

CHAPTER EIGHT

AMPHIBIA

8.1 The amphibian fauna of south central Seram

The amphibian fauna of Seram is still imperfectly understood, despite the efforts of those working on various aspects of Moluccan natural history in the first half of the present century [Rubenkoning, 1959: ii]. Even Rumphius, who in other respects was a notable pioneer of Moluccan zoology, seems to have paid little attention to it [Greshoff, 1902; Wit, (ed.) 1959].

Frogs are the only amphibians known from the Moluccas. Of more than 20 Anuran families recognised, only three seem to occur on Seram. Prior to 1969, six species had been reported: *Rana grisea ceramensis* and *Platymantis papuensis* from the family Ranidae, *Phrynomantis fusca* from the family Microhylidae, *Litoria infrafronata infrafronata*, *L. amboinensis*, and *L. vagabunda* from the family Pelodyadidae. All of these were obtained between 1970 and 1975 in the south central part of the island, with the exception of *Rana grisea* and *L. vagabunda*. *R. grisea ceramensis* is known only from a single specimen collected in central Seram at about 1000 m in 1919, while *L. vagabunda* is also rare, being known from only two specimens, collected in 1872, one from Seram and one from New Guinea. In addition, *Rana modesta* was found (previously unknown from Seram), plus two hitherto biologically undescribed species: *Litoria* sp. (*bicolor* group) and *Rana* sp.

The species most commonly encountered by the Nuaulu is *Litoria infrafronata*, a noisy green tree frog common in coastal and village areas and among the largest of its kind. This frog, however, has a wide altitudinal distribution, certainly occurring at 700 m, and possibly higher. It has a snout vent length of up to 13.5 cm, is immaculate green above with a green throat and whitish venter. There is a distinctive white stripe along the upper lip extending onto the sides of the neck. The hands and feet are webbed.

All other species, although present and audible in the immediate Nuaulu area, are less obtrusive. *Litoria amboinensis*, *Phrynomantis fusca*, *Platymantis papuensis* and *Litoria* sp. (*bicolor* group) are certainly present along the coastal strip. *L. amboinensis* is of medium size, with a snout vent of up to 6.5 cm. It is grey-brown above with irregular darker markings, is white below and has a throat spotted with brown. In contrast to the Pelodyadidae, *P. fusca* has fairly short hind legs, a little longer than the head and body together. The fingers and toes are unwebbed with tips that are only

slightly expanded (again contrasting with the Pelodryadidae). It is rather large for a microhylid with a snout vent length of about 5 cm. It is dark grey-brown above, flecked more or less profusely with white, and is whitish below. *Rana modesta* is only reported from sago swamp forest towards the mouth of the Ruatan. The Ranidae on Seram are broad-headed, with a relatively pointed snout, large eyes and distinct tympanum. Their hind legs are long, much longer than the head and body together. Tips of the fingers and toes are slightly enlarged. The feet are webbed but the hands are unwebbed. *R. modesta* is a medium-sized frog with snout vent length of up to 7 cm. It is brownish olive above with or without a medium lighter stripe, whitish below and has a throat mottled with brown. *Rana* sp. was only obtained at the village of Piliانا at an altitude of 700 m to the north of Teluti Bay.

A checklist of amphibians reported from south central Seram is presented in table 13.

TABLE 13 Checklist of amphibians recorded in the Nuauulu region of south central Seram.

Species	Ecological zones					Nuauulu glosses
	1	2	3	4	5	
Pelodryadidae						
<i>Litoria infrafrenata</i>	-	+	+	+	-	poro-poro, notu
<i>Litoria amboinensis</i>	-	+	+	+	-	notu, inararai
<i>Litoria</i> sp. (<i>bicolor</i> group)	-	+	+	+	-	notu anae
Ranidae						
<i>Platymantis papuensis</i>	-	+	+	+	-	notu, kere, teteye
<i>Rana modesta</i>	-	-	-	+	-	notu, kere
<i>Rana</i> sp.	-	+	+	+	-	notu
Microhylidae						
<i>Phrynomantis fusca</i>	-	+	+	+	-	notu, kako

Key. Zone 1 = above 1000 m, principally montane rain forest; zone 2 = lowland tropical rain forest; zone 3 = secondary forest, garden and village areas; zone 4 = freshwater and swamp forest; zone 5 = marine and estuarine.

Although Seram certainly has a depauperate fauna [Ellen, 1978b], it is unlikely to be quite so depauperate as current knowledge suggests. Most of the material collected is very widespread and quite typical of cultivation

zones. It is probable that a more thorough investigation would reveal further endemic species.

8.2 Nuaulu categories applied to frogs

There are seven Nuaulu terminal categories applied to frogs. These are listed in table 14 against biological species to which they correspond.

TABLE 14 Species identifications compared with Nuaulu categories applied to 53 frogs.

Species	Nuaulu categories							Total number of responses	Total number of specimens collected 1970-1975
	notu	notu poro- anae	poro- poro	kere	teteye	inararai	kako		
<i>Litoria infrafrenata</i>	1	-	11	-	-	-	-	12	12
<i>Litoria amboinensis</i>	6	-	-	-	-	1	-	7	6
<i>Litoria</i> sp. (bicolor group)*	3	7	-	-	-	-	-	10	6
<i>Platymantis papuensis</i>	2	-	-	6	6	-	-	14	7
<i>Phrynomantis fusca</i>	2	-	-	-	-	-	1	3	3
<i>Rana modesta</i>	9	-	-	1	-	-	-	10	7
<i>Rana</i> sp.*	12	-	-	-	-	-	-	12	12
Totals	35	7	11	7	6	1	1	68	53

* Biologically undescribed species

8.2.1 Poro-poro

Poro also means 'foolish, silly' and although cognate with **poro-poro** it is unclear which derives from which. This is the only Nuaulu frog category consistently applied to one species only, namely *Litoria infrafrenata* (plate 13). The morphological and behavioural distinctiveness of this large green tree frog, together with its commonness around villages makes this

understandable. The name is described by Nuaulu informants as onomatopoeic and given the call of this species, this seems highly plausible.

The reproductive biology of *Litoria infrafnata* is well-understood by the Nuaulu; that it lays large numbers of eggs in still water. These are likened to sago jelly or porridge (*sona*), and this is no doubt connected with the belief that **poro-poro** had its origin in the sago palm (*Metroxylon sago*). The palm features prominently in Nuaulu myths of origin of other life-forms, including (notably) the Dutch.

PLATE 13: Two specimens of the tree-frog **poro-poro** (*Litoria infrafnata*) caught in banana plant in Rohua following rain: 14 August 1973 (neg. 73-4-12).



8.2.2 notu

The term **notu** also means 'fart' (**notute** = fart (n. sing.), **inotu** = to fart, to emit wind and noise from the anus). This association is a frequent source of scatological humour, although it is uncertain which meaning is primary. **Poro-poro** is occasionally used to refer to a particular kind of fart, but this usage is almost certainly derived from its classificatory association with **notu**.

The form most commonly referred to by this term was *Rana* sp., although it was found to be used to identify the following in order of decreasing frequency: *Rana modesta* (7), *Litoria* sp. (6), *Litoria amboinensis* (5.5), *Phrynomantis fusca* (3), *Litoria infrafronata* and *Platymantis papuensis* (one each). Part of the explanation of this situation is undoubtedly to be found in the use of **notu** as a generic term for frogs (**notu kere**, **notu teteye**, etc.). It is clear that this is the sense in which respondents included the one specimen of *Litoria infrafronata* which is otherwise consistently identified as **poro-poro**. This may also have been the case with *Platymantis papuensis*, *Phrynomantis fusca*, and *Litoria amboinensis*, which respondents also allotted to other categories. *Phrynomantis fusca* is encountered infrequently in the Nuaulu area and seems to have been allocated to the category **notu** in its generic sense. Both this species and *Platymantis papuensis* are also significant in that they are the only Seramese frogs known not to possess a tadpole stage; instead laying their eggs in damp places on land. However, limited knowledge of frog taxa among most informants suggests that it is by no means certain that they recognise folk categories or differentiate between separate species within the category **notu**, even if morphological and behavioural variation is acknowledged. Many informants were unable to attach more specific names in the context in which specimens were examined (usually in the village), and the fact that most of the specimens were collected by Menzies in the Jala river area and not by the Nuaulu themselves may well have contributed to their inability to differentiate further.

Rana sp. and *Rana modesta* are morphologically similar and the absence of lexemic differentiation is not surprising in the overall context of Nuaulu Anuran classification.

8.2.3 notu anae

Seven *Litoria* sp. of the *bicolor* group, very small green creatures, were described as **notu anae** (**anae** = 'child', 'young'), suggesting that although they were differentiated morphologically from other **notu** were not accorded a completely separate classificatory status, through either ignorance or disinterest. In fact, informants maintained that **notu anae** were subsequently transformed into **notu**. Komisi stated that **notu anae**, **notu** (in its terminal sense) and **kako** were all derived from the spawn of **notu** developmentally [c.f. Bulmer and Menzies, 1972-3a: 101-4].

8.2.4 kere

This term was explicitly stated by several informants to be onomatopoeic, the call being rendered as '**kere, kere, kere...**'. Sometimes called **notu kere**, the term was applied most frequently to *Platymantis papuensis* although once to *Rana modesta*. In no case was **kere** applied to a frog for which no other term was also forthcoming. In the case of six specimens informants were equally divided as to whether *P. papuensis* was **kere** or **teteye**. In one case a specimen of *Rana modesta* was termed **kere** by one informant out of four, the other three settling for **notu**. One informant commented that **kere** was distinguished from **notu** on the morphological grounds that the former had a patterned skin (**unte nikate**), while the latter was black. This suggests that it is generally ascribed to *Rana modesta* rather than *Platymantis papuensis*, but the evidence is quite unclear. On all accounts **kere** was regarded by the Nuaulu as being very similar to **notu** (in its specific sense), although two older informants (Komisi and Sauute) did regard it as a type of **inararai**.

8.2.5 teteye

Probably an onomatopoe. This term was applied to *Platymantis* and no other species, although in no case was **teteye** applied to a frog for which another term was not forthcoming. In all cases the other term applied was **kere**, and in all cases while **kere** was the response given to dead and preserved specimens, **teteye** was that elicited from listening to tapes of calls of some of the specimens made before capture. This suggests that there is one classification based on morphology and another on call, although there is no evidence that the equation **kere = teteye** is recognised and the evidence of one informant that it is not. Indeed, one informant classified **teteye** with **kauke** (crickets and grass-hoppers) in a card sorting test on the basis of similar calls and the fact that both inhabit the underbush and rubbish heaps.

According to Komisi **teteye inae** (**inae** = 'mother') is a small frog, not much bigger than a thumbnail. I have no evidence as to whether this is simply a small **teteye** or a different species altogether.

8.2.6 inararai

Only one response elicited this term and then for *Litoria amboinensis*, for which all other responses were **notu**. I have already suggested that informants' descriptions of *L. amboinensis* as **notu** involve the use of the term generically and perhaps on account of a poor knowledge of the anatomy of *Litoria*. That **inararai** is generally used for *L. amboinensis* is confirmed through the coincidence of names elicited independently for the call and on

the basis of morphology. In fact, call seems particularly important in identifying *L. amboinensis*, which may well explain the allocation of a live but noiseless specimen to the category **notu**. However, at least two informants (Komisi and Inane) said they were able to recognise **inararai** on the basis of its possession of a prominent tail remnant, in which case observations were presumably based on young, incompletely metamorphosed, specimens. **Inararai** is generally described as a type of **poro-poro** on account of the fact that, like **poro-poro**, it is said to have originated from **notu**. Two types of **inararai** are usually said to exist: **inararai marae** (**marae** = 'blue-green'), a small green tree frog, and **inararai msinae** (**msinae** = 'red'), a reddish and heavily mottled form with a yellowish ventral surface becoming deeper on the throat. There is some evidence that these may represent distinct colour morphs.

8.2.7 kako (kakoi)

The term is onomatopoeic and sometimes rendered **kako-kako**. It is occasionally confused with **kako nione** (**nione** = coconut), which is how the vocalisation of **nopa hanaie** (chapter 6.2.7.5) is described. Only one specimen of *Phrynomantis fusca* was obtained from near Rohua to which informants attached this label, although it was very much in evidence vocally. **Kako** was described to Ellen as a distinct type, smaller than **notu**, from which it is said to develop. Like **notu**, it only lays a few eggs at a time.

8.3 Social uses of frogs

Poro-poro is the only frog reported as being eaten by the Nuauulu, although there are no prohibitions on consuming other types. Although it is probably used as a general famine food it is commonly caught by children in the context of play activities and roasted whole in an open fire. With such an abundance of potential sources of animal protein (particularly in the form of 'big' game animals) only the larger of the small game species are regarded as being worthwhile collecting, unless they have other qualities which make them desirable. At least one Nuauulu (Saite Somori) used **poro-poro** to catch young eels, as an English countryman might use a ferret to catch rabbits.

No ritual associations have been reported for frogs other than the existence of a **wate poro-poro**. This is a scare charm or taboo sign used by the clan Matoke to threaten actual or potential thieves. Violation is said to give rise to stomach ache and itching in the victim.

8.4 General remarks on the classificatory structure of categories for frogs

Although no single term is used exclusively for frogs as a whole, it is clear from observation, card sorting tests and interviews that they are seen as a distinctive 'natural' group. The term **notu** is usually used to refer to all unspecified frogs, although this term contrasts at several different degrees of inclusiveness:

- 1) **notu**: all non-frogs
- 2) **notu** : **poro-poro** (i.e. tree frogs)
- 3) **notu** : **poro-poro**, **teteye**, **inararai**, **kere**
- 4) **notu** : **kako**, **notu anae**

At the second degree of inclusiveness **notu** is used for all ground and bush-dwelling frogs, in contrast to tree frogs (**poro-poro**). Alternatively, this can be seen as a distinction between frogs of the river and forest (sometimes labelled **notu waene**; **waene** = 'river', 'freshwater') and those of the village and gardens, although it is recognised that this is not an accurate classification of natural kinds in terms of habitat. The second degree of inclusiveness of **notu** includes all terminal categories with the exception of **poro-poro** and **inararai**, which are usually grouped together under the separate generic **poro-poro**.

The third contrast distinguishes all other types from **notu** (in its terminal sense), **kako** and **notu anae**. We have already noted that these last two are held to develop from **notu** spawn, and this presumably is part of the logic grouping them together.

These contrasts give us the taxonomic structure set out in figure 12. Such a taxonomy seems to explain the various contrasts made in a way most consistent with Nuauulu knowledge of anuran biology. It is not suggested that it is a consistently employed mental construct; rather it is an analytical aid to interpretation. A different means of modelling is presented in figure 13. The advantage of the Venn diagram is that it plays down the cognitive centrality of hierarchy and contrast, emphasising the fuzziness of the relationships.

It is clear from what has been said that behaviour (especially vocalisation) is an important means of distinguishing between different types of frog. In 1975 Menzies made a series of recordings of frog vocalisations. Two informants were able to agree on the identification of three types of frog on the basis of their vocalisations, which matched exactly the names elicited on

FIGURE 12 Nuauulu classification of frogs arranged as a taxonomy. The chart incorporates the *maximum* number of classificatory levels elicitable from informants. In all cases the condition of transitivity is understood.

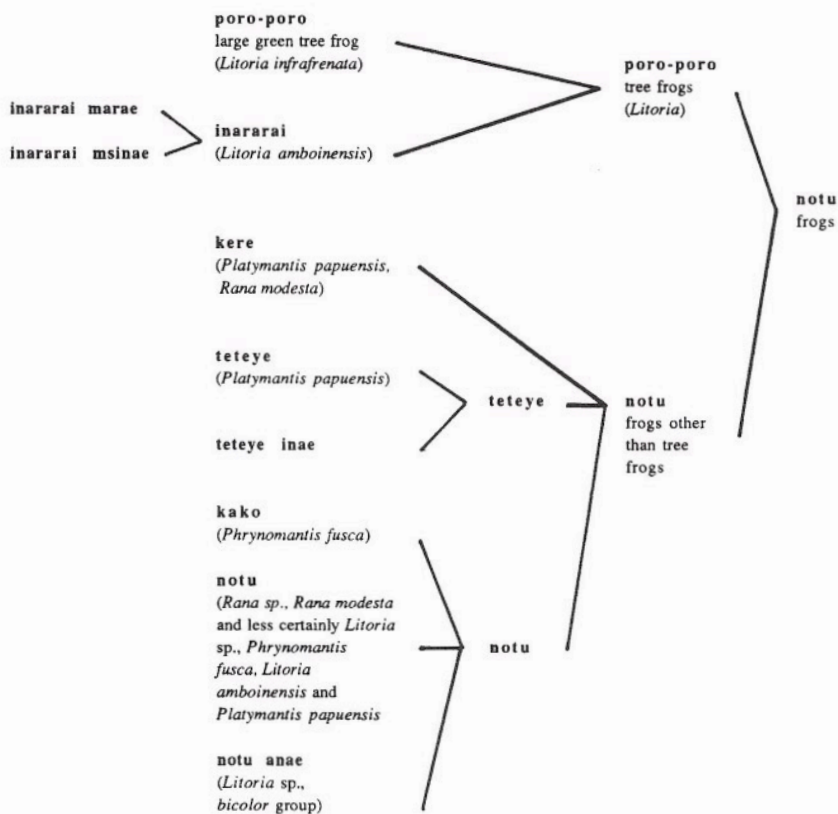
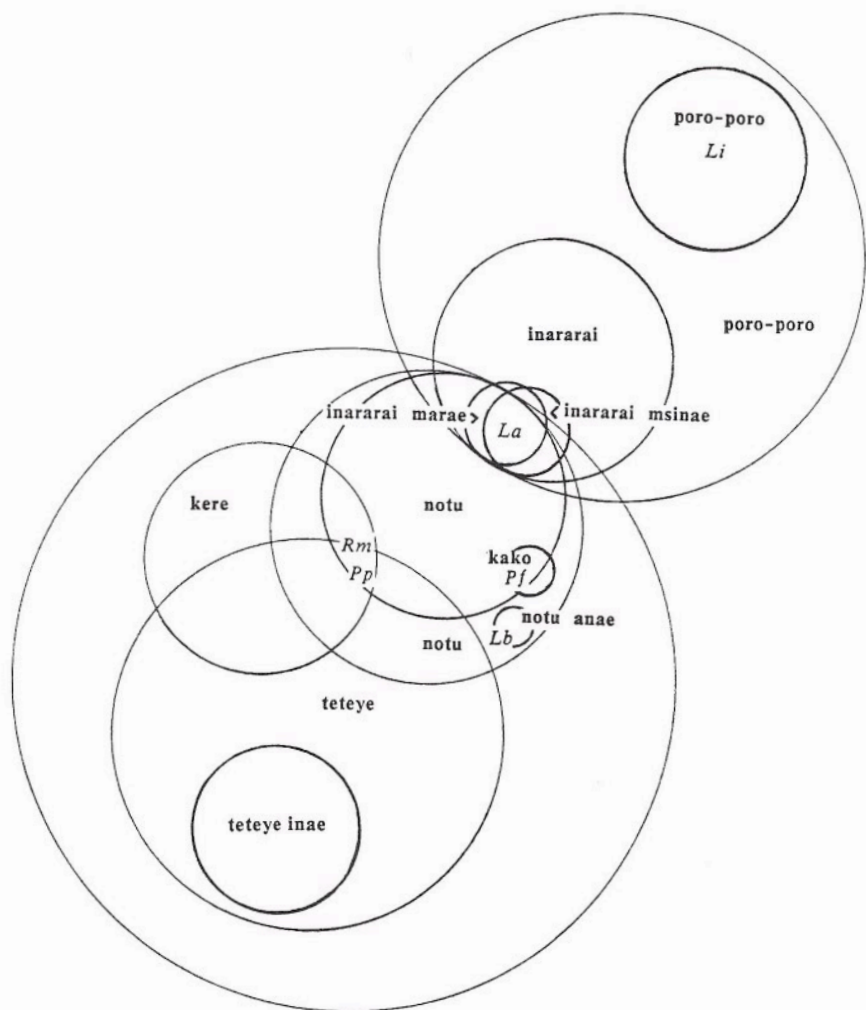


FIGURE 13 Nuauulu frog classification arranged as a Venn diagram. In the figure La, Lb, Li, Pf, Pp, Rm and R? refer to Linnaean nomenclature spelled out in figure 8.1.



independent examination of the live specimens. The case of **teteye** is particularly interesting in this respect. On one occasion Komisi described some specimens of *Litoria amboinensis* as **notu waene**, that is 'river', 'stream' or

'freshwater' **notu**. He said that three kinds could be recognized on the basis of the sound they produced:

- 1) those calling from holes in stones (nocturnal),
- 2) those calling from under the water (diurnal), and
- 3) those calling from the dry land - **inararai**.

The only positive identification here is the third as *Litoria amboinensis*. It is difficult to know to what extent these represent a knowledge of actual frog behaviour and to what extent they are simply colourful ways of expressing particular vocalisations.

8.5 Consistency in the application of frog labels

I think it is clear that there is a discernible structure to Nuauulu classification of frogs and that it is not a wilful distortion to represent this for didactic purposes as a taxonomy. On the other hand, despite the sophistication of some of the discriminations employed, the evidence presented here indicates that boundaries between categories are often operationally 'fuzzy'. Knowledge of frogs is poor and identification inconsistent, compared with other vertebrate groups known to the Nuauulu and compared to other societies for which there are data [Bulmer and Tyler, 1968].

In July 1975 Menzies and Ellen visited the non-Nuauulu mountain village of Piliiana, at an altitude of 700 m above Japutih on Teluti Bay. Here a small collection of frogs was made and some information on indigenous terms gathered (for a list see Ellen et al, 1976b: table 3, p. 136). Although the period at Piliiana was brief (a few days only) and the material gathered entirely through the medium of AM, it was clear that Piliianan knowledge of anuran biology was more extensive than that of the Nuauulu and that terms were applied to biological species with a much greater consistency, as well as there being a much closer correspondence between phylogenetic and local categories. This appears to be due to a combination of the greater diversity and population of frogs in this upland region and more restricted sources of animal protein. The latter compels inhabitants to take a greater interest in minor food resources. Only three out of seven species were not thought to be appropriate foods, two because they were simply too small and one because there were no local or regional traditions prescribing this as a suitable food source.

Nuauulu are not compelled to take such minor protein sources as frogs over seriously, as other more reliable and productive ones are available. Lack of nutritional significance is probably the most important single reason explaining the restricted anuran inventory and inconsistency in the

application of terms. However, locality is also important. Although the smaller frogs undoubtedly do occur in the inner zone of the Nuaulu extractive environment (the area bounded by the most distant gardens), some species are only found in abundance at more distant localities, determined by altitude (*Rana* spp.) and extensive swamp forest (*Phrynomantis fusca*). High altitude areas are rarely visited, even on hunting expeditions and for the collection of *Agathis* resin. Areas of swamp forest, however, are commonly visited for the purpose of collecting sago flour and their fauna is well-understood. However, that the nomenclature is as extensive as it is, gives some reason to suspect that it evolved during the period the Nuaulu were living in the highlands. Migration, resettlement and economic change have combined to alter the cultural significance of frogs, with the result that while the names remain the experience necessary to employ them constantly, consistently, and perhaps also accurately, is lacking.