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Further Records of Bats From Jordan and a Synopsis

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Abstract: Recent records along with a synopsis of the known bats of Jordan are given. Twenty-four species of bats are reported from Jordan, including two additional records, *Rhinolophus mehelyi* and *Asellia tridens*. Five other bat species are suspected to occur.

Key Words: Bats, Jordan, *Asellia tridens*, *Rhinolophus mehelyi*.

Ürdün'den Yarasa Türlerinin Özeti ve Yeni Kayıtlar

Özet: Yeni kayıtlarla birlikte Ürdün'ün bilinen yarasa türleri özetlenmektedir. Yeni kayıt olan *Rhinolophus mehelyi* ile *Asellia tridens* dahil olmak üzere şimdiye kadar Ürdün'den 24 yarasa türü kaydedilmiştir. Bunların yanı sıra beş diğer yarasa türünün bulunduğu düşünülmektedir.

Introduction

The attention that the chiroptera of Jordan have received over the past three decades has culminated in our present knowledge of this group (1, 2, 3, 4, 5, 6, 7).

In this paper, we report 24 bat species, and include notes on their ecology and biology, as well as reporting additional localities for previously and newly recorded species.

Materials and Methods

From 1990 to 1994, bats were collected from various parts of Jordan. Mistnets measuring 10-16 meters were stretched across forest openings, over water bodies and in narrow wadies. Bats were collected after sunset (the first 3-4 hours after dark). For bats roosting in caves, daytime collecting was undertaken by exploring caves by flashlight and specimens were collected by hand. Selected samples were prepared as museum specimens (skin and skull), and other morphometric measurements were recorded. The systematic order used was that of given according to Harrison & Bates (8). Specimens were deposited at the Jordan University of Science and Technology Museum (JUST) and the Jordan University Museum of Natural History (JUMNH).

Results

A total of 24 bat species from Jordan, belonging to 7 families, are recorded. The present results expand the list of known species in Jordan and provide additional information on the distribution and biology of these species.

Suborder Megachiroptera Family Pteropodidae Family Pteropodidae Genus Rousettus

Rousettus aegyptiacus Egyptian Fruit Bat

New material: 1 (JUST), Wadi Ibn Hammad (31 18 N 35 31 E), 19.5.1992. 1 (JUST), Wadi Faynan (30 38 N 35 36 E), 1.1.1997.

The fruit bat is an African species that has found its way into the Eastern Mediterranean region and appears to be expanding its range in Jordan. East of the River Jordan, this species is present at Wadi Az Zarqa (9), Al Mahattah near Amman (5), and Al-Hammah, near the Yarmouk River (6, 10). Additional specimens were examined at the JUMNH from Ghor As Safi, Wadi Fidan, and Al-Hemma (11). A large colony was spotted in Wadi Ibn Hammad, Karak area, inhabiting the caves surrounding the water flow.

The young are reported to be born from June to August in Lebanon (3), and from March to May in Egypt

(12). In northern Jordan, we obtained juveniles in February. There may be no fixed breeding season for this species (13).

Suborder Microchiroptera

Family Rhinopomatidae Genus *Rhinopoma*

Rhinopoma hardwicki Lesser Mouse-tailed Bat

New material: 3 females (2 JUST, 1 JUMNH), Al-Majdal (32 14 N 35 51 E), 18.8.1994. 1 female (JUST), An-Naqah (31 02 N 35 29 E), 26.5.1991.

Both species of mouse-tailed bats are found in Jordan, but older records probably include many mis-identifications. Specimens were collected recently near Quraiqira in Wadi Fidan (14). We located a cave at Majdal near Dibbin Forest in which about 500 *Rhinopoma* (both species) were located. The record extends the known distribution of this species in Jordan to mountainous regions.

Eastern Mediterranean populations were described as *Rhinopoma cystops* (Thomas 1903) and later assigned *R. h. cystops* (3,15). Kock (9) re-assigned them to *R. h. sennaariense*. This latter name is, however, a *nomen nudum*, as pointed out by Koopman (16), and thus these specimens should be referred to as *R. h. arabium*. Qumsiyeh (12) examined specimens from different areas of Egypt and Palestine and reviewed the nomenclature, determining the northern Egyptian and Palestinian specimens to be closer to *R. h. arabium*.

Rhinopoma microphyllum Larger Mouse-tailed Bat

New material: 2 Females (1 JUST, 1 JUMNH), Al-Majdal (32 14 N 35 41 E), 8.8.1994.

There is much confusion over the identity of this species in the literature prior to the 1960's (3, 9, 17). For example, although Tristram (18), Bodenheimer (19), Dor (20, specimens from owl pellets), and Aharoni (21) reported that this species is common in Palestine and Jordan, especially around the Dead Sea area, they were probably referring to the smaller species *R. hardwicki* (17). Specimens were also collected from Tabqat Fahl in the Jordan Valley (6, 22).

Family Emballonuridae Sheath-Tailed Bats Genus *Taphozous*

Taphozous nudiventris Naked-bellied Tomb Bat

This species is not uncommon in Palestine (12). Thus, it is only a matter of time before it is reported from Jordan. This tomb bat roosts in old buildings, small caves that receive a good amount of light, and crevices in small sandstone hills. A Males, females and lactating young

were found on August 5, 1976 at Mt. Quarantina (West bank). Active individuals were also collected in September. In Iraq, these bats mate in September and October, hibernating from November to March, and the females separate from the males to deliver their young in April (23).

Although migration has been suggested for this species (15), there is no direct evidence of this behavior. Large deposits of fat are found in the abdominal regions, similar to those found in *Rhinopoma*, and this may be the source of reserve nutrition in the hibernating season.

Taphozous perforatus Geoffroy's Tomb Bat

This bat was recorded from 2 km E Ghor As Safi (14). This bat roosts in caves, ruins, crevices and tunnels.

Family Rhinolophidae Genus *Rhinolophus*

Rhinolophus ferrumequinum

Larger horseshoe bat

New material: 1 female (JUST), Quwaylibah (32 40 N 35 52 E), 11.12.1991.

The larger horseshoe bat is common in the northern part of Jordan, especially in the mountains and forested regions. It has been recorded from the Jarash and Suwaylih area (8), and the Dibbin and Zubiya forests (6, 14). Hibernating individuals were collected in Dibbin Forest on 20 November and active individuals in August. Similar reports of hibernation in November and December were reported from Iran (24). This species may share caves with *R. euryale* (15). In Dibbin forest, it was noted that *R. hipposideros* occurred in the same cave as this species but generally roosted closer to the exit. Larger colonies of this species were absent in the late 1970's (5). The reason for their decrease is not clear, although increased tourist activity may be a factor. There are areas in Jordan where this species is still common. In Zubiya Forest, many were caught in one night with a 10-meter mistnet.

Rhinolophus clivosus Arabian Horseshoe Bat

Jordanian records are from Petra (25), near Quraiqira and Disah (Wadi Rum) (14). The Jordanian specimens are referable to the nominate subspecies *R. c. clivosus*, originally described from the western coast of Saudi Arabia. Specimens of *R. c. brachygnathus* from Egypt are smaller than specimens of *R. c. clivosus*.

Rhinolophus hipposideros Lesser Horseshoe Bat

The small horseshoe bat is more common in northern Mediterranean climates than in the more arid regions of the south. The southernmost record for the species in the Near East is of a single specimen from Feiran Oasis in the

Sinai (12). It has been reported from Dibbin National Forest (6) and Zubiya Forest (14).

These bats are found as solitary animals in caves, ruins, and other dark dwellings. Because individuals are found alone, it is not known how abundant this species is. It is encountered rarely but may be more common and widespread than the meager collection reports indicate.

***Rhinolophus euryale* Mediterranean Horseshoe Bat**

The species has been reported from Jarash (3) and Dibbin Forest (8, 12).

***Rhinolophus mehelyi* Mediterranean Horseshoe Bat**

New material: 1 (JUST), An-Naqah (31 02 N 35 29 E), 26.5.1992.

This species is very poorly known due to confusion with *R. euryale*. The following specimens, variously noted as *R. euryale*, are clearly *mehelyi*: Jerusalem (BM), Solomon's Quarries (BM), Herzelia (HZNM), and "Palestine" (FMNH) (4). There is also a specimen from Jerusalem at the Senckenberg Museum (26). We collected a specimen from An-Naqah in Wadi Araba which clearly belongs to this species since it had typical lancet shape and a zygomatic arch of 10.3 mm. The forearm measured 52 mm.

***Rhinolophus blasii* Peter's Horseshoe Bat**

New Material: 1 female (JUST), from Ash Shawbak, 30 32 N 35 34 E, 1992.

This species was collected from Magharat al Roman (The Roman Cave), Jarash Refugee Camp (5) Tabaqat Fahl, and Magharat El Mata (5 km NNE Wadi Faynan, tributary to Wadi Araba) (6). A specimen deposited at the JUMHN from Magharat El Mata was listed erroneously as an additional record of the species from "Wadi Faynan" by Amr & Disi (11). One specimen at JUMNH is from Madaba. This species was also collected from Zubiya Forest, north Jordan, with mistnets (14). The specimen from Ash Shawbak had a forearm length of 44.9 mm, thus fitting well within the range of variation of this ubiquitous species.

We found many individuals (30-40) in a visit to Magharat al Roman near the Jarash refugee camp on 8 October 1976. All observed or collected individuals were female. On October 15, only 3 bats were observed, and on 1 May 1977 no bats were in the cave. An active colony of 25 individuals (adult males and females) was found in a small cavern in Wadi Faynan near Wadi Araba. This is very dry, desert habitat, much different from that of Dibbin Forest (Mediterranean climate), where this species

was also collected. It is thus possible that both a desert form and a mountain form of *Rhinolophus blasii* occur in Jordan.

Family Hipposideridae Leaf-Nosed Bats Genus *Asellia*

***Asellia tridens* Trident Leaf-nosed Bat**

New material: 1 female (JUST), An-Naqah, 31 02 N 35 29 E, 26.5.1991.

We obtained the first record from Jordan from An-Naqah near Ghor As Safi. The Jordan Bridge and Mehola records (27) are from West of the River Jordan, and not from "Jordan" as stated by Harrison & Bates (8). *Asellia* is distinguished easily from other leaf-nosed bats of the region (*Rhinolophus*) by the presence of three projections of the dorsal nose leaf and by a relatively larger ear size. The specimens in Palestine, Iraq, Iran, and Afghanistan are morphologically more similar to those from Morocco than to those from Egypt (27). Because of this, the Palestinian and Jordanian specimens may be referred to the subspecies *A. t. murriana*.

This is a desert-adapted colonial species. It has been found in regions of the Sahara desert where no other species of bat has been seen. Some roosting sites in Iraq are abandoned in winter, which suggests migration (28). However, Al-Robaae (29) showed that they have winter quarters which they occupy until April, whereupon they return to their summer quarters. The gestation period is assumed to be 9-10 weeks with a single young born in early June at the Iraq site (29).

Family Vespertilionidae Genus *Myotis*

Myotis emarginatus

Geoffrey's Bat, Notch-eared Bat

The notch-eared bat has been reported only from northern, mesic habitats, such as Dibbin Forest (6).

***Myotis capaccini* Long-fingered Bat**

The long-fingered bat occurs only in northern, mesic habitats such as Tabaqat Fahl (6).

***Myotis nattereri* Natterer's Bat**

Natterer's bat has been reported only from northern, mesic habitats such as Dibbin Forest (5). Harrison (15) reported a maternity colony where each female carried a single young at Aqua Bella, near Jerusalem, on April 30. Thus it is estimated that delivery occurs in late May or early June. This species is found to share its roost with *M. capaccinii* in Lebanon (30). One of us (MBQ) found a colony of about 250 (mostly non-pregnant females and

sub-adults) on 7 July 1977 in Dibbin Forest. Fewer animals were found on a return visit on 20 November and only one was found on 27 February 1981.

Genus *Pipistrellus*

Pipistrellus kuhli

Kuhl's pipistrelle

New material: 1 (JUST) Ar-Ramtha (32 34 N 63 00 E), 4.11.1992. Three males (JUST), 3 km W Suwaylih (32 02 N 35 50 E), 19.8.1994. 1 male and 3 females (JUST), Al-Hazim (31 35 N 37 15 E), 28.10.1996.

Kuhl's pipistrelle is very common throughout Jordan because it has adapted well to living in towns and cities. This species is known from Azraq and Druz and Azraq ash Shishan (1, 2). We now report specimens from Ar Ramtha, and 3 km W Suwaylih. One specimen at JNHM is from Aqraba. Ten individuals (one male and nine females) were found roosting in a deserted brick wall in the Al-Hazim area. The species has also been recorded from several localities in Lebanon and Syria, including Beirut, Damascus and Dayr az Zur, and between Horns and Latakia (15, 31). There is extensive geographic and individual variation in color and size in these bats, indicating that *ikhwanius* (32) and *marginatus* should be synonymized with *P. kuhli* (12, 33).

Stencel (34) studied the distribution of this species in Lebanon and commented on its relationship to man. Its abundance may be due to its adaptability to roost in almost any shelter, including inhabited human dwellings. In Beit Sahur, a colony of about 50 was found in a crevice in a stone house. Active bats were seen from January through late September. Bats emerged individually shortly after dark and returned shortly before dawn.

Males with enlarged testes were noted in August and September. Reproducing males also have enlarged buccal pads (15). The function of these glands during the reproductive season is not well documented. It appears that dominant reproductive males roost singly and court females along specific routes while other males roost in groups.

Parturition probably occurs around late April and May in many areas in the Near East including Palestine (15, 33, 35) (Personal observation-Lactating females in June, 24). Dor (20) obtained 24 specimens of this bat from some 6000 owl (*Tyto alba*) pellets in Palestine.

Pipistrellus rueppelli

Rüppell's Bat

This bat has been reported from several localities in Palestine near the Dead Sea and in Wadi Araba (36, 37) and is thus certainly found in the same habitats in Jordan.

Little is known of the biology of this species. In Egypt it was collected from under rocks in arid regions (12). This and the coloring (white underneath) suggest that this animal may forage on or close to the ground. Other specimens are occasionally caught in mistnets near water.

Pipistrellus bodenheimeri

Bodenheimer Pipistrelle

This species is not uncommon in Wadi Araba, around the Dead Sea, and the Waids of southern Jordan. Specimens were collected from 2 km E Ghor As Safi, and from Disah in Wadi Rum (14). Yom-Tov *et al.* (37) found this to be the most common bat netted in areas west and southwest of the Dead Sea. Yom-Tov *et al.* (37) reported some aspects of the biology of this species. Where it occurs in Palestine, it appears to be common. These pipistrelles are rare between October and April near water sites. This was explained as indicative of hibernation. Another explanation may be that they can acquire their water from other sources during these milder, occasionally rainy seasons. These bats feed intensively in the evening hours and gain up to 15% of their weight during that time. A female collected in April had a single embryo and the few specimens examined were usually shot near Acacia trees (15). A pregnant female was obtained in May.

Pipistrellus ariel

Pygmy Pipistrelle

This species has been reported from Wadi Siyal (38) and a possible specimen is known from Disah in Wadi Rum (14). This is small pipistrelle with a forearm length of between 28 and 31 mm. It is distinguished from *P. savii* and *P. khlii* by its smaller size. It is distinguished from *P. savii*, *P. pipistrellus* and *P. bodenheimeri* by the unicuspid first upper incisor. However, one specimen of *P. bodenheimeri* from Ain Gedi also had a unicuspid incisor (8). Further confusion may exist with the poorly diagnosed *Pipistrellus arabicum* (8). Thus, further material and studies on the relationships of these three species (*ariel*, *bodenheimeri* and *arabicus*) are necessary.

The specimen from Disah is similar to *Pipistrellus ariel* in having unicuspid 1st incisor. It is unusual in the absence of the tiny premolar. It also differs from the type *ariel* in having more parallel maxillary tooth rows and small 1st lower premolar, a more rounded skull and a smoother rostrum. It most likely represents a new species (52). Further material (including chromosomes) from Wadi Rum is necessary to define the relationship of this very interesting miniature pipistrelle.

Genus Nyctalus***Nyctalus noctula* Common noctule**

This species was reported by Festa in 1894 from mount Qarantal (fide 19) and from the Huls Nature Reserve (36). Studies in the northern parts of Jordan will doubtless show a wider distribution. This species migrates in Europe, with one individual recovered 755 km from the place where it was marked (39, 40). It would be interesting to see if similar migrations occur in the Near East. Other studies in Europe suggest that the noctule is colonial and roosts in hollow trees. They are noisy animals and produce various audible sounds, especially males when defending territory (41). One to two young are born after a gestation period of 50-70 days (40). In Lebanon, the species has been reported in crevices of fissures in a natural bridge (42).

Genus Eptesicus***Eptesicus serotinus* Serotine Bat**

This species was recorded from Jerusalem, Tel Aviv, and Wadi Amud (15, 19, 43). Further studies in the mountain regions in north Jordan will certainly find this species. This is a species found in areas well vegetated. It roosts in buildings, tree holes, crevices and similar structures. Summer breeding colonies with up to 50 females are known in Europe. Food consists mainly of insects, especially beetles, which they can easily manipulate with their powerful teeth.

***Eptesicus bottae* Botta's Serotine**

Botta's serotine is found in arid regions in the south, including Wadi Araba, the southeastern Jordan desert, and probably Ann Naqab. Records are available from "Lawrence's pool" (near Rum) (7) and Disah (Wadi Rum) (14).

Genus Otonycteris***Otonycteris hemprichi*****Hemprich's long-eared Bat**

New material: 1 JUST, Ghadir Al-Qatawneh (Karak), 26.6.1992. 3 (1 male and 2 females, JUST), Burqa (32 40 N 37 55 E), 25.9.1996.

Hemprich's long-eared bat probably occurs throughout the arid regions of Palestine. The first specimen from Palestine was probably that collected by Pastor Schmitz at the turn of the century from Wadi el Mukallih, near Nebi Musa (19). This species was also reported from "Lawrence's pool" (near Rum) (7), near Quraiqira and Disah (14), and we now have a specimen from Ghadir Al-Qatawneh.

The very unique morphology of this genus with its limited distribution in desert habitats suggests a very specialized biology. Unfortunately, little is known of the habits and habitats of this species. The wing morphology (large and broad) and the smooth flight suggests the ability to forage close to the ground. The overall morphology is reminiscent of carnivorous bats (44) and studies on this species are much needed to elucidate its feeding habits. One specimen from Egypt was caught in a mouse trap, also indicating foraging close to the ground. The specimens obtained from Jordan were collected in mistnets set over water pools.

Otonycteris hemprichi roosts in the fissures of rocks or in human constructions. It has been reported to be mostly solitary, although occasional clusters of up to 18 females have been reported (45). It is found in xeric and usually rocky habitats that have little vegetation. This bat seems to be well adapted to arid climates. *Otonycteris* has been observed in flight by few investigators. It seems to hover close to the ground, probably because it hunts non-flying prey.

Genus Barbastella***Barbastella barbastellus* Barbastelle**

This species is poorly known in the eastern Mediterranean. The type *leucomelas* most likely comes from Sinai. It has been reported only once from the northern shores of the Gulf of Aqaba, N of Eilat (36). Thus, it is most likely found on the eastern shores of the Gulf of Aqaba. Little is known of the biology of the barbastelle. In Iran they have been found to roost in trees (under bark or in holes), tunnels and small caves (46).

Genus Plecotus***Plecotus austriacus* Grey Long-eared Bat**

New material: 1 (JUST), Ra's an Naqb (30 00 N 35 29 E), 4.11.1992.

The long-eared bat is commonly caught in mistnets in Palestine, and is probably common in all habitats. Aharoni (21) reported this species from the Dead Sea Basin. Recently, the species was reported from near Gharandal (Wadi Araba), Disah (14). We have another specimen from Ra's an Naqb. Specimens from the Syrian desert in the southeast of Jordan are closer to *P. a. christiei* (14). *P. austriacus christiei* differs from the nominate subspecies in being somewhat smaller and having a smaller baculum, with a more angular shape, as illustrated by Qumsiyeh (12).

This bat has been found roosting in caves, abandoned mines, ruins, and underground tunnels. It is usually found

solitary and this any estimate of its abundance is difficult. Some of its prey is picked from foliage, trees, rocks, cliffs and so forth. As such, this bat is well adapted to "hovering" flight. The long ears are held back close to the body when resting. In open areas, these bats fly with the ears erect. This bat is an expert climber, and in captivity has been observed to climb very small branches with ease. Harrison (15) reported a female with a single small fetus in March.

Genus *Miniopterus*

Miniopterus schreibersi

Schreibers's Bat, Long-wind Bat

The long-winged bat is a European species adapted to more mesic habitats. It is thus found only in the northern parts of Palestine. It has been reported from caves in the "Jordan Valley" (18, 21). Harrison (47) reported a specimen from Jarash which he referred to as *M. s. pulcher*, which he had described from north Iraq. This subspecies was based on slight color differences. There is much individual variation in color with age and locality in specimens of this species from the Arab world. Thus, Harrison (15) later declared *pulcher* to be a synonym of *M. s. palidus*. It has also been reported from Magharat el Wardani in Dibbin Forest (8).

This is a highly colonial species. In caves in Algeria, one of us (MBQ) found female communal feeding colonies. Dor (20) reported this species from owl pellets in Palestine.

Family Molossidae Genus *Tadarida*

Tadarida teniotis European Free-tailed Bat

New material: 1 (JUST), Amman (31 57 N 35 56 E), May 1992. 1 (JNHM), Jarash (32 17 N 35 34 E), no date.

Known locality records and personal collecting indicate that the European free-tailed bat is present throughout Palestine and probably in many areas in Jordan. The lack of specific records is perhaps due to its ability to fly at high altitudes and for long distances.

This species was first reported (as *Xantharpyia aegyptica*) by Tristram (18, 48) from Wadi Qarn and caves along the Jordan Valley. East of the River Jordan, this species was found at Faidhat edh Dhahikiya (2, 3), and Jordan University Campus, Jubayhah (5), 2 km E Ghor As Safi near the Dead Sea, Disah in Wadi Rum (14).

In places where this species was collected in Europe, and the Near East individuals were found living in fissures in the sides of cliffs, in crevices in natural rock

formations, or in crevices in the roofs of caves. The bats fly high and can travel long distances (49). They descend to roost, drink, and rest. Their flight is fast and direct due to unique adaptations of their wings. In Jordan, the species was found in extreme desert conditions in the north end of Wadi Sirhan in Eastern Jordan (2, 3) as well as in very mild Mediterranean forests of the north. In Lebanon, pregnant females with a single embryo each were collected on 31 May with an estimated parturition in mid-June (33).

Tadarida aegyptiaca Egyptian Free-tailed Bat

This species has not yet been recorded from this area, but it doubtless occurs in the deserts of south Jordan.

Note: A photograph taken by Mr. Dr. Al-Shafee from Northern Jordan clearly shows *Pipistrellus pipistrellus* (locality not known, 52). If the specimen is located, this will be the first record from Jordan. Since the species is common in Lebanon (33) and many Mediterranean habitats from North Africa (50), it is expected to occur commonly in the northern regions of Palestine. It is thus surprising that only a single record from Mt. Meiron in Palestine is available (51).

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List of Bats Known and Suspected to Occur in Jordan

Suborder MEGACHIROPTERA

Family PTEROPODIDAE

1. *Rousettus aegyptiacus*

Suborder MICROCHIROPTERA

Family RHINOPOMATIDAE

2. *Rhinopoma hardwickei*
3. *Rhinopoma microphyllum*

Family Emballonuridae

4. *Taphozous nudiventris*
5. *Taphozous perforatus*

Family Rhinolophidae

6. *Rhinolophus ferrumequinum*
7. *Rhinolophus clivosus*
8. *Rhinolophus hipposideros*
9. *Rhinolophus euryale*

10. *Rhinolophus mehelyi*

11. *Rhinolophus blasii*

Family Hipposideridae

12. *Asellia tridens*

Family VESPERTILIONIDAE

13. *Myotis emarginatus*

14. *Myotis capaccinii*

15. *Myotis nattereri*

16. *Pipistrellus pipistrellus*

17. *Pipistrellus kuhli*

18. *Pipistrellus rueppellii*

19. *Pipistrellus bodenheimeri*

20. *Pipistrellus ariel*

21. *Pipistrellus nathussii*

22. *Nyctalus noctula*

23. *Eptesicus serotinus*

24. *Eptesicus bottae*

25. *Otonycteris hemprichi*

26. *Plecotus austriacus*

27. *Miniopterus schreibersi*

Family MOLOSSIDAE

28. *Tadarida teniotis*

29. *Tadarida aegyptiaca*

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