

# Final Report Operation Wallacea

Sinai 2005/2006

# Bats



by

**Christian Dietz**

**University of Tuebingen, Germany.**

email: [ChristianDietzHorb@web.de](mailto:ChristianDietzHorb@web.de)

**With 2006 Additions by**

**Alanna Maltby**

**Natural History Museum and Imperial College London**

Email: [alannamaltby@hotmail.com](mailto:alannamaltby@hotmail.com)

**Preface**

The report consists of two parts. In part 1 the data collected during the Operation Wallacea 2005 Sinai expedition are given and discussed. Some suggestions for further scientific studies are outlined as well. In part 2 ideas how to induce scientific bat research projects are given.



*Rhinolophus hipposideros*



*Barbastella leucomelas*

## Contents

<b>1. Bats of the St.-Katherine-Protectorate, Sinai</b> .....	4
1.1 Abstract.....	4
1.2 Introduction .....	4
1.3 Methods.....	4
1.4 Results .....	5
1.5 Species records and species discussion.....	6
1.5.1 <i>Rousettus aegyptiacus</i> .....	6
1.5.2 <i>Rhinolophus clivosus</i> .....	7
1.5.3 <i>Rhinolophus hipposideros</i> .....	7
1.5.4 <i>Asellia tridens</i> .....	8
1.5.5 <i>Nycteris thebaica</i> .....	8
1.5.6 <i>Hypsugo ariel</i> .....	8
1.5.7 <i>Hypsugo bodenheimeri</i> .....	9
1.5.8 <i>Eptesicus bottae innesi</i> .....	9
1.5.9 <i>Plecotus christii</i> .....	10
1.5.10 <i>Barbastella leucomelas</i> .....	11
1.5.11 <i>Tadarida teniotis</i> .....	11
1.5.12 unidentified Molossidae.....	11
1.5.13 <i>Rhinopoma hardwickii</i> .....	12
1.5.14 <i>Taphozous perforatus</i> .....	12
1.6 General discussion .....	13
1.7 Suggestions for studies in the St. Katherine Protectorate .....	13
1.7.1 searching for roosts.....	14
1.7.2 mist-netting .....	14
1.7.3 bat-detectors .....	14
1.7.4 training of rangers and staff of the protectorate .....	14
1.8 Suggestions for studies during Operation Wallacea Expeditions.....	14
1.9 Prospect .....	14

## **1. Bats of the St.-Katherine-Protectorate, Sinai**

by Christian Dietz, University of Tuebingen, Germany

Additions by Alanna Maltby, Natural History Museum, UK

### **1.1 Abstract**

Data on the distribution and echolocation of bats were gathered during the Operation Wallacea 2005 Sinai expedition between 29<sup>th</sup> of July 2005 and 19<sup>th</sup> of August 2005. Bats were captured by mist-nets in foraging areas or at drinking sites and their echolocation calls were recorded. By comparing release-calls of individuals of known species with recordings from various sites in the St.-Katherine-Protectorate and the capture data a species list of bats could be established. Out of the 7 species that have been found in the Sinai before, at least 6 species could be confirmed. In addition at least 5 more species were found for the first time in the Sinai. The confirmation of the historical records of *Barbastella leucomelas* and *Rhinolophus hipposideros* by recent captures and sound-recordings show the importance of the protectorate for bats. Both species are only found in Egypt in Sinai.

2006: Data were collected between 20<sup>th</sup> June and 4<sup>th</sup> August 2006.

### **1.2 Introduction**

The bat fauna of Egypt is poorly known. The most recent summary of all bat data was done by M.B. Qumsiyeh in 1985 (Qumsiyeh, M.B. 1985. The bats of Egypt. Special Publications of the Texas Tech University No. 23, 102 pp.). This comprehensive work shows that most data on the distribution of bats come from the lower Nile valley. For the Sinai only 7 out of the 22 species found in Egypt are reported. Of most species only single records are known. On the other hand, two species, the barbastelle (*Barbastella leucomelas*) and the lesser horseshoe bat (*Rhinolophus hipposideros*) are known in Egypt from the Sinai only, both species with single individuals. The barbastelle (*Barbastella leucomelas*) has been found by Rüppell in 1822 in the Sinai and described by Cretzschmar in 1826 as a species on its own. The lesser horseshoe bat (*Rhinolophus hipposideros*) was found in 1953 by Hoogstraal. Both species have been never found since in Egypt. Aim of the study has been to evaluate the status of distribution of these two species, to search for further species, to produce a species list and to provide data on their echolocation behaviour which will enable a sound library to be established.

### **1.3 Methods**

Between the 29<sup>th</sup> of July and the 19<sup>th</sup> of August 2005 and 20<sup>th</sup> June and 4<sup>th</sup> August 2006 bats were captured using mist-nets in foraging

habitats and at drinking sites. Mist-nets are specially designed nets that are used to catch birds and bats. They are strung between poles (we used fishing poles) within suitable foraging areas or at places where the bats come to drink. Captured bats were removed as soon as possible and kept individually in cloth bags. Standard measurements of forearm-length and lengths of fifth and third finger and body mass were taken for all individuals. Photographs were taken of all species and echolocation calls recorded when the bats were released.

Echolocation calls were recorded with the custom-built recording system PCTape (© University of Tuebingen, Germany). The system consists of an ultrasound-microphone, an interface with ring-memory and recording software on a laptop. Each file consists of a 6 second long recording and a comment file, both stored in wav-format. The recordings were analysed using the custom-built analysis-software SELINA (© University of Tuebingen, Germany). Standard sound parameters like start-frequency, best-frequency, end-frequency, sound-duration and pulse-interval were measured to analyse the sounds. The recordings were compared with an existing sound-library at the University of Tuebingen and with recordings of known species. Some recordings that could not be assigned to a certain species were sent to colleagues at the Universities of Jerusalem and Tel- Aviv to compare with their sound-libraries.

#### **1.4 Results**

Ninety-three bats belonging to 8 species were captured by mist-nets in 2005. Twenty seven bats belonging to 8 species were captured by mist-nets and flick nets in 2006. More than 500 sound files contain recordings of at least 11 species, including several ones that have not been recorded so far from the Sinai. The following species list (Tab. 1) summarises published and new results.

Table 1: Records of bats from the Sinai including the data of the 2005 season.

Species	Records given by Qumsiyeh 1985	Mist-netting: number of individuals 2005	Sound-recordings 2005	Photographs 2005	Mist-netting: number of individuals 2006	Sound-recordings 2006	Photographs 2006
<i>Rousettus aegyptiacus</i>	-	60	+	+	5	+	+
<i>Rhinolophus clivosus</i>	+	1	+	+	6	+	+
<i>Rhinolophus hipposideros</i>	+	2	+	+	2	+	+
<i>Asellia tridens</i>	+	-	+	-	-	-	-
<i>Nycteris thebaica</i>	+	-	+?	-	-	-	-
<i>Hypsugo ariel</i>	-	1	+	+	4	+	+
<i>Hypsugo bodenheimeri</i>	+	2	+	+	2	+	+
<i>Eptesicus bottae innesi</i>	-	1	+	+	3	+	+
<i>Plecotus christii</i>	+	22	+	+	4	+	+
<i>Barbastella leucomelas</i>	+	2	+	+	-	-	-
<i>Tadarida teniotis</i>	-	-	+	+	-	+?	-
<i>Molossidae spp.</i>	-	-	+?	-	-	-	-
<i>Rhinopoma hardwickii</i>	-	-	+?	-	-	-	-
<i>Taphozous perforatus</i>	-	-	+	-	-	-	-
<i>Otonycteris hemprichii</i>	-	-	-	-	1	+	+
<b>Number of species</b>	7	8	11 + 3?	8	8	8 +?	8

## 1.5 Species records and species discussion

### 1.5.1 *Rousettus aegyptiacus*

The Egyptian fruit-bat is common in the Nile Valley but has not been found in the Sinai before. We captured a single individual of the species at Ein Hodra and observed a foraging one in St. Katherine. More than 60 individuals were captured in a garden in Wadi Feiran. The high number of captured individuals suggests that the species forms a maternity colony in this wadi. Colonies are usually found in caves or underground structures like mines or galleries.

2006 records:

1 ind. (f ad) captured at a fruit tree in Oder's Garden, Wadi Shagg on 27.07.2006 (mist-net).

3 ind. (3 f sbad) captured at a toot tree in Hamid's Garden, Wadi Klar on 01.08.2006 (mist-net).

2005 records:

1 ind. (f ad) captured at a well in the Oasis Ein Hodra, Wadi Hodra on 04.08.2005 (mist-net). 5 ind. in the Oasis Ein Hodra, Wadi Hodra on 04.08.2005 (visual obs).

1 ind. at the village of St. Katherine patrolling the trees along the road on 09.08.2005 (obs, rec). 66 (8 f ad, 6 f sbad, 17 m ad, 5 m sbad, 30 released without sexing or ageing) captured in Wadi Feiran, Feiran Oasis, garden el Braga on 10.08.2005 (mist-net). 3 ind. in Wadi Feiran, Feiran Oasis, garden el Braga on 11.08.2005 (visual obs). 3-5 ind. in Wadi Feiran, Feiran Oasis, garden el Braga on 12.08.2005 (visual obs).

Published records:

No published records from Sinai (Qumsiyeh 1985).

### 1.5.2 *Rhinolophus clivosus*

The Arabian horseshoe bat has been found earlier in the Sinai. We captured a single specimen in Wadi Feiran and took sound recordings of several more individuals. The species roosts in underground galleries like mines and caves.

2006 records:

2 ind. (1 f ad, 1 f sbad) captured between Wadi Klar and Wadi Shagg on 29.07.2006 (mist-net).

→ Observations: 3 adults, 1 juv in house and pit of church next to Toot tree (Wadi Klar) on 29.07.2006. 1 adult inside small house in Beer il Abed on 29.07.2006. 4 adults and 1 juv near start of Wadi Shagg on 29.07.2006.

2 ind. (1 f ad, 1 f sbad) captured in the house next to the Toot Tree in Wadi Klar 02.08.2006 (mist-net).

2 ind. (2 f ad) captured in the deserted house west of Hajsalem's garden in Wadi Shagg/Wadi Klar on 04.08.2006 (mist-net).

2005 records:

3 ind. (1 f sbad, 2 f ad) captured at Wadi Feiran, Feiran Oasis, garden el Braga on 10.08.2005 (mist-net). 1 ind. at Wadi Feiran, Feiran Oasis, garden el Braga on 11.08.2005 (obs, rec). 2 ind. at Wadi Feiran, Feiran Oasis, garden el Braga on 12.08.2005 (obs, rec).

Published records:

3 ind. Al Arish (Hoogstraal 1962, Qumsiyeh 1985). 9 ind. Feiran Oasis (Hoogstraal 1962, Qumsiyeh 1985). Wadi Talaah near Saint Katherine Monastery (Wassif & Hoogstraal 1954).

### 1.5.3 *Rhinolophus hipposideros*

The lesser horseshoe bat has been found with a single specimen only once before in Egypt in Wadi Feiran. We got sound recordings from this Wadi, observed one individual at Farsh el-Romana and captured two individuals at the Ecolodge al-Karm. Our new records confirm the occurrence of the species in Egypt at the edge of the species' distribution.

2006 records:

2 ind. (1 m sbad, 1 f ad) captured in a cave 15 metres west of Abu Dagash in Wadi Klar on 02.08.2006 (mist-net).

2005 records:

1 ind. at Farsh el-Romana in the garden Abu Hamat on 08.08.2005 (obs, rec).

1 ind. at Wadi Feiran, Feiran Oasis, garden el Braga on 12.08.2005 (obs, rec).

1 ind. at Farsh el-Romana in the garden Abu Hamat on 15.08.2005 (obs, rec).

2 ind. (1 f sbad, 1 m sbad) captured at the Ecolodge Al-Karm, Wadi Shiekh

awad on 17.08.2005. 1 ind. at the Ecolodge Al-Karm, Wadi Shiekh awad on 17.08.2005 and 18.08.2005 (obs, rec).

Published records:

1 ind. Feiran Oasis (FMNH 74476) (Hoogstraal 1962).

#### 1.5.4 *Asellia tridens*

The trident leaf-nosed bat has been found in the Sinai before as well. We got sound recordings from Wadi Feiran. The species is known to roost in underground shelters.

2006 records:

None.

2005 records:

1 ind. at Wadi Feiran, Feiran Oasis, garden el Braga on 11.08.2005 (obs, rec).

Published records:

El Arish (Hoogstraal 1962). Tor (Anderson 1902).

#### 1.5.5 *Nycteris thebaica*

The Egyptian slit-faced bat has been recorded from the Sinai. We got a sound recording from Wadi Feiran that might be assigned to the species, but unfortunately the quality is quite low.

2006 records:

None.

2005 records:

Sound recordings of 1 ind. at Wadi Feiran, Feiran Oasis, garden el Braga on 11.08.2005 might belong to this species, but are too bad in quality to assure correct species identification.

Published records:

2 ind. "Mt. Sinai" (BMNH) (Qumsiyeh 1985).

#### 1.5.6 *Hypsugo ariel*

The Egyptian desert pipistrelle is a very rare bat, known only from a very few specimen from Sudan, Egypt, Israel and Saudi Arabia. It has not been recorded from Sinai before. We captured a specimen by mist-net in Wadi Arbain and it was identified by several morphological characters. Species identification was confirmed later on by several skull and teeth characters. The taxonomy of the Arabian species of the genus *Hypsugo* is poorly understood, it is well possible that *Hypsugo ariel* and *Hypsugo bodenheimeri* belong to the same species, in this case the name *ariel* would have priority over *bodenheimeri*. The echolocation calls of the specimen from Wadi Arbain did not differ from those of *Pipistrellus bodenheimeri* from Ein Hodra.

2006 records:

1 ind. (m ad) captured at Ein Hodra on 04.07.2006 (mist-net).

1 ind. (m ad) captured at Wadi Mara on 11.07.2006 (mist-net).

1 ind. (1 f ad) captured at Mohammed's Garden, Sheikh Awad on 19.07.2006 (mist-net).

1 ind. (1 f sbad) captured outside Ecolodge, Sheikh Awad on 19.07.2006 (mist-net).

2005 records:



1 ind. (m ad) captured in a garden in the Wadi Arbain (Ramadan's garden) on 01.08.2005 (mist-net).

Published records:

No published records from Sinai (Qumsiyeh 1985).

### 1.5.7 *Hypsugo bodenheimeri*

Bodenheimer's pipistrelle is a rare species known only from the Arabian Peninsula and the Sinai, where it has been found in St. Katherine before. We captured two individuals in the oasis Ein Hodra in 2005.

2006 records:

1 ind. (1 f ad) captured at Oder's Garden, Sheikh Awad on 20.07.2006 (mist-net).

1 ind. (1 f ad) captured at Awad's Garden, Wadi Nasb on 22.07.2006 (mist-net).

2005 records:

2 ind. (1 f sbad, 1 m ad) captured in the oasis Ein Hodra, Wadi Hodra on 05.08.2005 (mist-net).

Published records:

2 ind. at Saint Katherine Monastery (HUJ) (Qumsiyeh 1985).

The two pipistrelle species *Hypsugo ariel* and *Hypsugo bodenheimeri* did not differ in their echolocation calls, so the sound recordings could not be assigned to one of the two species. Pipistrelles (*Hypsugo spec.*) were recorded regularly around St. Katherine, Ein Hodra, Wadi Feiran and at the Ecolodge Al-Karm. Pipistrelles belong to one of the most common and widely distributed of all the bat species in the Sinai.

2005 records:

2 ind. at the Research Centre Saint Katherine in Wadi Arbain on 30.07.2005 (obs, rec). 4 ind. in the oasis Ein Hodra, Wadi Hodra on 04.08.2005 (obs, rec). 8 ind. In the oasis Ein Hodra, Wadi Hodra on 05.08.2005 (obs, rec). 1 ind. centre of the village Saint Katherine on 09.08.2005 (obs, rec). 1 ind. at the entrance to the monastery of Saint Katherine on 09.08.2005 (obs, rec). 2 ind. at the Research Centre Saint Katherine in Wadi Arbain on 09.08.2005 (obs, rec). 3 ind. at Wadi Feiran, Feiran Oasis, garden el Braga on 11.08.2005 (obs, rec). 1 ind. at Wadi Feiran, Feiran Oasis, garden el Braga on 12.08.2005 (obs, rec). 15-20 ind. foraging close to the Ecolodge Al-Karm, Wadi Shiekh awad on 17.08.2005 (obs, rec). 6 ind. foraging close to the Ecolodge Al-Karm, Wadi Shiekh awad on 17.08.2005 (obs, rec). 2 ind. at Sharm el-Sheikh airport on 24.08.2005 (rec).

### 1.5.8 *Eptesicus bottae innesi*

Botta's serotine has been recorded rarely in Egypt in the Nile valley, no records have been made in the Sinai. We captured a single individual in Wadi Feiran. By comparing sound recordings of this individual with other recordings we could identify most of the mystery calls as belonging to this species. Recordings were made at St. Katherine, Ein

Hodra, Wadi Feiran and at the Ecolodge Al-Karm. It seems to be a widely distributed species in the Sinai.

2006 records:

1 ind. (1 m ad) captured at Awad's Garden, Wadi Nasb on 28.06.2006 (mist-net).

1 ind. (1 m ad) captured at Mousa's Garden, Wadi Nasb on 29.06.2006 (mist-net).

1 ind. (1 m ad) captured in the Bedouin Garden at Fox Camp on 03.07.2006 (mist-net).

2005 records:

2 ind. around the Research Centre Saint Katherine in Wadi Arbain on 30.07.2005 (obs, rec). 4 ind. foraging around the Research Centre Saint Katherine in Wadi Arbain on 02.08.2005 (obs, rec). 1-3 ind. in the Oasis Ein Hodra, Wadi Hodra on 05.08.2005 (obs, rec). 1 ind. (m ad) captured in Wadi Feiran, Feiran Oasis, garden el Braga on 10.8.2005 (mist-net). 4 ind. in Wadi Feiran, Feiran Oasis, garden el Braga on 11.08.2005 (obs, rec). 2-4 ind. in Wadi Feiran, Feiran Oasis, garden el Braga on 12.08.2005 (obs, rec).

Published records:

No published records from Sinai (Qumsiyeh 1985).

#### 1.5.9 *Plecotus christii*

The desert long-eared bat has been regarded as belonging to the Grey long-eared bat, *Plecotus austriacus*, for many years. Recent genetic studies have shown, that *christii* is a separate species. Long-eared bats have been known from the Sinai as well. We captured 22 individuals at many sites, a fact that is easy to explain, long-eared bats in general are easy to catch with mist-nets.

2006 records:

1 ind. (1 m ad) captured in Awad's Garden in Wadi Nasb on 28.06.2006 (mist-net).

1 ind. (1 f ad) captured in Wadi Mara on 13.07.2006 (mist-net).

2 ind. (1 m a, 1 f a) captured in oder's Garden, Wadi Shagg on 26.07.2006 (mist-net).

2005 records:

1 ind. in a garden in the Wadi Arbain (Ramadan's garden) on 01.08.2005 (obs, rec). 1 ind. (m ad) captured in the Oasis Ein Hodra, Wadi Hodra on 04.08.2005 (mist-net). 4 ind. (2 m ad, 1 m sbad, 1 f ad) captured in the Oasis Ein Hodra, Wadi Hodra on 05.08.2005 (mist-net). 2 ind. (2 f ad) captured in a garden in Wadi Gebal (Hussein's garden) on 07.08.2005 (mist-net). 3 ind. (3 m ad.) Captured in Wadi Feiran, Feiran Oasis, garden el Braga on 10.08.2005 (mist-net). 6 ind. (5 m ad., 1 m sbad) captured in Wadi Feiran, Feiran Oasis, garden el Braga on 11.08.2005 (mist-net). 1 ind. (m ad) captured at the Ecolodge Al-Karm, Wadi Shiekh awad on 17.08.2005 (mist-net). 1 ind. (m ad) captured at the Ecolodge Al- Karm, Wadi Shiekh awad on 18.08.2005 (mist-net).

Published records: 5 ind. Jabal El' Ajmah (HUJ). 1 ind. St. Katherine Monastery

(HUJ). 1 ind. Tor (BMNH). 1 ind. Um Hashiba (TAU) (Qumsiyeh 1985).

#### 1.5.10 *Barbastella leucomelas*

The Sinai barbastelle has been found only once in Egypt in the Sinai. Most probably the isolated population of the barbastelle from the Sinai Peninsula forms a distinct species even though it has been traditionally united with the Asian barbastelle. We captured two individuals at St. Katherine and many sound recordings were taken here as well. The only other place where the bat was found was around the Ecolodge Al-Karm. If the separate species status of the Sinai-barbastelle could be confirmed, it will be an endemic species to the Sinai Peninsula and might require special conservation.

2006 records:

None.

2005 records:

5 ind. at the Research Centre Saint Katherine in Wadi Arbain on 29.07.2005 (obs, rec). 2 ind. (f ad) captured the Research Centre Saint Katherine in Wadi Arbain on 30.07.2005 (mist-net). About 20 ind. at the Research Centre Saint Katherine and its surroundings in Wadi Arbain on 30.07.2005 (obs, rec). About 20 ind. at the Research Centre Saint Katherine and its surroundings in Wadi Arbain on 02.08.2005 (obs, rec). About 10 ind. at the Research Centre Saint Katherine and its surroundings in Wadi Arbain on 09.08.2005 (obs, rec). 1-2 ind. at the Ecolodge Al-Karm, Wadi Shiekh awad on 17.08.2005 (rec).

Published records: 2 ind. Sinai, Egypt 1822 (labelled Arabia Petraea) (SMF 4343, SMF 12393) (Mertens 1925, Kock 1969, Qumsiyeh 1985, Harrison and Makin 1988, Harrison & Bates 1991).

#### 1.5.11 *Tadarida teniotis*

The European free-tailed bat has not been recorded from the Sinai before. We got many sound recordings of the species from St. Katherine, Wadi Arbain and the Ecolodge Al-Karm.

2006 records:

1-5 ind. Foraging every night above Fox Camp, Saint Katherine (obs, rec).

2005 records:

1-5 ind. foraging every night around the Research Centre Saint Katherine in Wadi Arbain between 29.07.2005 and 20.08.2005 (obs, rec). 2 ind. foraging in the oasis Ein Hodra, Wadi Hodra on 05.08.2005 (obs, rec). 1 ind. at the Ecolodge Al-Karm, Wadi Shiekh awad on 17.08.2005 (rec).

Published records:

No published records from Sinai (Qumsiyeh 1985).

#### 1.5.12 unidentified Molossidae

We also got sound recordings of a molossid bat (Molossidae) that are higher in their frequency than those of *Tadarida teniotis* but are otherwise quite similar. Most probably they belong to an other species of free-tailed bat, but unfortunately no reference calls are available. The only other free-tailed bat known from Egypt is *Tadarida aegyptiaca*, but the species emits echolocation calls much higher than those recorded (but reference sound recordings are only available from

South Africa!). It might be possible that the recorded sounds belong to one of the *Chaerephon* species. None of those species has been found in Egypt until now, but they are known from Sudan and from the Arabian Peninsula. All these species are very strong fliers and it is not hard to imagine that the high flying bats have not been captured before.

2006 records:

None.

2005 records:

1-2 ind. foraging around the Research Centre Saint Katherine in Wadi Arbain on 30.07.2005 (rec). 1 ind. foraging at a garden in the Wadi Arbain (Ramadan's garden) on 01.08.2005 (rec). 2 ind. foraging around the Research Centre Saint Katherine in Wadi Arbain on 02.08.2005 (rec). 1 ind. foraging close to the bus parking of the Monastery Saint Katherine in Wadi Sheikh on 09.08.2005 (rec).

Published records:

There are no published records of any molossid bat from Sinai (Qumsiyeh 1985).

#### 1.5.13 *Rhinopoma hardwickii*

The lesser mouse-tailed bat is a common bat of the Nile valley but has not been reported from the Sinai. We got a sound recording in Wadi Feiran that might belong to the species. Unfortunately the foraging situation of the individual was atypical in a much cluttered background situation, so the calls are not well comparable to reference calls and species identification remains doubtful.

2006 records:

None.

2005 records:

Maybe 1 ind. foraging in Wadi Feiran, Feiran Oasis, garden el Braga on 12.08.2005 (rec). Species identity not well supported.

Published records:

No published records from Sinai (Qumsiyeh 1985).

#### 1.5.14 *Taphozous perforatus*

The tomb bat is known from the Nile valley, but has not been reported from the Sinai. Sound recordings from Wadi Feiran are identically with reference recordings from Wadi Degla and from Israel, so the species could be confirmed for the first time from the Sinai.

2006 records:

None.

2005 records:

At least 2 ind. foraging in Wadi Feiran, Feiran Oasis, garden el Braga on 11.08.2005 (obs, rec). At least 1 ind. foraging in Wadi Feiran, Feiran Oasis, garden el Braga on 12.08.2005 (rec).

Published records:

No published records from Sinai (Qumsiyeh 1985).

## 1.6 General discussion

Together records of 12 positively identified bat species are now available from the Sinai, representing more than 50 % of the 22 species reported until now from Egypt. In addition sound recordings of maybe two more species were taken. Certainly some more species could be found in further surveys, but the number of reported species already highlights the importance of the St. Katherine-Protectorate for the conservation of bats in Egypt. Two species that have been found previously in Egypt only within the protectorate, the barbastelle (*Barbastella leucomelas*) and the lesser horseshoe bat (*Rhinolophus hipposideros*), were found during the recent survey again. It is a very good result of the 2005 Sinai expedition to find the barbastelle for the first time since 1822 at its type-locality again. The Sinai-barbastelle is one of the rarest bats in the western Palaearctic, it has been found only at a few other sites in Israel and only in low numbers. Most probably *Barbastella leucomelas* forms a distinct species completely isolated from the two other species of the genus, the European barbastelle (*Barbastella barbastellus*) and the Asian barbastelle (*Barbastella darjelingensis*). The species could be found with at least 20 individuals at the Research Centre in St. Katherine, a hint that the species forms a well established population within the Protectorate. Some more individuals were found foraging around the Ecolodge Al-Karm. The lesser horseshoe bat *Rhinolophus hipposideros* has only been reported in Egypt in 1953 from a single specimen collected in Wadi Feiran. During our expedition we found the species at three localities within the Protectorate and two captured individuals were young born in the year, so the species certainly reproduces in Egypt as well.

## 1.7 Suggestions for studies in the St. Katherine Protectorate

The assessment of bats in a certain area has to be a combination of several methods. Usually roosts can be found only with the help of locals. The knowledge about roost gives the necessary prerequisite to study the ecology of species and populations in more detail. In only sparsely vegetated areas it is quite difficult to assess bat species by mist-netting and the use of sound recording systems gives only limited information about the ecology of a species (no reproductive data can be assessed by this method). It is also important to study bats at different times of the year, as bats react in a very fast and complex way to changes in prey availability and temperature. It might be well possible that further species occur within the protectorate in winter, spring or autumn. I would like to emphasize that all bat work should only be carried out by trained and well educated bat specialists to avoid negative impacts on the very rare bat species of the

protectorate. Some basic suggestions for further studies are given here:

#### 1.7.1 searching for roosts

During the 2005 expedition no roosts of bats could be surveyed. Especially the many mines in the Wadi Feiran which seem to be suitable roosts for bats of many species should be surveyed. In the past bats have been found in underground galleries there by oogstraal. The high number of captured fruit-bats in 2005 makes it highly probable that an underground roost of this species exists somewhere in the Wadi Feiran. It would be very helpful for the protection of bats and the estimation of their population size to find some of their roosts. In addition new species not found in the Sinai before might be found in underground site of the Wadi Feiran like *Rhinopoma hardwickii* or *Taphozous perforatus*.

#### 1.7.2 mist-netting

Further scientific studies should include mist-netting in other oases and at further drinking sites. Especially wadis with "dense" vegetation like Wadi Tebeg should be studied concerning their bat fauna. If roosts are found captures within or at these roosts to asses the species and their reproductive condition should be carried out.

#### 1.7.3 bat-detectors

It might be also possible to perform transect-work with bat detectors, but all people doing this transect work must be advised in detail about the possibilities and especially about the problems of species identification with normal bat-detectors, to avoid the collection of pseudo-scientific data. To use sound recording for transect work requires expensive equipment (time-expansiondetector with sound recording device) and analysis software. It seems wise to provide such equipment to the Protectorate that could also be used during Operation Wallacea Egypt expeditions.

#### 1.7.4 training of rangers and staff of the protectorate

Rangers and staff of the protectorate should be trained in how to identify bats found in houses or roosts and how to search for bat roosts.

### **1.8 Suggestions for studies during Operation Wallacea Expeditions**

As outlined above the relative rareness of bats in arid regions, especially in the Sinai Mountains, makes regular bat projects difficult. Scientific projects about the desert bats require many skills and techniques that do not allow doing them in group work with untrained

students (e.g. telemetry). On the other hand nearly nothing is known about most of the species and all kind of data on the rare and most probably endangered species are welcome. I suggest including some bat work in a general mammals project and to do one or two nights per week surveys or transect work on bats. As the bat density was found to be highest around St Katherine, it might be best to do parts of the bat work there. I suggest to do repeated transect work on fixed transects with bat-detectors to get data on the spatial and temporal distribution of the species. Further projects could include faunistic assessments in further oasis. Because all activities like bat catching or searching for roosts require well trained bat workers to avoid disturbance to the bats, sound recording and analysis might be the best methods as well. If a bat scientist will be there to give advice it might be most promising to check further oasis and valleys for the presence of bats and to search especially Wadi Feiran for roosts and foraging grounds.