



behavioural functions (e.g. Nässel 2002). Despite the enormous physiological importance of neuropeptides, the effect of ecological factors on species-specific peptide variability is poorly understood.

In a comparative approach peptide variability of several Mantophasmatodea species (between species variability) and of different populations (within species variability) will be correlated to ecological and climate patterns (winter- summer rain areas, vegetation type) of their habitat.

This report gives 1) an overview of results of mass peak analysis of neuropeptides, 2) first de-novo-sequences of the neuropeptides 3) preliminary results of linking biographical and ecological factors to peptide inventory of species and 4) an outlook for further research steps.

## Methods

In 2003 and 2005 living Mantophasmatodea were collected from several locations Western and Northern Cape Provinces of South Africa and in Namibia.

During the field trips data concerning geographic distribution, habitat type, vegetation and climate data were surveyed. Further information on distribution and ecology of Mantophasmatodea in Southern Africa were obtained by unpublished data (Picker in prep.). In total, at least 9 species from 7 genera and 2 families (some of the taxa have an uncertain status- see Klass et al. 2003) have been collected and studied so far. Note, that the species, *Tyrannophasma gladiator* and *Mantophasma zephyra* were sampled during the Namibia excursion in 2005, which has been granted by the BES-grant.

The methodological approach of peptide analysis (dissection of neurohemal organs, identification and sequence analysis of peptides by mass spectrometry) is given in Predel (2001) and Predel et al. (2005). Data of the ecological survey and found peptide inventory of species and population will be compared with ordination and phylogentic methods in order to detect geographical and taxonomic patterns. Programs used for data analysis were Canoco 4.5. (PCA) and MEGA 3.1.

## Results

### Mass peaks analysis of Neuropeptides

Table 1 gives an overview about mass peaks of all analysed Mantophasmatodea species so far (see also Predel et al. 2005).

Table 1: Summary of distinct mass signals of peptides repeatedly detected in preparations from major neurohemal organs of different Mantophasmatodea species.

+ indicates identical signal with HM (first column)

Abbreviations: a/t PSO= abdominal/thoratic perisymphatic organ; CC= corpora cardiaca  
HM: *Hemilobophasma cf. montaguensis*, **MZ**: *Mantophasma zephyra*, **TG**: *Tyrannophasma gladiator*, **H2**; *Hemilobophasma spec. 2*, **K2** *Karoophasma spec. 2*, **KB**: *Karoophasma biedouwensis*, **AB**: *Austrophasma gansbaaiensis*, **NO**: *Namaquophasma ookiepensis*, **LR**: *Lobophasma redelinghuysensis*

Species/ Neuro- hemal organs	HM	MZ	TG	H2	K2	KB	AG	NO	LR
<b>aPSO</b>									
1	872.42			+	+	+	+	+	+
2	1064.49	1110?		+	+	+	+	+	+
3	1168.68	1239	1142	+	+	+	1182.69	1184.70	+
4	1318.61	1381?		+	+	1304.62	1317.63	1288.60	+?
5	1479.66	1493	1493	1493.71	1493.66	+	1493.69	1493.69	+
6	1783.79	1677	1772	+	1809.80	1995.04	+	+	+
7	2046.89	2037	+	+	+	2037.15	+	+	2065
8	2682.24	2672		+	+	2672.48	+	2664.37	2700
<b>tPSO</b>									
1	833.51	+	818?	+	+	+	+	+	+
2	964.53	988?	977?	+	+	+	1046.58	+	+
3	974.54	1020		+	+	1004.51	1004.56	+	1046*
4	992.57	1036	1035?	+	+	+	+	+	+
5	1033.58	+	+	+	+	+	+	+	+
6	1074.63		+	+	+	+	+	+	+
7	1076.61	+	+	+	+	+	+	+	+
8	1090.61	1137?		+	+	+	+	+	+
9	1148.63	1164	1177	+	+	+	+	+	1129
10	1201.58			1228.61	1215.62	+	1272.64	1228.60	+
11	1577.85	1547	1576	+	+	+	+	1590.81	+
12	1754.81	1858	1714	+	+	+	+	1789.92	1789
13	2172.21	2259		2199.16	2185.74	+	2242.76	2199.13	+
14	2592.31	2561		+	+	+	+	2605.29	+
<b>CC</b>									
1	952.43		938	+	+	+	+	+	+
2	1061.60				+	+	+	+	+
3	1097.60				+	+	1111.58	1111.59	+
4	1130.62				+	+	+	1104.61	+
5	1257.64		+	+	+	+	+	+	+
6	1350.64		1369	+	+	+	+	+	+
7	1415.80				+	+	1429.76	1517.81	1528
8	1503.81		1515?		+	1497.88	+	?	+
9	1598.80		1583?		1612.82	1612.90	1616.72	1612.84	1611!
10	2073.86			+	+	+	+	+	+
Z1	2289.1				+	+	+	+	+

### De-novo-sequencing of the most abundant neuropeptides

Some of the found neuropeptides mass peaks (see table 1) turned out to be members of known peptides:

Mass peak	Pertidfamily	Sequence
1168	periviscerokinin (PVK)	EAAGLIPFPRVa
1182	periviscerokinin	EAAGLIPFPRL/Ia
1184	periviscerokinin	ESAGLIPFPRVa
1239	periviscerokinin	AEAAGLIPFPRVa
1142	periviscerokinin	EAAGLIAFPRVa
930	adipokinetic hormone (AKH)	pEVNFTPgWa
1257	leucomyosuppressin (LMS)	pEDVDHVFLRFa
1493	pyrokinin (PK)	NSGEGSGMWFGPRLa
1479	pyrokinin	NSGDGSGMWFGPRLa



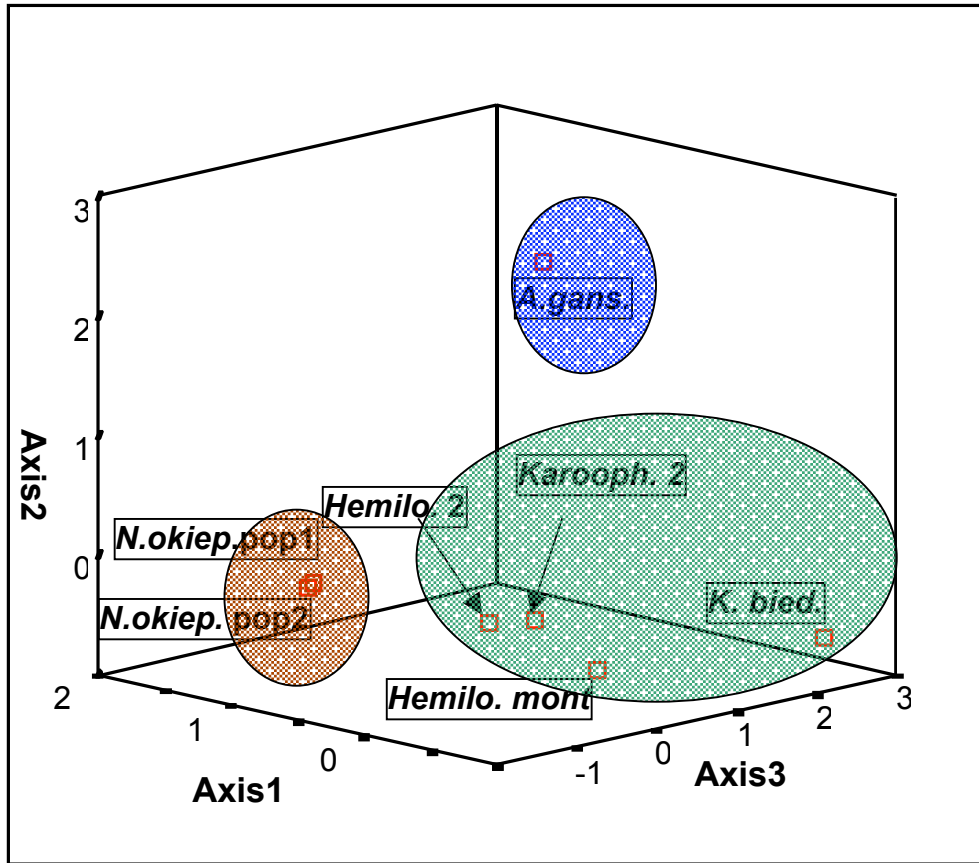


Fig 1

Similarity of selected species according to the PCA by using the presence-absence-data of mass peaks of peptides (see table1). The eigenvalues of the PCA are:

axis1=0.446/axis2=0.196/axis3=0.172/axis4=0.094.

Occurrence of species to biomes is superimposed:

**Blue:** only Fynbos - biome

**Brown:** only Succulent Karoo - biome

**Green:** both Succulent Karoo and Fynbos – biome

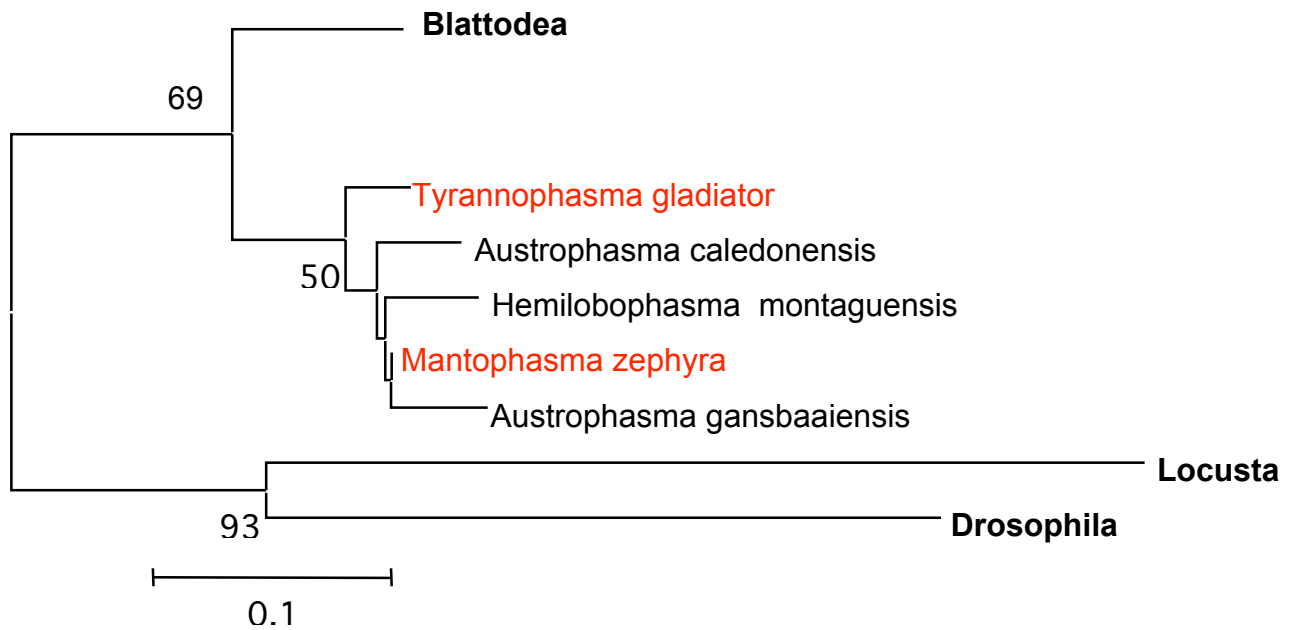


Fig 2

Neighbour joining - tree inferred of PVK and PK hormones

Values indicate supported nodes in more than 49% of bootstrap replicates (N=1000)

5 species Mantophasmatodea species grouped in relation to other insect order. Colour of Mantophasmatodea species indicates their geographic distribution:

black Cape Provinces

red Middle Namibia

### Acknowledgement

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