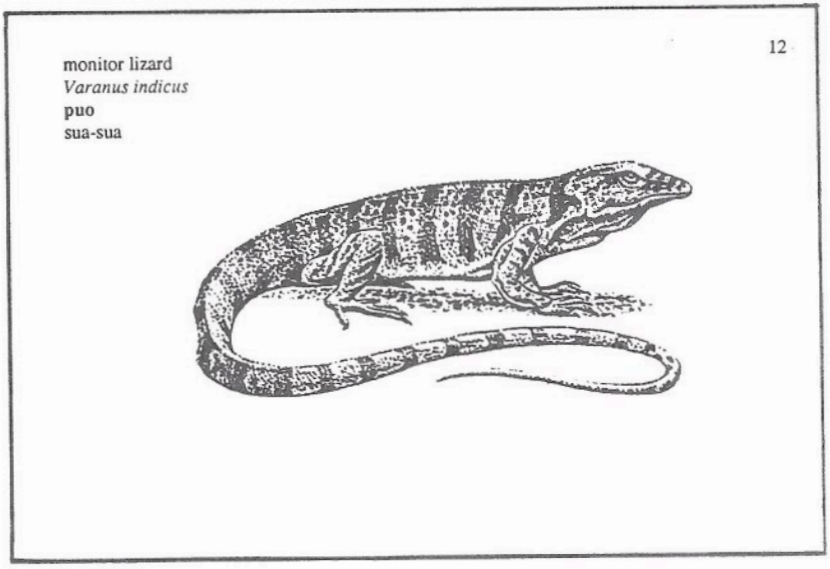
1.5 The presentation of data in the present work

In recording repetitive systematic information I have tried to be as clear, concise and consistent as possible. To this end I have used a number of abbreviations, and these are listed separately at the end of the book. To facilitate location and cross-referencing of data, sections and sub-sections are indicated by a numerical code (e.g. 12.2.2.3), where the first numeral is the chapter, the second the section, the third the sub-section, and so on.

In each chapter information has wherever possible been given in the following sequence: (1) summary description of the relevant fauna for south

FIGURE 5: Examples of picture cards used in field sorting tests. Illustrations reproduced from M. Tweedie, *Animals of southern Asia*, by courtesy of Hamlyn Publishing Group Ltd.





central Seram, (2) systematic listing of all Nuaulu categories applied to that fauna, (3) an analysis of the relations of non-basic Nuaulu categories, and (4) a brief account of social and economic uses. Where there is little matter to be included, some of these sections have been run together, as with sections (3) and (4) in chapter 14.

Each entry in section (2) begins with a list of terms applied to the category. Entire terms or part-terms appearing in round brackets indicate instances of free variation. Synonyms simply follow on from each other, separated only by a comma. In subsequent references to the category, and including all tables, the citation form chosen is what I judge to be the most commonly found lexical variant of the most commonly used synonym. Sometimes this decision has perforce had to be a fairly arbitrary one.

Each description generally begins with a semantic analysis of the term. If a term is not further reducible semantically, and if there are no clues as to its meaning or etymology, this is indicated only by omission. This is followed by information on the phylogenetic species to which the terms are applied, and occasionally their Ambonese Malay or Indonesian gloss. The entry concludes with a discussion of the cultural significance of the category.

I have used Linnaean taxonomic terminology only in so far as this is minimally sufficient to identify the range of categories and place species in the broader phylogenetic context. I have used the following typefaces (upper case Roman, italicised capitals, lower case Roman, italicised lower case) to indicate the different levels of taxonomic organisation:

PHYLUM	*ORDER*	superfamily	*genus*
CLASS	*SUBORDER*	family	*species*
SUBCLASS		subfamily	*subspecies*

My knowledge of Nuaulu ethnozoology is more thorough for some groups than others. Thus, I am particularly aware of the shortcomings in my account of bird categories, which arise from the inability or unwillingness to obtain sufficient live or preserved specimens for the purposes of identification. In view of these problems, I provide discussion on informant variation only where my data are most complete.

Finally, in their various publications on Kalam ethnozoology, Bulmer and his associates [e.g. Bulmer and Tyler 1968: 381, Bulmer and Menzies 1972-3: 102] have frequently presented charts plotting number of actual specimens collected against local terms (horizontally) and biological names (vertically). Bulmer's own procedure [personal communication] has in most cases been:

(a) to list the identifications provided by the original captor of a specimen, on the grounds that he has the greatest range of circumstantial information at his disposal; except

(b) when several persons are present at the place of capture, when the consensus identification is accepted for tabulation. If there is no consensus the identification accepted is that of the person reckoned to be most competent of those present.

Obviously, this only works if (a) identifications of single specimens are consistently unambiguous or (b) if a decision is taken to accept one identification as the 'correct' one. Many of the specimens collected on Seram were 'identified' by more than one informant, sometimes up to six. Frequently the response of one informant would contradict that of another. Consequently, the numerals in all but the initial (N) column of tables of species identifications presented here represent the number of individual responses.

Notes to Chapter 1

1 Algemeen Rijksarchief, The Hague: VOC 1293 (f.176r, 1.84r), 1317 (f. 200r-v, f.71), 1.344 (f. 56), 1368 (f. 40v) and 11245 [Anon., 1908: 130-31].

2 The most regular orthographic usage adopted by the Indonesian administration. In previous publications I have written 'Ruhuwa', in order to harmonize with the rendering found in some earlier Dutch maps (e.g. Topographische Inrichting 1919, *Schetskaart van Ceram* (Scale 1 : 100, 000), Batavia).

3 See Ellen, 1985, also for certain nomenclatural revisions to Ellen, 1973: 140-8; Ellen, 1975b and; Ellen, 1978c: 65-8. Further information relating to other matters discussed in this section may be found in Ellen, 1973: 20-63, 368-73, 391-2, 446-64; and; Ellen, 1978c: 212-9.

4 For further details on the history of the systematic zoology of the area see Nolthenius, 1935; Rubenkoning, 1959:ii-iv; Ruinen, 1928.

5 For convenience, the ethnographic present should be understood as 1970-75. Where data collected on subsequent occasions might reasonably be expected to reflect recent changes I have tried to make this clear in the text.

6 The term *phylogenetic* is used throughout this work to cover all forms of 'scientific' taxonomic, systematical and nomenclatural practices. The term is imperfect, but I find the possible alternatives - 'Linnaean', 'Western', 'scientific', and so on which I am occasionally tempted to resort to - equally if not more problematic.