

PhD thesis review report

"The ecology of lowland rainforest bird community in Papua New Guinea"
by Kryštof Chmel

On 122 pages, the PhD thesis of Kryštof Chmel endeavours to provide a deeper insight into structuring of tropical bird communities. Generally, such an effort is both valuable and demanding, as our knowledge of tropics is still poor and collecting field data difficult from obvious reasons. Kryštof's thesis consists of five chapters: three scientific manuscripts (one already published, one accepted and one ready to submission), the Introduction and the Summary. At the very beginning, I would like to say that I consider it a very nice contribution to the current debate in the field of avian ecology and I see a huge amount of field effort behind the outputs. All manuscripts are well elaborated and easy to read. Formally, the work deserves no critical comments.

The general Introduction is rather descriptive. It describes PNG, its avifauna, ecological specialisations of local birds and also employed methodological approaches. Although there is a more general sub-chapter about spatial distribution of birds, I really miss paragraphs dealing with general ecological concepts on community assembly, environmental gradients or ecological space use. From personal experience, I know that a real testing of such conceptual issues is tricky based on field data at local scale to which the dissertation is focused. However, the Introduction is in fact the only place in the thesis, where particular findings can be actually freely put into the broader ecological context and it is a pity that Kryštof did not put more effort in this direction. Anyhow, the Introduction is interesting to read especially for a person similar to me, who does not have detail knowledge of PNG situation.

The second chapter is so far unpublished manuscript about factors influencing distribution patterns of birds at small spatial scale. It is excellent that the authors counted birds within Forestgeo plot, for which precise information about vegetation structure is available. And I really like asking these old but still not adequately solved questions about bird-environment links. The authors found the topography as the most influential factor shaping species composition changes even given the small range in variable values. In this case, I think it might be confusing to put elevation, slope and convexity into one basket because, as even authors suggested, the effect of topography at such small spatial scale is a bit surprising. I would say not necessary, if we consider that micro-biotope quality relates to its location on "a geomorphological map", which can in turn relate to habitat preferences of birds such as streams in valleys or different forest types on ridges. However, the true elevational change in bird community composition is then not involved. My question here is straightforward. *Do higher elevations in the plot support species inhabiting higher elevations in general, or all are simply lowland species?* From a statistical point of view, I think that GLM without considering space does not adequately control for spatial autocorrelation between quadrates, *would a GLS approach change something?* A quadrate – the unit of analysis – is very small. *How frequently more than one individual of particular species was recorded in a quadrate?* I mean, testing a checkerboard distribution might be hampered by low difference between probability of detecting an individual and no individual, especially if the birds are highly mobile and 20 m means if fact nothing to them. The Figure S6 shows the effect of rain on avian abundances. I presume that there was no rain during counts, but *how exactly you think the rain affects the probability of bird detection?*

The chapter three is already published in Population Ecology and it is a really nice paper about occupation of ecological space estimation by using mist netting. In my opinion, vertical stratification investigations might truly bring a new insight! Authors found high abundances of caught birds in the canopy and close to the ground, which nicely reflects distribution of food resources and ecological adaptations within bird community (ground x canopy feeders). I like the effort invested as well as support for differential space use among tropical birds. I also like that the paper explicitly shows that just "ground mist netting" is not enough for assessing avian community in tropics. *I am curious how much the situation in temperate zone is different?* And also, *if the author compared potential of the*

classical audio-visual census with the ground-to-canopy mist netting? Authors conclude that foliage density does not affect overall community structure parameters, however it explains patterns at the level of feeding guilds (implied by discussion, page 81). Are you sure that avoidance of understory by frugivorous birds can be causally linked to foliage density?

The chapter four (accepted in Bird Study) deals with nest predation, one of the most influential factors limiting populations of birds. The authors did their best. In spite of low breeding densities and relatively aseasonal breeding patterns in tropics, they were able to collect reasonable dataset for natural nests, complete the results with artificial nests and made efforts to indentify nest predators. Thus, they provided quite comprehensive picture of nest predation for their study site. The Discussion of the results is well elaborated, too. One thing just crossed my mind. The authors claim that nest height, which varied from 0 to 9.5 m above the ground, did not influenced the predation rate, which suggests no vertical variation in predator densities. However, I did not find any information about distribution of nest height values. *Were they distributed "uniformly" along the range of values?* I think, nests located closer to the ground are easier to locate. The crucial factor affecting nest predation probability is its visibility (or accessibility) to predators. In Methods, I did not find any information how this varied among natural nests or was controlled in artificial ones (apart from the nest type itself). *Did the fragmented and continuous forests differ in visibility of experimental nests?*

In his thesis, Kryštof showed that he is an excellent field researcher capable to work in harsh tropical environments. Besides, he proved that he is familiar with adequate statistical approaches necessary to prepare data for high level scientific journals and write fluent scientific texts. His work is undoubtedly a relevant contribution to set of data available from tropical regions and assists nicely in understanding of ecological space use in tropical birds. From my point of view, the thesis meets all the demands placed on it by the academic environment and I am happy to recommend Kryštof for awarding a PhD degree.

Prague, 19th January 2018



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The dissertation by Kryštof Chmel (KC) at the University of South Bohemia, Czech Republic, entitled "The ecology of lowland rainforest bird community in Papua New Guinea" consists of an introduction (Chapter I), three manuscripts (Chapters II-IV) and a summary (Chapter V). The three manuscripts are all first-authored by KC. One manuscript (Chapter III) is published in *Population Ecology*, one manuscript (Chapter IV) has been accepted by *Bird Study* and one manuscript (Chapter II) is in a very progressed format. Chapter II presents a comprehensive dataset of bird distributions and abundances collected by KC within a 50 ha. lowland forest plot in Papua New Guinea and explores environmental and physical determinants of forest bird distributions. Chapter III explores the vertical structure of lowland forest bird communities. This is done by mist-netting vertically from 0-27 metres above the ground. No mean feat! Chapter IV explores predation of nests drawing on an impressive number of natural nests as well as artificial nests.

The field efforts are incredibly impressive and the novelty of the datasets coupled with existing knowledge and environmental data of the particular lowland rainforest area (mostly Wanang) makes for some novel research and some very exciting manuscripts! The thesis is well written and presented, the analyses are thorough and the discussion is balanced in a way that makes the reading interesting without unnecessary over-statements. The work is both original and timely.

The tropics have always provided an enormous playground for ecologists and the Indo-Pacific region has been the cradle of ideas pertaining to systematics, evolution and biogeography. As such the thesis builds on the work over the last centuries of prominent natural historians and ecologists such as Robert MacArthur, John Terborgh and Jared Diamond. The region's remoteness has led to a paucity in efforts to explore and tackle grand ecological questions (based on extensive fieldwork) in the region. Yet, the work by Binatang Research Center has greatly facilitated work in the region and this thesis greatly capitalizes on the available network and infrastructure, which has made this extraordinary work possible. In a time when rapid computer exercises seem the norm, it is heart-warming to see someone taking a stab at collecting such an amazing field dataset. The thesis by KC adds important and novel insights into the environmental factors that determine the distribution of diversity in lowland rainforests and beyond. The new data generated in the thesis is impressive and the handling of the data is of high quality. The conclusions are solidly based on the data and analyses and I have no reason not to believe in the results and the conclusions drawn. The literature cited suggests a thorough understanding of important references both pertaining to the focal organisms and to other organismal groups in the region. I cannot think of any short-comings to the work but would be interested to hear more about KC's thoughts on more wide-ranging ecological and biogeographical aspects based on the knowledge gained from his thesis work.

Overall, the thesis by KC fulfils all requirements and I warmly recommend its defence and acceptance by the Faculty of Science at the University of South Bohemia.

My very best,



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