

Writing assignment for Biol459, Mammalogy

Due by the 15th of April. Your work must be submitted on BlackBoard as a MS Word document.

Purposes:

- Learn how generative AI can assist or hinder scientific writing
- Learn how to structure a peer-reviewed product in a standard format for the discipline
- Learn to conduct a review of peer-reviewed literature and add value by combining others' researches into a synthetic article with the help of AI

Skills:

The ability to investigate, read and comprehend technical (scientific literature) is essential to success as a scientist or medical professional. Scientists and many medical practitioners are expected to share results of their research or case studies with a professional audience via such outlets as peer-reviewed journals, as discussed in class. In the last two years, many academics have become concerned that generative AI such as ChatGPT may lead to considerable cheating in the production of term papers and other academic content, *including research*. Regardless of intent, in a few years, most of our interaction with websites, computer programs, entertainment distributors, etc., will be via an AI interface that may be indistinguishable from a real person, perhaps better. Skill in developing AI prompts and evaluating AI-produced content will likely be required in many areas of academia and medicine.

Tasks:

1. Choose a mammalian family of interest to you.
2. Define some characteristics of an imaginary species within that family—you may use AI for this.
3. Read a *Mammalian Species* publication for a species in that family, and read instructions for authors from the publisher, the American Society of Mammalogists.
4. Conduct literature research for technical aspects of the family you've chosen and the characteristics you attribute to your new species. You can attempt to use AI to do this, but it won't work well. Most peer-reviewed, recent literature is behind paywalls. As a person, you can access these materials via WKU Libraries, but automated bots cannot. This information won't be in the knowledge base your AI uses.
5. Adhering closely to the *Mammalian Species* format, write an account for your new species. Your account will not be so detailed as a real MS account, of course, those may take months to write by professionals in the field. Use AI to write each section separately. You will end up with a hybrid approach, where AI may be useful for organization and grammar, but will struggle with technical concepts.
6. Illustrate your MS account with photos and diagrams similar to what you've seen in real MS accounts. Use Dall-E or similar imaging AI to do this (Bing is a good, free choice). Getting good images is very much tied to the quality of your prompts. You may need several attempts. This use of AI is likely to contribute the most to your paper.
7. Put all the sections and pictures together, then reread everything to make sure you've emulated real MS species accounts.
8. Keep track of all the prompts you used. Write a metacognitive summary of what you did and how you learned to structure prompts as you went along. Make suggestions for future users.

Criteria for Success:

Does your product contain all the elements of a MS account to reasonable detail? Did you actively and imaginatively craft and improve prompts for the AI contributions? If so, then you've done the best you can with the limitation of current AI products.

I've attached an example of a well-done student project, using first-generation generative AI. As AI has gotten better, so I expect the quality of your projects to improve on this one.

Each of your products will be shared with the other students in the class. During finals week, we'll have a class discussion on your experiences with the AI component of the project. Be prepared to discuss your work and ask questions of others.

Noctilius edereichthy (Chiroptera: Noctilionidae)

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Abstract: *Noctilius edereichthy* is a noctilionid bat commonly called Antarctic blubber bat. This medium to large sized fishing bat, fully furred with a thin layer of blubber comprising the hypodermis, is the only species in the newly described genus *Noctilius* (Noctilionidae). This species inhabits coastal regions of Antarctica from June to February (late winter to summer season) with a recorded range from Alexander Island up to the tip of the peninsula under southern Argentina. It migrates to southern regions of Argentina and Chile for the bulk of the Antarctic winter season. It prefers lukewarm, humid caves and ice caverns for roosting sites. It is not a species of concern, but the status of many populations is uncertain due to the paucity of research on this newly discovered species.

Key words: bat, carnivorous bat, fishing bat, Noctilionidae, Antarctic blubber bat

Noctilius edereichthy (new species)

Antarctic blubber bat

CONTEXT AND CONTENT. Order Chiroptera, suborder Yangochiroptera, superfamily Noctilionoidea, family Noctilionidae. Three species are recognized; two in the genus *Noctilio* and one in the newly described (in the account that follows) genus *Noctilius*.

NOMENCLATURE NOTES. The name *edereichthy* is derived from the combination of *edere*, meaning “eat” or “I eat” in Latin, and the Greek *ichthy*, which means fish. This was chosen based on the Antarctic blubber bat’s diet, which consists mainly of fish.

DIAGNOSIS

Noctilius edereichthy is a rare species of bat that inhabits a distinct coastal region of Antarctica (Fig. 1). The species account that follows is based off limited sampling. *N. edereichthy* is similar in general characteristics to *Noctilio leporinus* (greater bulldog bat), but with the added benefit of a thin layer of blubber under the skin and water resistant barb-like hair, similar to seals, to aid in thermoregulation. Like how *N. leporinus* is larger but resembles *N. albiventris* in most morphological features (Hood and Jones 1984), *N. edereichthy* is similar to but larger than *N. leporinus*. The length of the forearm of *N. edereichthy* (85-105

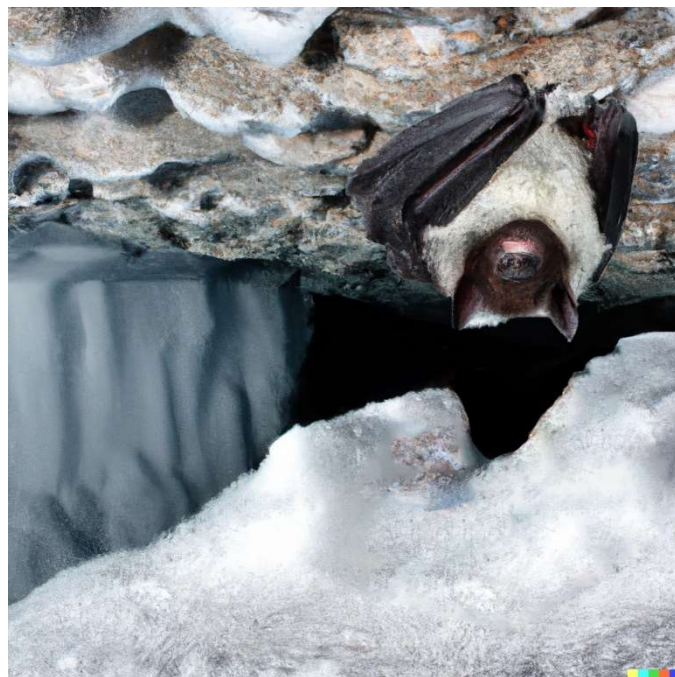


Figure 1: Antarctic blubber bat (*Noctilius edereichthy*) roosting in an ice cavern on the coast of Alexander Island, Antarctica. The only photograph of this rare species. Image: Nicholas Belt 2022

mm) is bigger than that of *N. leporinus* (70-92 mm) (Hood and Jones 1984). The wingspan is consequently larger, at about 600 mm (500 mm for *N. leporinus*) (Hood and Jones 1984). While also larger in proportional size, *N. edereichthy* hindlimbs are also

highly advanced and long with large feet, and well-developed claws.

GENERAL CHARACTERS

The characteristics of *N. edereichthy* similar to *N. leporinus* include elongated rostrum and strongly projecting nose pad; swollen lips; chin with cross ridges resembling a bulldog; internal cheek pouches, narrow and pointed ears; lobed tragus with lateral tendril-like projections; tail that extends 1-3 length of uropatagium and exits dorsally; enlarged hindfeet and claws; and a well-developed calcar (Hood and Jones 1984). Characteristics that distinguish it from *N. leporinus* (and other members of Noctilionidae) include a pelage of dark brown hair on the head and white to beige pelage on the dorsoventral abdomen; two layers of barb-like hair covering entire body; and a thin layer of blubber comprising the hypodermis of the skin on the body (excluding wings). Overall, males are typically larger than females.

The skull of both *N. edereichthy* and *N. leporinus* is relatively large, which is reinforced to support powerful jaws. The *N. edereichthy* skull (Fig 2) lacks distinct postorbital processes and the premaxillary nasal and palatal branches are fused with the maxillaries. The skull also has a distinct sagittal crest which is more developed in males (Hood and Jones 1984).

Like its relative, *N. edereichthy* has a relatively large braincase compared to other bat species, which is necessary for processing complex echolocation signals. The rostrum is elongated and flattened with tubular nares, and a groove running down the middle. This structure helps to focus and direct echolocation signals (Hood and Jones 1984). The eye sockets are not as enlarged as *N. leporinus*, an adaptation for its diurnal lifestyle and reliance on echolocation. Zygomatic arches are robust and well-developed which provides a strong attachment point for the jaw muscles (Hood and Jones 1984). *N. edereichthy* has fewer teeth compared to other bat species. Some teeth are sharp and pointed, specialized for piercing. Upper incisors are crowded between the canines with single cusps extending slightly above cingulum of the inner teeth. The lower incisors are also crowded between the canines and broad in shape. Upper canines (2) with distinct oblique cingulum and no secondary cusps. Lower canines are slightly twisted. The first upper premolar is absent in this species. The molars are also small and simple, with low, rounded cusps adapted for grinding. Upper premolar with well-developed cusps. First and second upper molars with

well-developed cusps. Unlike *N. albiventris*, the three molars are separated by noticeable gaps. Lower molars similar in shape as the uppers. The dental formula is $I_1^2 C_1^1 P_2^1 M_3^3$, totaling 28 (Hood and Jones 1984).

The pelage is made of two layers of barb-like hair like the hair of a seal. The first layer is a visible outer layer comprised of long hairs. The second is an inner, down-like layer of underfur, referred to as “guard hairs”. The first layer keeps the inner layer warm and dry. The hairs have a barbed structure that helps them stick together and act as insulation (Biuw et al. 2003). Head coloration varies from light brown to black. Post-cranial coloration varies from white to beige. A distinct dark brown to black dorsal stripe extends from between the shoulder blades to the lower back (end of thoracic vertebrae). Coloration of hair on the wings proximal to humerus and radius typically matches color of the head of the individual. The brownish to blackish ears are furred at the base (Hood and Jones 1984).

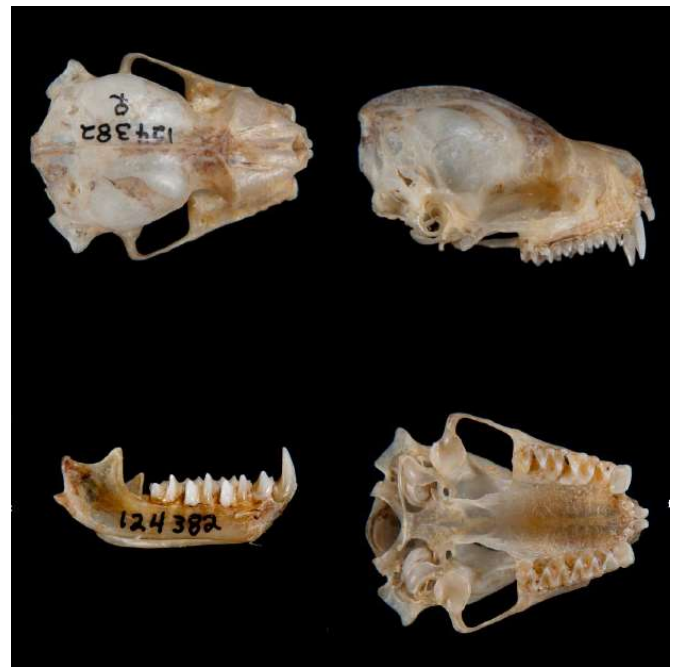


Figure 2: Dorsal and lateral view of cranium, lateral view of dentary, and ventral view of mandible of a female *Noctilius edereichthy*. Stored in University of Michigan Museum of Zoology 124382, specimen from Alexander Island, Antarctica. Images are not scaled to actual size. Image: Phil Myers

The blubber found in *N. edereichthy* is identical in form and potential function to that of a polar bear or seal. However, as fishing bats do not submerge in water at any point, its proposed that the function of the blubber in the Antarctic blubber bat is strictly for insulation and



Figure 3: Distribution of *Noctilius edereichthy* on coastal regions of Alexander Island, Antarctica, extending up into the peninsula.

not buoyancy. The blubber is much thinner (0.5-1 cm) than other aquatic/terrestrial mammals to account for continued flight capabilities. Lipids from prey are stored in the blubber tissue to aid in hibernation or prey droughts (Biuw et al. 2003).

DISTRIBUTION

Noctilio leporinus, also known as the greater bulldog bat, is found in Central and South America. Its range extends from southern Mexico to northern Argentina, covering much of the Amazon basin and other tropical and subtropical regions (Davis 1973). It is proposed that *N. edereichthy* evolved after a bat like mammaliaform colonized Antarctica during the Jurassic period. The extant species range is very limited to do resources, hunting strategies, and habitat requirements. It occurs on coastal regions of Alexander Island, Antarctica, presumably expanding up toward the

peninsula closest to the distal tip of Argentina, South America (Fig. 3).

FOSSIL RECORD

Family Noctilionidae has a relatively limited fossil record compared to other bat families (Czaplewski 1996; Salles et al. 2014). Nonetheless, several fossils of related species have been discovered, shedding light on some of the evolutionary history of this group. One of the oldest known fossils of a bat is *Onychonycteris finneyi*, which lived around 52 million years ago in what is now Wyoming, USA (Simmons et al. 2008). *Onychonycteris* is notable for its primitive features, such as its elongated fingers and clawed thumbs, which suggest that it was adapted for climbing and perching rather than flight. Another important fossil is *Palynephyllum antimaster*, which lived in what is now Argentina around 16 million years ago. *Palynephyllum* is considered to be a transitional form between the primitive climbing bats and the more advanced aerial bats. This bat is also considered to be an ancestor of nectivorous bats based on its morphology (Czaplewski et al. 2003; Dávalos et al. 2014).

In addition to these fossils, several other specimens of noctilionid bats have been discovered from the Eocene, Oligocene, and Miocene periods, mostly from North and South America (Ameghino 1894; Vizcaíno and Bargo 1998). One example of a fossil species within the family Noctilionidae is *Noctilio robustus*, which lived during the early Miocene period (approximately 23-16 million years ago) in what is now Argentina. The fossil record of this species consists of several fragmentary skull and jaw specimens, as well as isolated teeth, which have been used to reconstruct aspects of the animal's morphology and diet (Ameghino 1894; Vizcaíno and Bargo 1998). Unfortunately, there are no known fossil records specifically for *N. edereichthy*, as the species is relatively young and has not yet had sufficient time to leave behind a significant fossil record. Fossils of older relatives or mammaliaforms of this species have also not been found in Antarctica itself.

FORM AND FUNCTION

Form: All species in the family *Noctilionidae* have a unique flight style compared to many other bat species. They are powerful and agile flyers, capable of rapid changes in direction and speed, and are

theoretically able to fly in a variety of different environments. *N. edereichthy* is also able to fly close to the surface of water, using its enlarged feet and sharp claws to grab fish or other aquatic prey from the water's surface. It has been observed flying over water at speeds of up to 20-30 km/h (12-19 mph) and achieving aerial flights speeds of up to 70 km/h (Norberg and Rayner 1987). Its wings are elongated and narrow, with a high aspect ratio. Its wing morphology enables it to generate lift and reduce drag more efficiently than other bat species. In particular, the bat's elongated wings allow it to achieve high lift coefficients, which enable it to stay aloft at lower airspeeds than other bats. Additionally, its narrow wings reduce drag, allowing it to achieve higher airspeeds with less energy expenditure (Smith and Starrett 1979). The wings of all species in *Noctilionidae* are practically identical in shape based on morphometrics (Smith and Starrett 1979). In all species, almost 65% of the wingspan is composed of the third digit. The high aspect ratio can be attributed to a shortened first phalanx in the third and fourth digits.

Evidence concludes that individuals of *N. leporinus* (and potentially *N. edereichthy*, understudied) do not display dental abnormalities. Of 39 specimens examined, only one adult male had lost a right upper incisor in life (Phillips and Jones 1969; Hood and Jones 1984).

All species in the family *Noctilionidae* have cheek pouches that are typically used for food storage during foraging. Specifically, a fish captured by *N. leporinus* and *N. edereichthy* is placed into the mouth, partially chewed, then stored in the cheek pouches. It is proposed that this feeding strategy maximizes efficiency when foraging in a given area for an extended period of time (Murray and Strickler 1975). Fishing bats also have other morphological adaptations for piscivory found in the digestive tract including modifications to the stomach that allow for storage of larger meal items (Forman 1973).

Function: *Noctilio leporinus* is capable of maintaining a body temperature within a narrow range of approximately 34-36°C, which is similar to other bats. This is achieved through a combination of behavioral thermoregulation and physiological adjustments. During periods of rest, the bats lower their metabolic rate and reduce heat production, while during activity, they

increase their metabolic rate and heat production to maintain body temperature (Giannini and Kalko 2004). *N. edereichthy* maintains the same narrow range of body temperature through similar processes with the added aspect of blubber aiding in thermoregulation as well.

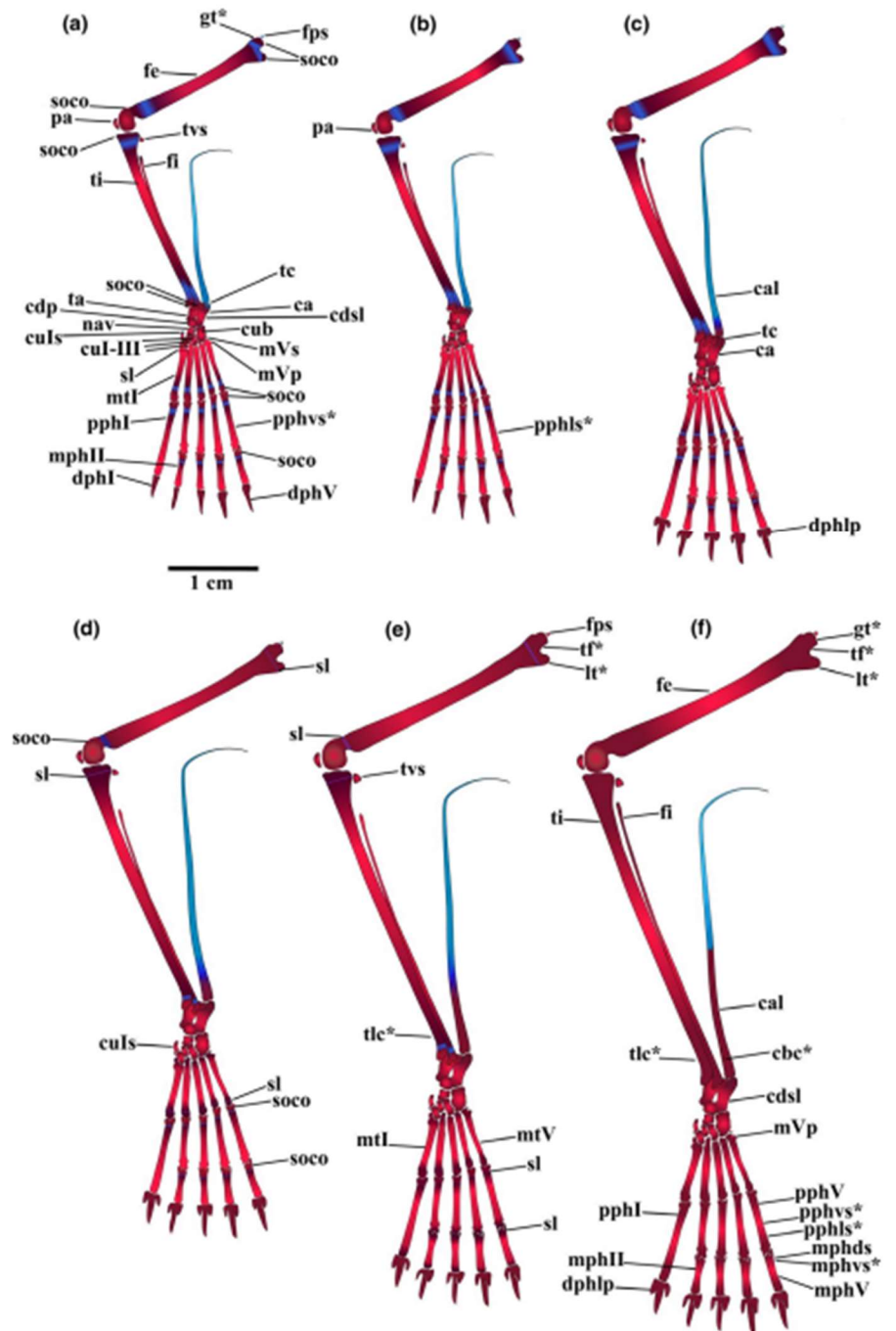
Much like *Noctilio leporinus*, *N. edereichthy* also has a high metabolic rate compared to other bat species. A study measured the resting metabolic rate of several bat species and found that *N. leporinus* had the highest metabolic rate, with an average resting metabolic rate of 4.4 mL O₂/g/h. The high metabolic rate of both species is thought to be related to their carnivorous and insectivorous diet and the need to maintain high levels of energy during flight and echolocation (Chua et al. 2021).

ONTOGENY AND REPRODUCTION

The ontogeny of *N. edereichthy* involves several distinct stages of development, from birth to adulthood. Embryonic development of this species begins in utero, with gestation lasting approximately 100 days (López-González et al. 2008). Female individuals are monovular and give birth to a single offspring per year. For *N. leporinus*, breeding usually begins in November and December with gestation during the winter and early spring, followed by parturition from late April to June (Hood and Jones 1984). Due to the geographical distribution of *N. edereichthy* being restricted to Antarctica, which only has summer (October-February) and winter seasons (Schneider et al. 2004), its breeding and gestation patterns are different. This species typically breeds during early June with gestation lasting until the end of winter, followed by parturition from early October to mid-November. During lactation, female *N. edereichthy* produce milk with high fat content, which is essential for the rapid growth and development of their offspring (Esbérard and Motta-Junior 2004). The young are weaned at around 8 weeks of age. (Buchler and Childs 1981). At birth, the neonates weigh approximately 10-15 grams and are altricial, or completely dependent on their mother for nourishment, warmth, and protection (Esbérard and Motta-Junior 2004).

The young bats have a distinct white fur coloration, which changes to a darker hue as they age (López-González et al. 2008). For the first few weeks of their lives, *N. edereichthy* pups remain in the roost with their mother, feeding on her milk and developing their

Figure 4: General diagrams of the hindlimbs of *Noctilius edereichthy* at dorsal view along postnatal development. (a) juvenile B stage of development. (b) juvenile C stage. (c) juvenile D stage. (d) juvenile E stage. (e) subadult F stage. (f) adult H stage of development. ca: calcaneous; cal: calcar; cbc: calcar basal crest; cdp: calcaneous dorsal process; cdsl: calcaneous dorsal slot; cub: cuboid; culs: cuneiform I ventral sesamoid; cul-III: cuneiforms I to III; dphI: distal phalange I; dphly: distal phalanges lateral process; dphV: distal phalange V; fi: fibula; fe: femur; fps: femur proximal sesamoid; mphII: medial phalange II; mphV: medial phalange V; mphds: medial phalanges dorsal slots; mphvs: medial phalanges ventral slots; mtl: metatarsal I; mtV: metatarsal V; mVp: metatarsal V proximal process; mVs: metatarsal V ventral sesamoid; nav: navicular; nvp: navicular ventral process; pa: patella; pphI: proximal phalange I; pphls: proximal phalanges lateral slots; pphV: proximal phalange V; pphvs: proximal phalanges ventral slots; qco: ossification centre open; sl: suture line; soco: secondary ossification centre open; ta: talus; tc: tuber calcanei; tf: trochanteric fossa; gt: greater trochanter; ti: tibia; lt: lesser trochanter; tlc: tibial lateral crest; ttp: trochlea tali proximalis; tvs: tibial ventral sesamoid. Asterisk "*" indicates structures present but not visible at dorsal view. Modified from Celeita et al. 2018.



physical and behavioral skills. As they grow, they begin to explore their environment and learn to fly, initially taking short flights around the roost before gradually venturing out further. Flight ability typically occurs around 40-45 days of age (Esbérard and Motta-Junior 2004; López-González et al. 2008). As they become more independent, juveniles start to develop their hunting skills, initially practicing catching insects in flight before moving on to more challenging prey such

as fish. The development of the hindlimb (Fig. 4) from the juvenile stage to adult is an important process for *N. edereichthy* considering its main food source is fish, and it cannot survive long on a strictly insectivorous diet. Once the hindlimb is fully developed, the bat can learn to forage for fish.

They also start to develop their echolocation abilities, gradually refining their calls and learning to interpret the echoes that bounce back. As the bat grows

and develops, various morphological changes occur, including the development of the teeth and the acquisition of the characteristic bulldog-like face shape (Esbérard and Motta-Junior 2004). Sexual maturity in this species is reached at around 10-11 months of age (Buchler and Childs 1981). By the time they reach adulthood, *N. edereichthy* individuals are fully independent and capable hunters, with well-developed flight and echolocation skills.

N. edereichthy has a unique reproductive strategy that involves both polygyny and communal roosting. Males exhibit polygynous mating behavior, where dominant males mate with multiple females (Esbérard and Motta-Junior 2004). Their sperm is unique compared to other mammals. The head is large and flat with a large acrosome that lies anterior to the nucleus. The shape of the acrosome looks like a dozen “accordion-like” folds that run parallel to the long axis of the sperm. Researchers believe these acrosome ridges may strengthen the sperm head during transport (Phillips et al. 1997). A pocket-like fold of skin in the scrotum of males has glands that are partially responsible for the musky odor exuded by them (Dunn 1934; Goodwin and Greenhall 1961). This odor also comes from oily secretions found beneath the wings. Females scent mark their heads with the secretions of other females by rubbing their heads under other bats' wings. It is believed that these secretions differ between sexes and may communicate information about sexual identity and reproductive condition or can be other individuals (Phillips et al. 1997). Communal roosting is a key feature of this species reproductive strategy. Both males and females roost together in large groups, with females forming maternity colonies for pup rearing (Esbérard and Motta-Junior 2004). This communal behavior allows for increased protection against predators and facilitates social learning and communication.

ECOLOGY

Noctilius edereichthy is found on coastal regions of Alexander Island, Antarctica for the late winter season and all of summer. This species migrates to the southern portions of Argentina and Chile for the bulk of the winter season (late February to mid-May). The preferred roost of this species is permanent structures such as caves, mines (Argentina and Chile), and ice caverns. While it is in Antarctica, the roost is typically found no

more than 5 km from the shoreline, where it forages for fish and glean the Antarctic midge (*Belgica antarctica*). It is capable of catching fish that are swimming close to the surface of the water, using its large feet and sharp claws to grasp and hold onto its prey (Hood and Jones 1984). It may also feed on the midges, which it locates using its echolocation abilities and gleans it from the surface of the landscape.

N. leporinus is commonly found in tropical lowland habitats near ponds, streams, rivers, and coastlines (Bloedel 1955; Carter et al. 1966; Davis et al. 1964; Goodwin 1946; Jones et al. 1971, 1972; Watkins et al. 1972; Davis 1973). However, *N. edereichthy* are only found along coastlines in Antarctica and southern portions of Argentina and Chile. Antarctic blubber bats roost in colonies that can number up to 100. The roost is typically structured wider than it is tall with a dark, lukewarm, and humid atmosphere exuding a strong odor of fish. Juvenile and adult males and females can be found together in the roosts (Armstrong and Johnson 1969; Jones et al. 1973; Silva Taboada 1979). However, in some cases, males will congregate singularly in a roost (Carter et al. 1966) as well as segregated subadults in their own roost (Dickerman et al. 1981). In other cases, males and pregnant females will segregate in a single roost during parturition (Goodwin and Greenhall 1961).

N. leporinus and *N. edereichthy* are two of a few bats that have evolved to eat fish, suggested by adaptations in functional morphology that would aid in piscivory. These include enlarged feet, claws, sharp canines, cheek pouches, and specializations of the stomach. However, this species does not exclusively feed on fish. Only small amounts of insects are consumed (Goodwin 1928; Gudgey 1945) by *N. edereichthy* because there is only one viable prey species of insect located in Antarctica. The Antarctic midge is a small wingless arthropod native to the region (Gressitt and Leech 1961; Sugg et al. 1983). This insect is prevalent year round but only accounts for roughly 10% of the bats diet.

N. leporinus is a host to both ectoparasites and endoparasites including ticks, mites, bat bugs, bat flies, nematodes, and trematodes (Wenzel 1976). *N. edereichthy* is not a suitable host to ectoparasites due to the extreme environmental conditions that would be placed on the arthropods while the bat inhabits

Antarctica seasonally. It is unclear if the bat is host to any endoparasites due to the lack of research conducted on large samples of live specimens. However, some species of bat flies (Streblidae) documented on *N. edereichthy* shortly after migration from southern South America include *Noctiliostrebla aitkeni*, *N. dubia*, *N. megastimata*, *N. traubi*, *Paradyschiria fusca*, *P. lineata*, and *Xenotrichobius noctilionis* (Wenzel 1976; Wenzel et al. 1966). These genera of bat flies are primarily restricted to parasitize species of *Noctilio*. The occurrences on *N. edereichthy* are not considered true associations as they are scarcely found on the host population and die shortly after migration when present.

White nose syndrome (*Pseudogymnoascus destructans*), rabies and *Histoplasma capsulatum* (infective agent for histoplasmosis) have not been currently documented in wild populations of this fishing bat but further research is necessary to determine prevalence.

BEHAVIOR

Noctilio leporinus is a highly social and active species that forms groups of individuals called colonies. These colonies typically consist of around 20-30 individuals, although larger colonies of up to 100 individuals have been observed. Within the colony, individuals communicate using a variety of vocalizations and physical cues, such as scent marking and grooming. They may also engage in social play and other forms of interaction, which can help to maintain group cohesion and promote reproductive success (Ceballos and Oliva 2005).

This species uses echolocation to navigate and locate prey. It emits a series of high-frequency calls that bounce off nearby objects, allowing it to form a mental map of its surroundings. It can adjust the frequency and amplitude of its calls to suit the environment, which helps it to locate prey in a variety of different habitats (Ceballos and Oliva 2005). Echolocation dynamics of *N. edereichthy* are identical to *N. leporinus*. Both species emits calls at a frequency range of 24 to 41 kHz, with a maximum energy peak at around 31 kHz. The emitted sound waves propagate through the air and when they encounter an object, they bounce back as echoes towards the bat's ears (O'Farrell et al. 2004). The bat's auditory system then processes these echoes to determine the location, distance, and size of the object. The bat's brain contains a neural map of the surrounding environment,

which is created by the auditory system from the echoes received. These bats also use frequency modulation of their calls to gather additional information about their environment. As the bat approaches an object, it increases the rate of frequency modulation to obtain more detailed information about the object's size and shape (Simmons and Stein 1980). This technique is known as "frequency modulation depth" and was first described by Griffin and Galambos (1941).

It typically flies low over the water and once it detects its prey, it uses its large feet and claws to gaff fish out of the water (Eisenberg and Redford 1999). Additionally, the species has a long, narrow snout that allows it to detect prey in murky water (Altringham 2011). *Noctilio edereichthy* is an adept flyer that is capable of maneuvering through complex environments. It can take off and land from a variety of surfaces, including rocks, ice, and water. It can also fly in a variety of different patterns, including straight flights, hovering, and rapid, zig-zagging movements that help it to avoid obstacles and catch prey.

Observations on foraging behavior document that like *N. leporinus*, *N. edereichthy* skim the surface of bodies of water (Bloedel 1955; Goodwin and Greenhall 1961). It is undetermined whether this bat species proposed that bats randomly "drag" over areas with high prey density (Bloedel 1955), locate prey beneath the surface using echolocation (Griffin and Novick 1955), or actively search for fish and detect them at the surface (Suthers 1965). A hunting strategy that is unique to *N. edereichthy* is its apparent commensal ecological interaction with species of seals in Antarctica. Other observations on foraging behavior display the Antarctic blubber bat frequenting areas where seals reside. They will then fly around until the seals' hunting efforts drive the fish toward the surface of the water, where the bat will use the opportunity to gaff the fish before they regain depth. These bats are unable to detect prey that are submerged but can register minute disturbances on the water surface (Hood and Jones 1984). They can catch fish up to 100 mm in length from depths as great as 25 mm below the water surface (Schnitzler et al. 1994). For *N. leporinus*, vision and olfaction are not necessary to locate prey (Hood and Jones 1984); for *N. edereichthy* vision is used along with echolocation due to differentiation in foraging times between the species.

GENETIC

Very few genetic studies have been conducted on this species due to the paucity of field research being conducted in Antarctica and only a recent discovery of their existence. The only information currently available is that the chromosomal complement found in *Noctilio leporinus* is identical to that found in *Noctilius edereichthy* as well as analysis of genome sequences that support *N. edereichthy* being classified in a new genus.

However, some assumptions can be made about the genetic diversity and structure of *Noctilius edereichthy* populations based on genetic studies of its closest relative, *Noctilio leporinus*. For instance, phylogenetic analyses using mitochondrial DNA (mtDNA) have suggested that *N. leporinus* belongs to a monophyletic group with other species of *Noctilio* bats, including *N. albiventris*, *N. labialis*, and *N. albiventris* (Gannon et al. 2005). This study has also indicated that *N. leporinus* and *N. albiventris* are the most closely related species within the genus *Noctilio* (Gannon et al. 2005).

Population genetic analyses using microsatellite markers have shown that *N. leporinus* has a relatively high level of genetic diversity compared to other bat species (Rojas et al. 2012). These studies have also suggested that there may be some population structure within *N. leporinus*, with some genetic differentiation between populations from different regions (Rojas et al. 2012; Marroig and Kirsch 2017).

CONSERVATION

Noctilius edereichthy is not currently considered globally threatened or endangered. However, there are still some conservation issues that are important to consider. One major threat to *N. edereichthy* is habitat loss and limited range. The species relies on glaciated coastal regions for foraging and roosting. Human activities such as construction, agriculture, and urban development can degrade or destroy the ozone layer, consequently melting ice caps in polar regions and thus reducing available roosting sites. In turn, climate change in general poses a threat to this species because as temperatures and rainfall patterns shift, the availability of suitable habitats and food sources for the species may

change, potentially leading to declines in population size.

To address these conservation issues, it is important to promote habitat conservation and restoration efforts. Public education and outreach efforts may also help to reduce negative attitudes towards bats and promote their conservation. Finally, continued monitoring and research is needed to better understand the population status, ecology, and genetics of *Noctilius edereichthy* as well as to identify and mitigate potential threats to the species.

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