

Part 11

Biology of Owls with with Emphasis on Vocalisations



Sokoke Scops Owl *Otus ireneae*

Convener:
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Owl-Vocalizations as Interspecific Differentiation-Patterns and their Taxonomical value as Ethological Isolating Mechanisms between various Taxa

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ABSTRACT

Owls are mainly active by night or at dusk Therefore plumage-patterns and colourations are less important for mutual recognition than vocalizations. This may explain the sometimes enormous individual variability of plumage patterns, as well as the existing different colour-morphs in various species. On the contrary the whole vocabulary of each species is totally inherited and therefore taxonomically specific. Keeping this in mind, vocalizations seem to be the most important differentiating patterns between species, playing apparently also a role as ethological isolating mechanisms between separate species. In comparison with passerine birds, owls show rather little geographical variation of vocal patterns and the specifically typical parameters are always kept. Therefore we have no very distinctive geographical "dialects" within the range of the same species! Geographical differences in voice are often even less obvious than individual variation within the same population.

The author has studied owls in the wild and in aviaries for more than 35 years. Most of his field-work was done in Europe, South America and Africa. His studies proved the hypothesis mentioned above, which has been supported by molecularbiological studies (PCR, DNA-sequences). According to these investigations we can speak of about 213 species of Strigiformes in the world.

Owls are chiefly active at dusk or at night. Therefore plumage-patterns and colourations are obviously less important for interspecific recognition than are vocalizations - in spite of the birds' increased visual perception under faintest light-conditions. Keeping this in mind, the sometimes enormous variability of plumage-patterns, as well as the different colour-morphs in several species of owls may be understood quite well. Indeed many species can "afford" a large individual polymorphy (e.g. *Strix aluco* or some *Glaucidium* and *Otus*), while on the contrary in all species of owls the complete vocabularies are totally inherited and taxonomically specific. The variability of vocalizations is generally rather low as well individually as on a geographical level. In no case the specific vocal parameters are altered in different races of the same species. Distinct regional "dialects", very obvious in many passerine birds, do not exist in owls! If, in two owl-specimens very similar in plumage, striking differences in voice may be noted, they doubtless are good candidates for specific separation. Therefore bioacoustics is highly important as a taxonomical criterion in "difficult" species-groups of owls (e.g. *Glaucidium* and *Otus*), showing no obviously distinctive patterns in plumage or size. This knowledge has led to the discovery of "new" species. Meanwhile the specific status of the latter could be proved by molecularbiological studies (PCR, DNA-sequences) and ecological investigations in the field.

Supported by the German Scientific Community (Deutsche Forschungsgemeinschaft) my wife Ingrid König and myself have studied taxonomical problems in Neotropical owls, comparing the results with studies on Old World Strigidae. The hypothesis of the importance of vocalizations for taxonomy, based on investigations of Marshall (1978) and Scherzinger (1978), could be proved by the studies mentioned above: Vocal patterns are doubtless the most important interspecific isolating mechanisms in owls! Studies on DNA-evidence stress the bioacoustical results in a convincing manner.

We actually know that concerning the taxonomy of owls, the nucleotide substitutions by DNA-sequencing are varying at subspecific level between 0 to about 1 %. Greater distances (e.g. more than 1,5 %) of the nucleotide substitution suggest species status of the compared taxa. But, this is not valid for every order of birds! In species of Passeriformes the nucleotide substitutions may be much greater than in Strigiformes, and the vocal differences due to geographical dialects may be very striking.

Based on bioacoustic studies on a large scale on Old and New World Owls it may be quoted that:

- 1.) Clearly distinguishable vocal patterns (e.g. songs) speak for different species. This counts especially for sympatrically living taxa.
- 2.) In allopatrically distributed species many vocal patterns may be similar or even rather identical. But, this must not be taken as evidence for closer relationship! The areas of distribution of allospecies normally are separated by large distances. Therefore it is very unlikely that they might ever meet or get into contact with each other in any way, unless they are migratory species. Isolating mechanisms between allopatric, superficially similar species are therefore not necessary. This holds true for morphological as well as for vocal patterns. Here the phenomenon of convergence quite often plays an important part too, having fooled many taxonomists in the past.
- 3.) In parapatric species specific vocal parameters may be distinguished in all cases. But, the latter may be sometimes difficult to be told apart by the human ear; they are obviously sufficient for the owl-species in question, to recognize specific differences. Nevertheless interspecific hybridizations may occasionally occur, but hybrids will rather soon be exterminated by natural selection. Populations of hybrids (as it is usually the case between subspecies) of longer duration never will be established in such cases.

Now some examples for the mentioned topics:

- 1.) The Eurasian Pygmy Owl (*Glaucidium passerinum*) and the Sub-Saharan Pearl-Spotted Owlet (*Glaucidium perlatum*) are allospecies, although some authors have considered them to be geographical races of the same species (Eck & Busse 1973). Indeed they look very similar, as do most species of the genus *Glaucidium*. But there are totally different vocalizations, different habitat and different behaviour. Beyond DNA-evidence shows clearly the specific status of both taxa (Heidrich & Wink, pers. comm.) and proved the hypothesis of being doubtless two separate species.

Of the relatively large vocabularies of both species, which are very different, I wish to give here only few examples: The territorial song of male *Glaucidium passerinum* consists of long series of single notes uttered at intervals of about 1-2 s between each note (Fig. 1). If the bird is very excited, it utters a short "staccato"-trill after each note (Fig. 2). The female has a similar, but higher-pitched and less clear song. When begging for food, it delivers a high-pitched "seeht", mostly to be heard near the nesting-site (Figs. 1- 3).

Figure 1. "Normal" territorial song of a male *Glaucidium passerinum* from SW Germany. *

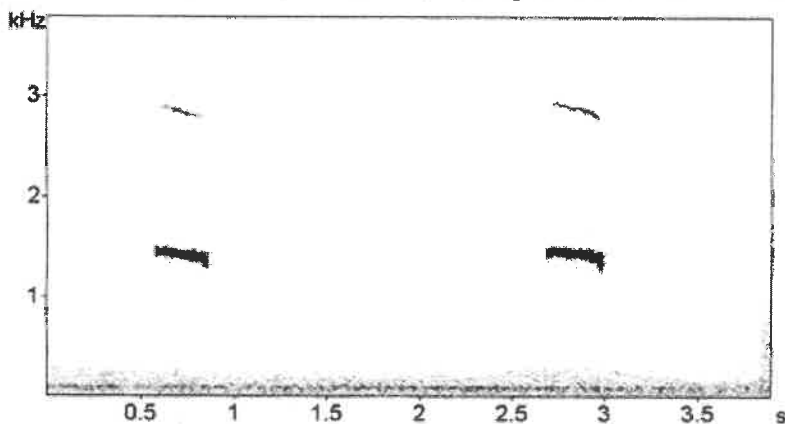
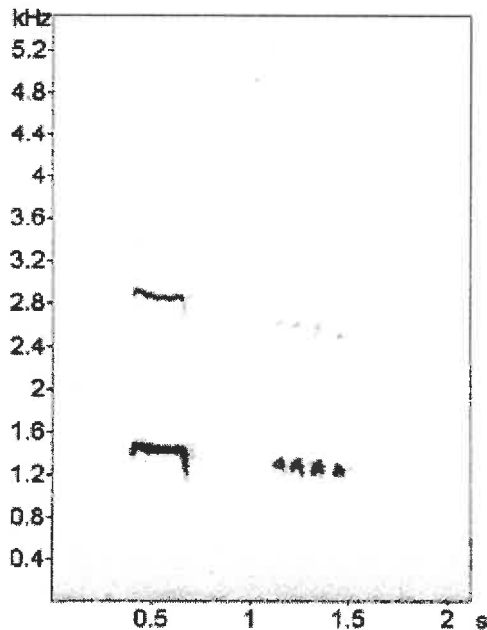
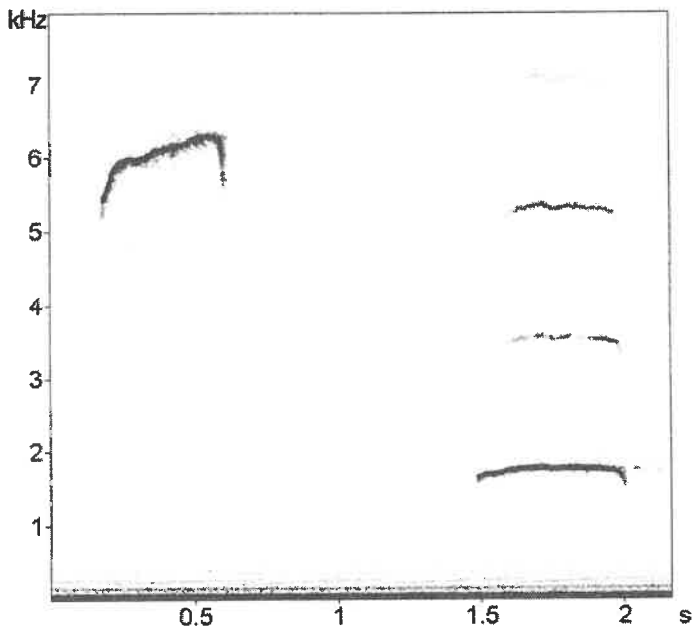


Figure 2. Phrase of the "excited" song of *Glaucidium passerinum*: the single note is followed by a short staccato trill. This song may be uttered in long sequences like the "normal" song.



*If no recordist is mentioned, the records are made by C. König, who also made the sonograms with "Avisoft" programme. Some sonograms have been prepared by Richard Ranft with the same programme at the British Library National Sound Archive.

Figure 3. Contact-calls of *Glaucidium passerinum*: female (left) and male (right).



The territorial song of *Glaucidium perlatum* is a relatively rapid sequence of notes with intervals of about 0.2 s between each. Further, the notes increase in volume and also slightly in pitch and finally end in several very loud “glissando”-notes “peeoh” with emphasis on the “ee” (Fig. 4 and 5). The contact-call (also begging-call) is a short “peowit” (Fig. 6).

Figure 4. Section of territorial song of *Glaucidium perlatum* from South Africa.

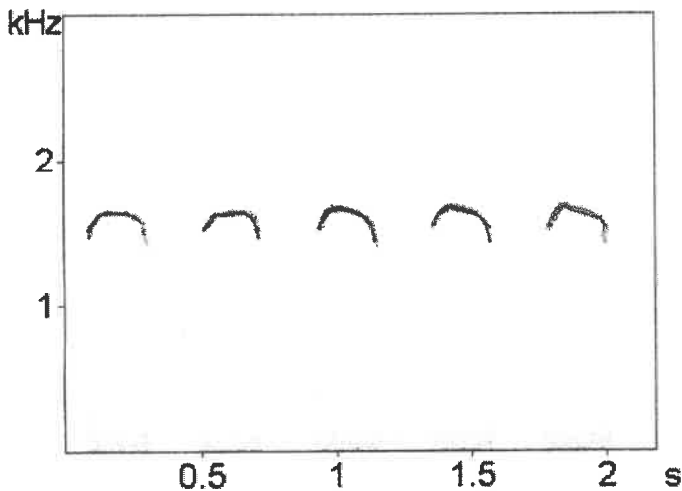


Figure 5. The “glissando” notes, which mostly follow the territorial song of *Glaucidium perlatum*.

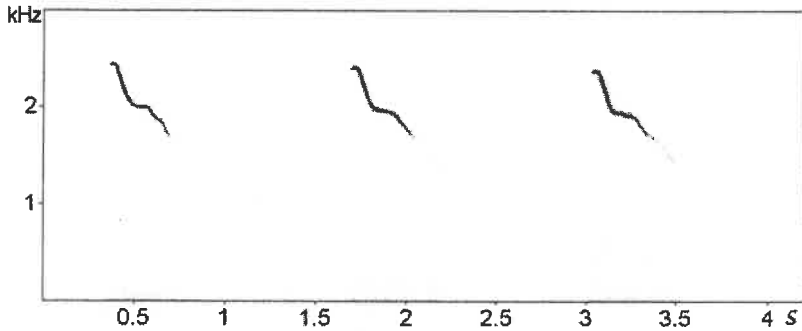
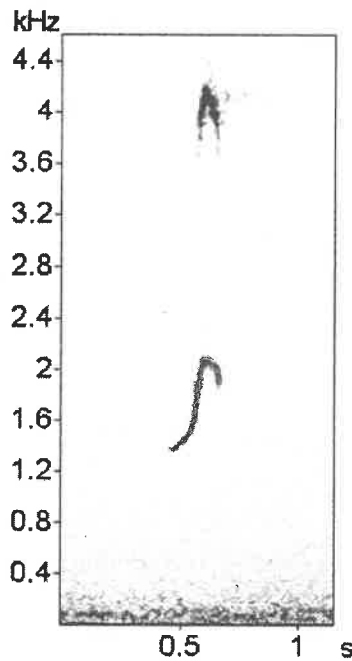


Figure 6. Contact-call of a female *Glaucidium perlatum*.



- 2.) On behalf of the American Pygmy Owls studies on vocalizations have shown, that there are much more species present, as most authors had supposed before (König 1991, 1994, 1998, Heidrich, König & Wink 1995, Howell & Robbins 1995, Vielliard 1989). According to bioacoustical, ecological and zoogeographical studies the taxonomical status of these taxa could be cleared up, as e.g. *Glaucidium californicum*, *G. gnoma*, *G. palmarum*, *G. sanchezi* and *G. griseiceps* being different species. In some of them DNA-evidence could in addition prove the results. This is for example the case on behalf of *Glaucidium nanum*, *Glaucidium peruanum* and *Glaucidium tucumanum*, being specifically distinct from *Glaucidium brasilianum*. Because of vocalizations, ecology and DNA-evidence the Andean Pygmy Owl (*Glaucidium jardiinii*) is only distributed in north-western South America from mountains in Venezuela to about the Marañón-depression in the northern Andes, while from Peru to N

Argentina the cloud forests of the eastern Andes are inhabited by the Yungas Pygmy Owl (*Glaucidium bolivianum*). The Central American taxon *costaricanum* is either a subspecies of *Glaucidium gnoma*, resp. *cobanense* or even a separate species, but never a race of *Glaucidium jardinii*! (König 1991, and in prep., Heidrich, König & Wink 1995; Robbins & Stiles 1999).

- 3.) The American Great Horned Owl (*Bubo virginianus*) and Magellan Great Horned Owl (*B. magellanicus*) have proved separate species (König, Heidrich & Wink 1986, König 1998). They are parapatric taxa with totally different vocalizations.

A similar situation we have to recognize in the African Spotted Eagle-Owl (*Bubo africanus*) and the Vermiculated Eagle-Owl (*Bubo cinerascens*) (König, Weick & Becking 1999). The latter has been regarded as northern race of the Spotted Eagle-Owl (Fry *et al.* 1988, Voous 1988). But both are specifically distinct and have different songs. Beyond the Vermiculated Eagle-Owl has dark brown (not yellow!) irides with a fleshy-red edge of the eyelids, which are blackish in the more southern counterpart *Bubo africanus*. Male *Bubo africanus* start singing in general with an incomplete song, consisting of a rather loud hoot, often followed by a deeper, somewhat drawn-out one, while the “full” song, often in duet with the female, consists of the “incomplete song”, followed by 2 rather loud hoots (Fig. 7), leading finally to a sequence of 3 slurred notes followed by a drawn-out, somewhat downward inflected hoot: “wuohu - whooh”. These phrases are repeated at intervals of several seconds. *Bubo cinerascens* never utters more than two notes in a phrase, nor does he give the described “wuohu - whooh”. He utters instead a song of bisyllabic notes uttered at intervals. The first note is always rather loud and explosive and followed after a short break by a softer hoot (Fig. 8).

Figure 7a. “Full song” (notes 1,3,4) of a female *Bubo africanus* from South Africa. The second note is a call of a nearby male. Rec. O. Prozesky.

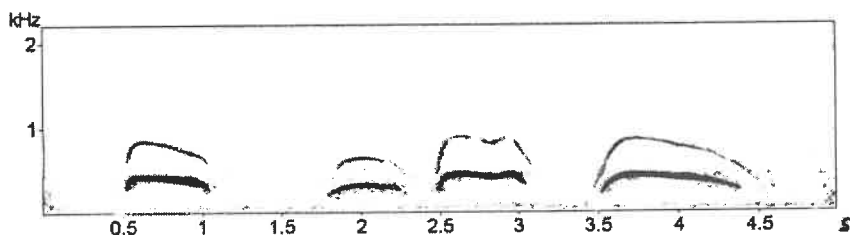


Figure 7b. One phrase of the “full song” of a male *Bubo africanus* from Tanzania. Rec. R. Stjernstedt. Spectrogram by R. Ranft (NSA).

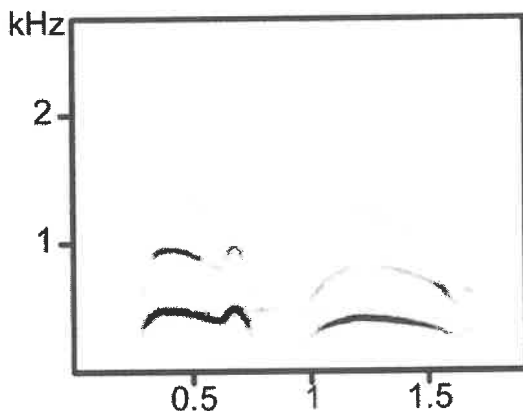
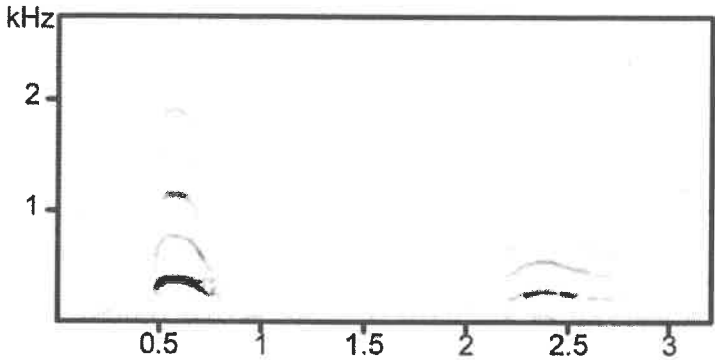


Figure 8. "Full song" of *Bubo cinerascens* from Mali. Rec. C. Chappuis. Spectrogram by R. Ranft (NSA)



4.) The Scops Owls are a taxonomically very difficult, large group of owls (Eck & Busse 1973). We actually recognize about 68 species. As in other Strigiformes the vocalizations are a good help for specific separation (Marshall 1978). The Common Scops Owl (*Otus scops*) is distributed from southern Central Europe to North Africa (north of the Sahara) and east to about Pakistan. There are no remarkable differences in song to be noticed (Figs. 9 and 10).

Figure 9. Territorial song of a male *Otus scops* from Mallorca (Balearic Islands).

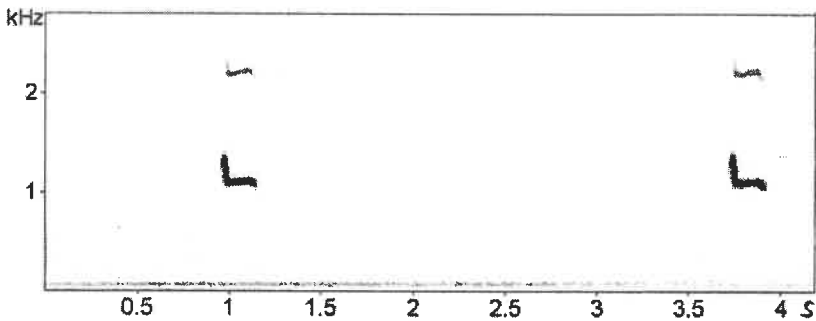
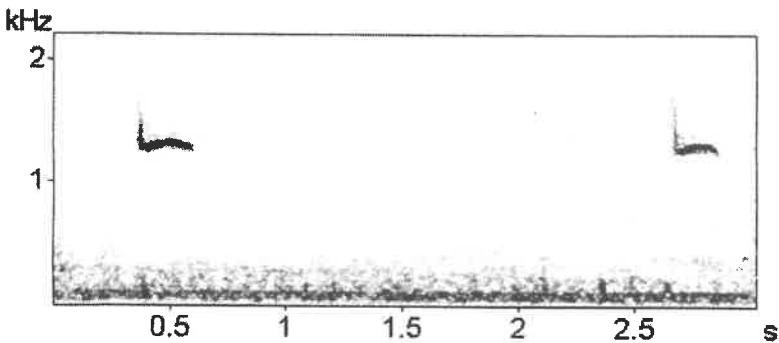


Figure 10. Territorial song of *Otus scops* from Pakistan. Rec. T. Roberts.



The Sub-Saharan African Scops Owl (*Otus senegalensis*) utters a purring song, while the Asian Scops Owl (*Otus sunia*) gives a tri-syllabic song. It is a typical Scops Owl in China and Japan. The southern races (*malayanus*, *rufipennis*, *leggei*) differ vocally and might perhaps be specifically distinct (Figs.11 and 12). In that case these 3 taxa would best be treated as geographical races of the taxon *malayanus*: *Otus malayanus* (Hay 1847) the Malay Scops Owl. The Seychelles Scops Owl (*Otus insularis*) utters a hoarse rasping song, similar to the sound of sawing a dry branch with a hand-saw. It is doubtless a separate species (Fig. 13).

Figure 11. Territorial song of *Otus sunia* from Japan. Rec. T. Kabaya.

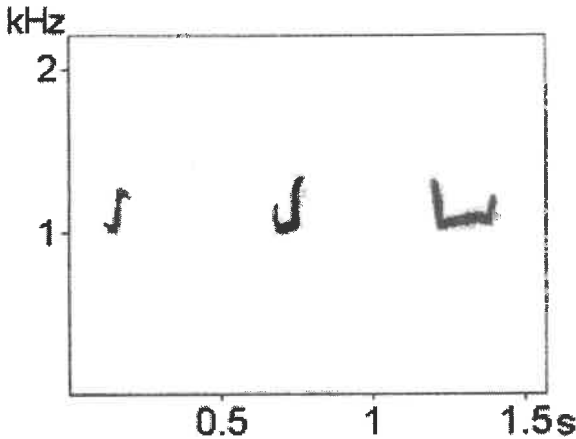


Figure 12. Territorial song of *Otus (sunia ?) malayanus* from Thailand. Rec. J.T. Marshall.

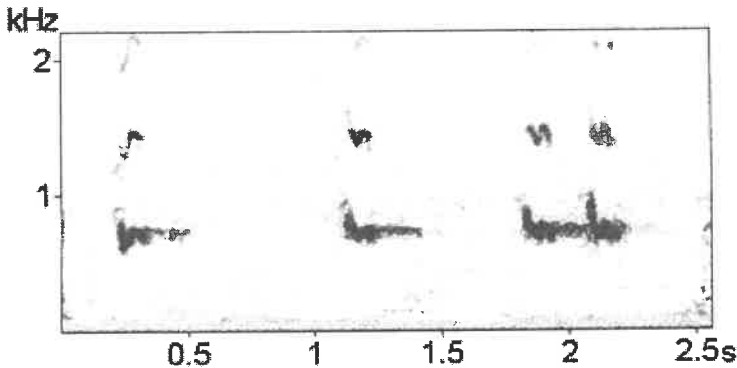
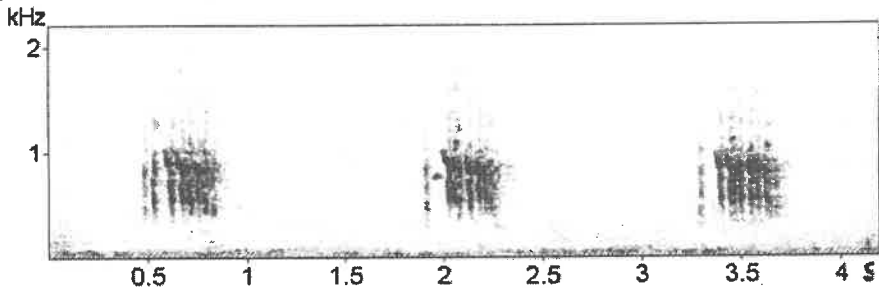


Figure 13. Territorial song (after playback) of *Otus insularis* from Mahé (Seychelles). Rec. R. Ertel.



Otus bakkamoena represents a species-group of the following taxa with specific rank, all differing vocally: *Otus bakkamoena* the Indian Scops Owl (eastern Middle-East to India), *Otus lempiji* the Sunda Scops Owl (Malaysia, Greater Sunda Islands), *Otus lettia* the Collared Scops Owl (from the Himalayas to China and Taiwan) and *Otus semitorques* the Japanese Scops Owl (Japan and coastal S Siberia). Probably one more species might be attributed to this group: the Singapore Scops Owl (*Otus cnephaeus*) which has been thought a race of *bakkamoena* or *lempiji*, but differing very much vocally (König, Weick & Becking 1999). It is found around Singapore.

All members of the *bakkamoena*-superspecies-group are very similar in appearance. *Otus lettia*, the Collared Scops Owl, has the most pronounced collar on its hindneck, together with an indistinct second collar (Fig. 14 and 15). It has brown irides. The male's song is a downwards inflected note, uttered at rather long distances (Fig. 16). The very similar in size and outside appearance *Otus semitorques*, the Japanese Scops Owl, has only an indistinct collar on its hindneck and dark red or orange-yellow eyes. The song consists of rather deep, uniform hoots without any inflections (Fig. 17).

Figure 14. Adult *Otus lettia glabripes* from Taiwan. Photo. R. Harling, Mus. Stuttgart.



Figure 15. *Otus lettia glabripes* from Taiwan showing the double collar. Fot. R. Harling, Mus. Stuttgart.



Figure 16. A note of the song of *Otus lettia* from Taiwan. Rec. J.-H. Becking.

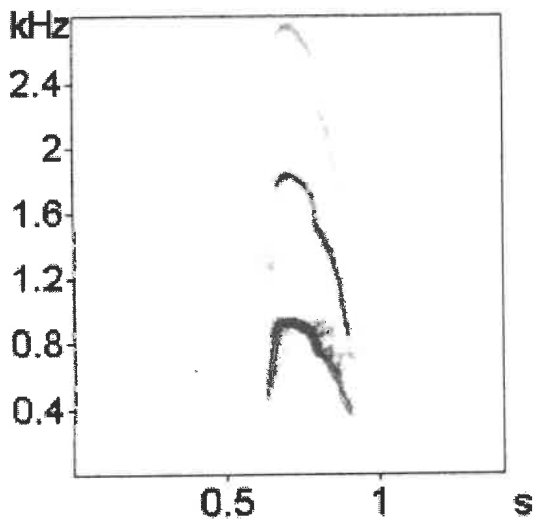
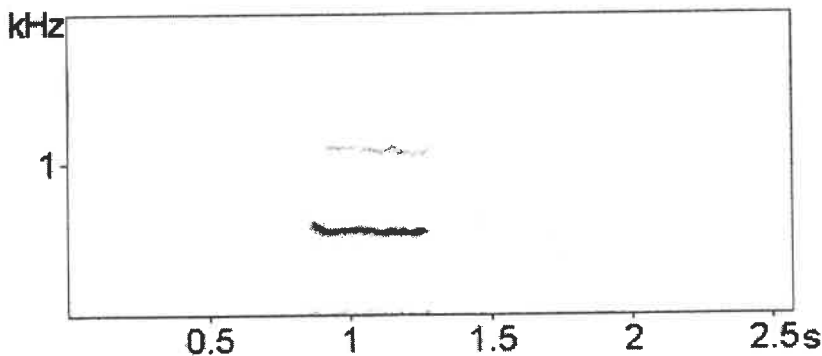


Figure 17. A note of the song of *Otus semitorques* from Japan. Rec. T. Kabaya.



- 5.) The American Screech Owls are the ecological counterparts to Old World Scops Owls. They are generally treated as species of the same genus, but should be given another generic name: *Megascops*. But there is one exception: the Flammulated Owl (*Otus flammeolus*) is related to Old World Scops Owls and not to New World Screech Owls! The latter have two different songs: the A-song uttered in a territorial function and the B-song given during courtship or in an aggressive sense; sometimes as an introduction to the A-song. The Montane Forest Screech Owl (*Otus hoyi*) of the “Yungas” of northern Argentina and southern Bolivia is a new species described in 1989 (König & Straneck 1989, König 1994) with typical vocalizations, while similar in plumage patterns to many other Screech Owls.

In the Peruvian Screech Owl (*Otus roboratus*) two "subspecies" differing very much in size have to be recognized. Their vocalizations are said to be similar (Johnson & Jones 1990), but there are differences, which might suggest specific separation. Like other Screech Owls, the Peruvian Screech Owl has two different songs: the territorial advertising (A-song) and a courtship, resp. aggressive song (B-song). In the dwarfish lowland form *pacificus* the A-song shows a distinctly slower sequence of notes in a trill than in *roboratus*, while in the latter the harmonics (overtones) are much more pronounced. In the B-song of *pacificus* the notes are accelerated towards the end of the short trill, first rising and finally falling in pitch (Hardy *et al.* 1989). In *roboratus* the B-song is longer and consists of equally-spaced "staccato"-notes uttered with a somewhat "undulating" quality in pitch (Figs. 18 and 19). Larger differences may be noted in the calls (see Johnson & Jones 1990!). I therefore cannot support the idea of Johnson & Jones (1990), who treat the taxon *pacificus* as subspecies of *Otus roboratus*, which is a relatively large *Otus*, living in mountainous regions. I suggest to give the dwarfish Pacific taxon from northwestern coastal Perú and western coastal Ecuador specific rank, calling it *Otus pacificus*, the Tumbes Screech Owl.

Figure 18. 2 phrases of the B-song of *Otus pacificus* from Tumbes, NW Perú. Rec. J.P. O'Neill (ARA-Records 16).

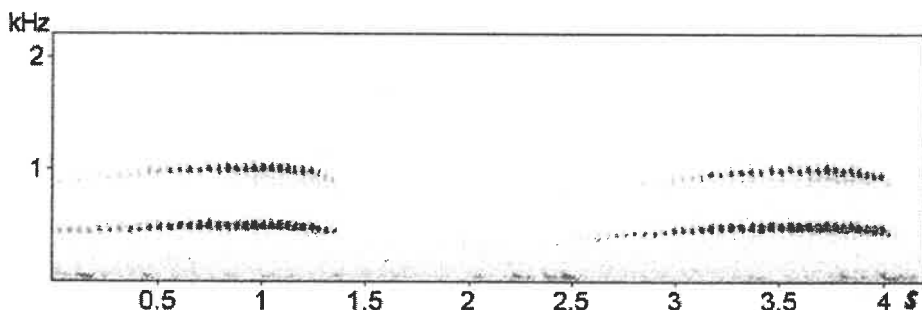
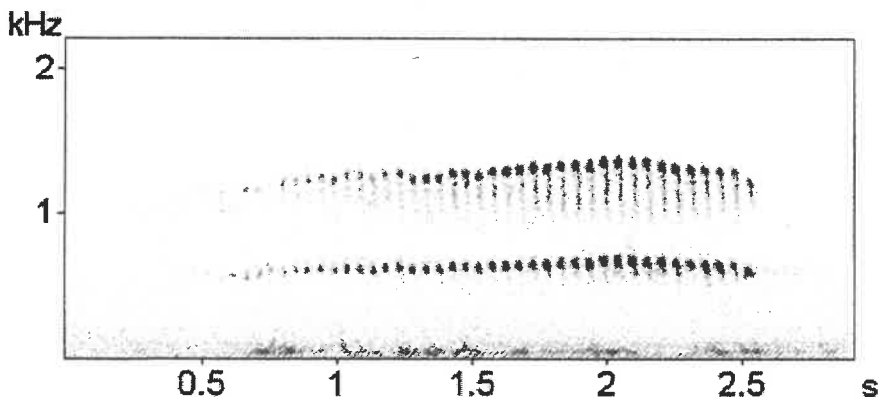


Figure 19. Phrase of the B-song of *Otus roboratus* from near Bagua, N Perú. Rec. J.P. O'Neill (ARA Records 16)



- 6.) The African White-Faced Owls should be split into two different species according to voice: The Northern White-Faced Owl (*Ptilopsis leucotis*) and the Southern White-Faced Owl (*Ptilopsis granti*) (Figs. 20 and 21). It was W. van der Weyden (1975) who first showed the differences in spectrograms. The distribution of the first taxon reaches from Senegambia across the Sahel-zone to N. Kenya and Ethiopia, while the second is distributed from southern Kenya south to South Africa and Namibia, avoiding the dense rain forest of Central Africa and the deserts.

Figure 20. Phrase of the territorial song of *Ptilopsis leucotis*. Rec. C. Chappuis. Spectrogram by R. Ranft (NSA).

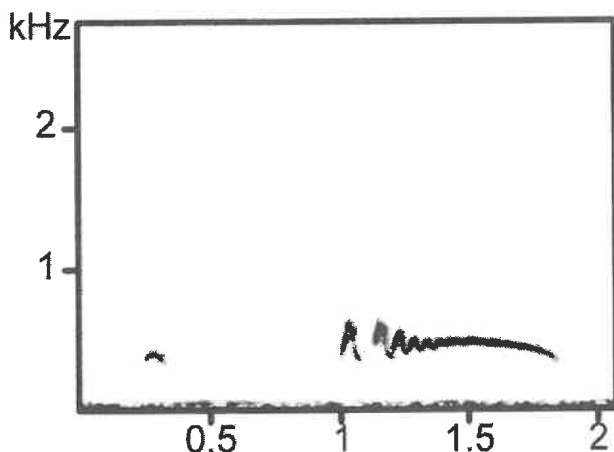
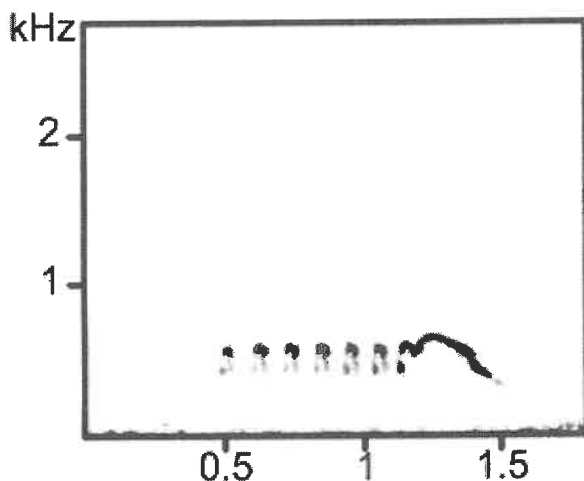


Figure 21. Phrase of the territorial song of *Ptilopsis granti* from Zambia. Rec. R. Stjernstedt. Spectrogram by R. Ranft (NSA).



Further investigations on vocalizations, ecology and zoogeography will doubtless enlarge the number of owl species in the world, especially in South America and South East Asia, as several taxa regarded as races of one species might prove specific distinction (Lambert & Rasmussen 1998; König, Weick & Becking 1999; Robbins & Stiles 1999).

According to our most recent knowledge the number of living owl-species in the world is about 213. Many of them have been described during the last years, or have been separated from existing species by bioacoustical, ecological and molecularbiological investigations. The specific status of most of them could be proved by such studies and may therefore be regarded as secured. Doubtless some more species will be found in the near future, not only in South America, but also in SE-Asia, as some taxa described as races might prove separate species. Bioacoustical studies doubtless will be very essential for taxonomy of "difficult" groups of owl-species, as they will help to complete the "taxonomical mosaic" in a sensible and effective way. Finally molecularbiological and ecological studies are needed to prove the results. Up to now we always found our hypothesis confirmed, that vocal patterns are the most important interspecific ethological isolating mechanisms (Osche 1966) in owls and being therefore very important for the taxonomy of the Strigidae (Marshall 1978, Scherzinger 1978, König 1994, 1998).

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