

THE BATS OF IRAN

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THE BATS OF IRAN

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CHAPTER I

INTRODUCTION

In 1962 and in 1968 the W. S. and J. K. Street Expeditions to Iran, sponsored by the Field Museum of Natural History and the Iran Department of Game and Fish, collected mammals at numerous localities around that country. The goal of these expeditions was to document the occurrence and distribution of mammals in this zoogeographically important area. As a member of the 1968 Street Expedition my primary duties were to gather data on the occurrence, distribution and ecology of bats in Iran and to collect specimens for detailed taxonomic study. This paper presents the results of these efforts.

Several authors, including Blanford (1876), Misonne (1959), Lay (1967) and Etemad (1968) have summarized the species of bats known from Iran, but none have presented a systematic evaluation based on external and cranial measurements of the specimens examined. Nor have any of these authors attempted a subspecies level account of all Iranian bats. The large number of specimens collected by the 1962 and 1968 Street Expeditions now allow such detailed studies to be made. I have examined all specimens collected by these two expeditions as well as numerous Iranian bats in the collections of other museums in this country and in Europe. While it is not yet possible to determine subspecific status of all bat specimens from Iran and while many large gaps still are evident in our knowledge of the chiropteran distributional patterns

in that country, I have been able to draw several conclusions on their subspecific and distributional status.

This paper presents a summary of all known locality records for Iranian bats, and keys for the identification of all bat species now known to occur in that nation. Existing distributional records in Iran and surrounding nations are coupled with ecological data from my own field observations and from the literature to predict the probable distribution of each species within Iran. A discussion of the taxonomic problems relating to each species and subspecies is presented and, in most cases, subspecies have been determined.

Previous Studies of Iranian Mammals

Many early authors reported small collections of mammals made in Iran (e.g., De Filippi 1865), and in 1876 W. T. Blanford made the first attempt to summarize existing knowledge on the natural history of Iran in his book, Eastern Persia, an account of the Journeys of the Persian Boundary Commission 1870-71-72, Vol. II, the Zoology and Geology. In this volume Blanford listed twelve species of Chiroptera for Iran. By modern taxonomic arrangement these 12 now represent 10 species. During the early part of the twentieth century several authors (Cabrera 1901; Thomas 1905, 1907; Cheesman 1921; etc.) added numerous species to the Iranian faunal list. Most of these authors reported specimens which had been collected by Col. A. C. Bailward, Col. J. E. B. Hotson and other officers in the British Army and deposited in the British Museum (Natural History) in London. In 1921 Cheesman listed the mammals reported from Iran since Blanford's (1876) work, adding one bat and bringing the total number of species on the list of Chiroptera to 11.

During the 1930's and 1940's virtually no work was done on Iranian mammals, but in 1959 Misonne published Analyse Zoogéographique des Mammifères de l'Iran. He listed 20 species of Chiroptera as having been reported from Iran, but one of these, Pipistrellus nathusii, was not based upon a specimen record. Of the remaining 19, 17 are presently recognized as full species.

Between 1962 and 1968 an Iranian mammalogist, Etemad (1963, 1964 and 1967), and the reporters of two small collections made by universities in Great Britain (Harrison 1963, Aberdeen University 1965) recorded several species of bats new to the Iranian faunal list.

During this same period three major expeditions from American museums made collections of Iranian mammals. In 1967 Lay reported the collections of the 1962 Street Expedition and included 32 species of bats in his list of mammals known from Iran. One of these is not based upon the report of actual specimens and a second is based upon an early misidentification which has recently been corrected. These reduced his 32 species to 30. In 1968 Etemad reviewed all of the known records for Iranian bats and recognized the same 30 valid species listed by Lay (1967). The second major expedition was conducted by the U. S. National Museum in the early 1960's. The results of this have not yet been published. In 1969 Farhang-Azad reported three species of Chiroptera new to the Iranian faunal list, but one of these is usually recognized only as a subspecies of a species already known from Iran. In 1970 Etemad reported another species new to the Iranian faunal list bringing the total number of bat species to 33.

The third major expedition referred to above was the 1968 Street Expedition. DeBlase (1971) in reporting major new records of bats

from this expedition recorded two species new to the faunal list of the country, bringing the total up to 35. The present paper reports three additional species and casts doubt on one of the earliest reported species. Thus the total number of chiropteran species presently documented from Iran is 37.

The 1968 Street Expedition

The 1968 Street Expedition collected mammals and their ectoparasites in western Iran from mid-July to mid-December of 1968. The expedition was led by Mr. and Mrs. William S. Street and included a three-man scientific staff, Daniel Womochel, Richard Rust and myself. Womochel and I were expedition mammalogists with primary responsibilities for prey and predaceous species respectively. Rust served as ectoparasitologist for the expedition. In addition to the American personnel several Iranians served as members of our group. At least two representatives of the Iran Department of Game and Fish were with us at all times and assisted in locating specimens and in hunting.

Collecting Methods

Bats were taken at 39 different collecting sites (see Appendix B) between Maku, near the Soviet and Turkish borders in northwest Iran, and Minab, near the Strait of Hormoz at the west edge of Baluchistan. Several methods of collecting were used. At each of the major base camps (see Appendix B) used by the expedition, our interpreter and the representatives of the Iran Department of Game and Fish questioned people about the location of caves ("gara" in Farsi, the Iranian language) and about populations of bats ("kofash," bats; or "chapareh,"

any small fluttering creatures including butterflies, bats, etc.) in the area. Word was also passed that we would pay for specimens and pay to be led to caves, buildings, etc., where bats could be found. With the assistance of local guides, and independently, we searched for caves, qanats (underground irrigation tunnels), and buildings that contained signs of bat habitation. Mistnets were used across cave entrances, near buildings containing bats, across streams and irrigation ditches, and in wooded areas where bats were observed. Many specimens were collected with shotguns as they flew over streams and open areas.

When specimens were brought to camp for us to purchase, we offered additional remuneration to be led to the collecting site so that other specimens could be obtained and habitat data recorded. In caves and man-made structures bats were collected from accessible places by hand, from higher areas and from mid-air with a hand net, and from cracks and crevices with a pair of twelve-inch forceps. Specimens observed at inaccessible heights in caves were shot with a .22 pistol loaded with dust shot. Aerosol cans of insecticide were used to drive bats from some crevices and from the straw mats which provide the support for the tamped-clay roofs of many buildings.

Field Data Recorded

In addition to the locality and date for each specimen, data were recorded on the habitat, behavior, and reproductive condition of each individual. All specimens were searched for ectoparasites and six standard measurements (Total Length, Tail, Hind Foot, Ear, Tragus, and Forearm - explained in detail below) were taken with a millimeter rule from fresh specimens. Usually about half of the specimens of a species

from one locality were prepared as standard study skins and skulls, the remainder were fixed in formalin and transferred later to alcohol. Postcranial skeletons, and carcasses preserved in spirit were saved from some of the specimens prepared as dry skins. Mummified individuals, found on several occasions, were preserved intact.

Post-Expedition Study

Since returning from Iran, I have examined in detail the 610 bat specimens collected by the 1968 Expedition and the 423 specimens collected by the 1962 Expedition. In addition to external measurements taken in the field, I have since taken numerous cranial measurements of all dry specimens and, in certain groups, measurements of nasal ornamentation, phalanges, metacarpals, and other body dimensions (see enumeration below). All post-expedition measurements were taken with a Helios dial caliper. In addition to the Street Expedition collections and comparative material in the Field Museum of Natural History (hereafter referred to as Field Museum), I have examined all Iranian material in the collections of the British Museum (Natural History) (hereafter referred to as the British Museum) (135 specimens), Dr. D. L. Harrison's personal collection (9 specimens), and the University of Illinois Museum (5 specimens); and I have received the loan of material from the U. S. National Museum (5 specimens), the University of Michigan Museum (5 specimens), and the Staatlichen Museum für Naturkunde, Stuttgart (8 specimens).

Explanatory Notes

Abbreviations

The following abbreviations are used for measurements taken from specimens and from the literature. Unless otherwise noted, all measurements in the tables were taken by me or by another member of the expedition. All measurements of specimens are given in millimeters.

- TL Total Length. Taken from the tip of the nose to the posterior tip of the last tail vertebra.
- HB Head and Body Length. Determined, for our specimens, by subtracting Tail Length from Total Length.
- T Tail Length. With tail bent up at a right angle to the body, measured from the angle to the tip of the vertebra.
- HF Length of Hind Foot. From the posterior edge of the heel (calcaneum) to the end of the longest claw. Unless otherwise indicated by "su", all Hind Foot measurements presented in this paper include the claw, "cu".
- E Length of Ear. From notch to tip.
- Tr Length of Tragus. From base to tip.
- FA Length of Forearm. From elbow to wrist, including wrist bones, with wing folded.
- D4 P1 Length of First Phalanx of Fourth Manual Digit.
- D4 P2 Length of Second Phalanx of Fourth Manual Digit.
- 3 Met Length of Metacarpal of the Third Manual Digit.
- 5 Met Length of Metacarpal of the Fifth Manual Digit.
- HW Width of Horseshoe. Measured at widest point.

- GL Greatest Length of skull. Self-explanatory.
- CBL Condylbasal Length. From anterior edge of incisive alveoli to posterior projection of the occipital condyles.
- CCL Condylcanine Length. From the anterior edge of the canine alveoli to the posterior projection of the occipital condyles.
- ZW Zygomatic Width. Greatest width across the outsides of the zygomatic arches.
- BB Breadth of Braincase. Measured just behind the posterior root of the zygomatic arch.
- PO Postorbital width. Least width across the postorbital constriction.
- IO Interorbital Width. Least width across the constriction between the orbits.
- C-M³ Maxillary Tooth Row. From the anterior edge of the canine alveolus to posterior edge of alveolus of the last molar.
- M³-M³ Palate width at M³. Distance between the inner edges of the alveoli of the last molars.
- C-M₃ Mandibular Tooth Row. From the anterior edge of the canine alveolus to the posterior edge of the alveolus of the last molar.
- ML Greatest Length of Mandible. Self-explanatory.
- TBL Greatest Length of Tympanic Bullae. Self-explanatory.

The following abbreviations are used to designate mammal collections which serve as repositories for Iranian specimens or for comparative material utilized in this study.

- BM British Museum (Natural History), London, England

DLH	D. L. Harrison, personal collections, Sevenoaks, Kent, England
FMNH	Field Museum of Natural History, Chicago, Illinois
NMV	Naturhistorisches Museum, Vienna, Austria
OSU	Oklahoma State University Museum, Stillwater, Oklahoma
SMNS	Staatlichen Museum für Naturkunde, Stuttgart, Germany
UIM	University of Illinois Museum, Urbana, Illinois
UMM	University of Michigan Museum, Ann Arbor, Michigan
USNM	U. S. National Museum, Washington, D. C.
ZMAS	Zoological Museum, Academy of Science, Moscow, USSR

Place Names

There is no standardized method for transliterating the Iranian language (known as Farsi) into the alphabet used by English-speaking peoples. There are many ways of spelling place names which will result in nearly identical pronunciations. For example, Qazvin, a town west of Tehran, has variously been spelled Qazvin, Kazvin, Gazvin, Qazveen, Gazveen, etc. I have accepted the Gazetteer included in Lay (1967: 243-61) as the first authority on "proper" spelling of the Iranian place names used in this volume. For names not listed by Lay, spellings in the Geographic Names Gazetteer 19, Iran (1956) published by the U. S. Government Printing Office, Washington, D. C. are accepted. This volume was also used as the primary authority by Lay (1967) in the preparation of his Gazetteer. For names not found in Lay or Gazetteer 19, spellings are used in the following order of preference: as they appear on U. S. Army Service maps, Iran-Iraq K501 Series 1:253,440 (1941) or K502 Series 1:250,000 (1951); as they appear in the original publication; as they appear on the Iran Highway Map, 5th Ed.

1967, published by the Ministry of Roads, Tehran, Iran; as they appear on bilingual (English and Farsi) highway signs in Iran, or as they sounded to the ears of the Expedition personnel when pronounced by natives.

All Iranian place names in this paper are spelled according to the above criteria except in the section titled PREVIOUS RECORDS. There each place name is spelled as it appeared in the original publication. If this differs in spelling (but not if it differs only in capitalization or punctuation) from the name accepted by the above authorities, the "correct" spelling is given in parentheses, e. g., Kazvin (=Qazvin), Urmiah (=Rezaiyeh). This same notation is used for "incorrect" spellings and outdated names in direct quotes.

Non-Iranian place names are spelled as they appear in the Times Atlas Comprehensive Edition (1967).

Provincial Boundaries

The internal political subdivision of Iran has changed frequently and no two maps seem to agree on the organization of provinces within the country. While it may be argued that such flexible boundaries tend to confuse rather than clarify a volume such as this, I feel that they do provide assistance to the person who is not familiar with the names of all Iranian towns and enable one immediately to place a site in the proper region within the country. Lay (1967:14-15, 245) listed province boundaries based upon a map published by the Iranian Information Center, New York, in about 1960. At the time of our visit in 1968, the provincial organization of Iran was already very different from that used by Lay. I have adopted the provincial boundaries given on

the Iran Highway Map, 5th Ed. 1967, Ministry of Roads, Tehran, Iran, for use in this volume (Fig. 41, Appendix B). All provincial designations given below correspond to the boundaries given on the 1967 map, but the spelling of provincial names follows the same authorities mentioned above for other Iranian place names.

Range Maps

Range maps (Figs. 4 to 9, 12, 14 to 39) in this volume show all records of each species from Iran. Question marks indicate specimens for which the precise locality is unknown or, in a few cases, those which are of undetermined taxonomic status. Solid figures represent specimens reported previously. Open figures represent specimens collected by the 1968 Street Expedition or specimens otherwise unreported in the literature. Specimen records from the area surrounding Iran are provided to indicate distribution patterns. Sources for these extralimital records are those listed in the World Range section for each species.

CHAPTER II

THE LAND OF IRAN

Iran, the largest country in southwest Asia, covers an area of approximately 628,000 square miles from 25°N to 40°N latitude and from 44°E to 63°E longitude (Fig. 1). It is about three times the size of France or roughly equal in area to the USA east of the Mississippi River.

The Iranian nation, formerly known as Persia, is bounded on the south by the Gulf of Oman and the Persian Gulf. Between these two gulfs, at the Strait of Hormoz, it is less than 60 km from Iran to the tip of the Arabian Peninsula. On the Peninsula across the gulf from Iran are Oman, Saudi Arabia, Kuwait and several lesser sheikdoms. To the west Iran borders on Iraq and Turkey. To the north lie the USSR and the Caspian Sea with Armenia SSR and Azarbaijan SSR bordering Iran west of the Caspian and Turkmeniya SSR sharing the frontier east of the Caspian. On the east lie Afghanistan and West Pakistan.

Several names which frequently appear in the literature refer to areas which extend into Iran but have no distinct political boundaries (Fig. 2). Mesopotamia is the area of the ancient civilizations of the fertile crescent. The Khuzistan Plain represents Mesopotamia in Iran. Kurdistan is the area of the Zagros Mountains inhabited by the Kurdish people and is today divided among three nations, Iran, Iraq, and Turkey. Armenia is also an ancient nation which is today incorporated

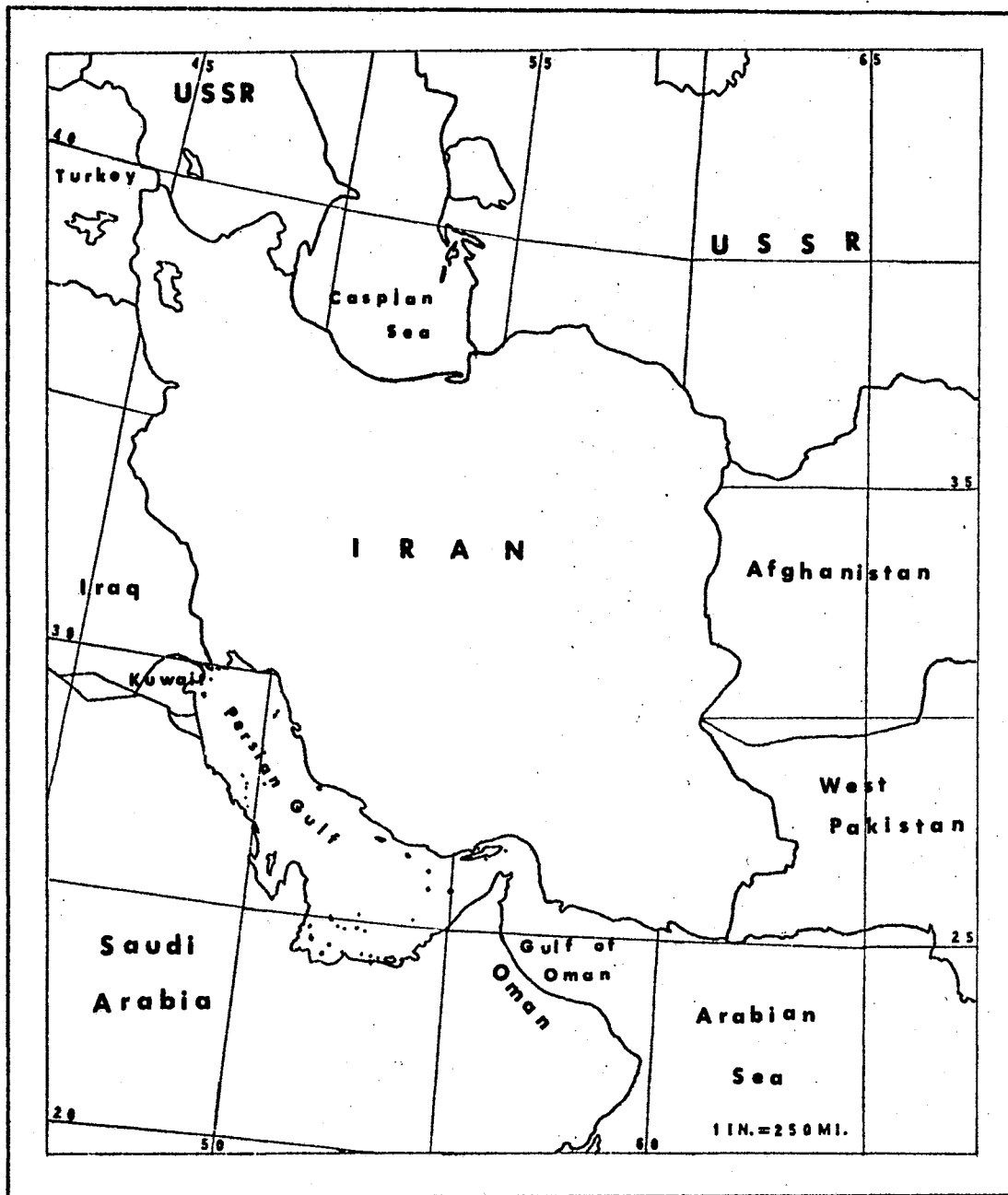


Figure 1. Iran and Adjacent Nations

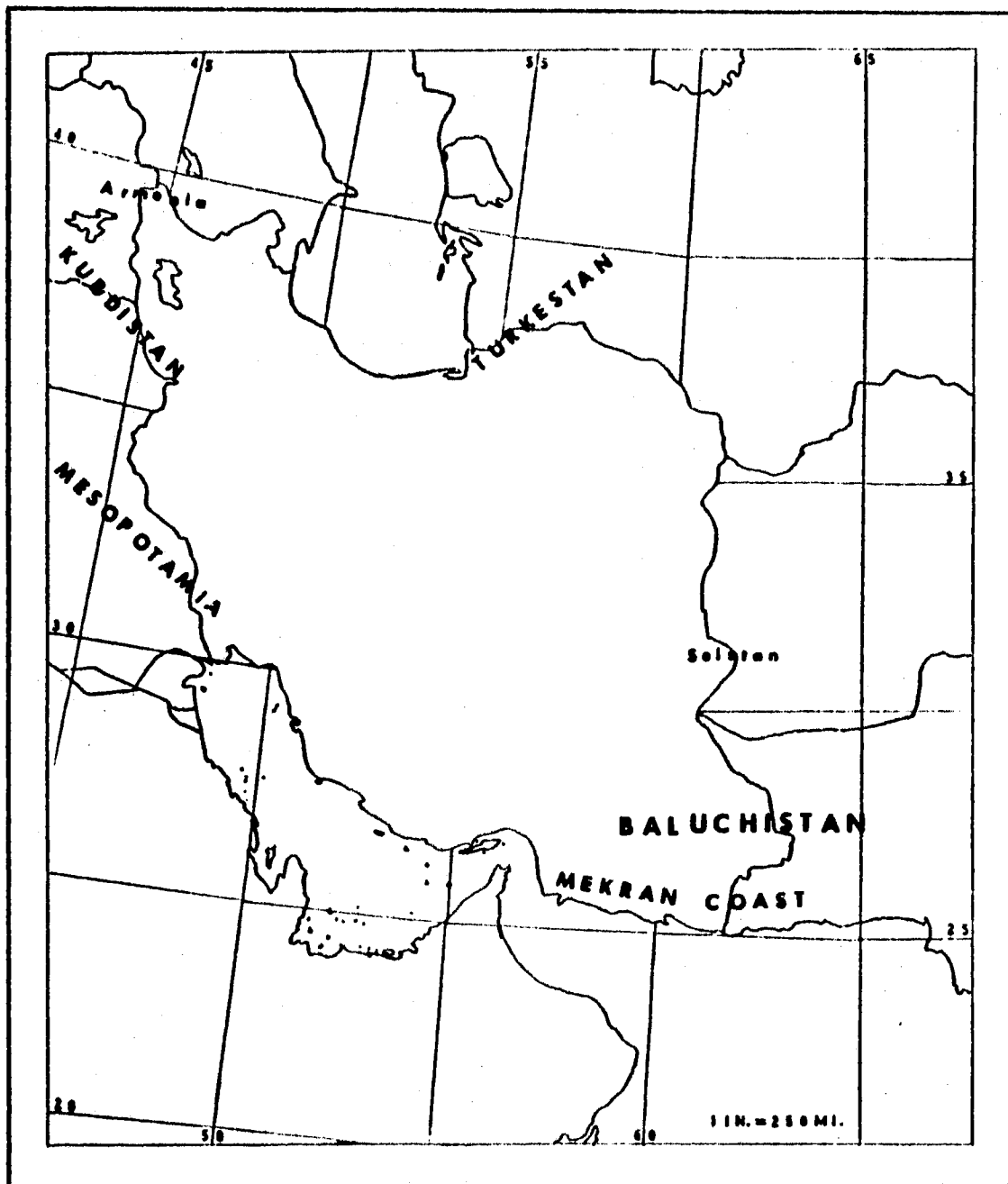


Figure 2. Regions Extending into Iran which lack Distinct Political Boundaries

into three nations, Iran, Turkey, and the USSR. Turkestan is a general term for the central Asian steppes and, in Iran, is represented only by the Turkmen Steppe. Seistan refers to the Seistan Basin and primarily the area around Seistan Lake. Today Seistan lies partly in Iran and partly in Afghanistan. Baluchistan is the extensive, rugged desert area of southeastern Iran and western West Pakistan. The Mekran coast is the old name for the coastal strip along the Mekran Range in the two last-named countries.

Several recent authors have dealt with Iran as a geographical unit. Misonne (1959), Lay (1967) and Womochel (unpublished manuscript) have described the physiography, climate and vegetation of Iran as these relate to mammalian distribution. Of a more comprehensive nature, The Cambridge History of Iran, Volume I: The Land of Iran (1968, 783 pp.) edited by W. B. Fisher, presents detailed accounts of the physical geography, geology, climate, soils, hydrography, vegetation, etc., of this country. I will present here only a brief sketch of the physiography, climate and vegetation.

Physiography

Iran occupies the western two-thirds of the Iranian Plateau, a geographic unit which arises in the Armenian Knot at the east end of the Anatolian Plateau of Turkey, expands southward to include most of Iran, Afghanistan, and West Pakistan, and constricts again at the Pamir Knot at the west edge of the Tibetan Plateau. To the south the Iranian Plateau is bordered from east to west by the Indus valley, the Arabian Sea, the Gulf of Oman, the Persian Gulf and the Mesopotamian Plain. To the north it is bordered by the Caucasus Mountains (sometimes

considered a portion of the Iranian Plateau), the Caspian Sea and the steppes of central Russia. The Plateau consists of series of mountain ranges on the periphery and several basins in the interior. The major physiographic features of Iran are shown in Figure 3.

The Zagros Mountains extend diagonally from Mt. Ararat in eastern Turkey (just across the extreme northeast border of Iran), south and east to the vicinity of the Strait of Hormoz. In the north these mountains are primarily fault blocks and Mt. Ararat in Turkey and Mt. Sabalan in northwest Iran are two principal volcanic cones in this area. Farther south the Zagros become a series of parallel folds which together range up to 322 km. in width (Lay 1967:13). Kuh Rang, at 4551 m. one of Iran's highest peaks, is in this folded area. Still farther south the ridges decrease in height but elevations of 3046 m. and above are still common (Lay 1967:13). The Mekran Range extends from the south end of the Zagros system (and is considered a portion of it by some authors) and continues east through Iranian and Pakistani Baluchistan to the Indus valley. The Mekran Range is lower in elevation than the Zagros and is much more dissected.

The Elburz Mountains arise in northwestern Iran and arc around the southern end of the Caspian Sea. Mt. Demavend, at 5784 m., Iran's highest peak, lies near the center of this system. East of the Caspian the Kopet Dagh mountains cross the border from Russian Turkistan, join the Elburz and extend east to the Afghanistan border. The Eastern Ranges are a series of small mountain ranges which run from north to south in eastern Iran and separate the two major basins on the Iranian Plateau.

The Iranian Basin is a large, roughly triangular depression

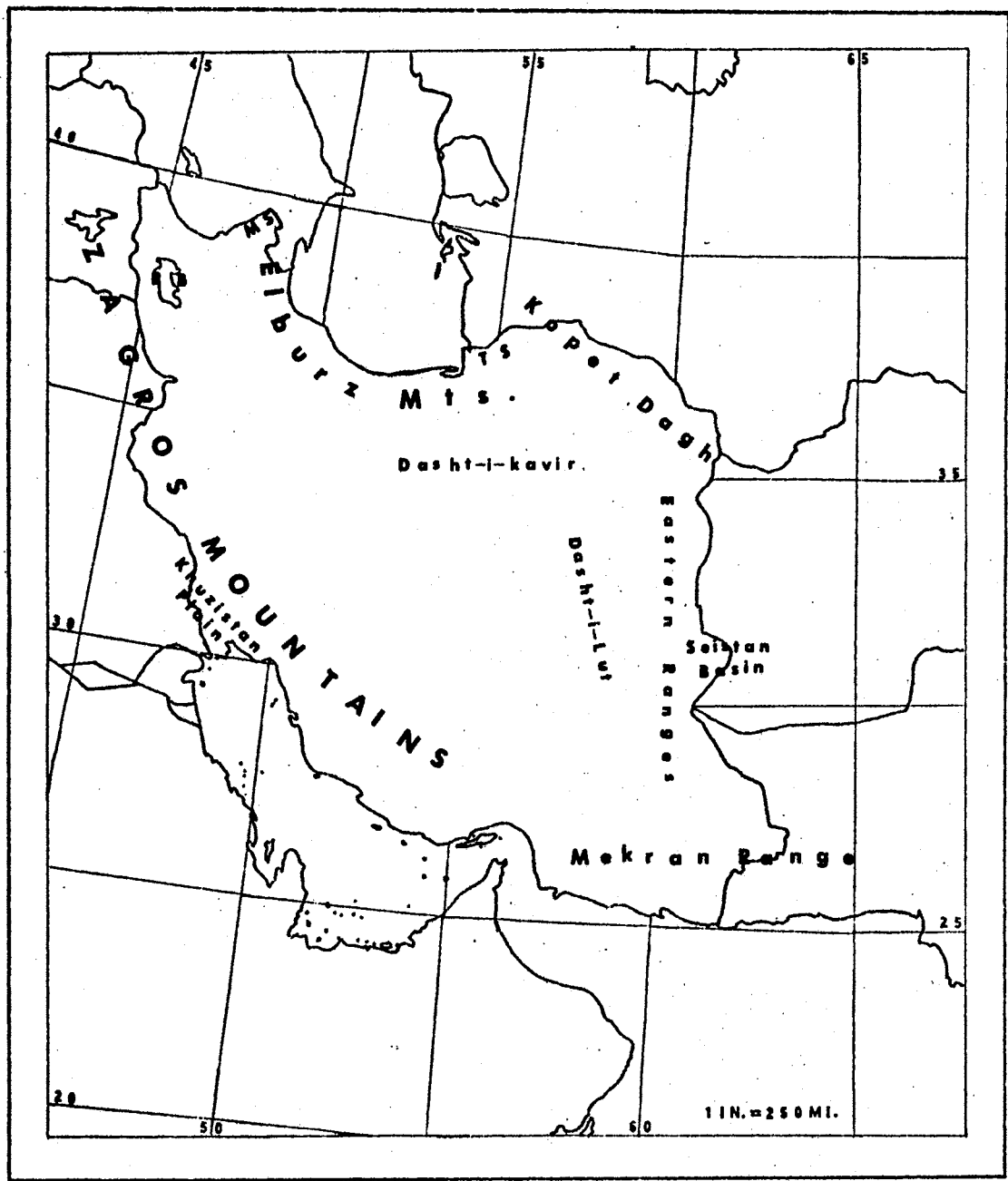


Figure 3. Major Physiographic Features of Iran

- RB = Rezaiyeh Basin
- MS = Mogan Steppe
- TS = Turkmen Steppe

flanked by the mountain ranges listed above. Within it are the two large central deserts of Iran. The Dasht-i-Kavir, the northernmost of the two deserts, is an extensive area of salt flats and pebble pavement. The Dasht-i-Lut, the southern desert, contains extensive areas of windblown sand. The Seistan Basin lies eastward of the Eastern Ranges, mostly in Afghanistan, and within the basin Seistan Lake straddles the Iran-Afghanistan border. The Rezaiyeh Basin lies in northwestern Iran in the Zagros Mountains. It is considerably smaller than either the Iranian or Seistan Basin, but it contains Lake Rezaiyeh (formerly Lake Urmiah), the largest lake in Iran.

The Khuzistan Plain, the only extensive lowland area within the political boundaries of Iran, lies southwest of the Zagros Mountains at the head of the Persian Gulf. Geographically this area is a part of the Mesopotamian lowland. A narrow southern coastal plain extends from the Khuzistan Plain to West Pakistan between the Zagros Mountains and the Persian Gulf and between the Mekran Range and the Gulf of Oman. Several small islands, mainly in the Strait of Hormoz, are a part of the Iranian state.

The Caspian Coastal Plain is a narrow strip ranging from one to 20 miles in width and lying between the Caspian Sea and the Elburz Mountains. The present level of the Caspian Sea is about 85 feet below sea level and much of the Caspian Coastal Plain is also below sea level. The Turkmen Steppe is a small portion of the central Asian steppes which extends into Iran from across the Soviet border east of the Caspian, north of the Elburz and southwest of the Kopet Dagh. The Moghan Steppe, which penetrates into Iran for a short distance, is a portion of the Aras River valley in Soviet Azarbaijan.

Climate

The major feature in the climate of most of Iran may be summed up in one word: "dry." Only the northern slope of the Elburz Mountains, the adjacent Caspian Coastal Plain, and some of the highest peaks in the Zagros Mountains receive a mean annual precipitation of 600 mm. or more. On the Caspian coast this average ranges up to 1800 mm. per year. In general the northern and western portions of the country receive considerably more precipitation than those in the south and east. The average in the central Zagros ranges from 400 to 800 mm. per year; most of the areas of the northern and southern Zagros and the southern slope of the Elburz receive between 200 and 400 mm. of precipitation per year. The remaining areas receive an average of less than 200 mm.

Only the Caspian coast and northern slope of the Elburz receive a significant amount of precipitation during the summer. Most of the rest of the country has essentially no rainfall during the summer months and most precipitation occurs during the winter.

Iran can be divided into five zones on the basis of temperature. The northern slope of the Elburz Mountains, the Caspian Coastal Plain and the Turkmen Steppe are characterized by a low annual temperature range, with relatively cool summers and relatively warm winters. The Khuzistan Plain and southern coastal strip have the highest temperatures, with both the January and July means ranging from 4° to 10° C above the other areas. The Zagros Mountains and northwestern Iran have a very low January mean and the August highs are much lower than those of other regions. The southern slope of the Elburz Mountains and most

of northeastern Iran have temperatures similar to the Zagros Mountains, but have hotter summers and a wider annual temperature range. The central deserts and the Baluchistan area have the greatest range of temperature and except for the Khuzistan Plain and southern coast, the hottest July averages.

The climatic data is based upon Ganji (1968).

Vegetation

As is indicated by the preceding information on climate, the major feature of the Iranian habitat is aridity; therefore, forests are found only in a few restricted areas. The northern slopes of the Elburz Mountains and the Caspian Coastal Plain have a lush deciduous forest. Throughout the northern two-thirds of the Zagros Mountains, scattered remnants of stunted oak forests provide evidence that these mountains once were completely forested. However, except in the most inaccessible regions, centuries of disturbance by humans and their domestic animals have reduced these forests to scattered remnants. A second type of dry forest, the pistachio-almond-maple forest, once covered the more elevated portions of the interior, particularly along the southern slope of the Elburz and the eastern slope of the Zagros. Today, however, most of this forest is gone except in the southern Zagros and eastern Elburz. Thin stands of pistachio and almond still occur on some higher elevations scattered through the interior. Most of the interior of Iran varies from Artemisia steppe through various steppe and desert complexes to expanses of completely barren ground.

In sheltered valleys in the Zagros and on the southern slope of the Elburz, and along major rivers near the mountains in the interior,

riparian forests of maple, elm, walnut, mulberry, plum, and several other deciduous species may be found.

In the southern part of the country the vegetation is more similar to that of the Sahara and India and includes species such as the kunar tree and the dwarf palm. In this area riparian vegetation is primarily tamarisk, myrtle and oleander. Mangrove forests occur in small patches along the southern coast, particularly in the areas of the Strait of Hormoz.

The above information on vegetation is based upon Bobek (1968).

CHAPTER III

THE FAMILY PTEROPIDAE

The family Pteropidae is the only family in the suborder Megachiroptera, the fruit bats or flying foxes. These bats are characterized by generally large size, a simple ear in which the inner margin of the pinna forms a complete ring, large eyes, a vestigial tail and a very short uropatagium. The second finger retains three phalanges and is clawed in most species. The skull has a long rostrum and a well-developed postorbital process.

Only one genus, Rousettus Gray, 1821, occurs in Iran and is represented by a single genus.

Rousettus aegyptiacus Geoffroy, 1810

TYPE DESCRIPTION: Pteropus aegyptiacus Geoffroy, 1810. Ann. Mus. Nat. Hist. Paris, 15:96 (misprint), corrected to aegyptiacus in 1818. Description de l'Egypte, H. N. 2:134, pl. 3, fig. 2. TYPE LOCALITY: Great Pyramid, Giza, Egypt. TYPE SPECIMEN: Based by Geoffroy on "Plusieurs individus." According to Anderson (1912:31), in 1912 only one of these was in the Paris Museum. This was "an adult male, mounted, in bad condition, much faded, skull in situ; labelled 'Egypt' (reg. no. A. 69)."

Identification

The southwest Asian fruit bat is easily distinguished from all other Iranian species by its larger size (FA 82 to 92 mm; CBL 36.1 to 39.9 mm) and its reduced tail (10 to 16 mm) and uropatagium.

Tapozous nudiventris, the only Iranian bat which approaches Rousettus aegyptiacus in size, has a well-developed tail (27 to 43 mm) and uropatagium. The dental formula of Rousettus is I 2/2 C 1/1 P 3/3 M 2/3 = 34.

World Range

This species is widely distributed in Africa from Cape Province northwards to Senegal in the west and Egypt in the northeast (Hayman 1967:20). On the Arabian Peninsula it ranges along the Mediterranean coast from southern Turkey into Israel and has been collected from Aden, the Hadramaut and Muscat (Harrison 1964:50-51). It also occurs on the island of Cyprus in the Mediterranean (Bate 1903:341). To the east of Iran it has been reported from three localities in West Pakistan (Siddiqi 1969:6).

Iran Distribution

PREVIOUS RECORDS: In Iran R. aegyptiacus has been reported from Namakdun on the island of Kishm (=Qeshm), Kerman Province (Blanford 1876:18-19); from 1.6 km W Jahrom and from Ahmad Mahmoudi, both in Fars Province (Lay 1967:131). Eisentraut (1959:229) also mentioned a specimen in the Stuttgart Museum from Baluchistan (no exact locality given), Iran. Etemad (1968:3) reported a sight record from "Tiss,

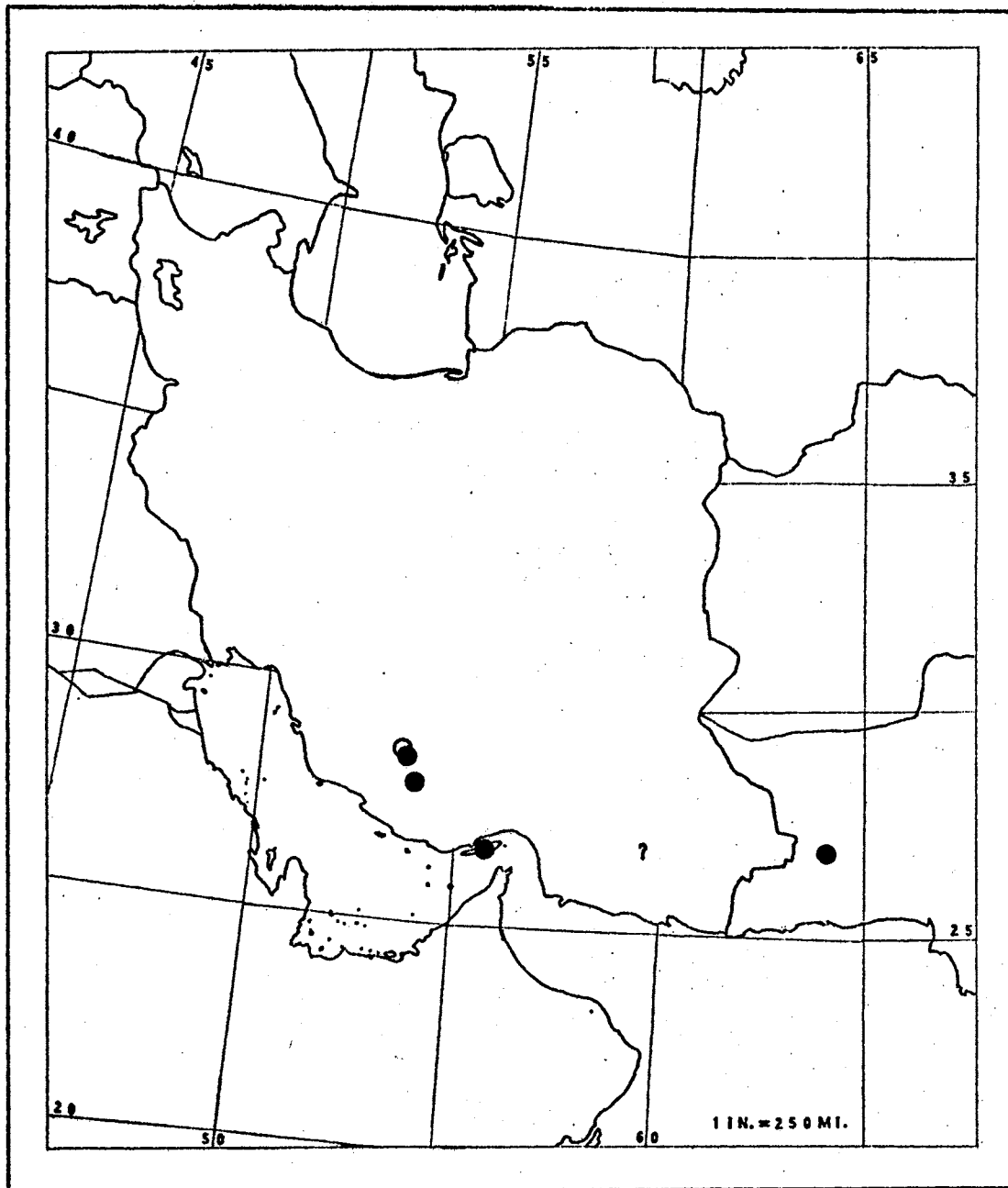


Figure 4. Distribution of Rousettus aegyptiacus

- = Previous reports
- ? = "Baluchistan, Iran" (no exact locality given)
- = 1968 Street Expedition specimen

Chahbahar, Baluchistan (coast of Oman Sea)," Seistan and Baluchistan Province.

NEW RECORDS: The 1968 Street Expedition collected a specimen from a cave 5.3 km WSW of Jahrom, Fars Province on 12 November 1968.

RANGE: The presence of this bat in southern Arabia and West Pakistan, together with the scattered records from southern Iran, indicates that it probably extends across southern Iran and occurs wherever dates and other tree-borne fruits are grown. It has not been reported from the Mesopotamian lowland of Iraq (Harrison 1964) and probably does not occur on the Khuzistan Plain of southwest Iran.

Subspecies

All Iranian specimens of R. aegyptiacus are referable to the form arabicus Anderson and de Winton, 1902. This subspecies occupies the eastern portion of the range of this species from Aden west through the southern Arabian Peninsula, southern Iran and West Pakistan.

Specimens Examined

I have examined 11 R. a. arabicus from Iran and three from West Pakistan as well as four R. a. aegyptiacus from Egypt and one from Lebanon.

CHAPTER IV

THE FAMILY RHINOPOMATIDAE

The mouse-tailed bats are the most primitive of the microchiropterans. The tail is very long and very slender. The short uropatagium encloses less than the basal third of the tail, the remainder of the tail is free. A simple, inconspicuous, triangular noseleaf is present. The ears are united across the forehead and the tragus is well developed. The second manual digit has two phalanges. The skull is conspicuously inflated in the nasal region and a distinct sagittal crest is usually present. The premaxillae have both a nasal and a small palatal branch but they are not fused to surrounding bone.

The family contains only a single genus, Rhinopoma Geoffroy, 1818. Three species occur in Iran.

Key to the Species of Rhinopomatidae of Iran

- 1 Larger, forearm greater than 60 mm; tail usually shorter than forearm; condylobasal length greater than 17 mm. Rhinopoma microphyllum
- 1' Smaller, forearm usually less than 60 mm; tail usually longer than forearm; condylobasal length less than 17 mm 2
- 2 Larger, forearm 52 to 60 mm; nasal inflations not projecting anteriorly over canines. . . . Rhinopoma hardwickei

TABLE I

MEASUREMENTS OF THREE SPECIES OF RHINOPOMA FROM MESHRAHEN, IRAN

Mea- sure	<u>R. microphyllum</u>	<u>R. hardwickei</u>	<u>R. muscatellum</u>
TL	114	132.1 (9) 121-141	127.5 (2) 127-128
HF	70	66.0 (9) 61-71	60.0 (2) 58-62
T	44	66.1 (9) 60-76	67.5 (2) 65-70
HF	14	13.4 (9) 12-14	13 (2) 13-13
E	19	20.0 (9) 18-22	20 (2) 20-20
FA	63	57.9 (9) 54-60	49.5 (2) 49-50
GL	19.5	17.4 (3) 17.1-17.5	16.1
CBL	18.6	16.2 (3) 15.7-16.7	15.2
ZW	11.2	10.2 (2) 9.9-10.5	
PO	2.7	2.6 (4) 2.4-2.8	2.2
C-M ³	7.0	6.0 (6) 5.7-6.8	5.6
C-M ₃	7.8	6.7 (6) 6.5-6.8	6.0
ML	14.0	12.1 (5) 11.8-12.4	11.0
TB	4.1	4.1 (4) 4.1-4.2	4.3

2' Smaller, forearm 41 to 52 mm; nasal inflations projecting anteriorly over and frequently beyond the canine alveolus. Rhinopoma muscatellum

Rhinopoma microphyllum Brünnich, 1782

TYPE DESCRIPTION: Vespertilio microphyllus Brünnich, 1782, Dyrenes Hist. 1:50 pl. 6, figs. 1-4. TYPE LOCALITY: Arabia and Egypt (Brünnich, 1782), a pyramid at Giza (Anderson and de Winton, 1902).
TYPE SPECIMEN: Copenhagen Museum.

Identification

Rhinopoma microphyllum is larger than the other species in most external and cranial measurements, however the tail is proportionately shorter and the bullae and nasal inflations of the skull are smaller.

World Range

In Africa R. microphyllum is known from Nigeria, Sudan and Egypt (Kock 1969:61). Harrison (1964:54) reported it only from Israel, Jordan and Lebanon on the Arabian Peninsula. To the east of Iran the species is known from Afghanistan (Gaisler 1970:6), West Pakistan (Siddiqi 1969:10) and India (Brosset 1962:31).

Iran Distribution

PREVIOUS RECORDS: Cheesman (1921:575) reported a female R. microphyllum from Telespid, Lurestan and Khuzistan Province. Lay (1967:134) collected a male at Ahmad Mahmoudi, Fars Province. Etemad (1969:4) said that a specimen from Shiraz, Fars Province which he had

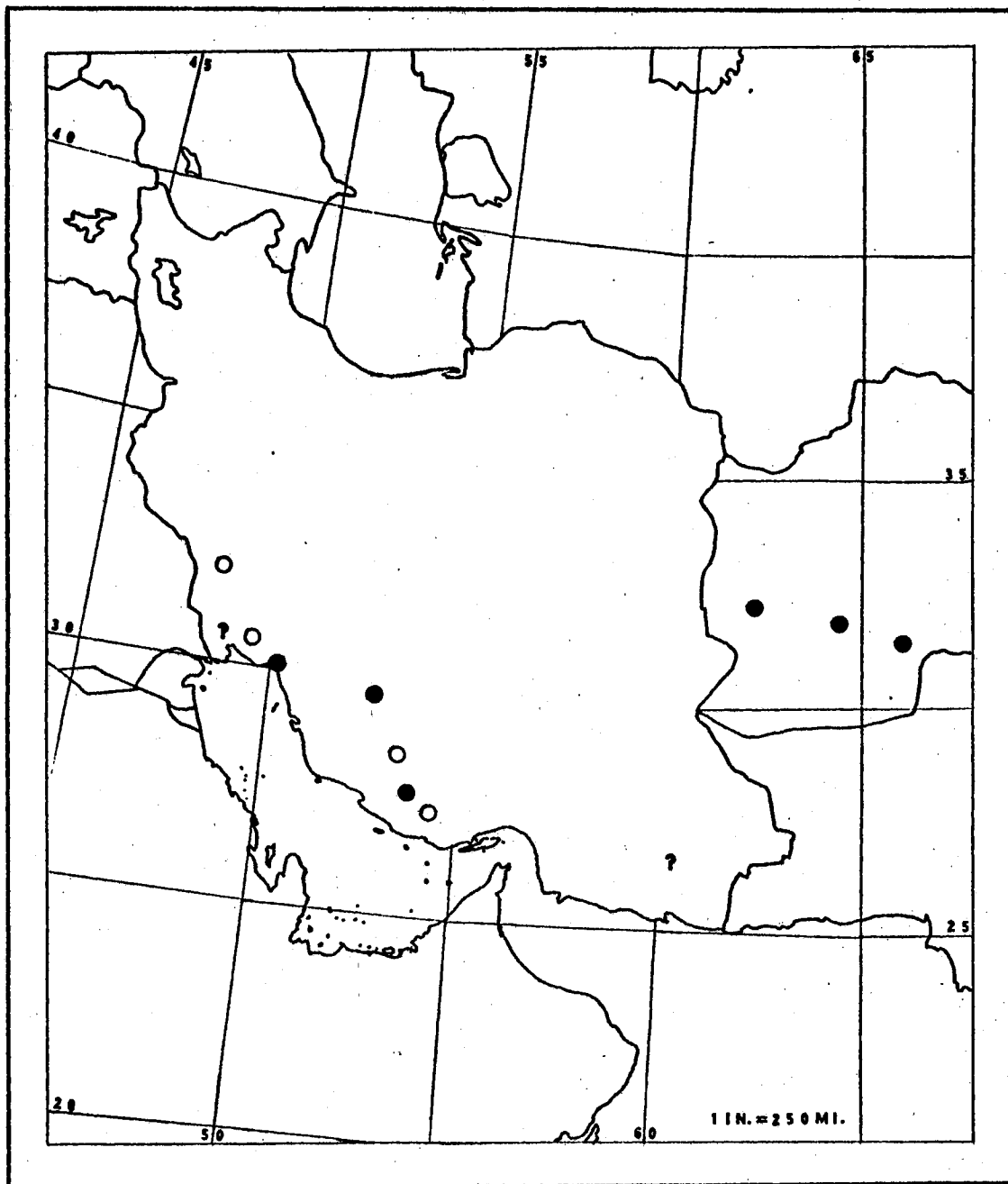


Figure 5. Distribution of *Rhinopoma microphyllum*

- = Previous records
- = 1968 Street Expedition specimens
- ? = "Misham, Persian Gulf" and "Ias Bela, Baluchistan," co-ordinates not found.

previously reported as R. hardwickei (Etemad 1967:775) is, in fact, R. microphyllum. Gaisler (1970:7) listed specimens from Misham, Persian Gulf and from Las Bela, Baluchistan in the collections of the British Museum.

NEW RECORDS: The 1968 Street Expedition collected four male R. microphyllum from Sarin Ab-Garma cave at Dehloran on 5 September and a single male shot at Meshrageh on the Jahari River about 85 km SW of Ahvaz on 22 October, both localities in Lurestan and Khuzistan Province. We also collected 32 specimens from Canae Gabru cave, near the village of Tar Divon about 65 km N of Jahrom on 10 November, and a single female from a small cave about 6 mi NW of Bastak on 20 November, both localities in Fars Province.

RANGE: The records for this species in Iran together with those from Afghanistan and West Pakistan indicate that R. microphyllum may be expected to occur throughout the Khuzistan Plain, along the southern coastal strip and throughout the arid mountains south and east from Shiraz. It may also occur in eastern Iran and in the central deserts.

Subspecies

Specimens of R. microphyllum from northern Egypt and from the Levant have been referred to the nominate form (Harrison 1964; Kock 1969) as have those from Afghanistan and West Pakistan (Gaisler 1970). Gaisler (1970:7) listed the specimens from Misham, Telespid and Las Bela as R. m. microphyllum. Kock (1969:61) included the Las Bela specimen as the nominate form on his map, however, he placed a question mark at the head of the Persian Gulf, the area from which the Misham

TABLE II
MEASUREMENTS OF RHINOPOMA MICROPHYLLUM FROM IRAN

Mea- sure	Dehloran	Meshrageh	Mishan	Telespid	Canae Gabru	Ahmad Mahmoudi	Bastak	Las Bela
TL	142.2 (4) 138-145	114		141	121.7 (32) 106-128	120	120	130
T	54 (4) 51-59	44		60	44.5 (32) 30-50	53	51	61
HF	16.5 (4) 16-17	14	14	15.5	15.9 (32) 15-17	15	14	16
E	22.2 (4) 21-23	19		22	20.2 (32) 18-21	20	21	21
FA	69.2 (4) 68-70	63	66.1	70.2	62.2 (32) 59-66	66	63	67.0
GL	20.6 (2) 20.4-20.7	19.5	19.7	19.0	19.7 (12) 19.1-20.2	19.5		19.6
GBL	19.8 (2) 19.6-19.9	18.6	18.4 (CCL)	18.8 (CCL)	18.8 (11) 18.3-19.4	18.2		
ZW	12.8 (2) 12.7-13.0	11.2	12.3	12.6	11.7 (9) 11.5-12.2	11.7		11.6
G-M ³	7.2 (2) 6.9-7.4	7.0	7.0	7.3	6.8 (12) 6.6-7.1	6.9		7.0
G-M ₃	8.3	7.8	8.1	8.1	7.9 (5) 7.6-8.1	7.8		8.0
ML	14.9	14.0	14.6	15.0	14.4 (5) 14.1-14.8	14.0		14.5

and Telespid specimens came.

Rhinopoma m. microphyllum is distinguished from the other three subspecies presently recognized, R. m. sumatrae, from Sumatra, R. m. kinneari from India, and R. m. tropicalia from Sudan and Nigeria, by its smaller size. The Iranian specimens all fall within the ranges of variation given for the nominate form by Kock (1969:56-57) and Gaisler (1970:78). However, the specimens from Dehloran and the one from Telespid are distinctly larger than those from the other Iranian locations, including the large series from Canae Gabru. It is possible that the smaller specimens represent an as yet undescribed form, but more material is needed before a decision can be made on its status.

Specimens Examined

I have examined 42 R. microphyllum from Iran, six from Egypt, 56 from Afghanistan, 20 from West Pakistan, five from India including the type of kinneari and one, the type of sumatrae, from Sumatra.

Rhinopoma hardwickei Gray, 1831

TYPE DESCRIPTION: Rhinopoma hardwickei Gray, 1831, Zool. Misc. 37. TYPE LOCALITY: India. TYPE SPECIMEN: Spirit specimen with extracted skull, male, British Museum, no catalog number on specimen.

Identification

Rhinopoma hardwickei may be distinguished from R. microphyllum by its smaller size, smaller sagittal crest and larger nasal inflations.

Ellerman and Morrison-Scott (1951:101) stated that "it is very difficult to believe that there are in reality four distinct species

of smaller Rhinopoma, and the smaller named species are here provisionally made representative races of the first-named hardwickei." Thus R. hardwickei Gray, 1831, R. cystops Thomas, 1903, R. muscatellum Thomas, 1903, and R. pusillum Thomas, 1920, have been regarded as representatives of the same species. I have, however, collected R. muscatellum together with typical R. hardwickei at two localities in Iran. Therefore, R. muscatellum Thomas, 1903 must be restored to full specific status.

The best characteristic for distinguishing between R. hardwickei and R. muscatellum is the size and shape of the nasal inflations. Those of R. muscatellum are larger and project conspicuously forward, extending over and frequently beyond the base of the canine. The nasal inflations of R. hardwickei are considerably smaller and do not project anteriorly over the canines. Where the two species have been found together R. muscatellum is distinctly smaller in cranial measurements but the differences are not as conspicuous in external measurements (Table I).

World Range

Rhinopoma hardwickei is known in Africa from central Kenya north to the Nile delta and from Mauritania and Morocco east to Eritrea and Somalia (Kock 1969:42). On the Arabian Peninsula this species is known from Iraq, the Levant, the Red Sea coast of Arabia and from the southwestern corner of the Peninsula (Harrison 1964:61). To the east of Iran R. hardwickei is known from eastern Afghanistan (Gaisler 1970), West Pakistan (Siddiqi 1969), and India (Brosset 1962). Ellerman and Morrison-Scott (1951:102) also listed Burma and lower Siam.

Iran Distribution

PREVIOUS RECORDS: Several Iranian specimens previously referred to this species are R. muscatellum. Thomas (1913:90) described R. muscatellum seianum from Seistan, Persia. Various authors have considered this to represent a form of hardwickei, but I agree with Thomas in allying seianum with muscatellum. Thomas (1920:25) described R. pusillum from Sib, southeastern Persia. This form is also allied with muscatellum. Wroughton (1920:316) cited a juvenile male from Ispid Lamin, Persian Baluchistan as Rhinopoma sp. and stated that "the specimen is too young for certain identification, all the more so that there are at least three species which may be represented in this locality." Both Lay (1967:132) and Etemad (1969:4) referred this ~~specimen~~ to R. hardwickei, but neither mentioned examining it or mentioned a reason for their identification.

Etemad (1967:275) reported specimens from Eshgeft-Raana cave, 5 km. north of Kazerun and from Shiraz, both Fars Province. Later he (Etemad 1969:4) stated that the Shiraz specimens were R. microphyllum, not R. hardwickei. In the 1969 paper he also reported collecting several R. hardwickei from a cave at Tiss, 9 km. north of Chahbahar, Baluchistan, Seistan and Baluchistan Province. Neither cranial nor external measurements for the Kazerun or Chahbahar specimens are presented in either of these papers. Both R. hardwickei and R. muscatellum have been found in the vicinity of Kazerun and it is impossible to tell which Etemad collected, if not both. Only R. muscatellum is known to date from Baluchistan, so I assume that Etemad's specimens are referable to this species.

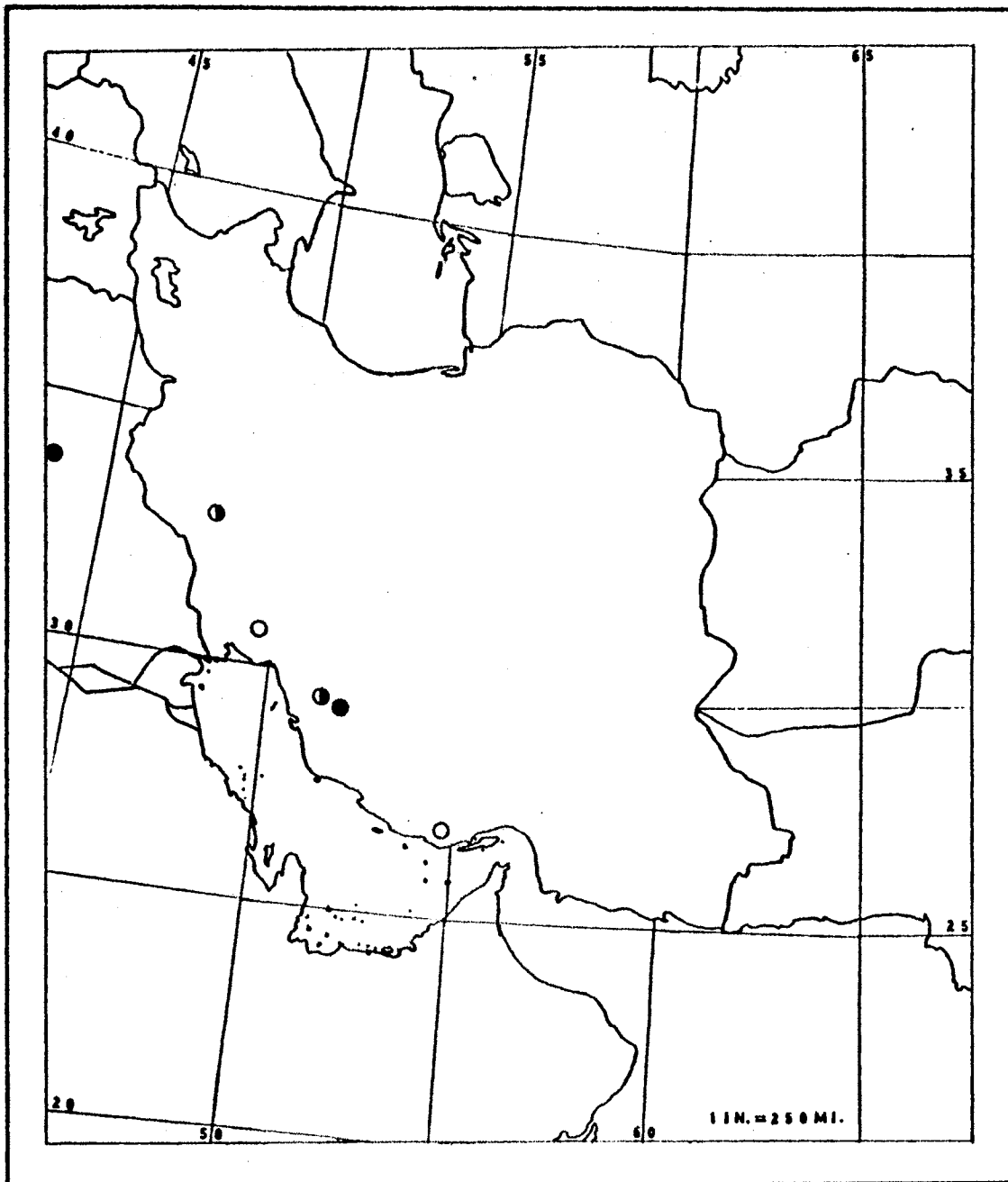


Figure 6. Distribution of Rhinopoma hardwicki

- o - Previous records
- Possible records
- 1968 Street Expedition specimens

Lay (1967:132) reported 22 specimens from Kuh-i-Khwaja, 29 km SW of Zabol, Seistan and Baluchistan Province, 15 from 4 km WSW of Jahrom, three from Ahmad Mahmoudi and three from Lake Famur, the latter three locations in Fars Province. Of these 43 specimens only the three from Lake Famur are properly referred to R. hardwickei. The remainder are R. muscatellum. Lay (1967:132) also reported two specimens from Besha Daraz (=Bisheh Deraz), Lurestan and Khuzistan Province in the collections of the British Museum and one from Baluchistan (no precise locality) in the collections of the Stuttgart Museum. I have examined the latter specimen and have found it to be R. muscatellum. I have not seen the other two specimens and these may be either R. hardwickei or R. muscatellum.

NEW RECORDS: The 1968 Street Expedition shot nine R. hardwickei as they flew over the Jahari River at Meshrageh, about 85 km. SW of Ahvaz, Lurestan and Khuzistan Province. This is the only locality from which all three species of Rhinopoma have been collected. We also collected five R. hardwickei from a cave about 6 mi. E of Chah Moslem, Fars Province.

RANGE: Rhinopoma hardwickei is definitely known from only three locations in Iran: Lake Famur, and Chah Moslem, in Fars Province and Meshrageh on the Khuzistan Plain. Two other collections, those from Kazerun and Bisheh Deraz, may include R. hardwickei. All five of these localities are in southwestern Iran. This species is probably restricted to the Khuzistan Plain, the southern coastal strip and the adjacent, relatively low-lying, mountains. If seianum is correctly referred to R. muscatellum, a considerable hiatus is left between the easternmost R. hardwickei in Iran (Chah Moslem) and the westernmost

TABLE III
 MEASUREMENTS OF RHINOPOMA HARDWICKEI FROM IRAN

Mea- sure	Meshrageh	Lake Famur	Chah Moslem
TL	132.1 (9) 121-141	116.5 (2) 110-123	118.0 (5) 112-123
T	66.1 (9) 60-75	56.5 (2) 55-58	57.2 (5) 52-61
HF	13.4 (9) 12-14	12.7 (3) 12-13	12.0 (5) 12-12
E	20.0 (9) 18-22	19.3 (3) 19-20	19.0 (5) 19-19
FA	57.9 (9) 54-60	54.3 (3) 48-59	51.3 (4) 51-52
GL	17.4 (3) 17.1-17.5	16.9	18.2
CBL	16.2 (3) 15.7-16.7	15.9	16.9
ZW	10.2 (2) 9.9-10.5	9.6 (2) 9.3-9.9	10.9
C-M ³	6.0 (6) 5.7-6.1	5.7 (2) 5.6-5.9	6.3
C-M ₃	6.7 (6) 6.5-6.8	6.5 (2) 6.4-6.6	6.2
ML	12.1 (5) 11.8-12.4	11.6 (2) 11.2-12.0	11.3

records of R. h. hardwickei in eastern West Pakistan.

Subspecies

The specimens of R. hardwickei from Meshrageh, Lake Famur and Chah Moslem are indistinguishable in size and structure from the specimens of this species from Israel and northern Egypt which I have examined. Harrison (1964:56) considered R. h. cystops Thomas, 1903 and R. h. arabium Thomas, 1913 to be synonymous and used the older name for the specimens from the Arabian Peninsula. Kock (1969:42) considered cystops, from lower Egypt, to be distinct from arabium. However, he resurrected the name Rhinopoma sennaariense Fitzinger, 1866, previously considered to be a nomen nudum for R. microphyllum, and placed this name in synonymy with R. h. arabium. Kock (1969:42) mapped specimens from the periphery of the Sahara Desert and from the western portion of the Arabian Peninsula as R. h. sennaariense. I follow Kock in referring the Iranian R. hardwickei to R. h. sennaariense.

Specimens Examined

I have examined 17 R. hardwickei from Iran, four from Israel, eight from Arabia, five from northern Egypt, two from southern Egypt, three from French Niger, six from eastern Afghanistan, two from West Pakistan, and 12 from India. I have also examined the type specimens of R. hardwickei, R. cystops, R. cystops arabium, and R. cystops macinnesi.

Rhinopoma muscatellum Thomas, 1903

TYPE DESCRIPTION: Rhinopoma muscatellum Thomas, 1903. Ann. Mag.

Nat. Hist. 11:498. TYPE LOCALITY: Wadi Bani Ruha, Muscat, Oman.

TYPE SPECIMEN. British Museum 94.3.9.17, a male in spirit with skull extracted.

Identification

Rhinopoma muscatellum includes the smallest of this genus. The nasal inflations are large and project anteriorly over, and frequently beyond, the base of the upper canine. For a more detailed discussion of the relationships between R. muscatellum and R. hardwickei, see the Identification section of the preceding species.

World Range

Rhinopoma muscatellum is known from Oman (Harrison 1964), southern Iran and western Afghanistan. It very likely occurs in western West Pakistan as well.

Iran Distribution

PREVIOUS RECORDS: Thomas (1913:90) described R. muscatellum seianum from Seistan, Persia and described R. pusillum (Thomas 1920:25) from Sib, Baluchistan. Both of these locations are in Seistan and Baluchistan Province and both types are referable to the species muscatellum. The juvenile specimen from Ispid Lamin, Baluchistan, reported by Wroughton (1920:316) as Rhinopoma sp. may be referable to R. muscatellum.

Specimens reported as R. hardwickei from Eshgeft-Raana cave, 5 km. N of Kazerun, Fars Province (Etemad 1967:275) may be R. muscatellum or may be the species originally designated. Specimens from a cave at

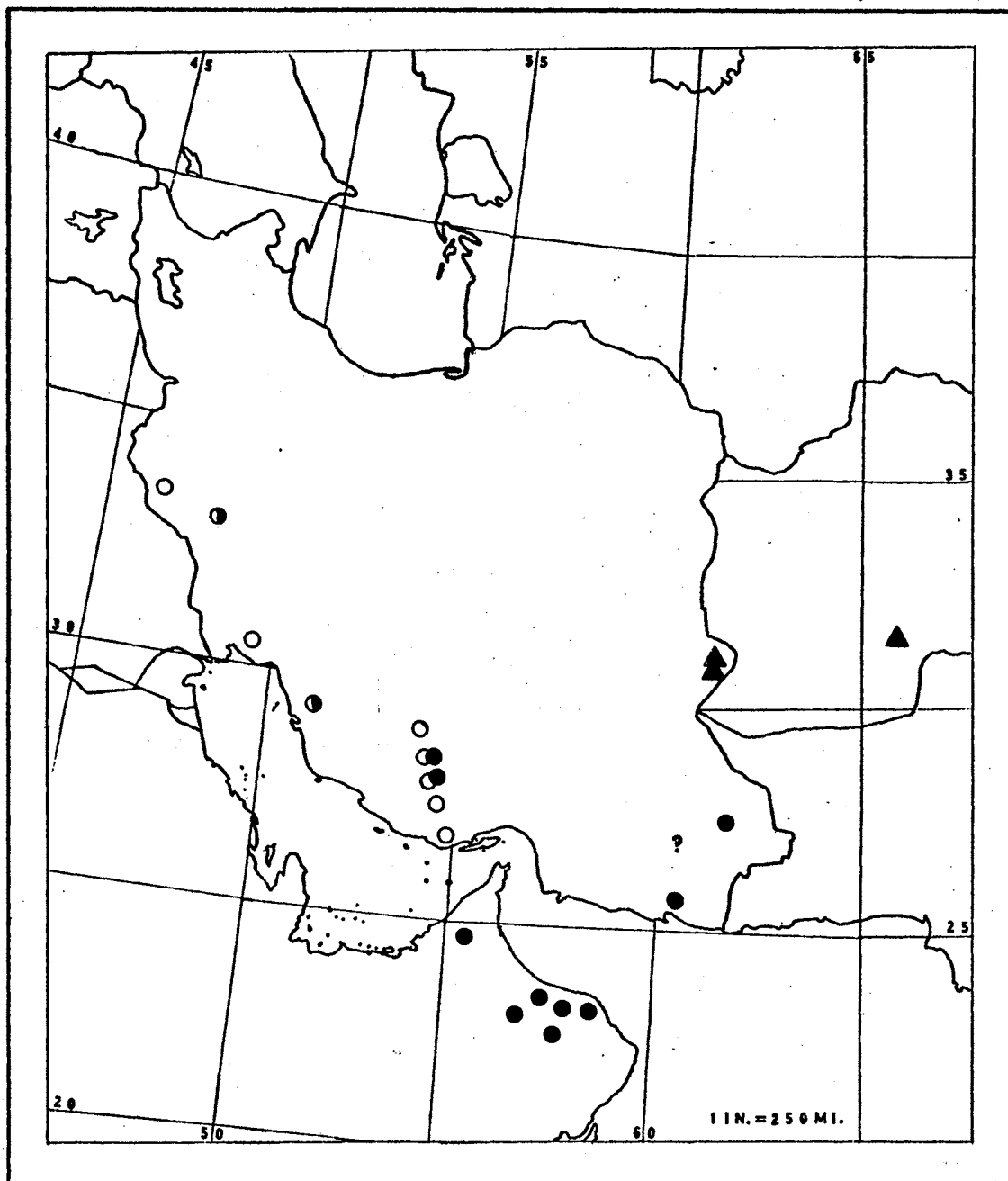


Figure 7. Distribution of Rhinopoma muscatellum

- = R. m. m., previously reported specimens.
- ◐ = R. m. m., possible records
- = R. m. m., 1968 Street Expedition specimens
- ▲ = R. m. m., "Baluchistan," no exact locality
- = R. m. s., previously reported specimens

Tiss, 9 km north of Chahbahar, Seistan and Baluchistan Province originally reported as R. hardwickei (Etemad 1968:9) are probably R. muscatellum (opinion based on location).

I have examined specimens from Kuh-i-Khwaja, 20 km SW of Zabol, and from Baluchistan (no exact locality) in Seistan and Baluchistan Province and specimens from 4 km WSW of Jahrom and from Ahmad Mahmoudi both in Fars Province, all of which Lay (1967:132) reported as R. hardwickei. I have determined these to be R. muscatellum.

I have not examined the British Museum specimens from Bisheh Deraz, Lurestan and Khuzistan Province which Lay (1967:132) reported as Rhinopoma hardwickei. These may be either that species or Rhinopoma muscatellum.

NEW RECORDS: The 1968 Street Expedition shot four R. muscatellum over a river about 39 mi S of Ilam, Kermanshahan Province and collected 10 more from a cave in the adjacent canyon wall. We shot two as they flew over the Jahari River at Meshrageh about 85 km SW of Ahvaz, Lurestan and Khuzistan Province, collected 11 from Canae Gabru cave, near the village of Tar Divon, about 40 mi N of Jahrom, seven in the vicinity of Bastak and five from a cave about 6 mi E of Chah Moslem. The last five localities are all in Fars Province.

RANGE: Rhinopoma muscatellum is known from several localities across the southern portion of Iran and probably occurs throughout the coastal lowlands and lower, more arid mountains and basins of the southern portion of that country.

TABLE IV
 MEASUREMENTS OF RHINOPOMA MUSCATELLUM FROM IRAN

Mea- sure	Ilam	Meshrageh	Fars Province ¹	Balu- chistan ²	Seistan ³
TL	115.1 (14) 100-128	127.5 (2) 127-128	113.8 (58) 96-131		110.3 (15) 102-124
T	59.3 (14) 51-67	67.5 (2) 65-70	55.8 (57) 43-67	54.0 (2) 51-57	52.1 (16) 49-63
HF	12.4 (14) 12-13	13 (2) 13-13	11.6 (59) 10-14	10.3 (2) 9.5-11	12.3 (16) 11-13
E	18.4 (14) 17-20	20 (2) 20-20	18.1 (59) 16-21	17	18.9 (16) 14-21
FA	45.4 (14) 44-51	49.5 (2) 49-50	49.1 (57) 44-53	48.6 (2) 46.9-50.3	49.4 (16) 46-53
GL	15.9 (5) 15.6-16.4	16.1	15.8 (27) 14.8-16.4	15.3 (2) 15.2-15.3	16.4 (6) 16.1-16.8
CBL	14.9 (5) 14.3-15.1	15.2	14.9 (27) 14.0-15.7	14.5 (2) 14.4-14.5	15.3 (6) 15.1-15.8
ZW	9.2 (4) 8.8-9.4		9.2 (25) 8.4-9.8	9.1	9.4 (10) 9.0-9.8
PO	2.3 (5) 2.0-2.5	2.2	2.3 (27) 2.0-2.4	2.3 (2) 2.1-2.3	2.3 (10) 2.0-2.5
C-M ³	5.3 (5) 5.1-5.4	5.6	5.4 (29) 5.0-5.7	5.4 (2) 5.2-5.5	5.6 (10) 5.3-5.8
C-M ₃	6.0 (5) 5.8-6.2	6.0	5.9 (29) 5.5-6.3	5.8 (2) 5.7-5.8	6.2 (7) 6.0-6.4
ML	10.7 (5) 10.3-11.1	11.0	10.9 (29) 10.2-11.5	10.8 (2) 10.6-10.9	11.0 (10) 10.5-11.4

¹ Includes five localities

² Includes type of pusillum and SMNS specimen

³ Includes type of seianum

Subspecies

Rhinopoma muscatellum from most of southern Iran are small (FA 41 to 52 mm; CBL 14.0 to 15.7 mm) and have tympanic bullae which are very large. In lateral view the bullae comprise about half of the total height of the skull. These specimens are indistinguishable from R. m. muscatellum from Oman. The specimens from Seistan are somewhat larger (FA 46 to 53 mm; CBL 15.1 to 15.8 mm) and have smaller bullae. In lateral view the bullae account for only about one-third of the total height of the skull.

The specimens from Seistan are R. m. seianum Thomas, 1913. All other Iranian R. muscatellum including the type of R. pusillum and the SMNS specimens from "Baluchistan" are referable to the nominate form R. m. muscatellum.

Specimens Examined

I have examined 93 R. muscatellum from Iran including the types of R. m. seianum and R. pusillum. I have also examined the type of R. muscatellum from Muscat, Oman and 43 R. muscatellum from western Afghanistan.

CHAPTER V

THE FAMILY EMBALLONURIDAE

The sheath-tailed bats are characterized by a tail which passes through the uropatagium for about half of its length then emerges through the dorsal surface of this membrane and lies unattached on top of it for the remainder of its length. There is no noseleaf, a tragus is present in the external ear, and the second finger has no phalanges. The postorbital processes of the skull are well-developed and the premaxillae are present only as nasal branches which are not fused to each other or to the maxilla.

One genus, Taphozous Geoffroy, 1818, occurs in Iran. The tomb bats may be distinguished from other Iranian chiropteran by the characters listed above for the family. The dental formula is $I\ 1/2\ C\ 1/1\ P\ 2/2\ M\ 3/3 = 38$.

Key to the Species of Emballonuridae in Iran

- 1 Larger, forearm greater than 70 mm, condylobasal length greater than 21 mm; lower abdomen, lower back, and base of uropatagium naked. . . . Taphozous nudiventris
- 1' Smaller, forearm less than 70 mm, condylobasal length less than 21 mm; fur extending onto base of uropatagium on both back and abdomen. . . Taphozous perforatus

Taphozous perforatus Geoffroy, 1818

TYPE DESCRIPTION: Taphozous perforatus Geoffroy, 1818, Description de l'Egypte, 2:162. TYPE LOCALITY: Egypt, restricted to Kom Ombo by Kock (1969:214). TYPE SPECIMEN: Paris Museum No. 372 (Anderson and de Winton 1902:138).

Identification

Bats of the genus Taphozous are easily distinguishable from all other forms known from Iran by the unique structure of the tail and uropatagium. Taphozous perforatus is distinguished from T. nudiventris by its smaller size and its fully haired abdomen. See Tables V and VI for measurements.

World Range

Taphozous perforatus occurs in West Africa from Senegal and Mauritania to Nigeria; in East Africa it ranges from Rhodesia north to the Nile delta (Kock 1969:81). It is known from Western Arabia (Harrison 1964:70) and was recently reported from Oman (Harrison 1968:323). To the east of Iran T. perforatus is reported from West Pakistan (Siddiqi 1969:7) and from Kutch, Kathiawar, and northern Gujarat in western India (Brosset 1962:34-35).

Iran Distribution

PREVIOUS RECORDS: Single specimens of Taphozous perforatus have been reported from Chah Moslem, about 57 km N of Bandar-e-Lengeh, Fars Province and from Minab, Kerman Province (DeBlase 1971). Both were

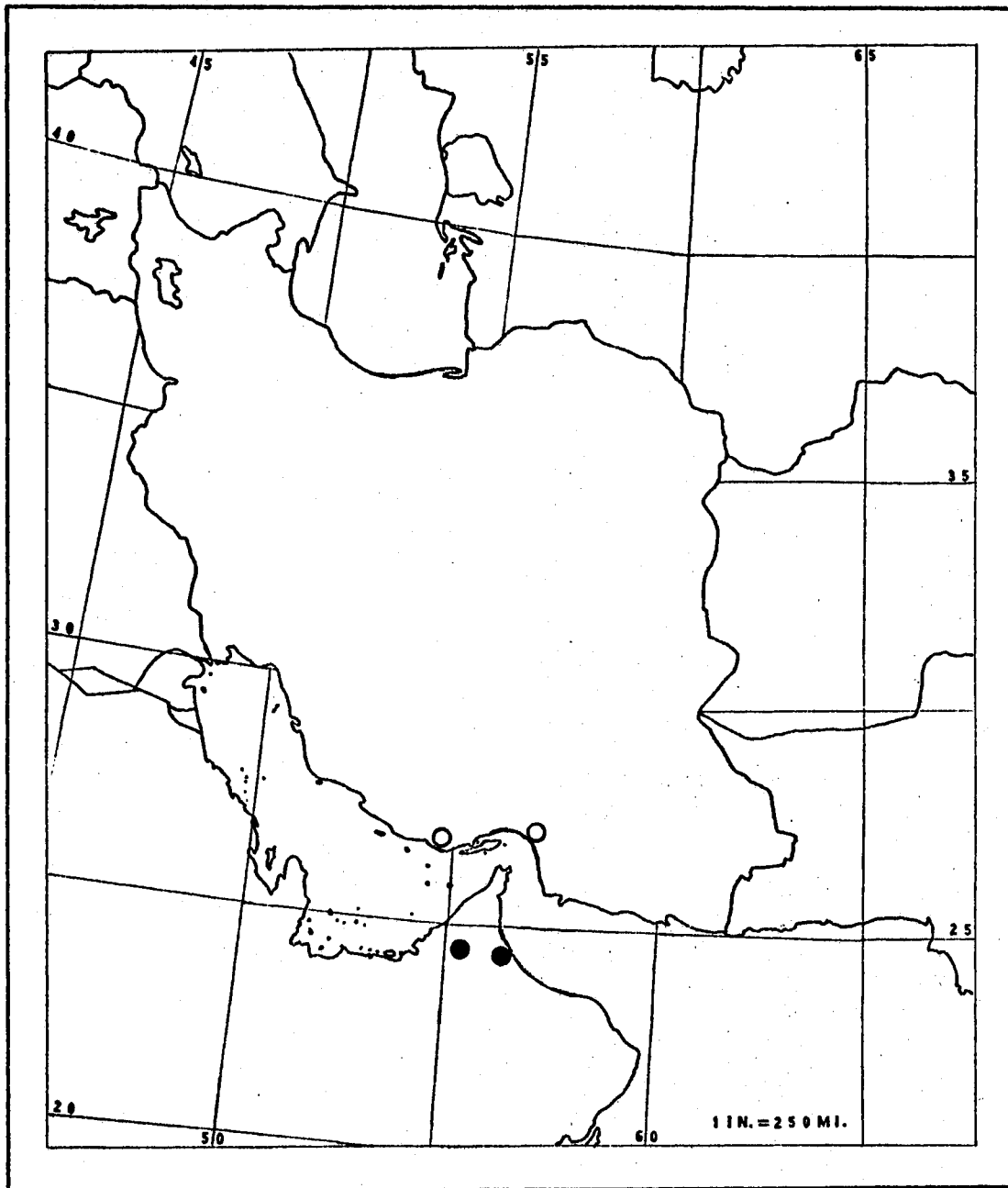


Figure 8. Distribution of *Taphozous perforatus*

- = 1968 Street Expedition specimens
- = Previous records

collected by the 1968 Street Expedition.

RANGE: The two localities above, both on the narrow, southern coastal strip, are the only Iranian records. However, in view of the world range of this species it is not unlikely that it ranges east along the Mekran Coast of Iran and West Pakistan and may extend along the Iranian coast west from Chah Moslem.

Subspecies

Only Taphezous p. perforatus is known from Iran. This subspecies also occurs in Egypt, Oman, West Pakistan and India. Harrison (1968: 323) described the specimens from Oman as distinctly paler in color than T. p. haedinus from southwest Arabia and hardly distinguishable in color from material from Sudan and Kutch. The Iranian specimens are also considerably paler than the T. p. haedinus specimens in the collection of the Field Museum.

The specimens from Iran are slightly larger than specimens from India, West Pakistan and Oman and in most measurements (Tables V and VI) fall within the range of specimens from Egypt. The two Iranian specimens differ significantly from others only in the size of the ear. Since the two were collected and prepared almost a week apart and since our ear measurements for other species do not differ significantly from those published by other authors, I must assume that the measurements on Table V are correct.

Taphezous p. perforatus is now reported from four rather widely spaced localities. Much more material from intervening areas will be needed before a clear picture of the subspecific assignment of the Iranian material is possible.

TABLE V
EXTERNAL MEASUREMENTS OF TAPHOZOUS PERFORATUS PERFORATUS

Mea- sure	Iran	Egypt ¹		Oman ²	West Pakistan ³	India ⁴
		Males	Females			
TL	103 (2) 103-103	101 (6) 99-102	102.3 (9) 101-106	93.5 (9) 87-97.8	98.0 (3) 93-101	
HB	80.0 (2) 78-82			69.3 (9) 58.5-78.3	74.7 (3) 71-77	
T	23 (2) 21-25	22.6 (6) 22-23	23.4 (9) 22-26	22.9 (9) 18.2-28	23.3 (3) 22-25	25.9 (8) 21-30
HF	13 (2) 13-13	14 (6) 14-14	13.6 (9) 13-15	11.2 (9) 10.2-12.1	11.3 (3) 11-12	
E	20 (2) 19-21	17.3 (6) 17-18	17.5 (9) 17-18	17.2 (9) 16.2-18.2	17.6 (3) 17-18	
Tr	5.5 (2) 5-6				5.5 (2) 5-6	
FA	63.4 (2) 62-64.5	64 (6) 63-65	64 (9) 63-66	60.7 (9) 58.9-61.8	62.6 (3) 61.5-64.0	60.8 (8) 59-63

¹ Setzer (1952:349)

² Harrison (1968:342); HF(su)

³ BM specimens, Nos. 60.254 to 256

⁴ Brosset (1962:33-34)

TABLE VI
CRANIAL MEASUREMENTS OF TAPHOZOUS PERFORATUS PERFORATUS

Measure	Iran	Egypt ¹		Oman ²	India ³
		Males	Females		
GL	20.7	20.3 (6) 20.1-20.6	20.1 (9) 19.8-20.3	20.2 (8) 19.7-20.5	20 (2) 20-20
CBL	19.3			18.9 (8) 18.2-19.2	
ZW	11.9	11.7 (6) 11.6-11.8	11.6 (9) 11.4-11.7	11.5 (7) 11.2-11.8	11 (2) 11-11
BB	10.4	9.5 (6) 9.3-9.7	9.3 (9) 9.0-9.5	9.0 (8) 8.9-9.3	
PC	4.4			4.1 (9) 3.9-4.3	
C-M ³	8.4	8.5 (6) 8.5-8.5	8.5 (9) 8.4-8.6	8.4 (9) 8.2-8.6	8 (2) 8-8
C-M ₃	9.6			9.2 (9) 9.1-9.4	10 (2) 10-10
ML	15.5			15.0 (9) 14.7-15.4	15.5 (2) 15-16

¹ Setzer (1952:349)

² Harrison (1968:342)

³ Brosset (1962:33-34)

Specimens Examined

I have examined two T. p. perforatus from Iran, 28 from Egypt, and three from West Pakistan, as well as numerous T. perforatus from Kenya and Uganda including the type of T. p. haedinus Thomas.

Taphozous nudiventris Cretzschmar, 1830 vel 1831

TYPE DESCRIPTION: Taphozous nudiventris Cretzschmar, 1830 vel 1831. IN: Senck. Naturf. Ges., Atlas Reise nördl. Afrika, Ruppell, Säugeth. 70, fig. 27b. TYPE LOCALITY: Giza, Egypt. TYPE SPECIMEN: Lectotype, Senckenberg-Museum Frankfurt no. 4310. Male "Gizeh Pyramiden" (Kock 1969:83).

Identification

The naked-bellied tomb bat is the largest microchiropteran reported from Iran (FA 77 to 85 mm). It may be distinguished from T. perforatus by its larger size (FA 62 to 65 mm in T. perforatus) and by its naked abdomen (fully furred in T. perforatus).

World Range

Taphozous nudiventris ranges from Mauritania and Portugese Guinea in West Africa to East Africa where it is found from Tanzania north to Egypt (Kock 1969:87). On the Arabian Peninsula it is recorded from Aden, the Hadramaut and Oman in the south, and from Israel, Jordan and Iraq in the north (Harrison 1964:66, 69). To the east of Iran this species is known from Afghanistan (Gaisler 1970:14), West Pakistan (Siddiqi 1969:7), and western and central India, Sikkim and Burma

(Brosset 1962:53). Chasen (1940) also reported it from the "Malay States" but Harrison (1966:115) "cannot find any details of their actual occurrence in Malaya."

Iran Distribution

PREVIOUS RECORDS: Taphozous nudiventris has been reported from Mohonmerah (=Khorramshahr), Lurestan and Khuzistan Province (Cabrera 1901:275); Varamin, 37 km SE of Tehran, Tehran Province (Etemad 1967:275) and from Basket Mountain, 26 km NE Rezaiyeh, West Azarbaijan Province (Lay 1967:134).

NEW RECORDS: The 1968 Street Expedition collected one male and one female from a building in Bandar Shahpur, Khuzistan Province on 22 October 1968. On 5 August 1968 we collected seven males from the site on Basket Mountain, West Azarbaijan Province where Lay had previously collected.

RANGE: Taphozous nudiventris has been reported from two localities on the Khuzistan Plain and most likely occurs throughout this Iranian section of the Tigris-Euphrates lowland. Basket Mountain and Varamin are both west of the Zagros Mountain divide. These locations indicate that T. nudiventris extends across the Zagros from Iraq and may well be found throughout Iran west of the central deserts. The regions east and south of the central deserts have been incompletely sampled, and the specimens reported from Afghanistan (Gaisler 1970:14) and from West Pakistan (Siddiqi 1969:7) indicate that it may be found throughout this eastern portion of Iran as well.

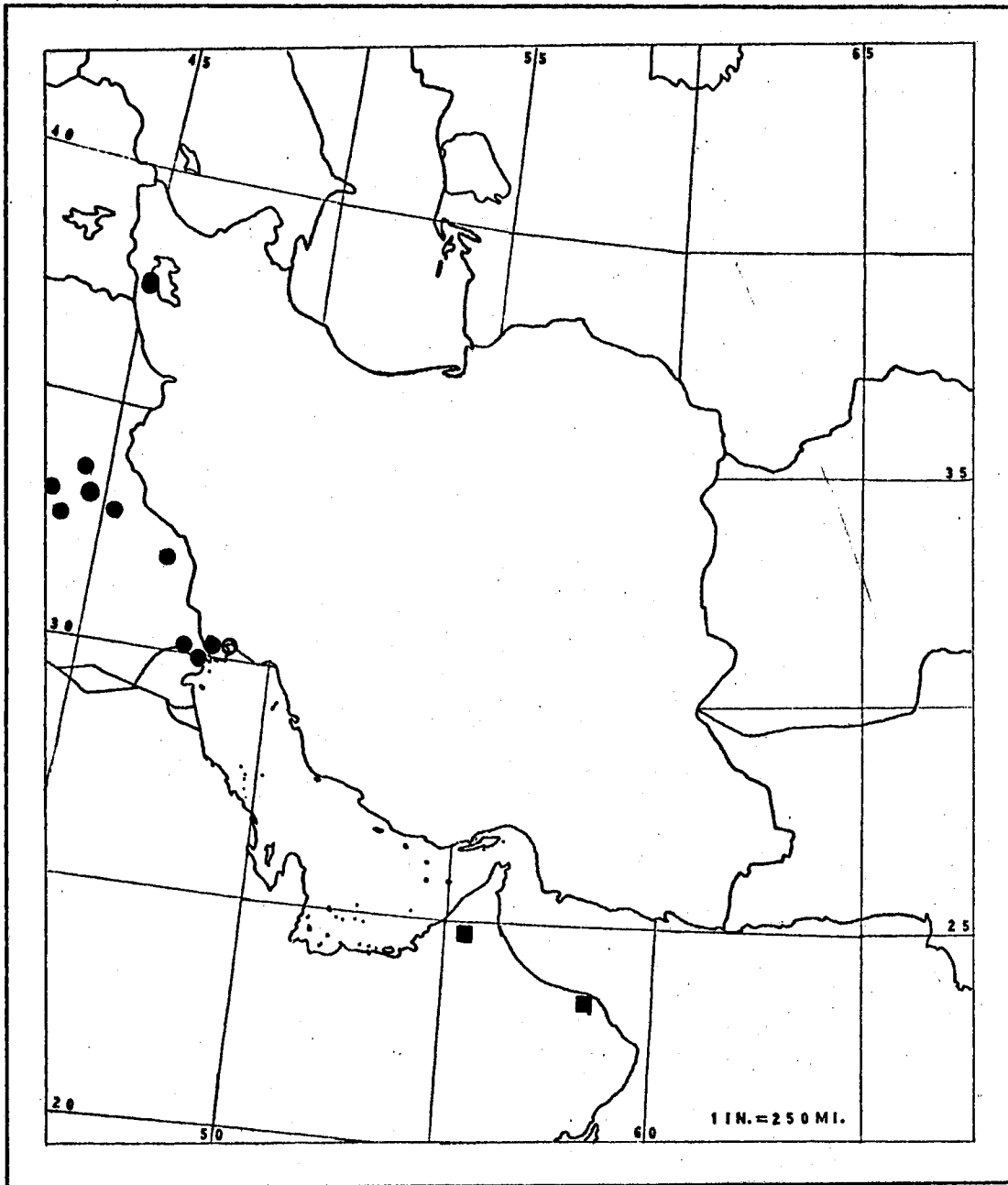


Figure 9. Distribution of *Taphozous nudiventris*

- = *T. n. magnus*, previously reported specimens
- = *T. n. magnus*, 1968 Street Expedition specimens
- = *T. n. zayidi*

Subspecies

Only T. n. magnus has been collected in Iran. This form is considerably larger than T. n. zayidi from Oman and does not have the ash gray color of this subspecies. Taphozous n. magnus is also larger, heavier and more robust than T. n. nudiventris from Egypt.

Taphozous n. magnus has been reported from the Tigris-Euphrates valley of Iraq, the Khuzistan Plain of southwestern Iran and in the mountainous areas of southwest and south-central Iran. The subspecies of the specimens from south-central Afghanistan has not been reported. Gaisler (1970:15) considered the possibility that these might be T. n. magnus but data are not available.

Specimens Examined

I have examined 47 T. n. magnus from Iran and one (the type of T. kochlensis babylonicus Thomas) from Iraq. I have also examined the types of T. n. zayidi Harrison from Oman and the cotype of T. kochlensis Dobson.

CHAPTER VI

THE FAMILY RHINOLOPHIDAE

The horseshoe bats are characterized by a complex noseleaf consisting of a flat "horseshoe" at the tip of the muzzle extending from the upper lip and encircling the nostrils, a transverse "lancet" which is erect and terminates in a single apex, and a longitudinally oriented "sella" connecting the horseshoe and lancet. The external ears have a well-developed antitragal lobe but the tragus is absent. The second finger lacks phalanges and the postorbital processes of the skull are absent. The premaxillae are represented only by palatal branches which are fused to each other medially and are separated from the maxillae laterally by deep emarginations of the palate. Only the genus Rhinolophus Lacépède, 1799, is known from Iran.

Much of the taxonomy of Rhinolophus is based upon variations in the structure of the complex noseleaf. The taper of the lancet may be uniformly triangular or constricted to produce a fine linear tip. The base of the sella (in anterior view) may be parallel-sided or triangular. The anterior projection of the sella may be broadly rounded or more or less tapered and pointed. The dorsal connecting process of the sella varies from a bluntly rounded or squared-off projection to a long, sharply pointed, antero-dorsally projecting process. The dental formula is usually $I \ 1/2 \ C \ 1/1 \ P \ 2/3 \ M \ 3/3 = 32$. Six species are known from Iran.



Figure 10. Lateral Views of the Noseleaves of Rhinolophus from Iran.

A- R. ferrumequinum; B- R. hipposideros; C- R. clivosus;
D- R. mehelyi; E- R. euryale; F- R. blasii. (B-F after
Bobrinskii et al. 1965:84)

Key to the Species of Rhinolophidae in Iran

- 1 Size large; forearm 52 to 61 mm; condylobasal length 19 to 21 mm; condylocanine length 18 to 20 mm; first upper premolar displaced labially from toothrow; dorsal connecting process of sella blunt (Fig. 10-A)
 Rhinolophus ferrumequinum
- 1' Size smaller; forearm 35 to 53 mm; condylobasal length less than 19 mm; condylocanine length less than 18 mm; position of first upper premolar and shape of dorsal connecting process of sella variable 2
- 2 Size small; forearm 35 to 40 mm; condylobasal length less than 16 mm; condylocanine length less than 15 mm; first upper premolar in toothrow; dorsal connecting process of sella blunt (Fig. 10-B). . . . Rhinolophus hipposideros
- 2' Size larger; forearm 43 to 53 mm; condylobasal length 16 to 19 mm; condylocanine length 15 to 17 mm; position of first upper premolar and shape of dorsal connecting process variable 3



Figure 11. Anterior Views of Sellae and Lancets of Rhinolophus.

A- Sella of R. blasii; B- Sella of R. euryale or R. mehelyi; C- Lancet of R. mehelyi; D- Lancet of R. euryale. (A after Aellen 1955:362; C and D after Strianti and Aellen 1958:532).

- 3 First upper premolar displaced labially from tooththrow or absent; dorsal connecting process of sella blunt (Fig. 10-C) Rhinolophus clivosus
- 3' First upper premolar in tooththrow; dorsal connecting process of sella long and pointed in lateral view (Fig. 10-D to 10-F) 4
- 4 Base of sella in anterior view triangular, anterior projection of sella tapered and somewhat pointed (Fig. 11-A); first phalanx of fourth digit more than half the length of second phalanx; first and third lower premolars approximately equal in crown area Rhinolophus blasii
- 4' Base of sella in anterior view with nearly parallel sides, anterior projection of sella broadly rounded (Fig. 11-B); first phalanx of fourth digit less than half the length of the second phalanx; third lower premolar with a slightly larger crown area than the first lower premolar 5

- 5 Lancet tapering abruptly, distal portion linear (Fig. 11-C); skull larger; greatest length 19.4 to 20.0 mm; zygomatic width 10.0 to 10.5 mm; mandible length 12.4 to 13.1 mm. Rhinolophus mehelyi
- 5' Lancet essentially triangular, with a gradual and even taper from near the base to the apex (Fig. 11-D); skull smaller; greatest length 18.2 to 19.1 mm; zygomatic width 9.0 to 9.6 mm; mandible length 11.6 to 12.1 mm. Rhinolophus euryale

Rhinolophus ferrumequinum Schreber, 1774

TYPE DESCRIPTION: Vespertilio ferrum-equinum Schreber, 1774.

Säugeth. I:pl 62 upper figs, text p. 174. TYPE LOCALITY: France.

Identification

Rhinolophus ferrumequinum is larger than others of this genus from Iran. It has a somewhat elevated, but blunt, dorsal connecting process of the sella (Fig. 10-A). The minute first upper premolar is displaced labially out of the main line of the tooth row and the larger second upper premolar is in contact with the canine.

World Range

In Africa R. ferrumequinum is recorded only from Algeria and Morocco (Hayman 1967:45). It occurs throughout southern Europe from Portugal to Thrace and north to southern Britain and central Germany (van den Brink 1968:51). It has been reported from several areas of Turkey (Çağlar 1965), and the Levant and from northern Iraq (Harrison

1964:79). Bobrinski et al. (1965:Map 19) showed it in the USSR from southwest of the Carpathian Mountains, from Crimea, the Caucasus, Turkmeniya, Uzbekistan and southern Kazakhstan. To the east of Iran it is known from Afghanistan (Gaisler 1970:17), West Pakistan (Mirza 1965:205), Kashmir, Kumaon, Nepal, Sikkim, China (Ellerman and Morrison-Scott 1951:111), Korea and Japan (Wallin 1969:248).

Iran Distribution

PREVIOUS RECORDS: S. G. Gmelin (1774) reported this species from the Elburz Mountains (Pallas 1778:125) and Lay (1967:138) said that this locality is probably near Rasht. Murray (1884:98) reported a single R. ferrumequinum from Bushire (=Bushehr), Fars Province in the "Kurrachee Museum." Cheesman (1921:575) reported nine specimens from Shiraz, Fars Province and one from Turbat-i-Haidare (=Torbate-Heydariyeh), Khorassan Province. Etemad (1967:276) reported the species from Mozduran Cave, 110 km E of Meshhad (=Mashhad), and Shandiz village, 34 km W of Meshhad, both in Khorassan Province; from Azad-Khan and Baba-djaber caves in Mahalat (=Mahallat), Isfahan Province; and from Shapaur (=Shahpur) Cave, Fars Province. Lay (1967:138) reported two specimens from Maku, West Azarbaijan Province; 21 from Ganjah Kuh and Chaman Bid, both near Shahrabad Kaur, Khorassan Province, and one from Galatappeh, Isfahan Province. Farhang-Azad (1969:730) reported one from Chelmir, Khorassan Province.

NEW RECORDS: On 4 August, the 1968 Street Expedition collected four R. ferrumequinum from a cave about 10 miles NNW of Rezaiyeh. On 25 August, I collected 23 of this species in Mar Ab Canyon, 35.5 miles W of Shahabad, Kermanshahan Province, and on 13 September I collected

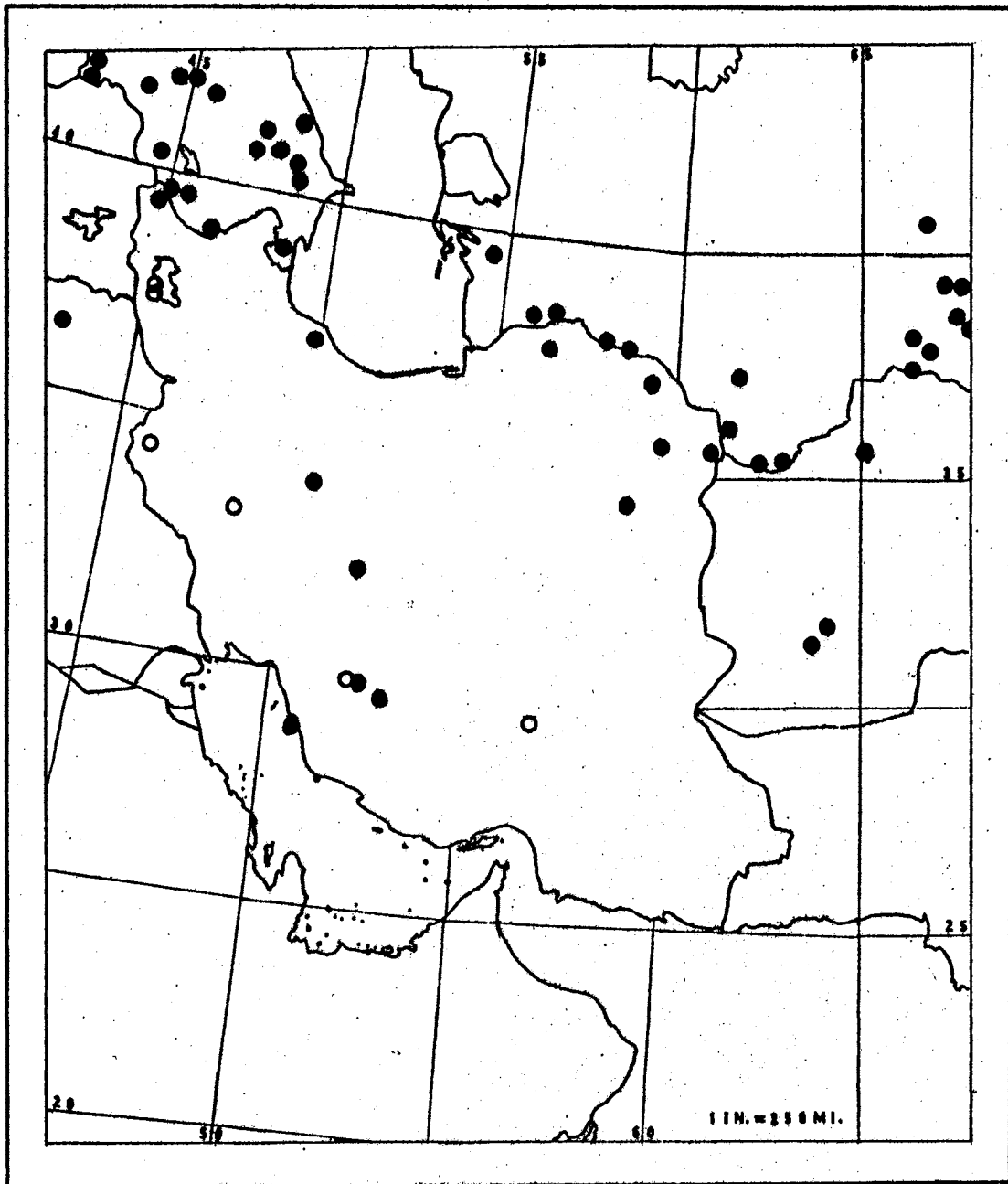


Figure 12. Distribution of Rhinolophus ferrumequinum

- = Previous records
- = 1968 Street Expedition specimens

three from a cave 2 miles N of Khurramabad, Lurestan and Khuzistan Province. On 9 October we collected three from Shahpur Cave, Fars Province, and on 6 December one from a cave about 35 miles SE of Sa'idabad, Kerman Province.

RANGE: Rhinolophus ferrumequinum has been collected from many locations on all sides of Iran. Considering these records and those in adjoining countries, this species could be expected to occur everywhere in Iran excepting probably the Khuzistan Plain, the central deserts, and Baluchistan.

Subspecies

Cheesman in 1921 described the form Rhinolophus ferrumequinum irani from Shiraz and attributed the Torbat-e-Heydariyeh specimen to this form. Misonne (1959) mentioned Cheesman's Shiraz records and included the Bushehr specimen in R. f. irani. He did not mention the Torbat-e-Heydariyeh specimen. Etemad (1967:276) listed his specimens from Mozduran Cave, Shandiz village, Shahpur Cave, Azad-Khan Cave and Baba-djaber Cave as R. f. irani.

Harrison (1964:79) assigned the single specimen from Iraqi Kurdistan to this form and Mirza (1965:205) listed five specimens from Nushki, Baluchistan, West Pakistan as R. f. irani. Aellen (1959:362) listed R. f. irani as the "Forme de la Perse, de l'Afghanistan et probablement aussi du Turkestan russe." He gave R. f. ferrumequinum as the "Forme de l'Europe moyenne s'etendant à l'E jusqu'en Perse occidentale (?)." The Russian authors, however, disagreed, and Bobrinskii et al. (1965:38) listed R. f. ferrumequinum from the European portion of the USSR and the western Caucasus and R. f.

proximus Anderson 1905 from eastern Transcaucasia and central Asia. Gaisler (1970:18) agreed with Aellen in referring the Afghan R. ferrumequinum to irani, but pointed out that the real relationship between R. f. irani and R. f. proximus is yet to be determined. If the two must be synonymized, proximus (1905) has priority over irani (1921).

In his original description of irani Cheesman (1921:575) compared his new subspecies to the nominate form from Europe and to R. f. tragatus from India, but made no mention of R. f. proximus. He described irani as being "paler in colour and slightly longer in forearm" than the two other forms he mentioned. Anderson (1905:112) compared R. f. proximus to R. f. ferrumequinum in size and said that the former has a proportionately much shorter tail and that the "horseshoe is remarkably narrow." Anderson did not mention color but since his type (BM 81.3.1.10), and apparently only specimen, is in alcohol this is understandable. Meyer-Oehme (1965) described a specimen from eastern Afghanistan as dark, medium-sized, with a very narrow horseshoe and short tail. He referred the specimen to R. f. proximus. Aellen (1959:362) keyed the three forms as follows:

- | | | |
|----|---|----------------------|
| 1 | Tail short, less than 60% of the length
of the forearm | <u>proximus</u> |
| 1' | Tail long, more than 60% of the length
of the forearm | 2 |
| 2 | Color generally pale | <u>irani</u> |
| 2' | Color generally darker | <u>ferrumequinum</u> |

Neither in this key nor in the text of his article did Aellen mention the color of proximus.

Of the 43 specimens from Iran in which I have examined the ratio of forearm to tail length, seven have the tail less than 60% of the forearm and four have a tail which is exactly 60% of the forearm. I can find no other characteristic which distinguishes these short-tailed specimens from others from Iran, and I feel that the short tail measurements are due either to natural variation or to damage. All of the Iranian (and Afghan) material which I have seen is definitely pale-colored. On the basis of Meyer-Oehme's (1965) description of his specimen of R. f. proximus as "dark" I retain the name irani in preference to proximus for the Iranian specimens. However, I agree with Gaisler (1970) that many more specimens (particularly of proximus) must be studied before the true relationship between these two forms can be clarified.

Bobrinskii et al. (1965:88) listed both R. f. ferrumequinum and R. f. proximus (= R. f. irani in this case) from the Caucasus. Aellen (1959) said that R. f. ferrumequinum ranges to western Iran but followed this statement with a question mark. Anderson (1905) differentiated irani from the nominate form on the basis of its longer forearm and paler color. Of the 63 specimens from Iran which I have examined, the forearms range from 52 to 62 mm (mean 56.1 mm). Thirty-five specimens from Lebanon, Jordan, Syria and Israel which Harrison (1964:80) listed as R. f. ferrumequinum have forearms ranging from 55 to 59 mm (mean 57.2 mm) and 26 of this form listed from western Europe by Miller (1912:143) have forearms ranging from 52 to 65 mm (mean 56.2 mm). This seems to be clear evidence that Cheesman's (1921) character of forearm length is not valid. Harrison (1964:79) is in agreement on this point.

Harrison (1964:79) differentiated R. f. irani from the typical form on the basis of color. Rhinolophus f. irani is "decidedly paler in colour . . . general colour above pale faun, the hair bases pale drab," while R. f. ferrumequinum has the "tint of the tips varying, usually light greyish or drab brown Some individuals are a distinctly paler sepia tint, others are paler, more buffy brown and occasionally brighter tints are seen."

In examining color of the specimens from the three Street Expeditions I noted that the specimens collected by the 1968 Expedition to Iran (all from the south and western portion of that country) were decidedly grayer than the reddish specimens collected in northern and eastern Iran by the 1962 Expedition and those collected in Afghanistan by the 1965 Street Expedition. Since immatures of many bat species are grayer than the typical adult, I confirmed the fact that the series from all three expeditions contained both young-of-the-year and full adults. The color difference I observed could not be due to biological age of the specimens. The only two dry specimens of R. f. ferrumequinum from the Arabian Peninsula available for comparison at the Field Museum are a female collected on 18 October 1964 at Jerash, Jordan, and a female collected 2 km NE of Hozmiye, Lebanon on 13 August 1960. One of these was very similar in color to those from the 1968 Street Expedition and the other very similar to those from the 1962 Street Expedition.

J. E. Hill of the British Museum kindly agreed to receive three randomly selected specimens from the Zagros Mountains collected by the 1968 Expedition and three similarly selected specimens from northeast Iran collected by the 1962 Expedition and to compare these with the

holotype and topotypes from Shiraz (in the Zagros Mountains) in the collections of the British Museum. He noted:

In colour the holotype and original series most closely resemble the specimens obtained in 1962 at localities other than the Zagros Mountains . . . The three specimens from localities in the Zagros Mountains . . . are slightly greyer than the holotype and the original series, with darker, greyer membranes. . . . I . . . conclude therefore that one is faced with a case of "foxing", the degree of grey remaining being dependent on the historic age of the specimen. (Hill pers. comm. 1970)

Thus while specimens of R. f. irani do appear to be paler in color than the typical race, particularly those from Europe, potential color change of dry specimens presents a problem in accurate comparison of museum specimens.

Rhinolophus f. irani does, however, have a smaller skull than R. f. ferrumequinum in Asia. This is particularly conspicuous in the condylobasal length. Twenty-three specimens of R. f. irani from Iran had a range from 19.8 to 20.9 mm with a mean of 20.3 mm while 27 R. f. ferrumequinum from Lebanon, Jordan and Israel have a range of 20.9 to 21.8 mm with a mean of 21.4 mm (Harrison 1964). A single specimen included in Harrison's list (excluded from the above calculations) has a condylobasal length of 20.3 mm. I am assuming that this is an immature specimen.

Figure 13 is a scatter diagram plotting condylobasal length against zygomatic width for 21 specimens of R. f. irani from Iran, 21 from Afghanistan and one from West Pakistan as well as four R. f. ferrumequinum from Turkey and 28 from the Arabian Peninsula (26 of these based upon data from Harrison 1964:81). The two R. f. ferrumequinum which fall into the range of R. f. irani are probably

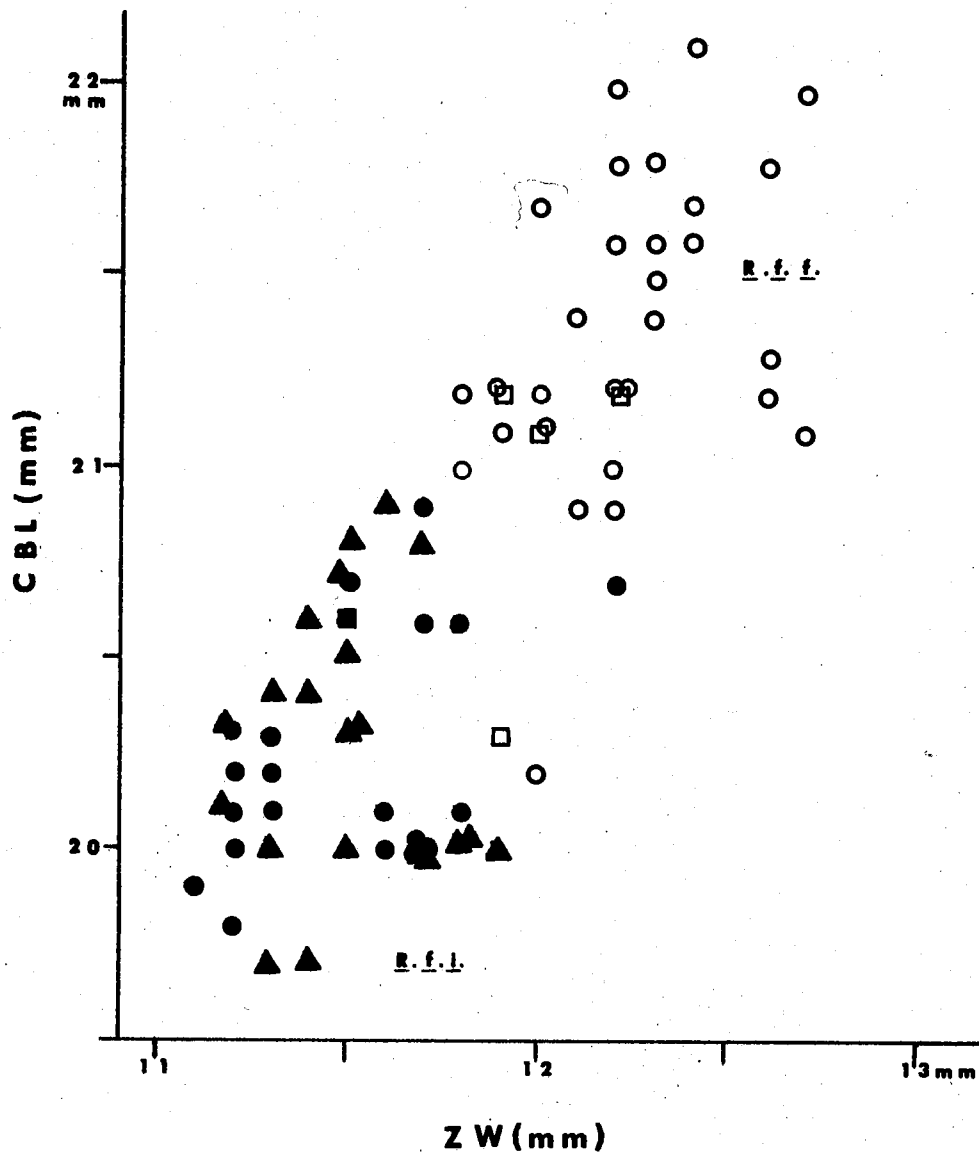


Figure 13. Condylbasal Length Versus Zygomatic Width of *Rhinolophus ferrumequinum*. A clear difference can be seen between the cranial size of *R. f. ferrumequinum* (open) and *R. f. irani* (solid). The two open figures with CBL below 20.5 mm may be immature specimens.

- = *R. f. ferrumequinum*, Arabian Peninsula; 26 from Harrison (1964) and two based upon my measurements
- = *R. f. ferrumequinum* from Turkey
- = *R. f. irani* from Iran
- = *R. f. irani* from West Pakistan
- ▲ = *R. f. irani* from Afghanistan

immature specimens. It should be noted that the Iran series includes a specimen from Maku, very close to the Turkish border, and the Turkish series includes two specimens from Trabzon, the easternmost site presently reported for the species in that country. Each of these three specimens falls well within the cluster for its form and thus the contact point for the two subspecies must be in Turkey east of Trabzon.

All Rhinolophus ferrumequinum from Iran are referable to the form irani Cheesman, 1921, type locality, Shiraz, Persia, type specimen, adult female, BM 20.2.9.2.

Specimens Examined

I have examined 39 R. f. irani (including the type) from Iran, 49 from Afghanistan, and one each from the USSR and West Pakistan. I have seen specimens of the nominate form from Israel, Italy, Jordan, Lebanon, and Turkey, and have examined examples of other subspecies from Britain and India.

Rhinolophus clivus Cretzschmar, 1828

TYPE DESCRIPTION: Rhinolophus clivus Cretzschmar, 1828, in Rüppell, Atlas Reise Nördl. Africa. Säugeth. p. 47. TYPE LOCALITY: Mohila (=Muwailih), Red Sea coast, approximately 27°49'N 35°30'E, Arabia (Harrison 1964:81). TYPE SPECIMEN: Lectotype, Senckenberg-Museum Frankfurt No. 4371. (Kock 1969:113).

Identification

The Iranian R. clivus is a medium-sized Rhinolophus (FA 49.9 to

52.6 mm; CBL 17.1 to 18.1 mm). The superior connecting process of the sella is short and bluntly rounded in lateral view (Fig. 10-C) and the small first upper premolar is lost or displaced labially so that the canine and larger, second upper premolar are in contact.

World Range

According to Hayman (1967:43) R. clivosus occurs in Africa in open country from Cape Province north to Egypt. Harrison (1964:82) reported it from Sinai, Aden, the Red Sea coast of Arabia, and Yemen. The species also occurs in Afghanistan and in Turkmeniya and Uzbekistan in the USSR (Aellen 1959:362-3).

Iran Distribution

PREVIOUS RECORDS: Farhang-Azad (1969:730) reported the only known Iranian specimen from Chelmir, Khorassan Province.

RANGE: Records in Russia and Afghanistan indicate that this species could be expected in much of north and east Khorassan Province. If Aellen (1959) were correct in assigning the central Asian form bocharicus to R. clivosus, it is likely that specimens will be found elsewhere in Iran and will bridge the gap between the two widely separated forms of this species.

Subspecies

Aellen (1959) has shown that Rhinolophus bocharicus Karschenko and Akimov is probably a form of Rhinolophus clivosus, but this arrangement is not accepted by all authors (Bobrinskii et al. 1965; Farhang-Azad 1969). The large hiatus between R. c. bocharicus in

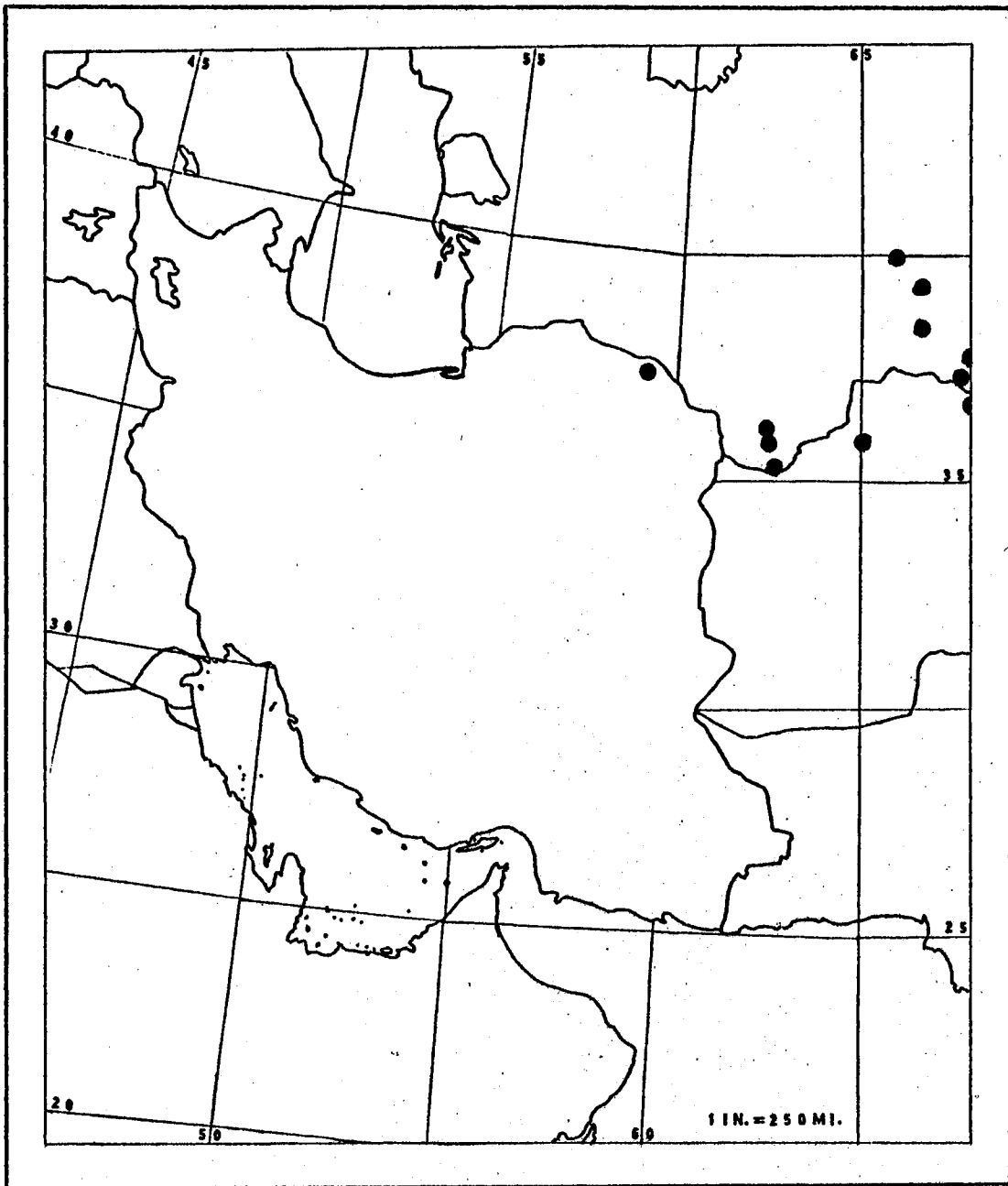


Figure 14. Distribution of Rhinolophus clivosus bocharicus

● = Previously reported specimens

northeast Iran and R. c. clivosus in eastern Arabia causes doubt as to the conspecificity of these two forms. Hopefully, future work in Iran and Arabia will narrow this gap.

Rhinolophus clivosus bocharicus Katschenko and Akimov, 1917

TYPE DESCRIPTION: Rhinolophus bocharicus Katschenko and Akimov, 1917. Annu. Mus. Zool. Acad. Sci. Russ. 22:221. TYPE LOCALITY: Termez (Uzbekistan). RANGE: Northeast Iran; northern Afghanistan; Turkmeniya and Uzbekistan, USSR.

Specimens Examined

I have examined only one R. c. bocharicus from Afghanistan and none from Iran. Other R. clivosus from Kenya, Egypt and Arabia were also seen.

Rhinolophus hipposideros Bechstein, 1800

TYPE DESCRIPTION: Vespertilio hipposideros Bechstein, 1800, in Thomas Pennant's Allgemeine Uebersicht der vier fussigen Thiere 2:629. TYPE LOCALITY: France.

Identification

Rhinolophus hipposideros is the smallest of this genus in Iran (FA 35.7 to 40.0 mm; CBL 14.2 to 15.0 mm). The dorsal connecting process of the sella is very low and blunt (Fig. 10-B) and the small first upper premolar is situated between the canine and larger second upper premolar.

World Range

In Africa R. hipposideros is recorded from Morocco, Sudan and Eritrea (Hayman 1967:43). In Europe it extends from Portugal and Ireland to the Ukraine and north to northern Germany and southern Poland (van den Brink 1968:51). Harrison (1964:86) listed it from Sinai, the Levant, Baghdad and the Red Sea coast of Arabia. Çağlar (1965:126) listed it from several areas in Turkey and Bobrinskii et al. (1965:Map 17) mapped its distribution from the Ukraine, the Caucasus, Turkmeniya, Uzbekistan, Tadzhikistan and southern Kazakhstan in the USSR. Aellen (1959) reported it from Boulon Cave, Afghanistan and Gaisler (1970:20) from the Jalalabad region of that country. Gaisler (1970:21) and Ellerman and Morrison-Scott (1951) also listed Kashmir.

Iran Distribution

PREVIOUS RECORDS: Anderson (1905) reported a specimen from Jask on the Persian Gulf, Kerman Province and listed a specimen from Urmi (=Rezaiyeh), West Azarbaijan Province. Kuzyakin (1950:210) mapped a record from West Azarbaijan, interpreted as Rezaiyeh by Lay (1967:137). This may be the Urmi (=Rezaiyeh) specimen reported by Anderson. Misonne (1959) attributed to Satunin (1905) records of the species from Lenkoran and in the Valley of the Araxe (=Aras) in the north of Iranian Azarbaijan. However, the only specimen Satunin (1906) mentioned was from Lenkoran, which is in Soviet Azarbaijan. Etemad (1967) listed R. hipposideros from Mahalat (=Mahallat), Isfahan Province and from Sari, Mazanderan Province. Lay (1967:137) reported 17 specimens from 12 km W, 2 km S of Chalus, Mazanderan Province and

one from 8 km NW of Maku, West Azarbaijan Province.

NEW RECORDS: The 1968 Street Expedition collected one R. hipposideros about 9 miles NE of Kermanshah, Kermanshahan Province on 20 August; five from Shahpur Cave, Fars Province on 9 October; and two from Canae Gabru Cave near the village of Tar Divon, about 40 miles N of Jahrom, Fars Province on 10 November.

In April 1970, I discovered a specimen of this species labeled "House of the Imperial Bank of Persia, Barforoush" (=Babol, Mazanderan Province) in a drawer of unidentified bats at the British Museum.

RANGE: Existing records for Iran and adjoining countries indicate that this species may be found in all parts of Iran with the possible exception of the central desert.

Subspecies

Three subspecies of Rhinolophus hipposideros have been reported in Iran. Anderson (1905:138) described the form "Rhinolophus midas, sp. n." from "Jask, Persian Gulf." Later he included midas as a subspecies of R. hipposideros (Anderson 1918). In the 1905 paper he also mentioned a specimen from "Urmi, NW Persia" and included it in his list of R. h. hipposideros.

Misonne (1959) listed R. h. hipposideros from the Valley of the Araxe (=Aras) River in the Iranian Azarbaijan on the basis of Satunin's (1906, not 1905) record of R. hipposideros from Soviet Azarbaijan. Misonne also mentioned the Jask specimen and referred to it as R. h. midas.

Etemad (1967:277) stated that "Rhinolophus h. hipposideros from Azarbaijan near Aras River northwest Iran and Rhinolophus hipposideros

midas from Jask, Persian Gulf, have been recorded before." Presumably the Aras River record referred to is from Misonne (1959) or Satunin (1906), though neither of these authors was listed in Etemad's bibliography. Etemad (1967:277) then reported specimens from Sari and Mahallat which had been identified as R. h. minimus by D. L. Harrison. But Etemad did not give Harrison's reasons for this identification.

Lay (1967) did not attempt to designate subspecies for his specimens from Maku or Chalus.

Anderson (1905) distinguished R. h. midas from R. h. hipposideros and R. h. minimus on the basis of sella shape. The sella of midas in anterior view is deltoid, approximating an equilateral triangle, while in the other two forms this structure is narrow and parallel-sided. He distinguished R. h. hipposideros from R. h. minimus and R. h. midas on the basis of size. R. h. minimus differs from R. h. hipposideros in "being in every respect smaller; in some respects, as it seems, absolutely smaller, in others at least on the average" while R. h. midas is, "in width of the braincase as well as in external dimensions," like R. h. minimus.

In the 1905 paper Anderson listed R. h. midas only from the type locality, R. h. minimus from the Mediterranean Subregion and R. h. hipposideros from the extreme northwest Himalayas; through northwest Persia and Armenia, over the whole of Central Europe north of the Balkans and the Alps. In 1913 he modified this, giving a range for R. h. midas from Gilgit (the record on which the northwest Himalayas were included under R. h. hipposideros in 1905) to Cyprus. "NW Persia" was left as the easternmost locality for R. h. hipposideros (Anderson 1918).

Recent authors have modified this somewhat. Harrison (1964:36) recognized R. h. minimus from the Mediterranean and Red Sea coasts of the Arabian Peninsula and R. h. midas from Baghdad. He differentiated between these two on the basis of sella shape. Bobrinskii et al. (1965:36) recognized R. h. hipposideros from the western Caucasus west to Moldavia and R. h. midas from eastern Transcaucasia, central Asia and Iran. They distinguished the two forms on the basis of color, R. h. hipposideros having an admixture of gray tones and R. h. midas exhibiting an admixture of ochraceous and yellowish tones. Aellen (1959:366) identified a specimen from Boulon Cave, Qalat, Afghanistan as R. h. midas. He separated R. h. midas from R. h. hipposideros on the basis of its lighter color, wider-based sella and wider infraorbital (=zygomatic?) arch. He also stated that in his specimen P_3 is miniscule and external so that P_2 and P_4 are in contact.

Gaisler (1970:20-21) reported R. h. midas in Afghanistan from the vicinity of Jalalabad and from Lalanda (south of Kabul). He presented measurements of these specimens, the type of midas, and specimens from Iraq, Caucasia and Asia Minor, all of which he considered to represent R. h. midas, as well as measurements of R. h. hipposideros from Czechoslovakia. He pointed out that the Asian specimens, while not fulfilling "the 75% difference rule" are conspicuously smaller than the nominate, central European form. He considered the difference in dentition to be significant. In all Afghan specimens " P_2 is entirely outside the tooth row, P_1 and P_3 nearly or completely touching." Gaisler felt that "this is in agreement with Anderson's original description of ssp. midas," which says "'. . . P_3 external. A very narrow interspace between P_2 and P_4 . . .'" He then pointed out that

in some 100 specimens of R. h. hipposideros which he examined he ". . . found P_2 less markedly outside the tooth row and invariably a distinct space between P_1 and P_3 ," and quoted Harrison (1964) who described R. h. minimus as having " . . . a small but distinct gap between $pm1$ and $pm3$." Thus Gaisler's "significant" character is that the Afghan specimens ("nearly or completely touching") resemble the type description of midas ("a very narrow interspace") more than the central European form ("a distinct space") or the Mediterranean form ("a small but distinct gap"). The difference between these statements is by no means clear, and I have great difficulty believing that it is significant. I have examined 21 specimens of R. hipposideros for this dental characteristic, including eight from six localities in Iran, nine from two localities in Afghanistan, one from Lebanon, two from Germany, and one from Switzerland. As can be seen from Table VII, this character is highly variable in populations in Iran.

I have examined all of the specimens of R. hipposideros from Iran with the exception of those reported by Etemad (1967) and find them easily separable into two groups on the basis of color (a criterion used by Bobrinskii et al. 1965 and Aellen 1959). The 15 dry specimens from 12 km W, 2 km S of Chalus and the specimen from Babol are all considerably darker than the other Iranian specimens I have seen and the nine adults in the Chalus series are very similar in coloration to specimens from Switzerland (one), Germany (two), and Lebanon (one) which I have examined. The overall dorsal hair color of these bats is closest to Cinnamon-Brown of Ridgway (1912 Plate XV 15,k). The immature specimens from the Chalus series are more gray. These dark Iranian specimens are all from the coastal plain of the Caspian

TABLE VII
 ARRANGEMENT OF P_1 , P_2 AND P_3 IN RHINOLOPHUS HIPPOSIDEROS

Locality	P_2 external, P_1 and P_3 touching	P_2 external, space between P_1 and P_3	P_2 in tooth row between P_1 and P_3	P_2 absent; space between P_1 and P_3
Germany			1	1
Switzerland		1		
Lebanon			1	
Iran: Maku	1			
Chalus	1		1	
Kermanshah			1	
Shahpur Cave	1		1	
Ganae Gabru		1		
Jask		1		
Afghanistan:				
Boulan Cave	1			
Jalalabad	8			

Sea, an area which receives an average of 800 to 1800 mm of precipitation annually (Gangi 1968:234). The other specimens are all from areas which receive an average of less than 600 mm of precipitation per year (Gangi 1968:234). The color difference is not unexpected when Gloger's Rule is considered.

The dry specimens from Maku (one), Kermanshah (one), Shahpur Cave (three), and Canae Gabru (one) are essentially identical in color and match *Avellaneus* of Ridgway (1912 Plate XL 17,b) most closely. These specimens are also very similar to one from Boulon Cave and to six adults from Jalalabad, both in Afghanistan. The Jalalabad specimens are a slightly richer brown. The only immature specimens of this lighter form which I have seen are from Jalalabad and are distinctly grayer than the adults collected at the same time and place.

The Rezaiyeh and Jask specimens are preserved in spirit and thus were not included in the above color comparison. However from their geographic locations between records of light-colored specimens and in areas of low average precipitation these specimens could reasonably be expected to match the lighter Iranian specimens more closely than the darker specimens from the Caspian coast. The fact that these two are in spirit would also explain why Anderson (1905) made no reference to the light color of midas in his original description and explains why he referred the Rezaiyeh specimen (which does not have the midas type sella - see below) to the darker form, R. h. hipposideros.

The lighter-colored R. hipposideros from Iran and Afghanistan are further separable on the basis of sella structure. The main characteristic used by Anderson (1905) in describing midas was the unusually deltoid sella which contrasted sharply with the much

narrower-based sellae of R. h. hipposideros and R. h. minimus. Of the 25 light-colored bats from Iran and Afghanistan which I have examined, only the type of midas from Jask and three specimens from Boulon Cave, 21 miles SE of Qalat, Afghanistan have this strikingly deltoid sella. This sella is easily distinguishable from the narrower, more parallel-sided sella of the specimens from western Iran and from Jalalabad. Among those authors who have discussed R. h. midas only Aellen (1959) and Harrison (1964) have mentioned Anderson's major character with respect to their specimens. The only specimen Aellen had while writing his 1959 paper was one from Boulon Cave, the same locality as the three specimens with deltoid sellae mentioned above. I have not seen the four specimens of midas from Iraq, but Harrison (pers. comm. 1971) has recently assured me that when he was working with these specimens "the breadth of the sella did seem to be quite striking in the type and in the few other specimens . . ." from Baghdad. Gaisler (1970) in describing his series from Jalalabad made no mention of sella shape, but all 10 of the Jalalabad area specimens which I have examined have the narrower, parallel-sided sella typical for the species. Bobrinskii et al. (1965) made no mention of sella shape of specimens from the USSR.

No one has reexamined the Gilgit and Cyprus specimens which Anderson (1918) himself referred to R. h. midas and the sella shape of these is not known, but it may be assumed that they too have a deltoid sella. Three of the Baghdad specimens were collected in 1917 and were cataloged at the British Museum on 4 July 1918. These were probably available to Anderson while he was preparing the 1918 paper. Thus the only records of midas based upon shape of sella are from Baghdad, Iraq,

Jask, Iran; and Boulon Cave near Qalat, Afghanistan, with those from Cyprus and Gilgit, Kashmir, being possible additions to this list.

The structure of the noseleaf is a major taxonomic character in the genus Rhinolophus and it normally shows little variation within a species. The fact that all four of the known specimens of midas from Baghdad and all four of those from Boulon Cave have the same deltoid sella and that this character has not been reported from any other specimen besides the type, indicates that this distinctive sella shape is not due to individual variation. On the basis of this character I feel that the name midas must be restricted to the specimens from Baghdad, Jask, and Boulon Cave (and perhaps Cyprus and Gilgit). While midas (sensu. stricto.) has not been found sympatrically with other R. hipposideros, the wide spacing of the recorded localities and the presence of other subspecies in western Iran and the Jalalabad areas indicate that Anderson (1905) may have been correct in his original designation of R. midas as a full species closely related to R. hipposideros. However, more material will be needed before the true status of this bat can be determined.

Rhinolophus hipposideros midas Anderson, 1905

TYPE DESCRIPTION: Rhinolophus midas Anderson, 1905. Proc. Zool. Soc. London 1905. Vol. 2, p. 133. TYPE LOCALITY: Jask, Persian Gulf, Iran. TYPE SPECIMEN: Adult ♂ BM 94.11.16.1 in spirit, skull extracted. RANGE: Known definitely from Baghdad, Iraq; Jask, Iran; and Boulon Cave, 21 mi SW Qalat, Afghanistan. Also reported from Cyprus and Gilgit, Kashmir (Anderson 1918) and from the USSR (Bobrinskii et al. 1965).

Among the Iranian bats with a narrow parallel-sided sella there are, as noted above, two distinct groups based upon color. These two color groups are also readily separable by average annual precipitation in their area of habitation. Etemad's (1967) two localities are split between the humid Caspian coastal plain (Sari) and the much more arid interior (Mahallat). These locations would indicate that both color types are included, yet according to Etemad (1967), D. L. Harrison identified specimens from both localities as R. h. minimus. Harrison (1964:85) in describing R. h. minimus from the Arabian Peninsula did say that the dorsal hair coloration is variable with "some individuals . . . a warm fulvous brown, others duller, more greyish brown." But he did not mention any particularly light specimens. Since all nine of the dry adult Caspian coastal specimens which I have seen are essentially the same dark brownish color and all seven of the dry Zagros Mountain specimens are essentially the same light brownish color I feel that individual variation may be ruled out and the two groups must be recognized as distinct subspecies. Of these two, the Caspian coastal specimens are more similar in color to R. h. minimus from the Arabian Peninsula and R. h. hipposideros from northern Europe.

Rhinolophus h. hipposideros and R. h. minimus have been differentiated on the basis of size; Rhinolophus h. minimus is smaller than R. h. hipposideros (Anderson 1905, 1907; Miller 1912, and others). Intergrades have been recorded from Switzerland (Anderson 1905). Anderson (1905) regarded as R. h. minimus those specimens with a forearm of 34.7 to 38 mm, and as R. h. hipposideros those with a forearm of 39 to 41.7 mm (it was on this basis that he assigned the Rezaiyeh specimen to the nominate form). Miller (1912) used Anderson's forearm

measurements, prefacing them with the word "usually" and added that R. h. minimus has the greatest length of skull ranging from 14.5 to 15.5 mm, and R. h. hipposideros has the greatest length of skull over 15.5 mm. Harrison (1964:87) reported for R. h. minimus from Arabia, a forearm range of 26.9 to 36.9 mm and a greatest skull length range from 15.0 to 15.8 mm. This forearm measurement falls within the range given by Anderson (1905) and by Miller (1912), but the greatest length of skull range overlaps Miller's (1912) dividing line. The 16 Chalus specimens have a forearm range of 35.7 to 38.8 mm and the forearm of the Babol specimen measures 38.4 mm. The skulls of the 15 dry Chalus specimens (FMNH) and the skull of the Babol specimen (BM) have all been lost. The two alcohol specimens from Chalus have not had the skulls removed. Therefore no skulls from this form in Iran were available to me. On the basis of forearm length and color, I tentatively assign these specimens to Rhinolophus hipposideros minimus.

Rhinolophus hipposideros minimus Heuglin, 1861

TYPE DESCRIPTION: Rhinolophus minimus Heuglin, 1861. N. Act. Acad. Caes. Leop.-Car. xxix p. 6. TYPE LOCALITY: Keren, Eritrea. TYPE SPECIMEN: "a young, but apparently full grown individual" in the Stuttgart Museum (Anderson 1905:141). RANGE: The Mediterranean subregion including Morocco, southern Europe, the Levant, Sinai, and the Red Sea coast of Arabia, Eritrea, and Sudan; and the Caspian coastal plain in Iran. Its distribution in Turkey is not known.

If the name R. h. midas is restricted to the form with a wide, deltoid sella, and the names R. h. minimus and R. h. hipposideros restricted to the dark-colored forms with narrow, parallel-sided

sellae, there is no name available for the light-colored form with a narrow, parallel-sided sella. I therefore propose the name:

Rhinolophus hipposideros billanjani subsp. nov.

DIAGNOSIS: Color pale brown, base of sella, in anterior view; narrow, the sides almost parallel.

TYPE LOCALITY: Shahpur Cave, 29°48'N, 51°37'E, Fars Province.

TYPE SPECIMEN: FMNH 111184, adult female, skin and skull.

DESCRIPTION OF HOLOTYPE: General color of dorsal pelage pale brown, matching "Avellaneous" of Ridgway (1912 Plate XL 17, b). Wings, uropatagium and other membrane areas light colored. Measurements (in millimeters) TL 71, T 26, HF(cu) 8, E 19, FA 39, GL 15.5, CBL 14.3, CGL 13.7, ZW 7.5, PO 1.5, BB 6.6, G-M³ 5.0, M³-M³ 3.0, G-M₃ 5.5, ML 9.6.

DISCUSSION: This form differs from R. h. minimus and R. h. hipposideros in its much lighter coloration of dorsal pelage and membranes. Forearm lengths of 10 specimens from Iran range from 37 to 40 mm (mean 38.9 mm) and overlap both those of R. h. hipposideros and R. h. minimus. R. h. billanjani is similar to R. h. midas from Boulon Cave, Afghanistan in general coloration but differs from this form in possessing a sella with a narrow base and almost parallel sides as opposed to the wide base and overall deltoid shape of the sella of midas.

RANGE: I have examined specimens of R. h. billanjani from 8 km NW of Maku; Rezaiyeh; 20 km NE of Kermanshah; Canae Gabru cave near the village of Tar Divon, about 40 miles N of Jahrom; and Shahpur Cave, all in Iran, and from Jalalabad, Afghanistan. The specimens reported

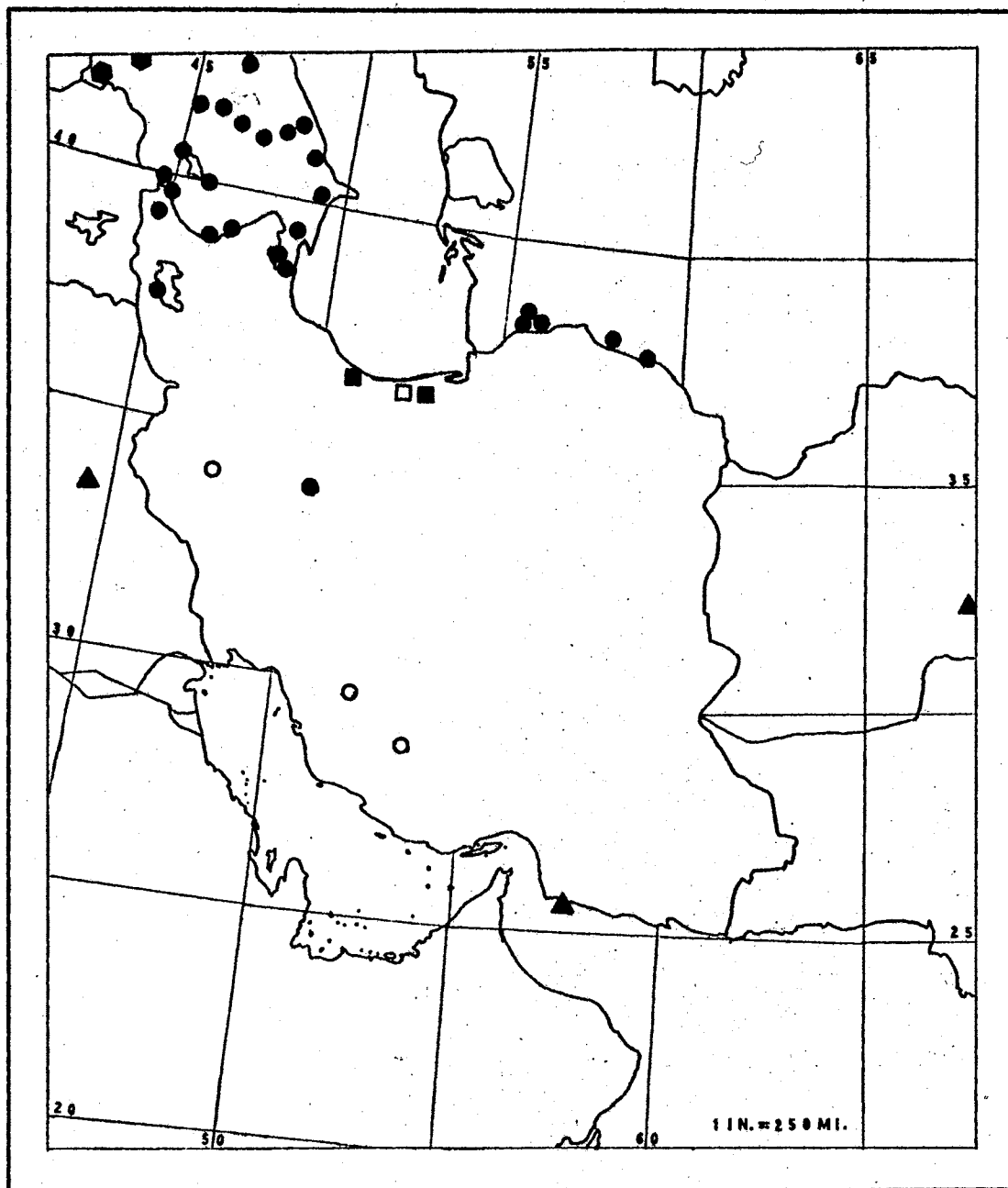


Figure 15. Distribution of *Rhinolophus hipposideros*
 Solid figures indicate previously
 reported specimens; open figures
 indicate new records.

- = *R. h. billanjani*
- = *R. h. minimus*
- ▲ = *R. h. midas*
- = *R. h. hipposideros*

TABLE VIII

EXTERNAL MEASUREMENTS OF RHINOLOPHUS HIPPOSIDEROS FROM IRAN

Locality	Total Length	Tail	Hind Foot	Ear	Forearm	Horseshoe Width
<u>R. h. minimus</u>						
Chalus	64.1 (17) 60-67	26.1 (17) 25-28	8.6 (17) 8-9	16.2 (17) 15-17	37.6 (16) 35.7-38.8	5.9 (8) 5.4-6.6
Babol	61	23	8	15	38.4	
<u>R. h. billanjanii</u>						
Maku	62	24	8	18	39.0	5.6
Urmi		30	8	17	39.8	
Kermanshah	73	29	8	19	39	
Ganae Gabru	74 (2) 74-74	31 (2) 31-31	8 (2) 8-8	17 (2) 17-17	39.5 (2) 39-40	5.4
Shahpur Cave ¹	71.2 (5) 70-72	28.0 (5) 24-32	7.6 (5) 7-8	17.2 (5) 16-19	38.4 (5) 37-40	6.3 (3) 6.2-6.3
<u>R. h. midas</u>						
Jask ²		24.5	7.6	17	37.7	

¹ Measurements of Type specimen included² Anderson (1905), Type specimen

TABLE IX
CRANIAL MEASUREMENTS OF RHINOLOPHUS HIPPOSIDEROS FROM IRAN

Locality	GL	GBL	CCL	ZW	PO	C-M ³	M ³ -M ³	C-M ₃	ML
<u>R. h. billanjani</u>									
Maku			13.2	7.6	1.9	5.1	3.1	5.4	9.7
Kerman-shah	16.2	14.3	13.7		2.0	5.1	3.2	6.0	10.0
Ganae Gabru	16.1	15.0	13.7	7.7	1.6	5.5	3.0	5.7	10.0
Shahpur Cave ¹	15.6 (2) 15.5-15.8	14.2 (2) 14.2-14.3	13.4 (2) 13.0-13.7	7.5 (2) 7.5-7.5	1.6 (2) 1.5-1.6	5.0 (2) 5.0-5.0	3.0 (2) 3.0-3.0	5.6 (2) 5.5-5.7	9.5 (2) 9.5-9.6
<u>R. h. midas</u>									
Jask ²	16.0	14.7	13.8	7.4	1.6	5.6	2.9	6.8	10.3

¹ Type specimen included

² Type specimen

reported from Mahallat, Iran (Etemad 1967) as R. h. minimus probably belong to this form. Specimens reported as R. h. midas from Jalalabad, Abdskil, Sariobi and Lalanda, Afghanistan (Gaisler 1970) probably belong to this form and specimens reported as R. h. midas from eastern Transcaucasia and central Asia (Bibrinskii et al. 1965:86) may belong to this form.

This subspecies is named in honor of William S. and Janice K. Street, leaders of the 1968 Street Expedition.

Specimens Examined

I have examined all specimens of R. hipposideros known from Iran with the exception of those reported by Etemad (1967), and have also examined 12 from Afghanistan, one from Egypt, one from Lebanon, two from Germany and one from Switzerland.

Rhinolophus euryale Blasius, 1853

TYPE DESCRIPTION: Rhinolophus euryale Blasius, 1853. Arch. Naturgesch. 19, 1:49. TYPE LOCALITY: Milan, Italy.

Identification

Rhinolophus euryale is a medium-sized Rhinolophus (FA 47 to 51.4 mm, CBL 16.5 to 17.3 mm) easily distinguished from R. ferrumequinum and R. hipposideros on the basis of size. It may be distinguished from R. blasii by the structure of the sella (Fig. 11) and from R. clivus by the sharpness of the dorsal connecting process of the sella (Fig. 10).

The differences between R. euryale and R. mehelyi are not as

conspicuous and warrant more detailed discussion. These two species are similar in external structure, and confusion has been heightened by errors in the original descriptions. A discussion of these latter problems is presented by Strianti and Aellen (1958).

In Asia both species have been reported from Transcaucasia (Bobrinskii et al. 1965) and from Turkey (Çağlar 1965). Sanborn and Hoogstraal (1955) have stated that R. euryale probably does not occur in Egypt and that the material examined by them from that country is referable to R. mehelyi. Harrison (1964:90) was unable to distinguish two species in his material from the Arabian Peninsula and considered all specimens from this region to be R. euryale. He also could not distinguish the Egyptian material he had seen from R. euryale, but he acknowledged that "this question clearly requires much further research before the status of these two forms in the eastern Mediterranean can be clarified" (Harrison 1964:90).

Miller (1912:139) distinguished between these two species in western Europe on the basis of forearm length (44.6 to 49 mm in R. euryale versus 48.6 to 51.4 mm in R. mehelyi), the difference in relationship between the first and second phalanges of the fourth digit (first 38% of second in R. euryale versus first 44% of second in R. mehelyi) and differences in the shape of the lancet ("gradually narrowed, never linear" in R. euryale versus "point of lancet linear" in R. mehelyi). Ognev (1928:300) keyed the two forms from Russia on the basis of phalangeal ratios given above and by the difference in condylobasal length (16.4 to 17.8 mm in R. euryale versus 17.4 to 18 mm in R. mehelyi).

Bobrinskii et al. (1965:84) keyed these two species in the USSR

by condylobasal length (15.4 to 16 mm in R. euryale versus 16.6 to 17.5 mm in R. mehelyi), zygomatic width (9.2 to 9.8 mm in R. euryale versus 10 to 11 mm in R. mehelyi) and forearm length 43 to 45 mm in R. euryale versus 50 to 55 mm in R. mehelyi).

Strianti and Aellen (1958:533) distinguished between the two species on the basis of lancet structure (lancet triangular with lateral borders slightly concave in R. euryale versus lancet with sharply acuminate point in R. mehelyi), width of horseshoe (6.2 to 7.1 mm, mean 6.7 mm in R. euryale versus maximum width 6.6 mm, mean 6.0 mm in R. mehelyi), the ratio of length of third digit to forearm (less than 1.6 in R. euryale versus greater or equal to 1.6 mm in R. mehelyi), length of maxillary tooth row (G-M³ 6.2 to 6.6 mm in R. euryale versus 6.6 to 7.2 mm in R. mehelyi) and relative widths across the zygomatic arches (ZW) and the mastoid processes (MB) (ZW equals MB, 8.8 to 10 mm in R. euryale versus ZW greater than MB, ZW equals 9.8 to 10 mm in R. mehelyi).

I have examined specimens from Iran, Turkey, Greece, Lebanon, Palestine, and Egypt and have found several characters which can readily be used to separate the two species in southwest Asia. The shape of the lancet is the most definite and easily recognizable external character. In R. mehelyi this structure tapers abruptly about halfway between the tip and dorsal connecting point of the sella. The distal half is narrow and parallel-sided (Fig. 11-C). In R. euryale the taper of the lancet is much more gradual and the structure is essentially triangular in shape. However, the lancet of R. euryale does have more or less pronounced lateral concavities (mentioned by Strianti and Aellen above) which may easily confuse someone not

familiar with both forms (Fig. 11-D).

Other external features mentioned by the above authors are less reliable. Forearm length, used by Miller (1912) and Bobrinski et al. (1965) does not appear to be useful for these species in southwest Asia. Of 64 specimens from Iran, 29 R. euryale had forearms of 46 to 51.4 mm and 35 R. mehelyi had forearms of 43 to 52.9 mm. Some of these are definitely young-of-the-year, but they were fully volant individuals with almost completely ossified epiphyses of the wing joints and must be considered in an enumeration of key characters. The difference in relative lengths of phalanges of the fourth digit utilized by Miller (1912) and Ognev (1928) is also unreliable. In only seven of 11 R. euryale examined, was the first phalanx greater than 40.5% of the second, and in only 18 of the 21 R. mehelyi examined was the first phalanx less than 40.5% of the second.

The width of the noseleaf utilized by Strianti and Aellen shows considerable overlap in Asian specimens. Nineteen R. euryale from Iran had a range of 5.4 to 6.7 mm (mean 6.1 mm) while 27 R. mehelyi had a range of 4.9 to 6.4 mm (mean 5.8 mm). Since the horseshoe is a very thin flap of flesh with free edges, an accurate measurement of its width is very difficult to make, particularly in preserved (dry or spirit) specimens. However, the general shape of the horseshoe is slightly different in the two species. That of R. euryale is more broadly rounded ventrally and has shallower lateral indentations near the top. This difference is conspicuous in Strianti and Aellen's (1958:532) illustration but they did not mention it in the text. The difference seems consistent in the series from southwest Asia. I do not have available measurements of the length of the third digit and

thus am unable to test the validity of Strianti and Aellen's (1958) character of the ratio between this structure and the forearm.

Ognev (1928), Bobrinskii et al. (1965), and Strianti and Aellen (1958) all utilized cranial measurements in distinguishing between R. euryale and R. mehelyi. In southwest Asia the skull of R. mehelyi is distinctly smaller than that of R. euryale in almost all dimensions. Table X compares means and extremes of nine R. euryale from Iran, Turkey and Lebanon and 10 R. mehelyi from Iran, Turkey and Palestine. For purposes of making these comparisons the shape of the lancet was used as the defining characteristic.

Rhinolophus euryale and R. mehelyi both range widely in southwest Asia. The former has been found in seven localities in Iran, and the latter in four. They have been collected together at three of these sites.

World Range

Rhinolophus euryale is known in southern Europe from Portugal to Thrace and extends north through much of France (van den Brink 1968:51). In Africa Hayman (1967) reported it from Morocco, Tunisia, Algeria, and Egypt, however, the Egyptian record has been placed in considerable doubt (Sanborn and Hoogstraal 1955). Çağlar (1965) reported it from several areas of Turkey, and Harrison (1964) from several localities in the Levant. Bobrinskii et al. (1965) mapped several localities for it in Transcaucasia and a single locality near Ashkhabad in Turkmeniya.

Iran Distribution

PREVIOUS RECORDS: There has been considerable confusion between

TABLE X

COMPARISON OF CRANIAL MEASUREMENTS OF RHINOLOPHUS EURYALE AND
R. MEHELYI FROM IRAN, TURKEY AND THE LEVANT

Measure	<u>R. euryale</u>	<u>R. mehelyi</u>
GL	n = 6 18.2-19.1	n = 8 19.4-20.0
CBL	n = 5 16.3-17.0	n = 7 17.0-18.1
CCL	n = 8 15.0-16.3	n = 9 16.3-17.0
ZW	n = 8 9.0-9.6	n = 9 10.0-10.5
BB	n = 9 8.5-9.2	n = 10 9.0-9.7
PO	n = 9 2.1-2.6	n = 10 2.3-2.6
G-M ³	n = 9 5.3-6.3	n = 10 6.0-6.6
M ³ -M ³	n = 9 3.9-4.1	n = 10 4.2-4.5
G-M ₃	n = 8 6.3-7.2	n = 10 7.0-7.2
ML	n = 8 11.6-12.1	n = 10 12.4-13.1

Rhinolophus euryale and R. mehelyi in Iran and many of the specimens previously reported as R. euryale are, in fact, R. mehelyi.

Etemad (1963) reported a single R. euryale from Khorassan Province. Lay (1967:136) stated that this specimen was actually collected by the 1962 Street Expedition at Shahpur Cave, Fars Province and Etemad (1968:6) has corroborated this. I have examined 13 of the 14 Street specimens from this cave in the collections of the Field Museum and on the basis of cranial measurements and shape of lancet have identified them all as R. mehelyi. Of Etemad's (1963) cranial measurements for his specimen, two, condylocanine length (CCL 16.3 mm) and length of upper tooth row (C-M³ 6.3 mm), lie in the area of overlap between R. euryale and R. mehelyi. The measurement for zygomatic width, the most useful in separating these two forms, lies well within the range for R. euryale. Since these two species have been found together at two other caves in Iran and at several points outside the country, on the basis of zygomatic width, it must be assumed that Etemad's identification is correct.

Lay (1967:135) mentioned a record from Mahallat, Isfahan Province attributed to "Etemad 1964 p. 653." In his 1964 paper Etemad did report R. blasii from Mahallat on page 653, but made no mention of R. euryale at all.

Aberdeen University (1965) reported having four specimens of R. euryale from Shah Abbas Caves, Kuh Rang, Bakhtiari (=Isfahan) Province, Iran. These bats were identified by J. E. Hill of the British Museum. After notifying Aberdeen University of their identity, Hill reexamined the collection and discovered that three of the above four individuals were R. mehelyi (Hill, pers. comm. 1970).

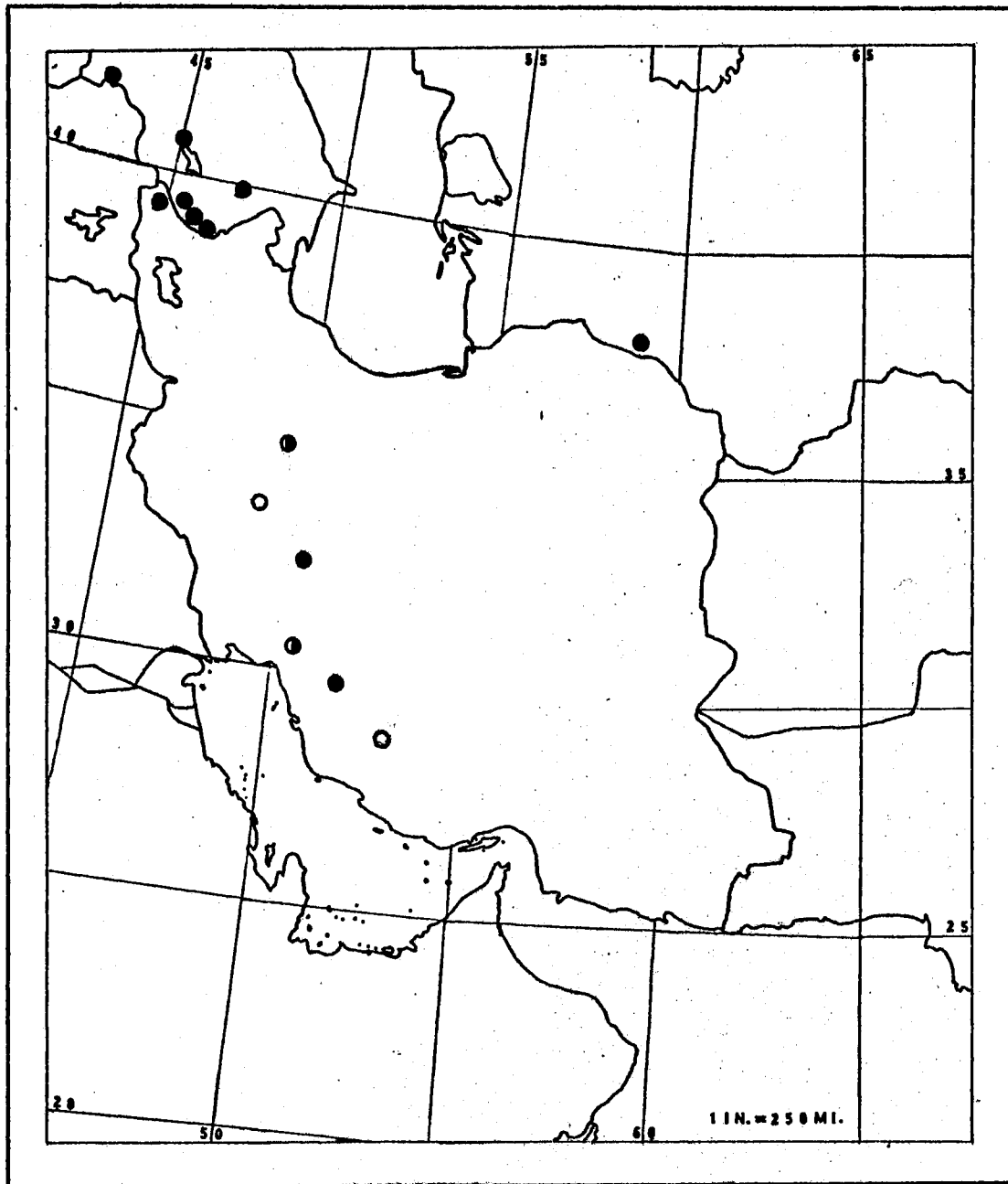


Figure 16. Distribution of Rhinolophus euryale

- = Previous records
- ◐ = Tentative records
- = New records

Lay (1967:135) reported 14 specimens from Shahpur Cave, Fars Province. As indicated above, 13 of these specimens are R. mehelyi. I have not seen the skeleton specimen, but on the basis of Etemad's (1963) record, Shahpur Cave tentatively remains a locality for R. euryale. Lay (1967:135) also reported 21 specimens of R. euryale from Maku, West Azarbaijan Province. I have reexamined this series and have found that on the basis of cranial measurements and lancet shape, it included four R. mehelyi and 17 R. euryale.

Etemad (1967:277) reported additional specimens of R. euryale from Behbahan (=Behbahan), Khorzaneh Cave (Etemad 1968:6), Hamedan, but gave no evidence to support his identifications. They are thus only tentatively included on the list of localities for this species in Iran.

NEW RECORDS: The 1968 Street Expedition collected nine R. euryale from Canae Gabru cave, near the village of Tar Divon, about 40 miles north of Jahrom on 10 November. On 6 September 1968 I collected one skull and three mummies of prevolant Rhinolophus from a cave in the mountain at the west edge of Khurramabad, Lurestan and Khuzistan Province. Two of the mummies had the noseleaf in good condition and I was able to identify them as R. euryale on the basis of shape of sella and lancet. The remaining mummy and the skull I tentatively assign to this species by their association with the identifiable specimens.

On 20 September 1969, Lay collected two R. euryale from a religious shrine about 30 km NE of Bijar, Kurdistan Province.

RANGE: Rhinolophus euryale is known from eight localities in western Iran. All of these except for Bebahan are situated within

TABLE XI
 MEASUREMENTS OF RHINOLOPHUS EURYALE FROM IRAN

Measure	Maku	Bi jar	Kuh Rang	Canae Gabru
TL	80.7 (15) 76-85	81.5 (2) 78-85	80	90.5 (8) 85-94
T	26.1 (17) 23-29	31.5 (2) 30-33	26	31.1 (9) 30-32
HF	10.9 (17) 10-12	11.5 (2) 11-12	10	10.9 (9) 10-11
E	21.8 (17) 19-24	23 (2) 23-23	20	21.1 (9) 20-22
FA	49.3 (17) 47-51	47.5 (2) 46-49	48.9	48 (9) 48-48
D 4, P 1	7.2 (17) 6.5-8.6	7.4 (2) 7.3-7.4		7.9 (9) 7.1-9.2
D 4, P2	18.3 (17) 16.5-19.7	18.0 (2) 18.0-18.1		18.0 (2) 16.1-19.4
HW	6.1 (13) 5.4-6.7	6.6 (4) 6.5-6.6		6.0 (2) 5.8-6.3
GL	19.1 (5) 19.0-19.4			19.0 (6) 18.7-19.4
CBL	16.9 (5) 16.8-17.0			16.9 (6) 16.5-17.3
CCL	15.9 (6) 15.7-16.4			15.7 (6) 15.5-15.9
ZW	9.5 (6) 9.4-9.7			9.4 (6) 9.1-9.6
C-M ³	6.0 (8) 5.8-6.3			5.8 (6) 5.7-5.9
C-M ₃	6.7 (8) 6.5-6.9			6.7 (6) 6.5-7.2
ML	12.0 (8) 11.7-12.2			12.0 (6) 11.8-12.1

the Zagros Mountains north of that city. The Behbahan specimen may have come from the mountains just north of that city. This species may be expected to range throughout these mountains and, in view of the Ashkhabad record in Bobrinskii et al. (1965), through the Elburz Mountains south and east of the Caspian Sea as well.

Subspecies

Two forms referred to R. euryale have been described from southwestern Asia. Euryalus judaicus Anderson and Matschie, 1904 was described from the Cave at Adallam, Jerusalem, Palestine and Rhinolophus euryale nordmanni Satunin, 1911 was described from Pavlovsh, Sukhum District, Transcaucasia. Both of these were regarded as full subspecies of R. euryale by Ellerman and Morrison-Scott (1951:120). Harrison (1964:85) retained the name R. e. judaicus for specimens from the Arabian Peninsula but stated that he considered "judaicus to be hardly distinguishable from R. e. euryale" (Harrison 1964:90). Ognev (1928:313) pointed out several discrepancies in Satunin's original description of R. e. nordmanni and also found little to distinguish this form from R. e. euryale. He listed it as "Rhinolophus e. euryale morpha. nordmanni." Bobrinskii et al. (1965:87) seemed to agree with Ognev. I have not had material of the nominate form or of R. e. nordmanni available for comparison, but agree with Harrison (1964) that all of this material must be more closely examined before the relationships can be clarified. Until this is done I must agree with the Russian authors and refer the Iranian specimens to the nominate subspecies.

Specimens Examined

I have examined 33 R. euryale from Iran, four from Turkey and two each from Greece and Lebanon.

Rhinolophus mehelyi Matschie, 1901

TYPE DESCRIPTION: Rhinolophus mehelyi Matschie, 1901. S. B. Ges. Naturf. Fr. Berlin, p. 225. TYPE LOCALITY: Bucharest Rumania.

Identification

Rhinolophus mehelyi is a medium-sized (FA 43 to 53 mm; CBL 17.0 to 18.1 mm) Rhinolophus. The dorsal connecting process of the sella is long and sharply pointed and the anterior projection of the sella is wide and broadly rounded.

Rhinolophus mehelyi resembles R. euryale rather closely and has frequently been confused with it. The tip of the lancet of R. mehelyi is long and parallel-sided whereas the entire lancet of R. euryale is triangular (Fig. 11-C, D). Rhinolophus euryale has a generally smaller skull than R. mehelyi. For a more detailed discussion of characters distinguishing these two species see the Identification section of the preceding species.

World Range

Rhinolophus mehelyi is known from several scattered locations in southern Europe ranging from Portugal to Rumania (van den Brink 1963: 53). In Africa it has been reported from Morocco, Tunisia, and Egypt (Hayman 1967:48). Harrison (1964) has disputed the Egyptian record

and does not recognize R. mehelyi from the Arabian Peninsula, however five specimens from near the Great Pyramid, Giza Province, Egypt and one from Palestine (no exact locality given) in the collections of the Field Museum are properly referred to this species. Çağlar (1965) listed R. mehelyi from several localities in Turkey and Bobrinski et al. (1965: Map 18) recorded it from the Transcaucasian region of the USSR.

Iran Distribution

PREVIOUS RECORDS: This species has not been previously reported from Iran. However, several specimens previously reported as R. euryale are in fact R. mehelyi. These are listed below.

NEW RECORDS: Aberdeen University (1965) reported four R. euryale from Shah Abbas Caves, Kuh Rang, Bakhtiari (=Isfahan) Province. These bats were identified by J. E. Hill of the British Museum. After notifying Aberdeen University of the identity of these specimens, Mr. Hill reexamined the collection and discovered that three of the four individuals were, in fact, R. mehelyi (Hill, pers. comm. 1970).

Lay (1967:135) reported 14 specimens of R. euryale from Shahpur Cave, Fars Province. I have reexamined 13 of these specimens and identified all as R. mehelyi. Lay (1967:135) also reported 21 specimens from Maku, West Azarbaijan Province. I have reexamined this series and found that it includes four R. mehelyi and 17 R. euryale.

On 13 and 14 August the 1968 Street Expedition collected 40 R. mehelyi from Gara Tarik (literally, Dark Cave) about 4 km north of the village of Qareh Darreh, Kurdistan Province.

RANGE: To date Rhinolophus mehelyi is known from four sites in

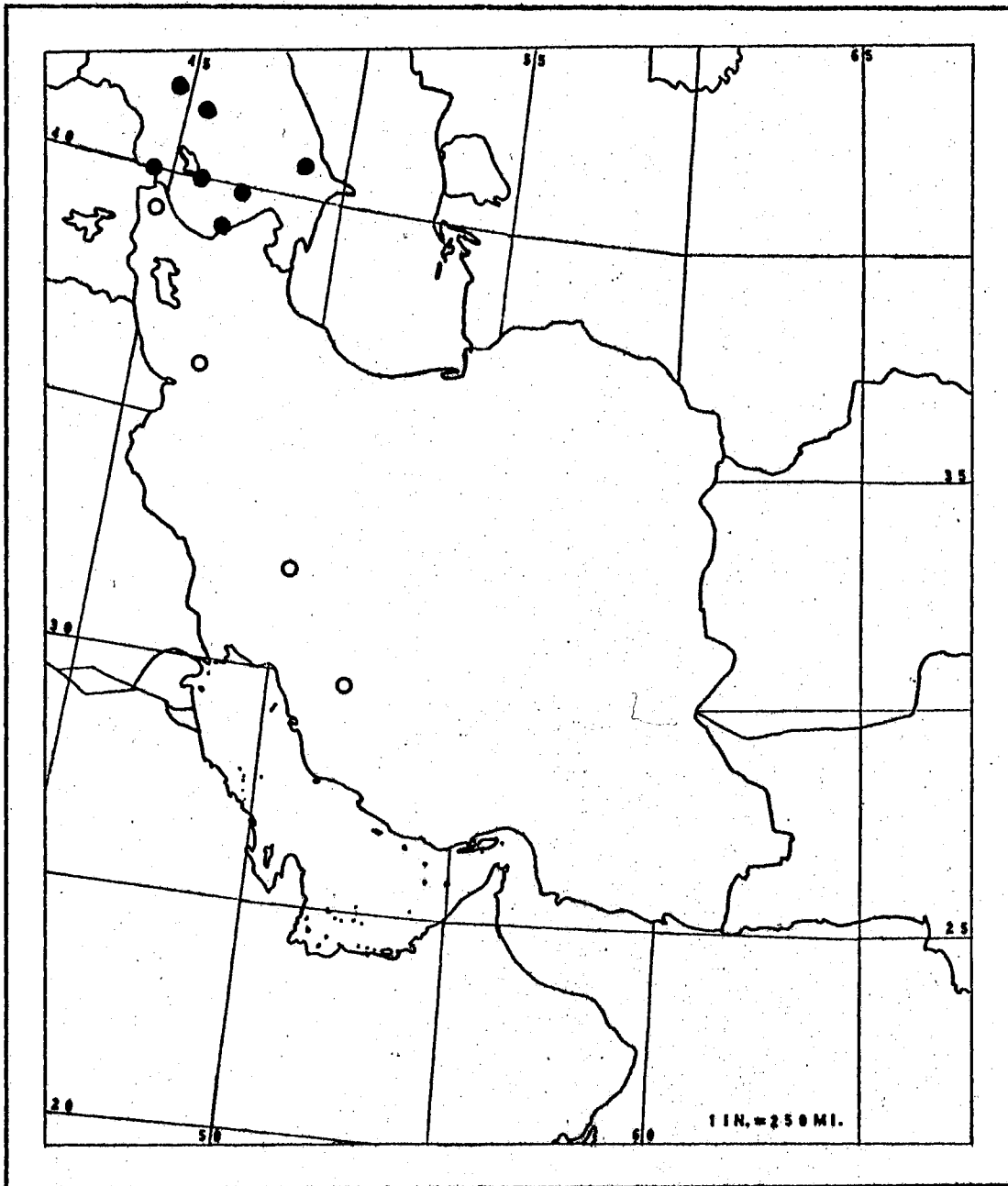


Figure 17. Distribution of *Rhinolophus mehelyi*

- = Previous records
- = New records

TABLE XII
 MEASUREMENTS OF RHINOLOPHUS MEHELYI FROM IRAN

Measure	Maku	Kuh Rang	Gara Tarik	Shahpur Cave
TL	85.8 (4) 82-90	85.0 (3) 82-88	85.2 (16) 76-95	79.4 (13) 72-84
T	27 (4) 26-29	24 (3) 24-24	28.1 (16) 22-23	24.5 (13) 20-28
HF	11.1 (4) 11-11.5	11.0 (3) 10-12	11.4 (16) 10-12	11.4 (13) 10-12
E	21.9 (4) 19-23.5	21.7 (3) 21-22	21.1 (16) 20-23	22.1 (13) 21-23
FA	50.2 (4) 46-53	51.2 (3) 50.7-51.7	51.7 (15) 50-54	50.0 (13) 43-52.9
D 4, P 1	8.0 (4) 7.8-8.2		8.0 (16) 7.4-8.5	7.9 (13) 7.5-8.3
D 4, P 2	19.3 (4) 18.6-19.7		19.5 (16) 17.8-21.4	19.7 (13) 18.6-20.8
HW	6.0 (4) 5.6-6.4		5.7 (13) 4.9-6.0	5.8 (10) 5.3-6.3
GL	19.6 (2) 19.4-19.9		19.7 (4) 19.4-19.9	20.0 (6) 19.3-20.2
CBL	17.5		17.3 (4) 17.0-17.7	17.7 (6) 17.2-18.1
GCL	16.7		16.3 (5) 16.2-16.5	16.7 (6) 16.1-17.0
ZW	10.2 (2) 10.1-10.3		10.2 (4) 10.0-10.4	10.3 (6) 10.0-10.6
G-M ³	6.4 (2) 6.2-6.6		6.3 (5) 6.0-6.6	6.4 (6) 6.1-6.9
G-M ₃	7.0 (2) 7.0-7.1		7.1 (5) 7.0-7.2	7.2 (6) 7.0-7.4
ML	12.4 (2) 12.4-12.5		12.6 (4) 12.5-12.8	12.8 (6) 12.4-13.1

the Zagros Mountains ranging from Maku, near the Soviet border, south to Shahpur Cave. It probably occurs throughout the Zagros Mountains north of Shiraz and may occur in the Elburz Mountains as well.

Specimens Examined

I have examined the 60 R. mehelyi known from Iran as well as five from Egypt and one each from Palestine and Turkey.

Rhinolophus blasii Peters, 1857

TYPE DESCRIPTION: Rhinolophus blasii Peters, 1857. Mber. Preuss. Akad. Wiss. 17. New name for clivosus Blasius, 1857 nec. Cretzschmar.

TYPE LOCALITY: Italy.

Identification

Rhinolophus blasii is a medium-sized Rhinolophus (FA 46 to 51 mm; CBL 16.9 to 18.6 mm). The sella has a high and acutely pointed superior connecting process and a narrow, somewhat pointed anterior projection (Fig. 11-A). The first phalanx of the fourth digit is over half the length of the second phalanx. The small first upper premolar is in the tooth row between the canine and second premolar and the anterior and posterior lower premolars are about equal in crown area.

World Range

In Africa R. blasii is known from Transvaal, Rhodesia, Malawi, Congo (Kinshasa), Eritrea and Morocco (Hayman 1967:47). In Europe it is known from Italy and Sicily and the Balkan Peninsula south to Greece and Crete (van den Brink 1968:51). In Asia Harrison (1964:90) reported

it from Yemen and the Levant, Bate (1903) listed it from Cyprus, and Khamann and Çağlar (1960) recorded it from Turkey. Bobrinskii et al. (1965: Map 17) showed two records from Transcaucasia and two from Transcaspia which appear to be in Khorassan Province, Iran. Neuhauser (1969:65) summarized the records for Afghanistan.

Iran Distribution

PREVIOUS RECORDS: Anderson (1905:192) reported a specimen from the Mekran Coast. The precise locality is unknown and the specimen may have come either from Iran or West Pakistan. Etemad (1964:653) reported two specimens from Baba-djber Cave near Mahallat, Isfahan Province. Bobrinskii et al. (1965: Map 17) showed two localities which appear to be near the Soviet border in northern Khorassan Province. Aberdeen University (1965) reported three specimens from the Shah Abbas Caves, Kuh Rang area, Isfahan Province. Lay (1967:136) reported 51 specimens from two qanats and a cave in the vicinity of Shahrabad Kaur; Khorassan Province and six specimens from a large fault crack 1.6 km east of Kerman, Kerman Province.

NEW RECORDS: On 10 November several members of the 1968 Street Expedition collected five R. blasii from Canae Gabru cave near the village of Tar Divon, about 40 miles north of Jahrom, Fars Province. On 26 July 1968, I collected a decomposing specimen of this species (skull and skeleton preserved) found floating in spring water in a man-made tunnel cut into the cliff at the north edge of Maku, West Azarbaijan Province.

RANGE: Rhinolophus blasii has been collected from the north, central and southern Zagros Mountains, from mountains of northeastern

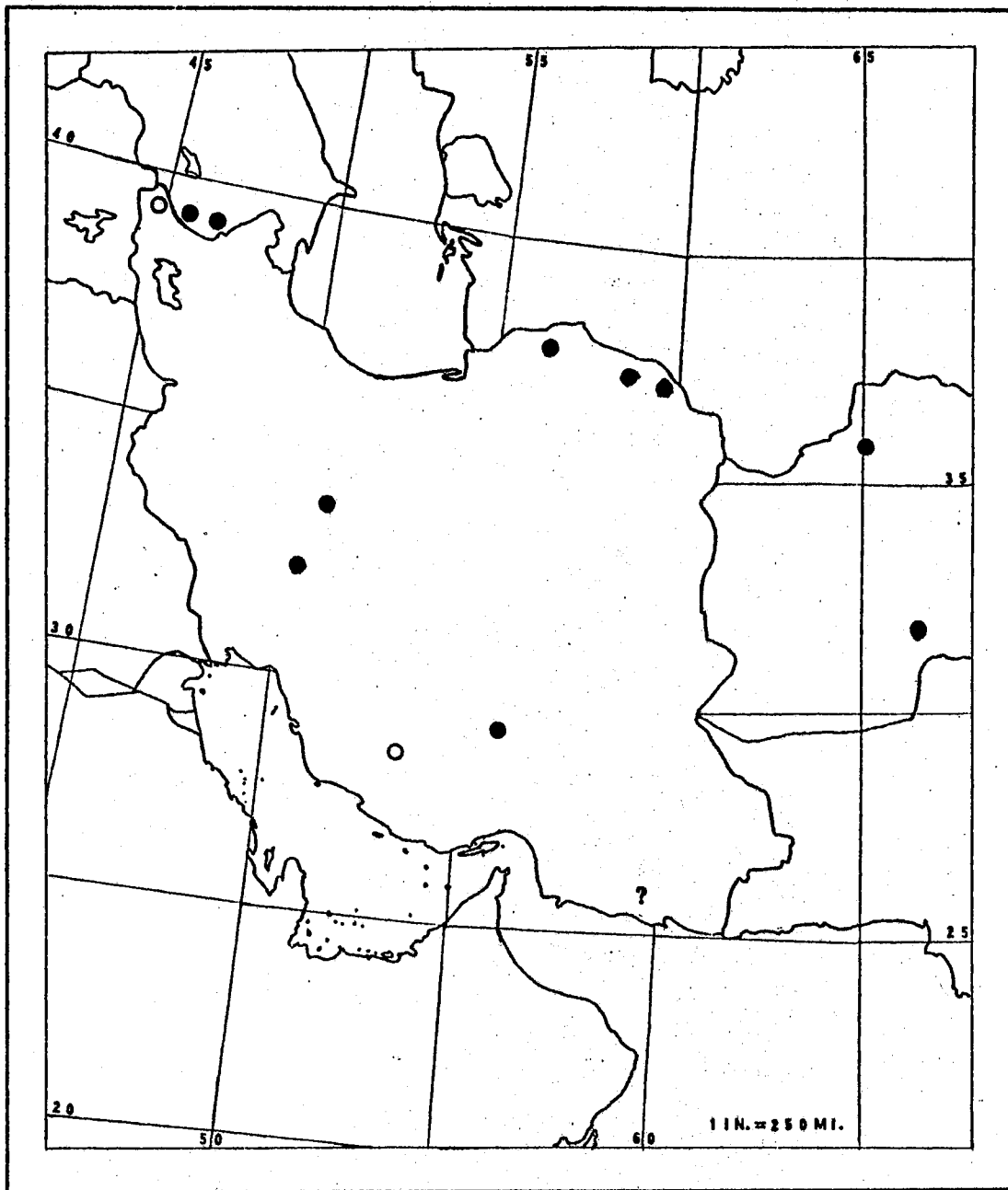


Figure 18. Distribution of Rhinolophus blasii

- = Previously reported
- = 1968 Street Expedition specimens
- ? = "Mekran Coast," either Iran
or West Pakistan

Iran and from Kerman and the Mekran Coast in the southeast. These widely distributed localities together with the numerous records in Afghanistan indicate that this species may be expected in all of the dry mountainous portions of this country.

Subspecies

Only the nominate form, Rhinolophus b. blasii, is known from the Palearctic. Other subspecies are presently recognized from the Ethiopian Region (Hayman 1967).

Specimens Examined

I have examined 65 R. blasii from Iran, 89 from Afghanistan, four from Cyprus, one from Palestine, one from Turkey, and six from Yemen.

CHAPTER VII

THE FAMILY HIPPOSIDERIDAE

The Old World leaf-nosed bats are closely related to the family Rhinolophidae and are included by many authors as a subfamily, Hipposiderinae, in that group. The noseleaf of the hipposiderids differs from that of the rhinolophids in several respects: the sella and connecting process are lacking; an erect transverse lobe corresponding to the lancet is, in Iranian species, divided into three distinct dorsally projecting lobes; and between this erect portion and the nostrils, the noseleaf is divided into a complex series of cells. As in the Rhinolophidae the tragus and postorbital process of the skull are absent. The premaxillae are represented only by palatal branches which are fused to each other medially but separated laterally from the maxillae by deep emarginations of the palate.

Two genera, Asellia Gray, 1838 and Triaenops Dobson, 1871, occur in Iran where each is represented by a single species.

Key to the Species of Hipposideridae in Iran

- 1 Pinna with a conspicuous notch on the inner margin;
noseleaf with three long vertical projections; a spicule of bone projects transversely into the wing membrane from the base of the distal phalanx of the third digit;
a very small first upper premolar present . . . Triaenops persicus

- 1' Pinna without notch on inner margin; noseleaf with three short vertical projections; no spicule of bone projecting from phalanges into wing membrane; the first upper premolar absent Asellia tridens

Asellia tridens Geoffroy, 1813

TYPE DESCRIPTION: Rhinolophus tridens Geoffroy, 1813. Ann. Mus. H. N. Paris 20:26, Pl 5. TYPE LOCALITY: Egypt. Restricted to Thebes by Kock (1969:215).

Identification

Asellia lacks a sella, and the large, single-pointed lancet of Rhinolophus is represented by three small subequal projections. In Asellia the pinnae do not have the marked indentations on their inner borders and there is no small first upper premolar. The dental formula is $I \frac{1}{2} C \frac{1}{1} P \frac{1}{2} M \frac{3}{3} = 28$.

World Range

Asellia tridens is a Saharo-Sindian species ranging from Morocco and Senegal east through the Sahara to the Red Sea and south through Somalia (Kock 1969:129). With the exception of the central Arabian deserts it ranges throughout the Arabian Peninsula from Mosul, Iraq to the southern coasts of Aden and Oman (Harrison 1964:97). To the east of Iran it is known from Baluchistan and Sind, West Pakistan (Siddiqi 1969:8), and from southern Afghanistan (Neuhauser 1969).

Iran Distribution

PREVIOUS RECORDS: Anderson (1881:113) reported a specimen of Asellia tridens from Bushire (=Bushehr), Fars Province. Etemad (1967:277) reported the species from Dezful, Lurestan and Khuzistan Province; Kazerun, Fars Province; and Roudan, 80 km E of Bandar Abbas, Kerman Province. Lay (1967:139) reported nine specimens from Rabatak and seven from Jahrom, both Fars Province, which he collected. He also reported specimens which he located in various collections as follows: Shush, Lurestan and Khuzistan Province (1); Kerman, Kerman Province (3); Seistan (no exact locality), Seistan and Baluchistan Province (1); and Mekran Coast (1). The "Mekran Coast" specimen could be from either Iran or West Pakistan (Siddiqi, 1969, has included this same specimen in his list for West Pakistan) and the "Seistan" specimen could be from Iran or Afghanistan.

NEW RECORDS: On 4 September while passing through the town of Mehran, Lurestan and Khuzistan Province, the 1968 Street Expedition purchased a mummified specimen of this species from a small boy. He said that it had been found in his home in that town. Later the same day we visited a large bat cave known as Sarin Ab-Garma (literally, "Beginning of the Hot Water") in the mountain just north of the town of Dehloran, Lurestan and Khuzistan Province. We collected eight of the approximately 5,000 Asellia tridens seen in this cave.

RANGE: The records of A. tridens in Iran and adjacent countries indicate that this species occurs throughout the Khuzistan Plain, the Persian Gulf and Mekran coastal strips, and the mountain and desert areas of southern Iran. Kock (1969:129) mapped this species much

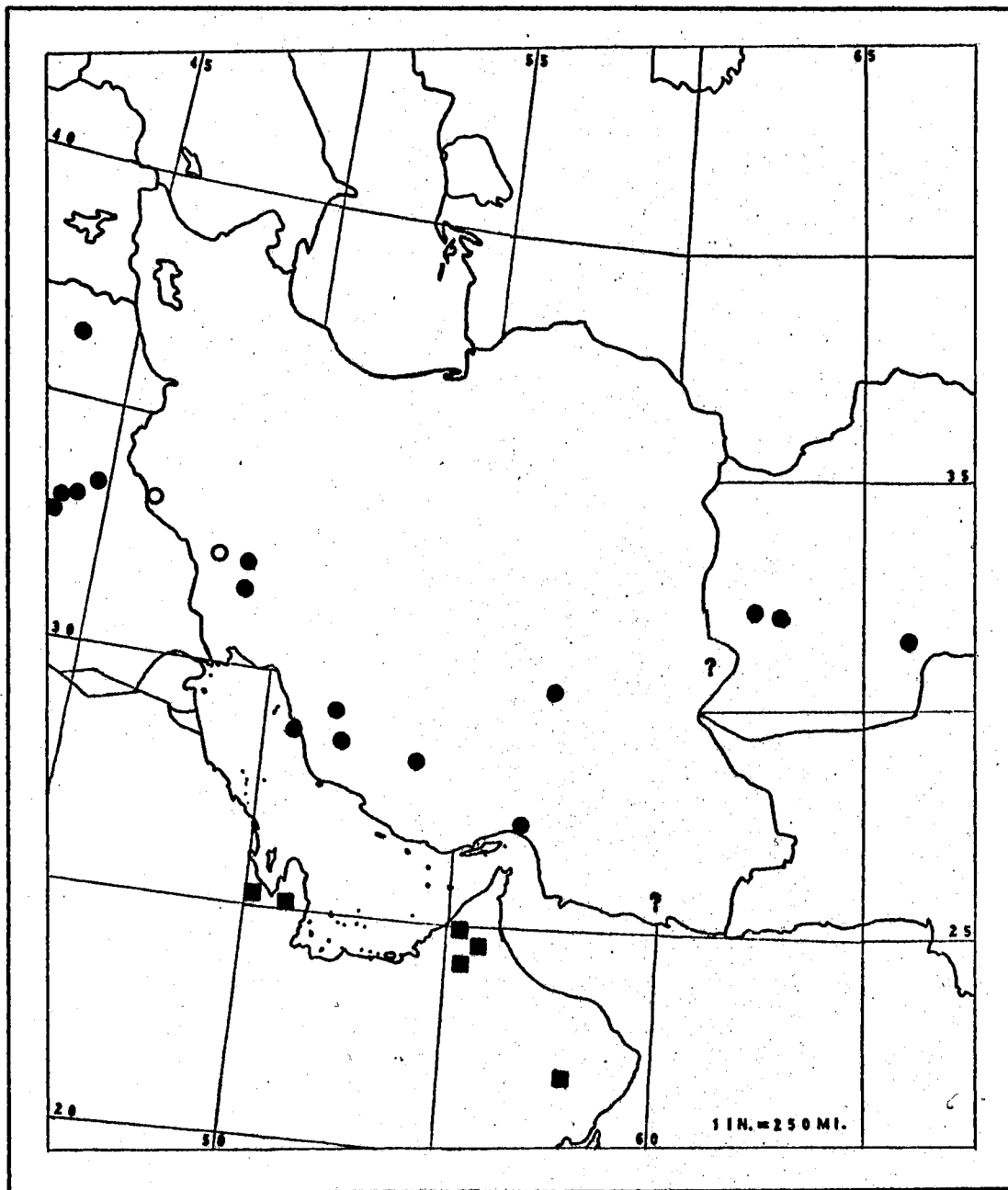


Figure 19. Distribution of Asellia tridens

- = A. t. tridens
- = A. t. murrayana, previous records
- = A. t. murrayana, new records
- ? = A. t. murrayana, "Mekran Coast"
(Iran or West Pakistan?)
- ? = A. t. murrayana, "Seistan"
(Iran or Afghanistan?)

further north in Iran than it has been reported and probably much further than it can be expected to go, though its range in the central deserts is unknown.

Subspecies

The form Asellia tridens murraiana Anderson, 1881, was described from Karachi, Sind, West Pakistan and has been reported from Afghanistan (Allen 1959) and from Iraq and Aden (Harrison 1964:97). The nominate form, A. t. tridens, was described from Egypt and has been recorded from Oman and southeastern Saudi Arabia (Harrison 1964:97). Kock (1969:129), in his recent study of the relationships between these two forms, mapped all of the Iranian records as "unterartliche zugehörigkeit noch ungeklärt."

Asellia t. murraiana was described by Harrison (1964:97) as being, on the average, larger in size than A. t. tridens. Kock (1969) agreed in using average lengths of forearm and various cranial dimensions to separate the two forms.

I have examined specimens collected by the two Street Expeditions from Mehran, Dehloran, Rabatak, and Jahrom, and specimens in the British Museum from Bushehr, Seistan, and the Mekran Coast. Measurements of all of these specimens fit the ranges and means given by Kock (1969) and Harrison (1964) for A. t. murraiana better than those for A. t. tridens (Table XIII).

Harrison (1964:97), in describing the color of A. t. murraiana, said that, "Erythristic individuals seem to be very unusual in this form and possibly even do not occur" The 24 specimens from Afghanistan and the Iranian specimens from Dehloran, Mehran, and

TABLE XIII
 MEASUREMENTS OF ASELLIA TRIDENS FROM IRAN

Mea- sure	Mehran	Dehloran	Bushehr	Rabatak	Jahrom	Seistan	Mekran Coast
TL		83.8 (7) 75-90					
T		23.6 (7) 21-27	23			23	
HF		9.4 (7) 9-10	9			8	
E		16.6 (7) 16-17	19			18	
FA	53	49.8 (7) 49-50	52.4	50.5 (7) 48.7-51.4	51.8 (2) 50.8-52.8	48.7	51.0
GL		18.6 (4) 18.0-19.2	[18.3]		18.5 (3) 18.3-18.8		
CBL		16.9 (4) 16.3-17.4	[16.8]		16.8 (4) 16.7-17.2		
CGL		15.7 (5) 15.4-16.0			16.0 (3) 15.9-16.1		
ZW		10.6 (4) 10.4-11.0	10.3		10.4 (2) 10.0-10.7		
BB		7.7 (5) 7.5-7.9	8.7		7.4 (4) 7.1-7.6		
PO		2.3 (5) 2.3-2.4	2.25		2.3 (4) 2.3-2.3		2.4
C-M ³		6.1 (5) 5.9-6.3	6.8		6.4 (4) 6.2-6.8		6.9
M ³ -M ³		5.0 (5) 4.8-5.1	4.7		5.1 (4) 4.8-5.3		4.7
G-M ₃		7.5 (5) 7.3-7.7	7.4		7.4 (3) 7.3-7.5		7.5
ML		12.8 (4) 12.1-13.2	12.9		12.7 (4) 12.5-13.2		

Jahrom which I have examined are mostly a light, yellowish brown, a few are more grayish. Of the series of eight mummified A. t. murraiana from Rabatak, five match the other Iranian specimens, but three are considerably redder both dorsally and ventrally. FMNH 93379 and 93384 have an overall dorsal coloration matching OOS 13-19° of Villalobos-Dominguez and Villalobos (1947) and a very similar ventral coloration. FMNH 98385 is even redder and has a ventral coloration closest to OSS 14-10°. The dorsal color is similar, but this mummy is in too poor a condition for accurate comparisons of the dorsum to be made. Forearms of these three specimens measure 50.4, 51.4 and 51.4 mm, respectively.

Specimens Examined

I have examined 25 A. tridens from Iran, 48 from Afghanistan and four from West Pakistan.

Trioenops persicus Dobson, 1871

TYPE DESCRIPTION: Trioenops persicus Dobson, 1871. J. Asiatic Soc. Bengal 40.2:455, pl 18. TYPE LOCALITY: Shiraz, about 4,750 ft., Persia. TYPE SPECIMEN: Adult female in spirit, Indian Museum Calcutta (Dobson 1878:125). Cotype: BM 76.3.10.3, Sex ?. Skull and viscera removed from specimen in spirit. The carcass has a paper tag with the following information: "No Reg. No," "Shiraz," "Paratype of persicus," and a metal tag with the numbers "302" stamped into one side and "1066" scratched into the other. No skull labeled as BM 76.3.10.3 was found. A skull of this species labeled "No Reg.," "Shiraz," "278" was located.

Identification

Triaenops persicus may be distinguished from the rhinolophids by the absence of a sella and from Asellia by the presence of a distinct notch on the inner margin of the ear and the presence of a minute first upper premolar. The dental formula is $I 1/2 C 1/1 P 2/2 M 3/3 = 30$.

World Range

Triaenops persicus is reported only from southwest Iran (Lay 1967:139), Oman and Aden (Harrison 1964:105) in Asia, and from Somalia, Kenya, Tanzania, ?Zanzibar, Uganda and Mozambique in Africa (Hayman 1967:59).

Iran Distribution

PREVIOUS RECORDS: Dobson (1871:459) described the species from Shiraz, Fars Province. Harrison (1955:900) mentioned a specimen in the British Museum from Bushire (=Bushehr), Fars Province, and Lay (1967:139) reported 16 specimens from Ahram, Fars Province.

RANGE: This species is known in Iran only from the above three localities. However, it has been only very rarely collected throughout its range and it may be more widely distributed in southwestern Iran.

Subspecies

Only the nominate form, Triaenops p. persicus, occurs in Iran.

Harrison (1955:900) described the form Triaenops persicus macdonaldi from Oman as being much darker in color than is indicated in the type description of the nominate form and darker than the Shiraz

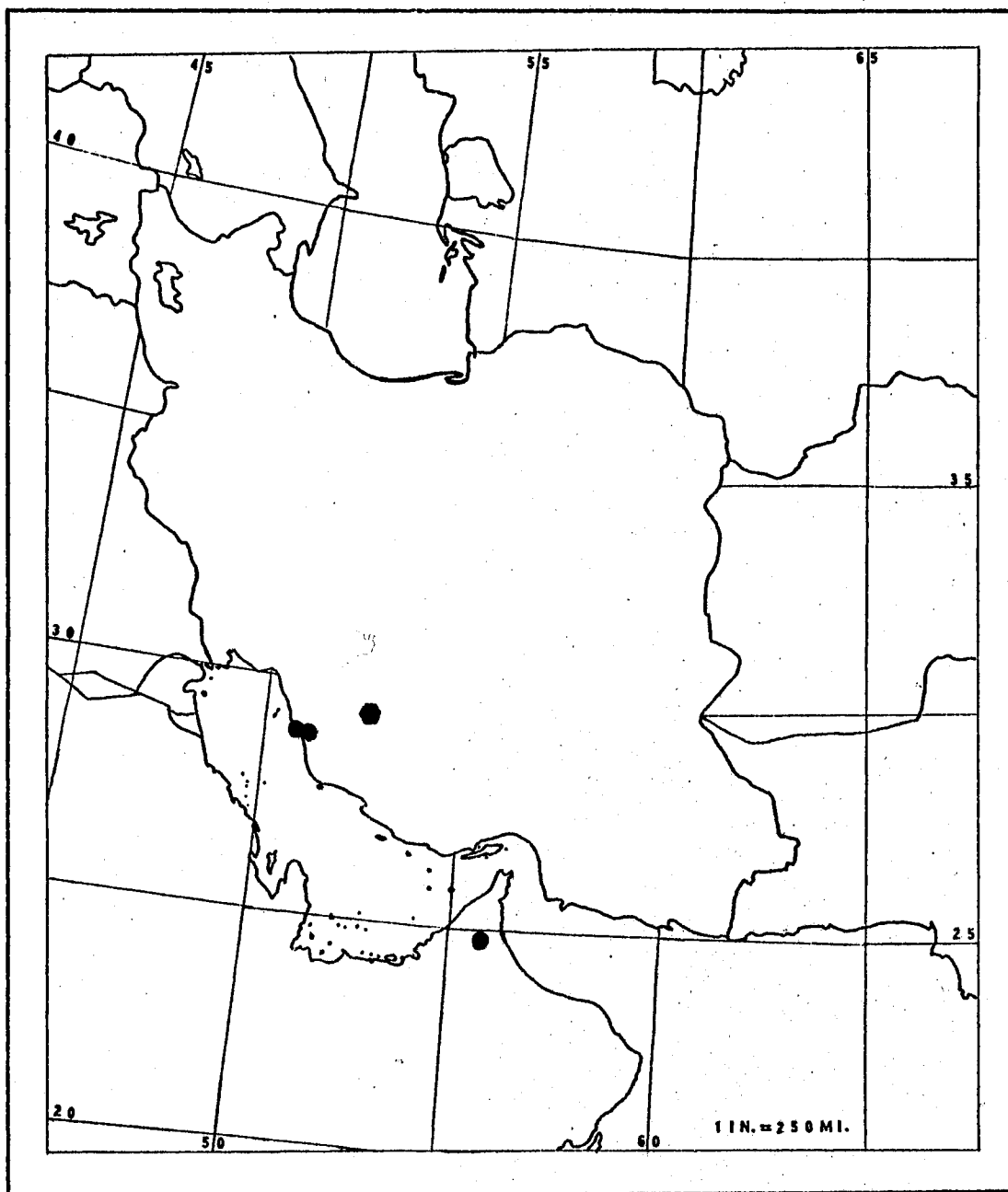


Figure 20. Distribution of Triaenops persicus

- = Type locality of T. persicus
- = Previous records

cotype and Bushehr specimens preserved in alcohol at the British Museum. The type of T. p. macdonaldi was described as "pale grey-brown somewhere between the drab of Ridgway (plate 3, No. 18) and drab-grey (plate 2, No. 13). The belly is a pale buff colour somewhere between olive-buff of Ridgway (plate 5, No. 12) and cream colour (plate 6, No. 20)." One of the eight specimens in the Oman series differs from the others in color. It was designated as a cotype and was described as "light brown, close to clay colour of Ridgway The face, throat and crown of the head are darker matching ochraceous buff of Ridgway (plate 5, No. 10), while the belly is uniformly paler, a little more orange than cream-buff of Ridgway (plate 5, No. 11)."

I have examined the ten specimens collected at Ahram by the 1962 Street Expedition and which are preserved as dry skins in the Field Museum. This series exhibits considerable color variation. The ten specimens may be divided into five groups on the basis of color. Colors stated below are from Villalobos-Dominguez and Villalobos (1947); the colors in this volume designated by the authors as matching the colors of Ridgway are also given where pertinent.

Specimens FMNH 96674 and FMNH 96675 (males) are the palest individuals in the series and match the type description of T. persicus as stated by Dobson (1871) and quoted by Harrison (1955). The dorsal pelage is O-14-4^o, slightly lighter than Clay Color (O-13-7^o). The ventral pelage is OY-18-6^o, slightly lighter than Cream Color (OY-18-8^o). As with Dobson's type, these specimens are slightly darker in the shoulder and head regions, but they do not have the yellowish tinge toward the root of the tail which he mentioned.

Specimens FMNH 96669 (female), 96671, 96676, and 96680 (males) are

intermediate between the two described above and those described below. The dorsal pelage is closest to O-13-10°, close to Clay Color (O-13-7°). The ventral color is O0Y-15-7°, slightly redder than Cream Buff (O0Y-17-6°).

Specimens FMNH 96673 and 96679 (males) are essentially the same as the four immediately above in ventral color but the dorsal color is darker. It is closest to O-10-6°, slightly darker than Clay Color (O-13-7°).

Specimen FMNH 96672 (female) is the darkest brown and resembles the type of T. p. macdonaldi most closely. The dorsal pelage is O0S-9-4°, very close to Drab Gray (O0S-10-3°). The ventral color is completely uniform but does approach Olive Buff (O0Y-16-3°) and is closest to O0Y-17-5°. The head and throat regions are darker and brighter, close to Clay Color (O-13-7°) and closest to O-16-7°.

Specimen FMNH 96678 (female) is the reddest individual in the series. The dorsal pelage matches O-11-9°, very close to Clay Color (O-13-7°). The pelage on the head is similar to that on the back and is not nearly as bright as the Ochraceous Buff (O-16-9°) on the head of the T. p. macdonaldi cotype. The ventral pelage, O-13-9°, is slightly brighter than the dorsal pelage and is considerably redder than the Cream Buff (O0Y-17-6°) venter of the T. p. macdonaldi cotype.

Harrison (1955:900) also stated that, from his examination of the two Iranian specimens in the British Museum, "it appears that the Omanese bats may have a slightly smaller, more delicate skull than the specimens from Persia and S. Arabia, but more material will be required before this can be assessed." My measurements of the skull of the type specimen of T. p. macdonaldi are as follows: GL 19.8 mm; CBL

TABLE XIV
 MEASUREMENTS OF TRIAENOPS PERSICUS FROM IRAN

Mea- sure	Shiraz ¹ Type	Shiraz ² Co-type	Bushehr	Ahram
TL	87.6			92.5 (15) 88-97
T	30.5	32	32	33.8 (15) 31-39
HF		9	10	9.5 (15) 8-11
E	11.4	12	14	15.1 (15) 13-16
FA	50.8	51.6	53.0	52.4 (15) 51-55
GL		18.9		20.2 (8) 19.1-21.4
CBL		16.5		17.8 (8) 16.9-21.4
ZW		8.7	9.2	9.0 (8) 8.7-9.5
BB		8.5	9.1	7.85 (8) 7.6-8.2
PO		2.6	2.7	2.7 (9) 2.5-3.0
C-M ³		6.6	7.1	6.4 (9) 6.1-6.6
M ³ -M ³		4.1	4.2	4.1 (8) 3.9-4.2
C-M ₃		7.2	7.5	7.3 (4) 7.0-7.7
ML		11.8	12.8	12.5 (9) 11.7-13.1

¹ Dobson (1878:125), converted from inches

² Skin, BM 76.3.10.3; skull, BM "No. Reg., Shiraz 278"

17.5 mm; ZW 8.8 mm; BB 8.9 mm; PO 2.8 mm; C-M³ 7.0 mm; M³-M³ 4.2 mm; C-M₃ 7.5 mm; ML 12.4 mm. All of these fall within the range of variation of the specimens from Iran (Table XIV).

It therefore seems apparent that neither color nor skull size can be used to distinguish T. p. macdonaldi, and that this form must be placed in synonymy with T. p. persicus.

Specimens Examined

I have examined 17 specimens of T. persicus from Iran including the cotype. In addition I have seen the type of T. p. macdonaldi Harrison from Oman.

CHAPTER VIII

THE FAMILY MOLOSSIDAE

The free-tailed bats are characterized by a tail which extends well beyond the distal end of the short interfemoral membrane. This character is found only in these bats and in the Rhinopomatidae, which have a comparatively longer and much more slender tail.

The ears of Iranian molossids are joined across the forehead and a small tragus is present. The wing is long and narrow with only a single rudimentary phalanx on the second digit. The skull has no postorbital processes and both the nasal and palatal branches of the premaxillary are present.

One genus, Tadarida Rafinesque, 1814, is represented in Iran by two species.

Key to the Species of Molossidae in Iran

- 1 Size smaller; forearm 45 to 55.5 mm; condylobasal length 19.3 to 21.3 mm; no more than two pairs of lower incisors. Tadarida aegyptiaca
- 1' Size larger; forearm 54.5 to 63.9 mm; condylobasal length 22.5 to 24 mm; three pairs of lower incisors. Tadarida teniotis

Tadarida teniotis Rafinesque, 1814

TYPE DESCRIPTION: Cephalotes teniotis Rafinesque, 1814. Préc. des Découv. Somiol. p. 12. TYPE LOCALITY: Sicily.

Identification

Tadarida are differentiated from other Iranian bats by the free tail, the thick wrinkled lips, the large forward-projecting ears which nearly obscure the eyes, and the large feet with numerous stiff hairs projecting from their outer edge. Tadarida teniotis differs from T. aegyptiaca in its larger size and the presence of three pairs of lower incisors. The dental formula is I 1/3 C 1/1 P 2/2 M 3/3 = 32.

World Range

Tadarida teniotis is recorded from southern Europe from Portugal to Greece, and north to Switzerland (van den Brink 1968:73); from Egypt, Morocco, and Algeria (Hayman 1967:137); Lebanon, Israel and Iraq (Harrison 1964:108); the Caucasus, Turkestan and Uzbekistan in the USSR (Bobrinskii et al. 1965:Map 36); Afghanistan (Meyer-Oehme 1965); India (Hill 1964); China (Allen 1938); Korea (Ognev 1928); and Japan (Wallin 1969:357).

Iran Distribution

PREVIOUS RECORDS: Trouessart (1904:104) mentioned this bat from Persia but gave no locality or reference to a specimen. Lewis and Harrison (1962:475) listed a specimen from "Bushire, Persia" (=Bushehr, Fars Province) and another from the "Foot of the Elburz Mts. SE

Caspian, Persia." DeBlase (1971) reported the 1968 Street Expedition specimen from Minab, Kerman Province.

RANGE: This species is known in Iran only from the three localities cited above. In view of their wide separation and the occurrence of this bat in Asia on all sides of Iran, it is reasonable to expect it to occur in all parts of the country with the probable exception of the central deserts. Lay (1967:232) reported hearing and glimpsing bats which behaved much like T. teniotis at Ahram and Lake Famur, both in Fars Province.

Subspecies

Lewis and Harrison (1962:477) have shown that the specimens from the Arabian Peninsula are referable to T. t. ruppelli. This subspecies differs from the nominate form only in its "decidedly paler grey brown colour of the back which lacks the warm brown tint of T. t. teniotis" (Lewis and Harrison 1962:477). The two Iranian specimens examined by Lewis and Harrison are preserved in spirit, thus their color could not be determined precisely, but these authors felt that these specimens will be found to belong to T. t. ruppelli. Unfortunately, the Minab specimen is also preserved in spirit and its color cannot be described accurately.

Meyer-Oheme (1965) described his mummified specimen from Afghanistan as follows: "Color of skin of dorsum and venter: mat pale brown; hairtips dorsally and ventrally isabel colored; base of hair whitish" He stated that "It cannot be decided from a single specimen whether the specimen from Kabul belongs to T. t. teniotis or T. t. ruppelli as, the variable color of the hair is the only difference."

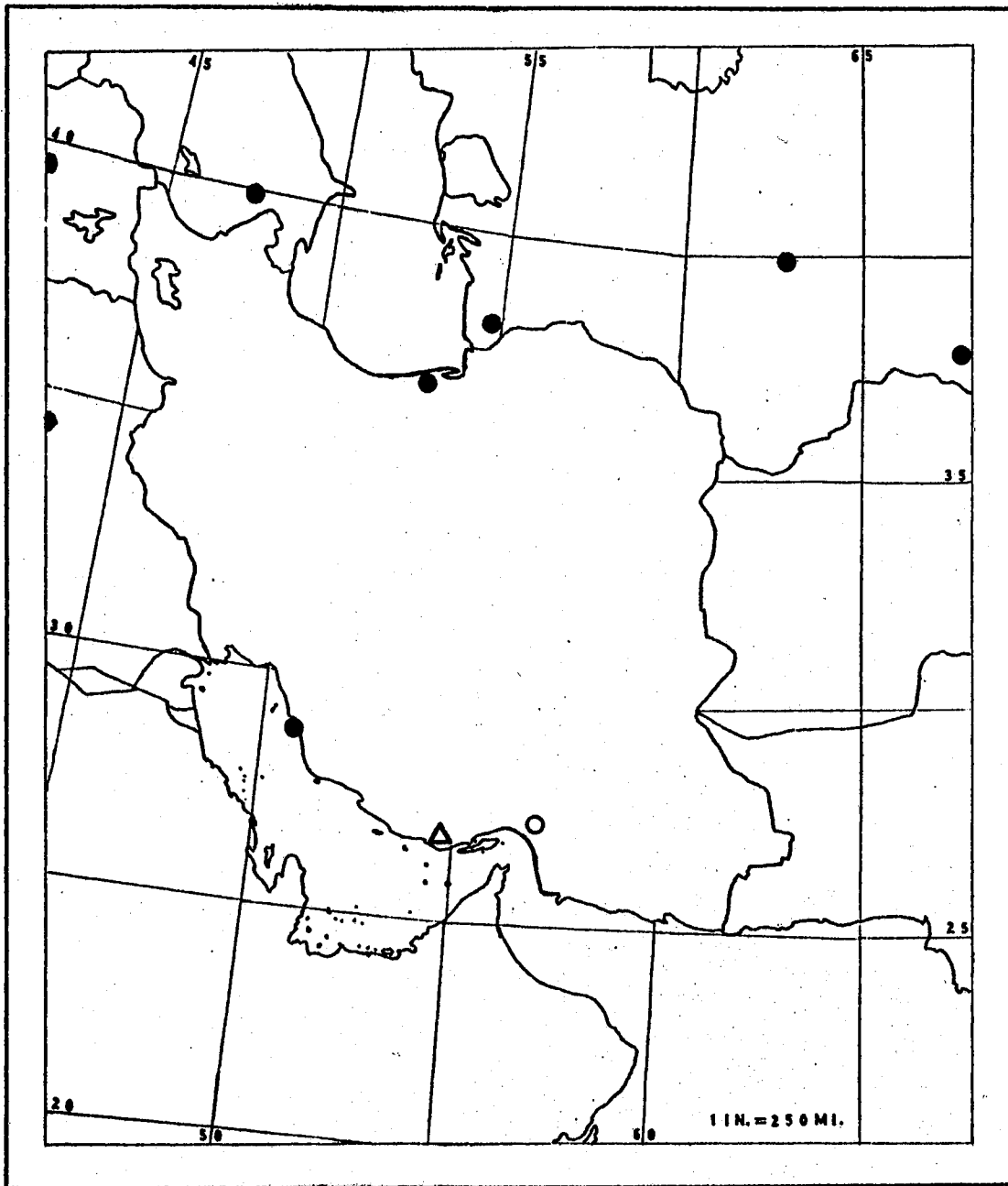


Figure 21. Distribution of Two Species of *Tadarida*

- = *T. teniotis*, previous records
- = *T. teniotis*, 1968 Street Expedition specimen
- Δ = *T. aegyptiaca*, 1968 Street Expedition specimens

However, he then went on to state that "the pale brown color typical for T. t. teniotis is present in this specimen." Bobrinskii et al. (1965:116) did not designate subspecies for the Russian specimens.

On the basis of the above, and the tendency for arid-land mammals to be lighter in color than their humid-area relatives, it seems logical at least tentatively to assign the two southern Iranian specimens to T. teniotis ruppelli. The Elburz Mountains specimen, coming from a considerably moister environment, may well prove to be the nominate form, T. t. teniotis.

Specimens Examined

I have examined all three T. teniotis known from Iran as well as a single specimen each from Lebanon, Egypt, and Italy.

Tadarida aegyptiaca Geoffroy, 1818

TYPE DESCRIPTION: Nyctinomus aegyptiacus Geoffroy, 1818.

Description de l'Egypte, 2:128, pl.2. No. 2. TYPE LOCALITY: Egypt.

TYPE SPECIMEN: Paris Museum (Dobson 1878:424).

Identification

Tadarida aegyptiaca may be distinguished from T. teniotis by its smaller size and by the presence of only two pair of lower incisors. The dental formula is $I \ 1/2 \ C \ 1/1 \ P \ 2/2 \ M \ 3/3 = 30$.

World Range

To the west of Iran T. aegyptiaca is known from south and central Africa, Nigeria, Algeria, Egypt and the Sudan (Hayman 1967:139; Kock

1969) and from Aden (Harrison 1964:1111). To the east it is known from Afghanistan (Meyer-Oehme 1965), West Pakistan (Siddiqi 1969:9), west, central and southern India and Ceylon (Hill 1961:33).

Iran Distribution

PREVIOUS RECORDS: Tadarida aegyptiaca has been reported only from the village of Chah Moslem, about 57 km N of Bandar-e-Lengeh, Fars Province (DeBlase 1971).

RANGE: Since this species is known from many areas west of Iran and many more east of this country it is likely that it occurs in southern Iran east to West Pakistan and perhaps west from Bandar-e-Lengeh region as well. Its occurrence in Kabul at about 5,900 feet indicates that it could be found through much of the mountainous southern area of Iran.

Subspecies

Specimens of Tadarida aegyptiaca from Egypt and Aden have been referred to the form T. a. aegyptiaca Geoffroy, 1818. To the east three forms have been described from India: T. a. sindica, T. a. thomasi and T. a. gossei, all Wroughton, 1919. Wroughton (1919:731-732) keyed these four forms as follows:

- A. Size larger, forearm about 52 mm.
 - a. General colour paler, about "drab grey."
 aegyptiaca, Geoff.
 - b. General colour darker, about "mouse grey."
 sindica, sp.n.
- B. Size larger [sic], forearm 48 mm or less.
 - a. General colour paler, near "seal brown."
 thomasi, sp.n.
 - b. General colour darker, near "clove brown."
 gossei, sp.n.

Various authors have accepted all three of the Indian forms (Ellerman and Morrison-Scott 1951; Hill 1961:33-34), lumped the two smaller ones (Sinha 1970:87-88), or considered all three inseparable (Brosset 1962:708). Since forearms of the two Iranian specimens are over 52 mm, and since sindica has page priority over thomasi and gossei the exact status of the three Indian forms is irrelevant to this study.

Wroughton (1919:731-732) distinguished aegyptiaca from sindica on the basis of color. Hill (1961:33) also said that "T. aegyptiaca sindica differs from T. a. aegyptiaca in its darker coloration" The Iranian specimens are both too brown for "Mouse Gray" (Ridgway 1912, Pl. LI) and too light for "Drab Gray" (Ridgway 1912, Pl. XLVI). Both fit the color description of the Aden specimens given by Harrison (1964:109) particularly with reference to the ". . . distinct pale speckling on the posterior back where the extreme hair tips are obscurely tipped with creamy white." However, they also fit the description of T. a. indica given by Hill (1961:33). Harrison (1964:109, 111) did state that the Aden specimens are ". . . unusually pale brown or grey for this species . . . in this respect quite unlike the African material seen." Unfortunately he did not mention which African material he was referring to, but I assume he meant other T. a. aegyptiaca and not a different African subspecies.

Meyer-Oehme (1965) described his specimens from Kabul, Afghanistan as follows:

The coloration of the back is mat brown (not gray!) venter paler in the middle, some white hairs at the ventral base of the wing membrane. The light Y-pattern mentioned in the literature for T. ae. indica is not recognizable. The posterior edge of the wing membrane is whitish. According to the measurements [FA 49.5 to 53.5 mm for nine females] the specimens from Afghanistan belong without doubt to the race T. ae. indica."

The posterior whitish edge of the wing membrane, a character not mentioned by Wroughton (1919), Hill (1961), or Harrison (1964), is conspicuous in both of the Iranian specimens.

To summarize, the dorsal coloration of the large Tadarida aegyptiaca from Asia has been described as "mouse grey" (India, Wroughton 1919:732), "grey brown" (India, Hill 1961:33), "pale brown or grey" (Aden, Harrison 1964:109), and "mat brown (not gray!)" (Afghanistan, Meyer-Oehme 1965). The Iranian specimens are both gray, but are browner than "Mouse Gray" of Ridgway. I do not know what Meyer-Oehme's "mat brown" is like but from his emphatic "not gray!" I must assume that the Iranian specimens are grayer than the ones from Afghanistan. The larger of the two Iranian specimens is slightly lighter than the smaller and has slightly less of the "speckling" described by Harrison (1964:109).

If T. a. sindica and T. a. aegyptiaca are indeed distinct, on the basis of the above similarities all of the larger Asian representatives of this species are probably referable to T. a. sindica.

Hill (1961:33) also differentiated T. a. sindica from T. a. aegyptiaca by the greater degree of reduction of P^2 in sindica. For the species as a whole he said, "the anterior upper premolar is minute and is not usually in contact with the canine cingulum." For the subspecies, sindica, he said, "the anterior upper premolar is small, extruded slightly from the line of the toothrow and in contact with the canine cingulum." In one Iranian specimen (FMNH 111596) P^1 is slightly out of the tooth row and in contact with the canine cingulum. In the other (FMNH 111597) P^1 is also slightly out of the tooth row but not quite in contact with the canine cingulum. In this character

TABLE XV
EXTERNAL MEASUREMENTS OF TADARIDA AEGYPTIACA

Mea- sure	Type, <u>T. a.</u> <u>aegyptiaca</u> ¹	Aden ²	Iran	Afghan, istan ³	India ⁴	Type, <u>T. a.</u> <u>sindica</u>
TL	107	120.5 (2) 120-121	132 (2) 131-133			137
T	41	50.6 (2) 47-54.2	45.5 (2) 45-46	(9) 41.5-44.5	44.8 (7) 39-57	60
HF ⁵		10 (3) 10-10	11 (2) 11-11	(9) 9.5-10.5		9
E	23	21.0 (3) 20-22.9	26 (2) 26-26			23
Tr	5		5 (2) 4-6			
FA	49.5	53.0 (3) 52.6-53.5	54.2 (2) 52.8-55.5	(9) 49.5-53.5	47.4 (7) 45-52	52.2
3 Met.	49	52.5 (2) 52.2-52.9	52.4 (2) 51.1-53.8		46.0 (7) 41.52	51.0
5 Met.	29	31.4 (2) 31.0-31.8	30.4 (2) 29.9-30.8		26.7 (7) 25-33	31.4
Tibia	13		14.8 (2) 14.5-15.1	(9) 13-15	14.4 (7)	

¹ Measurements of Dobson (1878:424) converted from inches in Anderson and de Winton (1902:155)

² Harrison (1964:110)

³ Meyer-Oehme (1965)

⁴ Brosset (1962:707)

⁵ Iran and type of T. a. sindica cu; others su.

TABLE XVI
CRANIAL MEASUREMENTS OF TADARIDA AEGYPTIACA

Measure	Egypt ¹	Aden ²	Iran	India ¹	Type, <u>T. a.</u> <u>sindica</u>
GL		20.5 (3) 20.3-20.9	21.3 (2) 21.2-21.7		20.7
CBL	20.0 (2) 19.7-20.2	19.6 (3) 19.3-19.8	21.1 (2) 20.9-21.3	19.0	19.8
ZW	12.5 (2) 12.3-12.6	12.3 (3) 12.1-12.5	12.8	13.2	13.0
IO	4.5 (2) 4.4-4.6	4.2 (3) 4.1-4.3	4.4 (2) 4.3-4.4	4.7	4.5
C-M ³	7.4 (2) 7.3-7.4	7.1 (3) 7.0-7.3	8.1 (2) 8.0-8.2	7.2	7.7
C-M ₃		8.0 (3) 7.9-8.1	8.8 (2) 8.8-8.9		8.6
ML		14.0 (3) 14.0-14.1	15.5 (2) 15.4-15.6		14.9

¹ Hill (1961:36)

² Harrison (1964:110)

the Iranian specimens also seem to agree with T. a. *sindica*, however I have not had skulls of either form available for direct comparison, so I do not know how consistent this difference in dentition is.

Harrison (1964:111) in describing the dentition of the Aden specimens said that P^1 is small and situated within the tooth row. He did not mention its contact, or lack of contact, with the canine.

Neither external nor cranial measurements seem to be of assistance in distinguishing T. a. *aegyptiaca* from T. a. *sindica* as the two are presently recognized (Tables XV and XVI). Too few specimens, from too few locations, are known to determine the relationship between these two forms at this time.

Specimens Examined

I have examined the two T. a. *aegyptiaca* from Iran as well as specimens from Aden and India, including the types of T. a. *sindica* Wroughton and T. a. *thomasi* Wroughton.

CHAPTER IX

THE FAMILY VESPERTILIONIDAE

The vespertilionids are small to medium-sized bats without a leaf-like appendage on the nose, and with a well-developed tragus. The tail is long and entirely, or almost entirely, enclosed within the uropatagium. The second finger has a single, small phalanx and the postorbital process of the skull is lacking. The premaxillae lack palatal branches and the palate has a single median emargination. Nine genera are known from Iran:

Myotis Kaup, 1758

Vespertilio Linnaeus, 1758

Eptesicus Rafinesque, 1820

Nyctalus Bowdich, 1825

Pipistrellus Kaup, 1829

Barbastella Gray, 1821

Otonycteris Peters, 1859

Plecotus Geoffroy, 1818

Miniopterus Bonaparte, 1837

The genus Myotis is characterized by medium length, rather pointed ears, a relatively long, slender tragus and a dental formula of I 2/3 C 1/1 P 3/3 M 3/3 = 38.

The genus Vespertilio, characterized by a palatal emargination which is broader than deep and a dental formula of I 2/3 C 1/1 P 1/2

M 3/3 = 32, is usually considered to contain only three species, one of which, V. murinus, is found in Iran. However, some authors include the genus Eptesicus which has the same dental formula, but a narrower palatal emargination in the genus Vespertilio. The genus Pipistrellus normally has a dental formula of I 2/3 C 1/1 P 2/2 M 3/3 = 34, but one species, P. savii, frequently has the minute first upper premolar missing. The presence or absence of this tooth is the major feature distinguishing Eptesicus from Pipistrellus and because of the variability of P. savii, Russian authors (Kuzyakin 1950, Bobrinskii et al. 1965, Alekperov 1966, etc.) have recognized only the single genus, Vespertilio. Since both Eptesicus and Pipistrellus range very widely and contain numerous species, most non-Russian authors recognize three distinct genera, Vespertilio, Eptesicus and Pipistrellus. All of which have rather short ears and a short, blunt tragus.

The genera Nyctalus and Barbastella have a dental formula like that of Pipistrellus, I 2/3 C 1/1 P 2/2 M 3/3 = 34. The ears of Nyctalus are relatively short and rounded and the tragus is short and expanded distally. The ears of Barbastella are large and joined together over the forehead and the tragus is relatively long and pointed.

The genus Otonycteris has long, large ears and a long pointed tragus. The dental formula is I 1/3 C 1/1 P 1/2 M 3/3 = 30.

The genera Plecotus and Miniopterus have the dental formula I 2/3 C 1/1 P 2/3 M 3/3 = 36. Plecotus have very long ears which are joined over the forehead, and a long, pointed tragus. Miniopterus have very short ears and a small rounded tragus.

Key to the Vespertilionidae of Iran

- 1 Postcanine teeth 6/6 Myotis 2
- 1' Postcanine teeth 4-5/5-6 6
- 2 Large, forearm greater than 50 mm, condylobasal length more than 20 mm. Myotis blythi
- 2' Smaller, forearm less than 47 mm, condylobasal length less than 18 mm. 3
- 3 Wing membrane attaches to the leg at or above the ankle, never to the side of the digits; foot large, 11 to 13 mm (cu); leg well furred. . . . Myotis capaccinii
- 3' Wing membrane attaches to side of digits; foot smaller, 7 to 11 mm (cu); leg not furred. 4
- 4 Ear and tragus long, ear 17 to 20 mm, tragus 11 to 12 mm; uropatagium with a dense fringe of stiff hairs projecting from its posterior edge. . . . Myotis nattereri
- 4' Ear and tragus shorter, ear 10 to 17 mm, tragus 7 to 10 mm; uropatagium with only a few short, sparse hairs projecting from its posterior edge 5
- 5 Outer edge of pinna with a marked, almost right-angled indentation just above the middle; size larger, forearm 37 to 46 mm, condylobasal length 14.5 to 16 mm Myotis emarginatus
- 5' Outer edge of pinna straight or with only a slight indentation just above the middle; size smaller, forearm 30 to 37 mm, condylobasal length 11.5 to 14.5 mm Myotis mystacinus

- 6 Upper postcanine teeth total 5. 7
- 6' Upper postcanine teeth total 4. 15
- 7 Lower postcanine teeth total 6. 8
- 7' Lower postcanine teeth total 5. 9
- 8 Ears very long, only slightly shorter than the
forearm, and joined across the top of the
head Plecotus austriacus
- 8' Ears short, less than half the length of the
forearm, and not joined across the top of
the head. Miniopterus schreibersi
- 9 Fifth digit short, its entire length only
slightly longer than the length of the
metacarpal of the third or fourth digit . Nyctalus 10
- 9' Fifth digit normal, its entire length
greater than the combined length of
metacarpal and first phalanx of either
the third or fourth digit 12
- 10 Size small, forearm less than 47 mm,
condylobasal length less than 17 mm; hairs
on back with distinctly darker bases. Nyctalus leisleri
- 10' Size larger, forearm greater than 47 mm,
condylobasal length greater than 17 mm;
hairs on back without darker bases. 11
- 11 Size smaller, forearm less than 60 mm,
condylobasal length less than 21 mm Nyctalus noctula
- 11' Size larger, forearm more than 60 mm,
condylobasal length more than 21 mm Nyctalus lasiopterus

- 12 Upper surface of rostrum concave; ears
joined across forehead. Barbastella leucomelas
- 12' Upper surface of rostrum convex; ears
not joined across forehead. Pipistrellus 13
- 13 Anterior upper premolar minute, its crown
area much less than that of the second upper
incisor; greatest width of tragus about equal to
height of anterior edge; wing and interfemoral
membranes not edged in white. Pipistrellus savii
- 13' Anterior upper premolar small but equal to the
second upper incisor in crown area; greatest width
of tragus much less than height of anterior edge;
wing and interfemoral membranes usually edged
in white 14
- 14 First upper incisor usually unicuspid; second upper
incisor short, less than half the height of the
first; second upper premolar in contact with canine;
small first upper premolar displaced lingually and
not visible in labial view of the skull; white
edges of membranes conspicuous; uropatagium with
several conspicuous light stripes running from
tail to leg Pipistrellus kuhli
- 14' First upper incisor usually bicuspid; second upper
incisor long, more than half the length of the
first; second upper premolar separated from canine
by a distinct gap, through which the small first
upper premolar is visible in labial view; wing

- and tail membranes narrowly edged in white
(P. p. aladdin) or not edged in white (P. p.
pipistrellus); uropatagium without light
stripes Pipistrellus pipistrellus
- 15 Incisors 1/3; ears long, over half the length
of the forearm Otonycteris hemprichi
- 15' Incisors 2/3; ears shorter, less than half the
length of the forearm 16
- 16 Palatal emargination broader than deep; dorsal
pelage dark with many white-tipped hairs giving
a "frosted" appearance Vespertilio murinus
- 16' Palatal emargination deeper than broad; pelage
variable but never "frosted" with white . Eptesicus 17
- 17 Larger, forearm longer than 41 mm; condylobasal
length 14.7 to 22 mm, greatest length of skull
longer than 16 mm 18
- 17' Smaller, forearm less than 43 mm; condylobasal
length 12.2 to 15.5 mm, greatest length of skull
less than 16 mm 19
- 18 Larger, condylobasal length 19 to 21.6 mm,
greatest length of skull 25.5 to 23.3 mm;
forearm 47 to 58 mm Eptesicus serotinus
- 18' Smaller, condylobasal length 14.7 to 17.9 mm,
greatest length of skull 16.1 to 18.5 mm;
forearm 40 to 49.1 mm Eptesicus bottae
- 19 Rostrum narrow, width at canines not more than
0.2 mm wider than interorbital constriction;

- forearm 33.5 to 36 mm; condylobasal length
14.0 to 14.6 mm Eptesicus bobrinskoi
- 19' Rostrum wide, width at canines more than 0.2 mm
wider than interorbital constriction; forearm
33 to 43 mm, condylobasal length 12.2 to 15.5 mm 20
- 20 Terminal caudal vertebra enclosed within the
uropatagium; wing membranes near body usually
studded with small warty projections (caused by
parasitic nematodes) visible in fresh and spirit
specimens, visible only as spots in dry
specimens Eptesicus nasutus
- 20' Terminal caudal vertebra projecting beyond
uropatagium; no "warts" or spots on wing
membrane 21
- 21 Larger, condylobasal length 14.2 to 15.5 mm,
forearm 37 to 43 mm Eptesicus nilsoni
- 21' Smaller, condylobasal length 12.2 to 14.3 mm,
forearm 33 to 40 mm Pipistrellus savii

Myotis mystacinus Kuhl, 1819

TYPE DESCRIPTION: Vespertilio mystacinus Kuhl, 1819. Ann.
Wetterau Ges. Naturk. 4, 2:202. TYPE LOCALITY: Germany. TYPE
SPECIMEN: "Probably not in existence" (Allen 1938:215).

Identification

Myotis mystacinus is the smallest Myotis in Iran (CBL 11.9 to
14.2 mm). The ear is of medium length (12 to 17 mm) and has a slight

emargination on the outer edge. The tragus is slightly more than half the length of the pinna (7 to 10 mm) and is bluntly pointed. The foot is short (7.6 to 9 mm) and the wing membrane extends down the legs to the base of the toes. The calcar extends about halfway to the tail.

World Range

In Africa M. mystacinus has been reported only from Morocco (Hayman 1967:68). It ranges throughout Europe except for the southern Iberian Peninsula, the northern British Isles and northern Scandinavia (van den Brink 1968:57). In the USSR it is known south of the Arctic Circle from Europe to Kamchatka and Vladivostok (Bobrinskii et al. 1965: Map 24). Osborn (1963:212) reported it from northeast Turkey, but Harrison (1964) did not list it from the Arabian Peninsula. To the east of Iran Neuhauser (1969:68) summarized the records from northern Afghanistan, Allen (1938) reported specimens from China, and Wallin (1969) listed those from Japan. In addition Ellerman and Morrison-Scott (1951:139) listed Mongolia, Formosa, Korea, Kashmir, Punjab, Nepal, Sikkim, Bhulan Duars, Laos, Malay States, Sumatra, Java and Borneo.

Iran Distribution

PREVIOUS RECORDS: Satunin (1909:31) listed a specimen from Astrabad (=Gorgan), and Bianki (1917:viii) listed one from Ashur-ade (=Ashuradeh-ye-Borzog), both in Mazanderan Province. Harrison (1963: 302) reported three M. mystacinus from the Sulphur Caves at Guter-Su (=Kutur Su), East Azarbaijan Province. The 1962 Street Expedition collected one specimen from each of the following localities: 8 km N

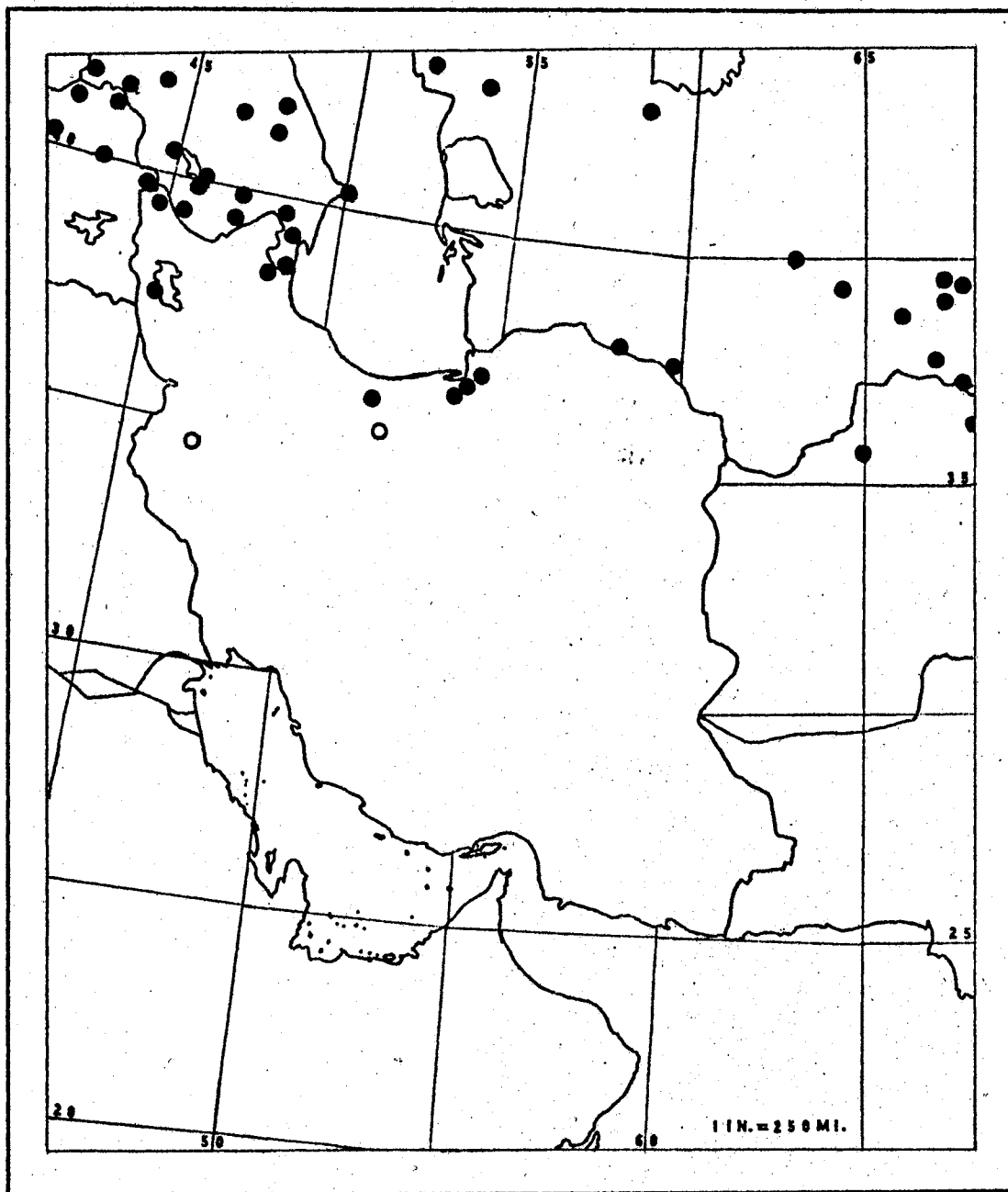


Figure 22. Distribution of *Myotis mystacinus*

- = Previous records
- = New records

of Gorgan, and Sama, Mazanderan Province; 2 km W of Maku, 10 km SW of Rezaiyeh, and 18 km SW of Rezaiyeh, West Azarbaijan Province (Lay 1967: 140).

NEW RECORDS: The 1968 Street Expedition obtained three M. mystacinus near our camp 4 mi N of Kermanshah, Kermanshahan Province on 20, 22 and 25 August. Specimen number 4056 in the collection of the Staatlichen Museum for Naturkunde, Stuttgart is an unreported M. mystacinus collected at Tehran, Tehran Province on 23 July 1952.

RANGE: This species has been collected in Iran in the Elburz Mountains south of the Caspian Sea and in the northern portion of the Zagros Mountains. In view of its range in the USSR it is likely that it extends east through the Elburz west of Gorgan at least to the Kopet Dagh. It also likely extends south through the Zagros beyond Kermanshah.

Subspecies

None of the authors who have reported M. mystacinus from Iran have designated subspecies. Misonne (1959:25) listed M. m. transcaspicus in his work on Iranian mammals and said that, "No capture has yet been made in Iran but this species has been found in the immediate proximity of the Turkmenistan frontier."

Ognev (1928:348) in describing M. m. transcaspicus said that it "is very close to M. mystacinus przewalskii" Recent Soviet authors (Kuz'yakin 1950; Bobrinskii et al. 1965) included all of the Transcaspien region and the Caucasus and Transcaucasus areas in the range of M. mystacinus przewalskii Bobrinskii, 1926. Bobrinskii et al. (1965:96) distinguished M. m. przewalskii by its relatively tall

braincase, (only 0.5 to 0.8 mm wider than tall as opposed to 1.2 to 1.5 mm wider than tall in the nominate form) by the minute size of the second upper premolar, and by the lingual displacement of this tooth. Ognev (1928:348) had mentioned these same characters in his description of M. m. transcaspicus

I have examined the skulls of nine M. mystacinus from Iran for these characteristics and have found considerable variation. The two specimens from Kermanshah, the two from Rezaiyeh and the one from Sama have a braincase which is only 0.4 to 0.8 mm wider than tall. However, the three specimens from Kutur Su all have a braincase 1.2 mm wider than tall. The Kermanshah female and the female from Sama have P^2 small and displaced lingually while P^1 and P^3 are almost in contact. The two Rezaiyeh specimens and the male from Kermanshah have P^2 small but not nearly as lingually displaced. The male from Tehran has P^2 slightly larger and situated between P^1 and P^3 .

Harrison (1963:302), after examining these characteristics in the Kutur Su series, said that "these characters are not clearly apparent in the present specimens and it appears wiser to leave the question of their subspecific determination open, pending the collection of further material." More material has been collected and examined but the picture is still unclear and I must echo Harrison's statement.

Specimens Examined

I have examined 12 M. mystacinus from Iran, three from Afghanistan and one from the USSR.

Myotis emarginatus Geoffroy, 1806

TYPE DESCRIPTION: Vespertilio emarginatus Geoffroy, 1806. Ann. Mus. H. N. Paris, 8:198. TYPE LOCALITY: Charlemont, Givet, Ardennes, France.

Identification

Myotis emarginatus is a medium-sized Myotis (FA 37.2 to 45.7 mm; CBL 15 to 15.7 mm) with ears which are, for this genus, medium in length (10.9 to 17 mm) and relatively blunt. The outer margin of the ear has a deep, right-angled notch just above the middle. The feet are medium-sized (7.9 to 11 mm) and the calcar extends about halfway to the tail. The wing membrane extends down the leg to the base of the toes.

World Range

In Africa M. emarginatus has been reported only from Morocco and Algeria (Hayman 1967:69). In Europe it is distributed irregularly from northern France to Sicily and Thrace (van den Brink 1968:57) and in the USSR ranges along the southern borders from Europe to the vicinity of Tashkent (Bobrinskii et al. 1965: Map 24). Neither Osborn (1963) nor Çağlar (1965) reported it from Anatolia, but Harrison (1964) listed specimens from Lebanon and Israel. Kuzyakin (1950:267) and Meyer-Oehme (1965:65) have reported specimens from Afghanistan. Siddiqi (1969) did not list the species from Pakistan but specimens have been collected very close to the West Pakistan frontier in Iranian Baluchistan.

Iran Distribution

PREVIOUS RECORDS: Blanford (1876:20) reported several specimens from Jalq (=Jalk) and Thomas (1920:933) described a specimen from Shastun, Dizak (=Dovar Panan) District. Both of these locations are in Seistan and Baluchistan Province. Kuzyakin (1950:267) indicated a locality for this species in central Khorassan Province which Lay (1967:232) interpreted as near Mashhad. Lay (1967:232) reported three specimens in the British Museum from Barfurush (=Babol), Mazandaran Province. Etemad (1967:277) reported specimens from Azad-Khan cave near Mahalat (=Mahallat), Isfahan Province; Babolsar (=Babol), Mazandaran Province; and Konar-Takhteh (Etemad 1968:10), Kazerun, Fars Province. Farhang-Azad (1969:731) reported four specimens from Chelmir in northern Khorassan Province.

NEW RECORDS: On 25 August I collected two of this species from among the jumbled boulders in Mar Ab canyon near the Baghdad highway about 72 km W of Shahabad, Kermanshahan Province.

RANGE: Myotis emarginatus has been reported from the very arid regions of Persian Baluchistan, the more moderate regions of the Zagros Mountains and from the lush Caspian coastal plain. With this wide range of habitat tolerance it is probable that this species ranges over the entire country.

Subspecies

Two forms of M. emarginatus have been described from Iran. Dobson described the form desertorum from Jalk, Baluchistan in 1875 (Blanford 1875:309). In 1920 Thomas (1920:933) described the form lanaceus from

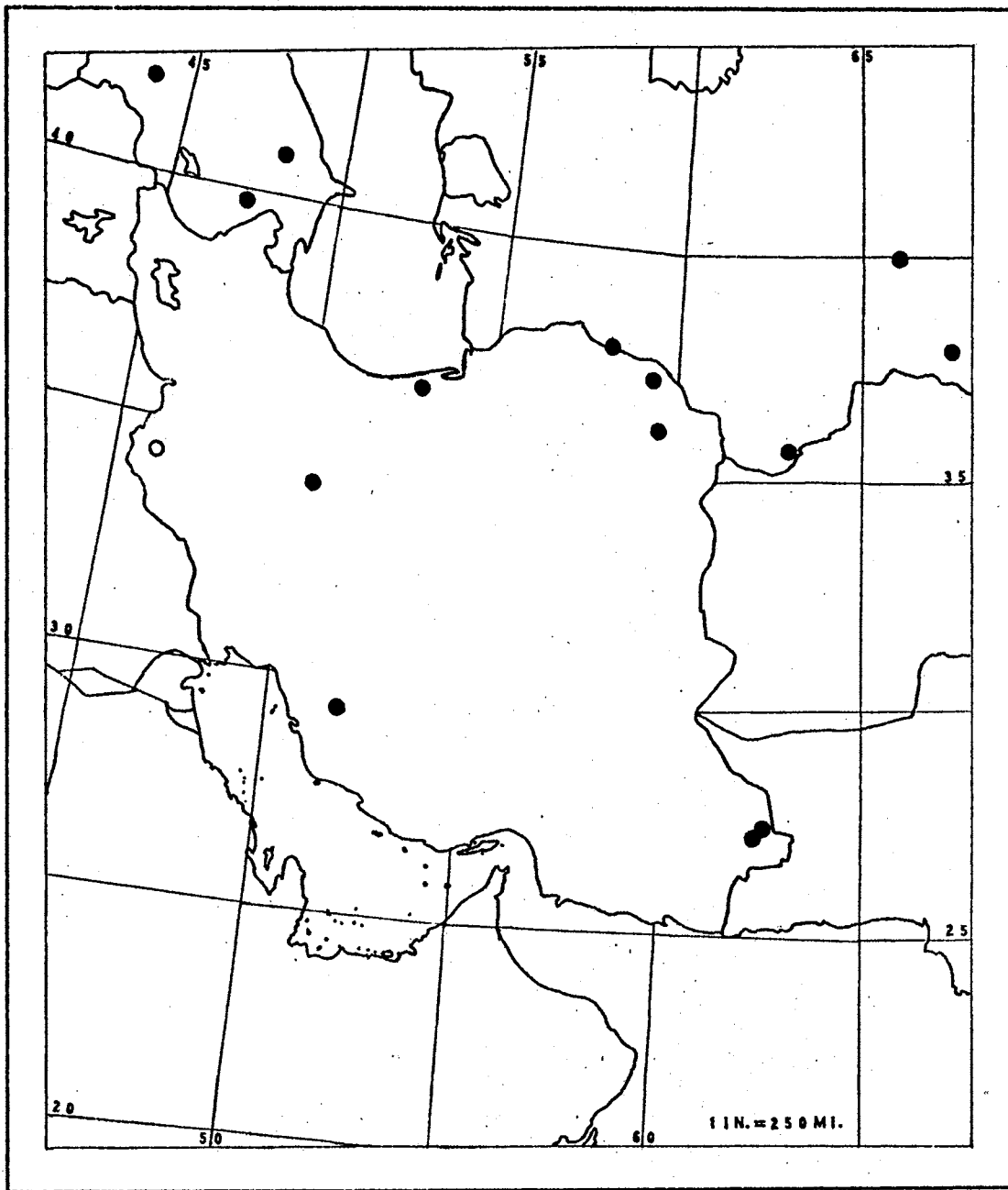


Figure 23. Distribution of *Myotis emarginatus*

- = Previous records
- = 1968 Street Expedition specimens

Shastun, Dizak District, Baluchistan. The two type localities are only about 50 km apart. Both forms were described as being larger and lighter than the nominate form. Ognev (1928:342) synonymized these two forms under the older name and he and the more recent Soviet authors (Kuzyakin 1950; Bobrinskii et al. 1965) have recognized M. e. desertorum as the form which inhabits Soviet Turkmeniya and eastern Iran.

Bobrinskii et al. (1965:95) included specimens from Transcaucasia in the nominate subspecies and distinguished between this form and desertorum solely on the basis of color. They described M. e. emarginatus as having the tips of the dorsal hairs brown or reddish-brown and M. e. desertorum as being lighter and brighter with the tips of dorsal hairs brick-red. They did not comment on the ventral coloration of the two forms but the bat labeled M. emarginatus in their color plate VI has a reddish-brown dorsum and a grayish-white venter.

The color of the Iranian specimens of this species is highly variable. The three cotypes of desertorum were described as having "light brown" hair tips (Blanford 1876:20). The type of lanaceus was described as "general colour greyish buffy" with dorsal hairs having an "inconspicuous tawny tip" (Thomas 1920:933). I have examined all four of these specimens. The lanaceus type is a very light reddish on the dorsum and has a white ventrum with only a slight hint of reddish wash. The three desertorum cotypes are preserved in spirit so that color comparisons are difficult, but they also appear to be very light colored, with only slight traces of red dorsally and ventrally. The three Babol specimens, however, have a very red pelage with hairs of both the dorsum and ventrum conspicuously tipped with

brick-red.

In describing his M. e. emarginatus from Lebanon and Israel Harrison (1964:126) said:

The colour is distinct and exhibits relatively little variation in the large series examined The general effect is for the orange brown hair tips (nearly matching B. 9. Wild Honey, Plate 13, Maerz and Paul 1950) to predominate, and grey bases showing through slightly. The ventral surface is paler, a clear and rather uniform orange-tinted buffy brown

The single dry specimen from Mar Ab canyon has an overall dorsal color matching Wild Honey of Maerz and Paul (1950: pl. 13) but the hair tips are considerably darker, matching Bay (Maerz and Paul 1950:pl. 7). The ventral pelage is considerably lighter and whiter.

Using only gross color differences it seems that the Mar Ab canyon specimen should be designated M. e. emarginatus, the three Baluchistan specimens designated M. e. desertorum, and the Babol specimens placed closer to desertorum than the nominate form. However, many more specimens, from more locations will be needed before the true relationships of these three color types are understood.

Specimens Examined

I have examined nine M. emarginatus from Iran including the types of desertorum Dobson and lanaceus Thomas. I have also seen three specimens of this species from France.

Myotis nattereri Kuhl, 1818

TYPE DESCRIPTION: Vespertilio nattereri Kuhl, 1818. Ann. Wetterau Ges. Naturk. 4, 1:33. TYPE LOCALITY: Hanau, Hessen, Germany.

Identification

Myotis nattereri is the largest of the "small Myotis" which are known from Iran (FA 42 to 43 mm; CBL 15.3 to 16.5 mm). The ear is long (17 to 20 mm) and the tragus is long (11 to 12 mm) and pointed. The hind foot (11 mm) is less than half the length of the tibia and the calcar extends about half the distance to the tail. The wing membrane extends down the leg to the base of the toes. The uropatagium has a dense fringe of short, stiff hairs projecting from the posterior edge.

World Range

In Africa M. nattereri has been reported only from Morocco (Hayman 1967:70). It extends through central Europe from Portugal to Poland and from southern Sweden to southern Italy but is absent from the Balkan Peninsula (van den Brink 1968:57). Çağlar (1965) reported it from near the Soviet border in Turkey and Harrison (1964:134) reported it from Israel. In the USSR it is known from several localities west of the Urals and in the Caucasus, and from a few scattered localities along the southern frontier from Turkestan to Vladivostok (Bobrinski et al. 1965: Map 18). To the east of Iran it has been reported from Japan (Wallin 1969:279) and from Korea and Manchuria (Ellerman and Morrison-Scott 1951:143).

Iran Distribution

PREVIOUS RECORDS: Harrison (1963:302) reported two specimens from the Sulphur Caves at Guter-Su (=Kutur Su), East Azarbaijan Pro-

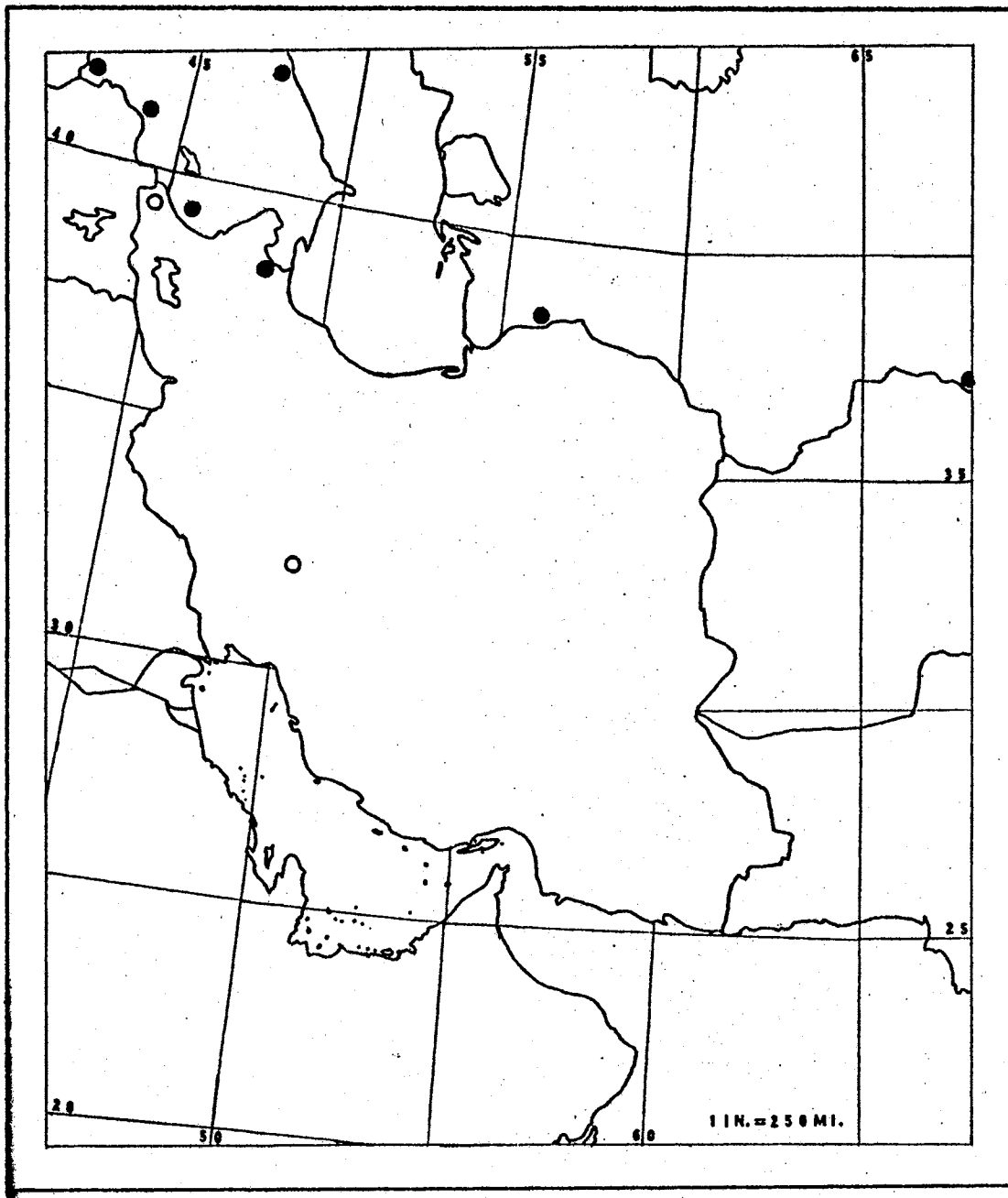


Figure 24. Distribution of Myotis nattereri

- = Previous records
- = 1968 Street Expedition specimens

vince. The 1968 Street Expedition obtained one specimen at Maku, West Azarbaijan Province and another near Kuh Rang, Isfahan Province (DeBlase 1971).

RANGE: The above records and the distribution of this species in the USSR indicate that it could be expected in the Zagros Mountains probably as far south as Shiraz and through the Elburz Mountains at least as far east as the Kopet Dagh.

Subspecies

Harrison (1963:302) has assigned the Kutur Su specimens to the form M. n. araxenus Dahl, 1947. This subspecies is larger than the nominate form and larger than M. n. hovei from Israel. Measurements of the Maku and Kuh Rang specimens are within the range for M. n. araxenus (FA 42, 43; C-M³ 6.8, 6.7) even though both are immature by epiphysial ossification.

Specimens Examined

I have examined all four M. nattereri known from Iran and the type of M. n. hovei Harrison from Israel.

Myotis blythi Tomes, 1857

TYPE DESCRIPTION: Vespertilio blythi Tomes, 1857. Proc. Zool. Soc. London. 53. **TYPE LOCALITY:** Nasiribad Rajputana, India. **TYPE SPECIMEN:** BM 48.8.18.6, skin and skull.

Identification

Myotis blythi is the largest Myotis in Iran (FA 57 to 65 mm; CBL

21.0 to 22.5 mm). The ear is long (19 to 29 mm) and the tragus relatively short (9 to 13 mm). The feet are large and the calcar extends less than halfway to the tail. The wing membrane extends down the leg past the ankle to the sides of the metatarsals.

World Range

In Africa M. blythi is known from Morocco, Algeria and Tunisia (Hayman 1967:65). In Europe it is found in the Mediterranean region (van den Brink 1968:59). Çağlar (1965:130) reported it from several areas of Turkey and Harrison (1964:125) listed it from Iraq, Syria, Lebanon and Israel. It ranges through the southern USSR from Moldaviya to the headwaters of the Ob (Bobrinskii et al. 1965: Map 21). To the east of Iran it has been reported from Afghanistan (Neuhauser 1969), China, Rajputana, Punjab and perhaps Kashmir (Ellerman and Morrison-Scott 1951:145).

Iran Distribution

PREVIOUS RECORDS: Dobson (1871:461) and Cheesman (1921:576) have reported this species from Shiraz, Fars Province. Thomas reported specimens from Derbent 50 mi W of Isfahan, Isfahan Province, from near Telespid, Khuzistan Province (Thomas 1905:576) and from the Elburz Mountains near Resht, Gilan Province (Thomas 1907:197). Kuzyakin (1950:246) mapped four localities in Iran, three in Mazanderan Province and one in Khorassan Province. Coon (1952:244) reported this species from Hotu Cave near Beshahr (=Bushehr), Mazanderan Province. Harrison (1963:301) reported a specimen from the Sulphur Caves at Guter-Su (=Kutur Su), N of Mt. Sabalan, East Azarbaijan Province and Aberdeen

University (1965) listed specimens from the Kuh Rang area of Isfahan Province. Etemad (1967:277-78); 1968:10) reported specimens from Rood Afshan Caves, Alburz Mountains (=Elburz Mountains), 105 km E Tehran, Tehran Province, and from Azad-Khan Cave at Mahalat (=Mahallat), Isfahan Province. Lay (1967:141) reported a specimen from 4 km W of Maku and another from 22 km SE of Rezaiyeh, both in West Azarbaijan Province. Farhang-Azad (1969:731) reported four specimens from near Chelmir, Khorassan Province.

NEW RECORDS: The 1968 Street Expedition collected Myotis blythi from the following ten locations: West Azarbaijan Province: one from a cave near the Zangamar River at the east edge of Maku on 28 July; 16 from a small room cut into a mountain 20.6 mi SSE of Rezaiyeh on 1 August; one from a cave about 10 mi NNW of Rezaiyeh on 4 August. Kurdistan Province: 18 from the large mosque in Sanandadj on 12 August; 25 from Gara Tarik, a large cave about 4 km N of Qareh Daneh village on 13 and 14 August; seven from Karaftu, a cave and abandoned cliff dwelling complex near Dashbologh village, about 32 mi N of Divandarreh on 16 August; 26 from a large, wet cave about 15 mi NW of Ravansar on 23 August. Kermanshahan Province: 21 from a cave about 20 mi SE of Ilam on 28 August. Lorestan and Khuzistan Province: 29 from a cave in the mountain at the west edge of Khurramabad on 6 September; and 16 from a cave about 2 mi NW of Khurramabad on 6 and 11 September 1968.

RANGE: Myotis blythi has been found throughout the Zagros and Elburz Mountains. Records from Boulon Cave, near Qalat, Afghanistan indicate that it may occur in eastern and southern Iran as well.

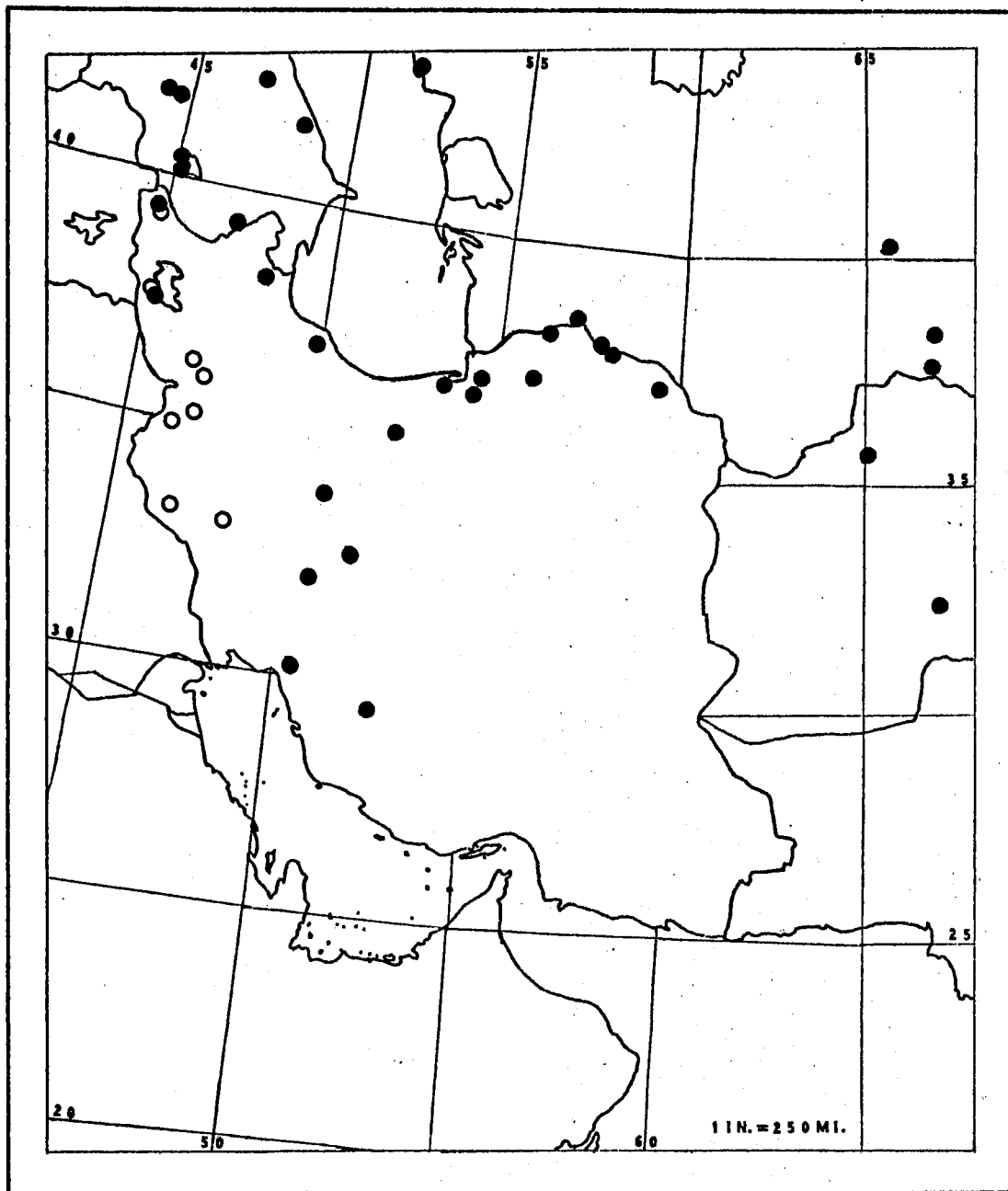


Figure 25. Distribution of *Myotis blythi*

- = Previous records
- = 1968 Street Expedition specimens

Subspecies

Thomas (1905:521) described "Myotis myotis omari subsp. n." from three specimens from Derbent, 50 mi W of Isfahan, Iran and included the specimen from near Telespid in his new form. Cheesman (1921:576) described "Myotis myotis risorius Subsp. nov." from four specimens from Shiraz, Iran. Misonne (1959:25) listed these two forms and cited the specimen from the vicinity of Recht (=Rasht) as M. m. myotis.

Miller (1912) showed that M. oxygnathus Monticelli, 1885 is distinct from M. myotis. Ellerman and Morrison-Scott (1951:145) considered oxygnathus conspecific with M. blythi Tomes, 1857. This arrangement has also been followed by many recent authors (Allen 1959; Harrison and Lewis 1961; Bobrinskii et al. 1965; Lay 1967; Neuhauser 1969; etc.). Harrison and Lewis (1961:379) have established that omari and risorius are representatives of M. blythi rather than M. myotis.

Thomas (1905:522) described omari as having "General colour above uniform pale 'wood brown,' the basal halves of the hairs smoky brown, succeeded by a broad ring of glossy whitish sandy and a fine pale brown point. Under surface broadly washed with 'cream buff'." Cheesman (1921:576) described the color of risorius as follows:

Much resembles, but is paler than M. m. omari, Thomas. Also differs from M. m. omari in the absence of the general washing of cream buff on the back, underparts and wing filaments, which on the back of M. m. risorius is replaced by a pale purplish washing General colour above "drab grey," slightly darker toward the tail Below . . . tips of hairs white Limbs and wing filaments "drab."

I have examined 165 M. blythi from Iran. While all are "light" there is considerable variation in hue including both Thomas' "wood brown" and Cheesman's "drab grey." Specimen FMNH 111249, an adult

female from Sanandadj, is the lightest specimen and has an overall dorsal coloration closest to Vinaceous-Buff (Ridgway 1912, Pl XL). Specimen FMNH 96720, an adult male from 22 km SE Rezaiyeh is the reddest; it is slightly redder than Avellaneous but not as red as Vinaceous-Fawn (Ridgway 1912:XL). Specimen FMNH 111252, an adult female from about 15.3 mi NW Ravansar is the darkest brown; it is closest to Buffy Brown (Ridgway 1912:XL). Specimen FMNH 111306, an adult female from Maku, is the grayest; it matches Light Drab (Ridgway 1912:XLVI). Specimen FMNH 82723, one of the original series of risorius from Shiraz (an adult female) matches Avellaneous (Ridgway 1912:XL). None of the Street Expedition specimens have a ventrum which is "broadly washed with 'cream buff'." (Thomas 1905). Most have all ventral hairs tipped with white.

Cheesman (1921:576) also said that forearm measurements of risorius "are on the average slightly longer than those of . . . omari." The six Shiraz specimens in the British Museum and the one in Field Museum have the forearm length ranging from 54.5 to 63.8 mm and averaging 61.1 mm. Forearms of bats from 15 other locations in Iran range from 56 to 68 mm; the means of these 15 samples range from 58.7 to 65.1 mm.

It thus seems clear that risorius must be placed in synonymy with M. blythi omari.

Aellen (1959) indicated his belief that M. b. omari is synonymous with M. b. blythi, and Bobrinskii et al. (1965:93) stated that "M. b. oxygnathus . . . i M. b. omari . . . vidimo, sinonimiu nominaino." However Harrison and Lewis (1961:379) have shown that M. b. omari from southwest Asia "have distinctly larger skulls on the average than

oxygnathus with slight overlap." Cranial measurements of the Iranian specimens are consistent with those of omari presented by Harrison and Lewis (1961:378) and on this basis M. b. omari from Asia seems to be subspecifically distinct from M. b. oxygnathus of Europe. Further investigation will be necessary to determine the relationship between M. b. omari and the nominate form.

Specimens Examined

I have examined 171 M. blythi from Iran including the types of M. b. risorius Cheesman and M. m. omari Thomas. I have also examined two M. blythi from Lebanon, 10 from Afghanistan and the type from India. Two M. m. myotis from Germany and the type and a topotype of M. m. macrocephalicus from Lebanon were used for comparison.

Myotis capaccinii Bonaparte, 1837

TYPE DESCRIPTION: Vespertilio capaccinii Bonaparte, 1837. Faun. Ital. I, fasc. 20. TYPE LOCALITY: Sicily.

Identification

Myotis capaccinii is a medium-sized Myotis (FA 37 to 43 mm; CBL 13.7 to 14.6 mm) with a rather small ear (12 to 15 mm) and a medium tragus (7 to 9 mm). The hind foot is long (11 to 13 mm) and is about three-fourths the length of the tibia. The calcar extends about two-thirds of the distance to the tail and the wing membrane extends down the leg only to the ankle.

World Range

In Africa M. capaccinii has been reported only from Morocco and Algeria (Hayman 1967:67). In Europe it is found in most of the Mediterranean region (van den Brink 1968:53). Çağlar (1965) reported it from scattered localities in Turkey and Harrison (1964:130) listed it from Iraq and Israel. In the USSR Bobrinskii et al. (1965: Map 22) showed records only from a locality on the Anu-Doria River just south of the Aral Sea and from the vicinity of Vladivostok. According to Wallin (1969) Japan, Korea and China should be included in the range of this species, but there is no basis for inclusion of the Philippines (Ellerman and Morrison-Scott 1951).

Iran Distribution

PREVIOUS RECORDS: Etemad (1963:309) reported a specimen from Fars Province. According to Lay (1967:141) Etemad's specimen was collected by the 1962 Street Expedition along with the 36 specimens which Lay reported from 5 km SE of Pol-i-Abgineh and Etemad (1968:12) has confirmed this. I have re-examined Lay's series and have identified as Miniopterus schreibersi six of the 19 specimens in alcohol which he reported as M. capaccinii.

DeBlase (1971) reported specimens collected by the 1968 Street Expedition at Persepolis on 3 October, from Shahpur Cave on 9 October, and from Ganæ Gabru cave, near the village of Tar Divon about 65 km N of Jahrom on 10 November. All of these localities are in Fars Province.

RANGE: Myotis capaccinii is known in Iran only from the above four localities all of which are within a radius of 100 km of Shiraz,

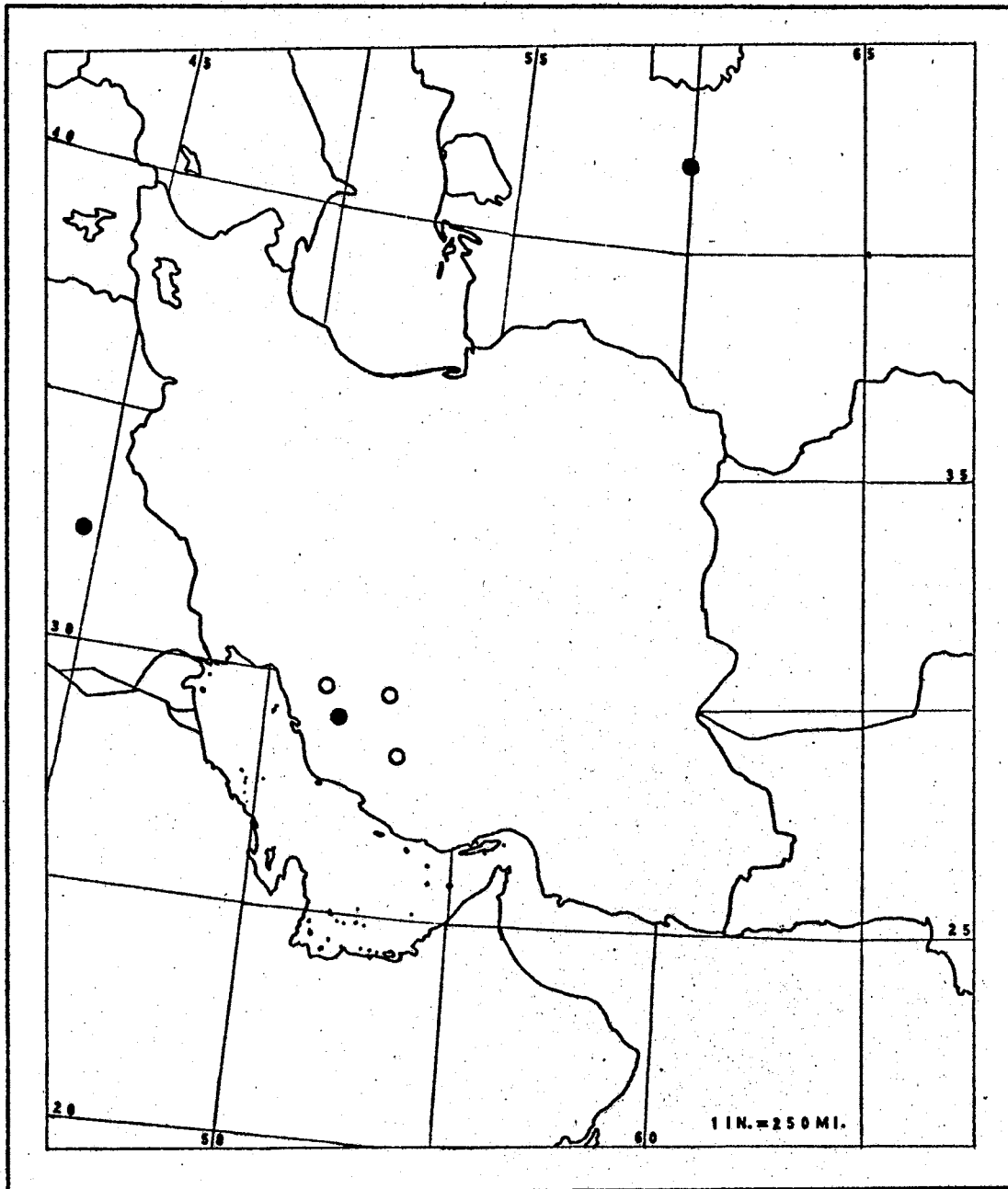


Figure 26. Distribution of *Myotis capaccinii*

- = Previous records
- = 1968 Street Expedition specimens

Fars Province. This species has been found only in a few widely scattered areas of Asia, but the large number of individuals found by Harrison (1964:131) at Carmel Caves in Israel and the frequent occurrence of the species in the Shiraz area indicate that in these scattered pockets it is not uncommon. It may exist in other parts of Iran as well.

Subspecies

Harrison (1964:130) referred M. capaccinii from Israel to the form M. c. bureschi Heinrich, 1936 on the basis of their whiter belly and paler back than the nominate race. The Iranian specimens agree with Harrison's external and cranial measurements and color description of the Israeli specimens. It is therefore probable that they should also be included as M. c. bureschi.

Specimens Examined

I have examined 36 of the 37 M. capaccinii known from Iran.

Vespertilio murinus Linnaeus, 1758

TYPE DESCRIPTION: Vespertilio murinus Linnaeus, 1758. Systema Naturae 10th Ed. I:32. TYPE LOCALITY: Sweden. TYPE SPECIMEN: Probably not in existence.

Identification

Vespertilio murinus has the dental formula I 2/3 C 1/1 P 1/2 M 3/3 = 32. The palatal emargination is broader than deep. The dorsal pelage is dark but many of the hairs are white-tipped presenting an

overall "frosted" appearance. The ears are relatively short and broad and the tragus is short and broadly rounded.

World Range

Vespertilio murinus occurs through most of eastern Europe west to France, and there are scattered records west to Britain and north to northern Sweden (van den Brink 1968:67). In the USSR this species ranges from Europe to the Pacific south of 60°N latitude. Ellerman and Morrison-Scott (1951:152) also listed Japan, Mongolia, Kashmir and Chinese Turkestan. Wallin (1969:308) said that the species does not occur in Japan, did not include Kashmir on his map, and questioned the record from Chinese Turkestan. Neuhauser (1969) reported a specimen from Afghanistan.

Iran Distribution

PREVIOUS RECORDS: Misonne (1959:25) cited "Vespertilio murinus murinus Linne, 1758 (Serotine bicolor). A Shiraz (Blanford, 1876)." However, Blanford (1876:20) reported a specimen of "Vespertilio murinus Schreb." from Shiraz and not V. murinus Linnaeus. Ellerman and Morrison-Scott (1951:144) listed Vespertilio murinus Schreber as a synonym of Myotis myotis Borkhausen. As discussed above, the large Myotis from Iran are all referable to Myotis blythi. Thus the specimen cited by Blanford and by Misonne is probably M. blythi Tomes.

Lay (1967:146) cited "Etemad (1964, p. 653 . . . two specimens from Isfahan [Province], Mahallat." The 1964 paper by Etemad contains no reference to V. murinus and Etemad (1968:12) said that he had never reported this species from Iran. Lay (1967:146) also reported a male

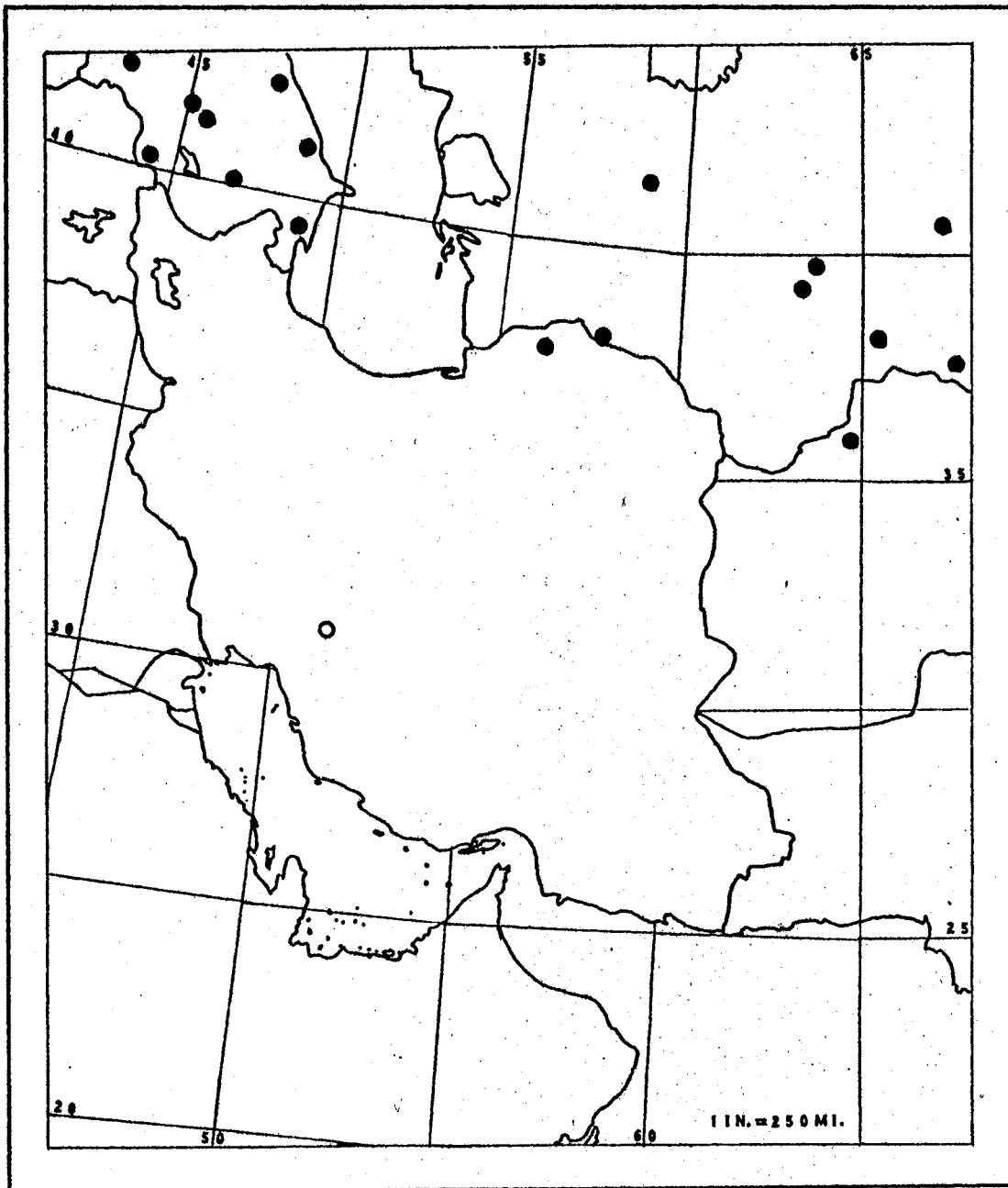


Figure 27. Distribution of Vespertilio murinus

- = Previous records
- = 1968 Street Expedition specimen

V. murinus Linne. collected by the 1962 Street Expedition near Dasht, Khorassan Province. This is the first authentic record of this species from Iran.

The 1968 Street Expedition collected a female V. murinus Linne. at the village of Sar Dasht SW of Lordegan, Isfahan Province on 1 October (DeBlase 1971).

RANGE: This species is known in Iran only from one site in the Elburz Mountains and one in the Zagros Mountains. It is not unlikely that it occurs throughout these two mountain ranges.

Subspecies

Only the nominate subspecies occurs in Iran. Wallin (1969) restricted the range of this form to the range of the species west of Mongolia.

Specimens Examined

I have examined the only two V. murinus from Iran as well as one each from Afghanistan and the USSR.

Eptesicus nasutus Dobson, 1877

TYPE DESCRIPTION: Vesperugo (Vesperus) nasutus Dobson, 1877. J. Asiat. Soc. Bengal 46, 2:311. **TYPE LOCALITY:** Shikarpur, Sind, West Pakistan. **TYPE SPECIMEN:** "In the Indian Museum, Calcutta" (Dobson 1878:200).

Identification

Eptesicus nasutus is a small Eptesicus (FA 35 to 40 mm; CBL 12.5

to 13.3 mm). The dorsal pelage is a uniformly pale yellowish beige and the ventrum is similarly colored or slightly lighter. Small warty projections (caused by parasitic nematodes, Gaisler, 1970) are frequently present on the wing membranes. These are conspicuous on fresh and spirit preserved specimens but are noticeable only as spots on dry skins.

World Range

Eptesicus nasutus is known only from the Arabian Peninsula (Harrison 1964:148); Iran, Afghanistan (Gaisler 1970:24); and West Pakistan (Siddiqi 1969:9).

Iran Distribution

PREVIOUS RECORDS: Thomas (1905:520) reported this species from Ahwaz (=Ahvaz), Karun River, Lurestan and Khuzistan Province. The 1968 Street Expedition shot 10 specimens as they flew over our camp at Meshrageh on the Jahari River about 85 km SW of Ahvaz, Lurestan and Khuzistan Province. We also shot one specimen as it flew along the Dozdan River at Minab, Kerman Province (DeBlase 1971).

RANGE: Considering this bat's distribution in Arabia, Afghanistan and West Pakistan, it is likely that it occurs along the entire low coastal area of southern Iran and may be found in the more arid southern mountainous areas as well.

Subspecies

Four subspecies of E. nasutus are presently recognized. The form matschiei was described by Thomas (1905:573) from Aden and is known

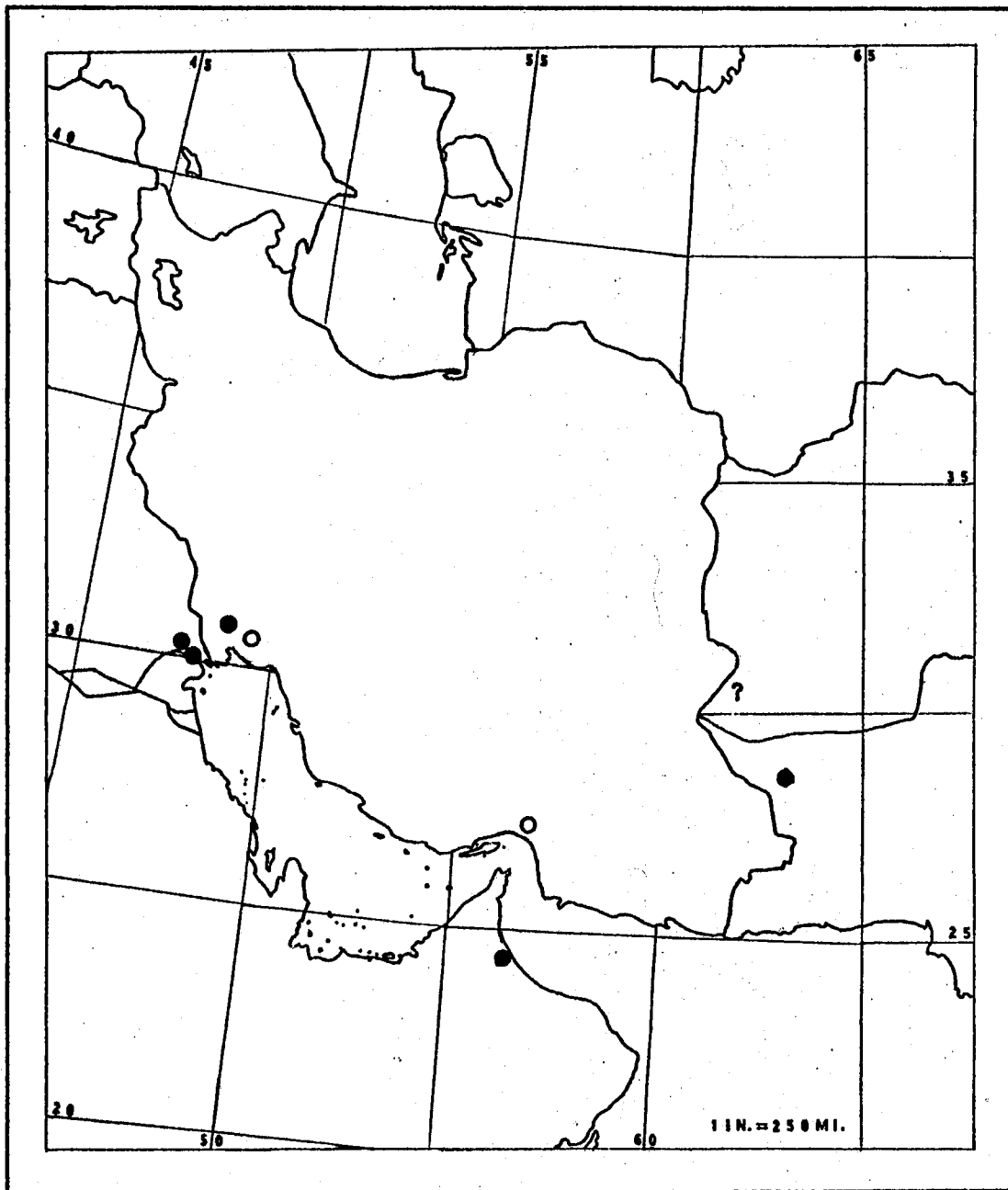


Figure 28. Distribution of Eptesicus nasutus

- = Previous records
- = 1968 Street Expeditions specimens
- ? = BM 6.1.2.15, "Seistan, SW Afghanistan"

from only two specimens. It is the smallest E. nasutus (FA 33.1, 35.4 mm; CBL 11.1, 11.2 mm) and has dark, opaque wing and interfemoral membranes. The form batinensis was described by Harrison (1968:321) from Oman and is known from only eight specimens. It is a medium-sized E. nasutus (FA 33 to 36.7 mm; CBL 11.6 to 12.9 mm) and has lighter, translucent membranes. The form pellucens was described by Thomas (1905:520) from Ahwaz (=Ahvaz), Iran and is known only from three specimens from Iraq, and 16 from Iran. It is a large E. nasutus (FA 34.5 to 38.2 mm; CBL 12.5 to 13.3 mm) and has membranes which become very light and transparent near the edges. The nominate form was described from West Pakistan and is known only from two specimens from that country and 53 from the Jalalabad area of Afghanistan. Eptesicus n. nasutus is very similar to E. n. pellucens in size (FA 33 to 42 mm; CBL 11.8 to 13.5 mm) but the Jalalabad specimens are slightly larger. The membranes of the nominate form are darker and lack the transparent edges which are conspicuous in pellucens. Gaisler (1970:24) has questioned the validity of the membrane pigmentation as a subspecific character for this species. However, there does appear to be a distinct clinal variation in size of this species from the smallest western forms (matschiei from Aden) to the largest eastern forms (nasutus from Jalalabad). The entire species must be examined before taxonomic conclusions are reached.

The 84 specimens mentioned above and a specimen in the British Museum (BM 6.1.2.15) labeled "Seistan, SW Afghanistan" "If any question should arise about this specimen, there is a possible doubt as to its origin, as it was mislaid and afterwards found in debris." are the only known representatives of this species.

Specimens Examined

I have examined 49 of the 85 specimens of E. nasutus known. These are: E. n. pellucens: 16 from Iran, including the type, and two from Iraq; E. n. matschiei: the two from SW Arabia; E. n. batinensis: the type from Oman; E. n. nasutus: 28 from Afghanistan and one from West Pakistan; E. n. subsp.: one from "Seistan, SW Afghanistan."

Eptesicus bobrinskoi Kuzyakin, 1935

TYPE DESCRIPTION: Eptesicus bobrinskoi Kuzyakin, 1935. Bull. Soc. Nat. Moscow 44:435-437. TYPE LOCALITY: Tjirlek wells in Aral Kara-Kum (desert), 65 km east of city of Aral'skoje More, Russian Turkestan.

Identification

Eptesicus bobrinskoi is a small Eptesicus (FA 34.5 to 36.0 mm; CBL 14 to 14.6 mm). According to Harrison (1963:303) it has a very flattened skull and narrow rostrum. The width across the upper canines does not exceed the width of the interorbital constriction by more than 0.2 mm.

World Range

Eptesicus bobrinskoi is known outside the borders of the USSR only from one locality in Iran. Within the USSR Bobrinskii et al. (1965: Map 33) mapped records only from Yakutsk and from four localities in Kazakhstan.

Iran Distribution

PREVIOUS RECORDS: Harrison (1963:303) reported seven specimens from the Sulphur Caves at Guter-Su (=Kutur Su), north of Mt. Sabalan, East Azarbaijan Province.

RANGE: The above record is the only known locality for Iran, however, in view of the known localities for this bat in the USSR, the species potentially ranges through much of northern Iran.

Subspecies

Only the nominate form is known. Ellerman and Morrison-Scott (1951:154) tentatively placed this species as a subspecies of E. nasutus, however Harrison (1963:303) has shown that E. nasutus and E. bobrinskoi are distinct.

Specimens Examined

I have examined the seven specimens known from Iran.

Eptesicus nilssoni Keyserling and Blasius, 1839

TYPE DESCRIPTION: Vespertilio nilssonii Keyserling and Blasius, 1839. Arch. Naturgesch. 5, 1:315. **TYPE LOCALITY:** Sweden.

Identification

Eptesicus nilssoni is a medium-sized Eptesicus (FA 37.7 to 43 mm; CBL 14.2 to 15.5 mm). The rostrum is wider than E. bobrinskoi, the width across the canines being more than 0.2 mm greater than the width of the interorbital constriction. The pelage is long and the dorsal

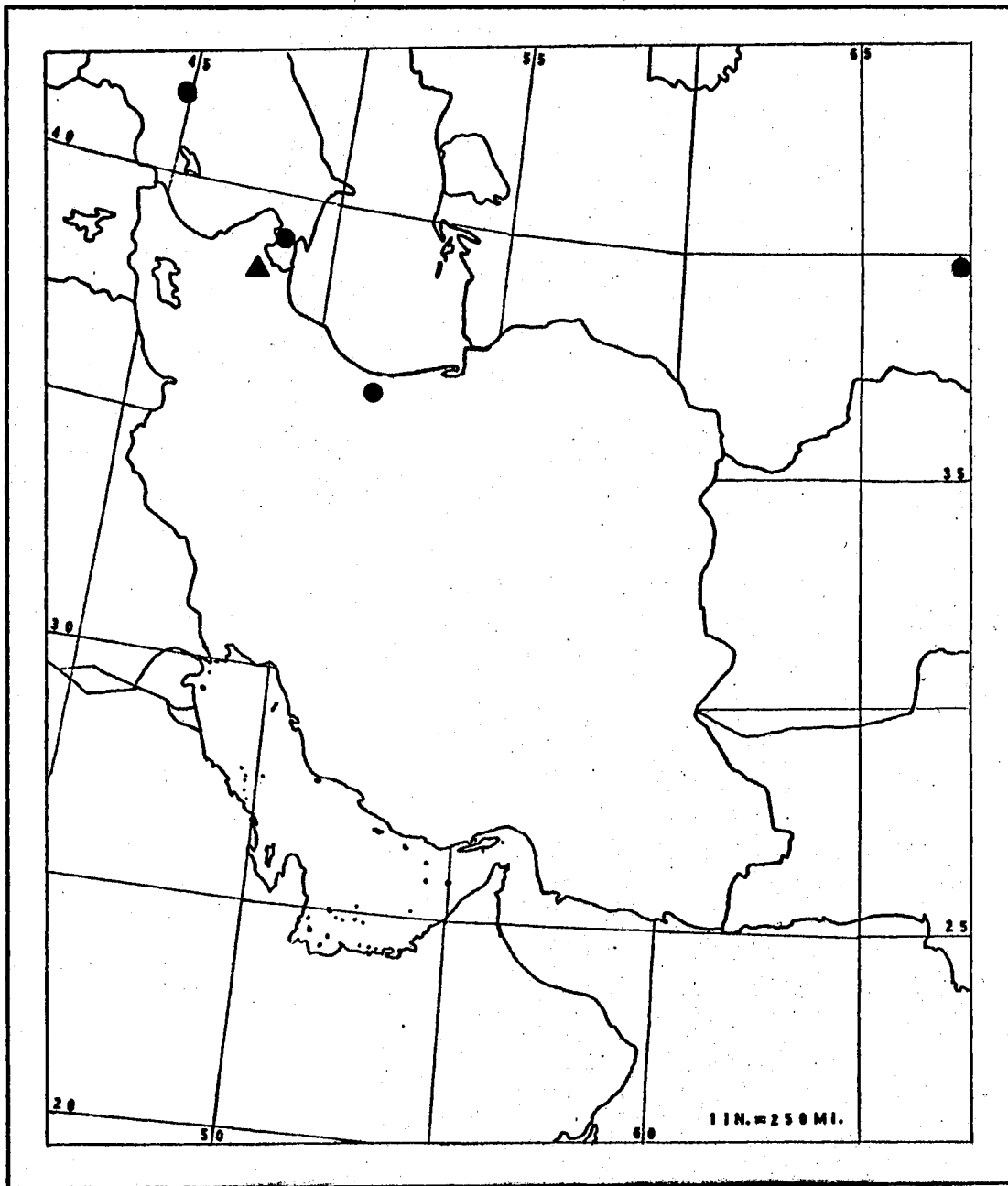


Figure 29. Distribution of Eptesicus bобринский and E. nilssoni

- = E. nilssoni
- ▲ = E. bобринский

hairs have dark bases and yellowish or golden tips.

World Range

Eptesicus nilssoni ranges through northern and eastern Europe, and is also found in the mountains of central Europe (van den Brink 1968:67). In the USSR it ranges from Europe to the Pacific and from north of the Arctic Circle to the southern borders of Soviet Azarbaijan and Tadzikstan (Bobrinskii et al. 1965: Map 33). Allen (1938:238) reported it from Mongolia and northern China, Wallin (1969:314) recorded it from Korea and Japan, and Siddiqi (1969:9) listed it from Kashmir.

Iran Distribution

PREVIOUS RECORDS: Lay (1967:145) reported a specimen collected by the 1962 Street Expedition at Sama, Mazanderan Province.

RANGE: The above locality is the only known record for Iran but this bat very likely occurs throughout the northern mountainous areas of Iran.

Subspecies

The Iranian specimen is too dark to fit Allen's (1938:238) description of the central Asian subspecies, E. n. gobiensis, and is referable to the nominate subspecies E. n. nilssoni.

Specimens Examined

I have examined the only Iranian specimen.

Eptesicus bottae Peters, 1869

TYPE DESCRIPTION: Vesperus bottae Peters, 1869. Mber. Preuss. Akad. Wiss. 406. TYPE LOCALITY: Yemen, Arabia. TYPE SPECIMEN: Paris Museum No. 112. Male. Collected by Botta in 1837 (Harrison 1964:140).

Identification

Eptesicus bottae is a fairly large Eptesicus (FA 40.0 to 51.7 mm; CBL 14.7 to 17.9 mm). The dentition is similar to E. serotinus and differs from E. nilssoni in having the second and third commissures of the last upper molar only feebly developed. The bases of the dorsal hairs are dark, even in the light-colored desert forms.

World Range

Eptesicus bottae is known in Africa only from Cairo, Egypt (Hayman 1967:89). In Europe it is known only from Switzerland and Rumania (van den Brink 1968:66, "Vespertilio sodalis"). Harrison (1964:144) reported it from Yemen, Sinai, and several sites in Iraq, but neither Çağlar (1965) nor Osborn (1963) listed it from Turkey. In the USSR Bobrinskii et al. (1965: Map 35) showed records from the northeast Black Sea Coast, Transcaucasia, Turkmeniya, Uzbekistan, Kazakhstan and Tadzikistan (as Vespertilio ognevi). Kuzyakin (1950) reported a specimen from Afghanistan and Neuhauser (1969:84) tentatively identified a specimen from that country as E. bottae.

Iran Distribution

PREVIOUS RECORDS: Thomas (1905:520) reported a specimen from

Mala-i-Mir, 70 mi NE Ahwaz (=Ahvaz) and another from Telespid as "Vespertilio sp. near V. serotinus." Cheesman (1921:574) listed the above two specimens and another from Basht as Eptesicus mirza. All three of these localities are in Lurestan and Khuzistan Province. Farhang-Azad (1969:731) reported five specimens of Eptesicus egnevi from Chelmir, Khorassan Province. Harrison (1964:143) has shown that the smaller serotines are referable to E. bottae and on this basis all of the above records are regarded as this species. Harrison (1964:143) also implied that he considered the form mirza, described by De Filippi (1865) from Zinjan (=Zanjan) and Kazvin (=Qazvin), Ghilan Province to be a representative of the species E. bottae. It is impossible to tell from the type description of mirza whether this form should be referred to E. bottae or E. serotinus. Most recent authors (Misonne 1959; Lay 1967; Etemad 1967, 1968) have included it under E. serotinus.

RANGE: Definite records of E. bottae are known from the southwest and northeast corners of Iran. In view of this species' occurrence in Iraq, Transcaucasia, Transcaspia and Afghanistan, it is likely that it occurs throughout western and northern Iran.

Subspecies

The systematics of the serotine bats in southwest Asia has a history of confusion. However, it is generally recognized that there are two broadly sympatric species, a larger form, Eptesicus serotinus, and a smaller form, Eptesicus bottae. In size the two species overlap, but where they occur together in any given area they are easily separable by both cranial and external measurements.

Harrison (1964:143) has shown that Vesperus bottae Peters, 1869;

Vesperugo innesi Lataste, 1887; Eptesicus ognevi Bobrinskii, 1918; and Eptesicus hingstoni Thomas, 1919 are all representatives of the smaller species, Eptesicus bottae by priority. Gaisler (1970:27) in reviewing the larger species, agreed with Harrison that these four smaller forms represent a single species.

In the area surrounding Iran three forms of E. bottae are presently recognized. Eptesicus b. ognevi has been reported from several localities in the Transcaspien area of the USSR and from three localities in Transcaucasia (Bobrinskii et al. 1965). Eptesicus b. hingstoni is known from several localities along the Tigris and Euphrates Rivers of central and southern Iraq (Harrison 1964). The forms ognevi and hingstoni are very similar in both cranial and external measurements and in color. By Ognev's (1928) description of ognevi and Harrison's (1964) description of hingstoni, they are inseparable and may prove to be synonymous. Farhang-Azad's (1969) measurements of the Chelmir specimen indicate that this is referable to the adjacent form, E. b. ognevi.

The third form of E. bottae on the periphery of Iran is known from four specimens from Iraqi Kurdistan. These were originally designated E. s. turcomanicus by Harrison (1956), but in 1964 he revised his identification and linked these specimens with the smaller species as "E. bottae ssp. indet." (Harrison 1964:143). These four specimens from the Zagros Mountains of Iraqi Kurdistan are very similar to the three specimens from the Zagros Mountains of southwestern Iran. While they are considerably smaller than E. serotinus from adjacent regions they are noticeably larger than either hingstoni or ognevi. According to Harrison (1964:143) they are similar to hingstoni in general

coloration of the pelage but have considerably darker membranes. It is reasonable to assume that these seven larger mountain dwelling specimens are subspecifically distinct from the smaller forms: ognevi from the Russian steppes, and hingstoni from the Tigris-Euphrates lowland.

The appropriate name for this subspecies may be E. b. mirza however the true identity of Vespertilio mirza De Filippi, 1865, is not clear. De Filippi (1865) reported mirza from Zanzan and Qazvin and in the same paper reported turcomanicus from Zanzan and Sar Cham. He distinguished mirza from turcomanicus on the basis of color and the greater length of the muzzle in mirza. Blanford (1876:22) pointed out that it is impossible to tell whether the measurements presented in the original description were made from a fresh specimen or from the type, a mounted specimen with skull intact, which he examined in the Turin Museum. Cheesman (1921) designated the three specimens from southwestern Iran E. mirza. However, Thomas (1919), Ellerman and Morrison-Scott (1951) and others have provisionally synonymized mirza with turcomanicus. Since De Filippi had both mirza and turcomanicus in his collection it is quite possible that mirza is a representative of the smaller serotine E. bottae.

If the type of mirza is still in existence it must be examined to determine its relationship to E. bottae and E. serotinus. If it proves to be the former, its type locality in the mountains of northwest Iran indicates that the specimens from the mountains of Iraqi Kurdistan and those from southwest Iran are probably also E. b. mirza. If the type of mirza proves to be E. serotinus, or if the type is no longer in existence and Vespertilio mirza must be designated a nomen dubium,

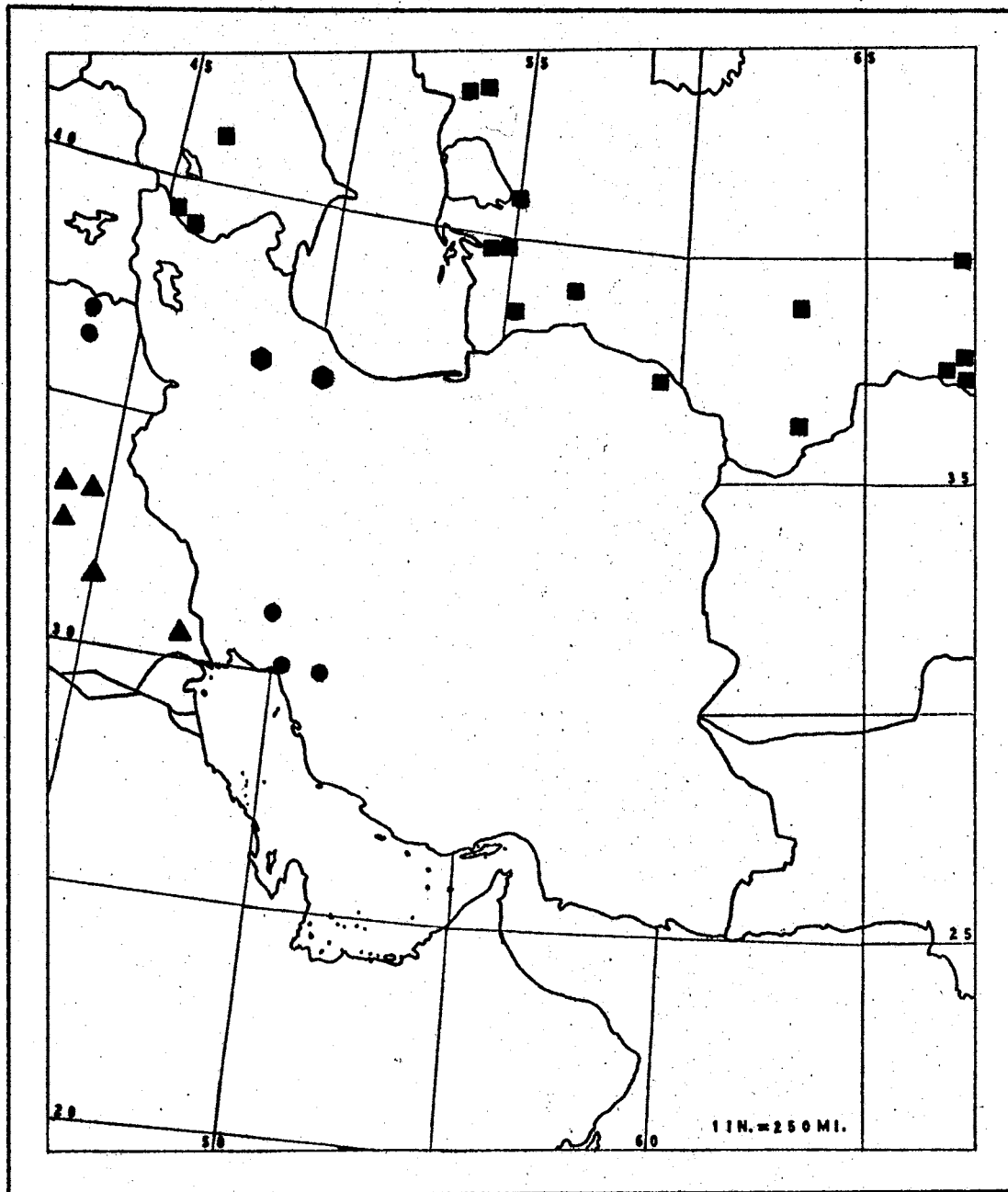


Figure 30. Distribution of *Eptesicus bottae*

- ▲ - *E. bottae hingstoni*
- - *E. bottae ognevi*
- - *E. bottae* subsp.
- ⬢ - *E. mirza*

TABLE XVII
 MEASUREMENTS OF EPTESICUS BOTTAE

Mea- sure	<u>E. b.</u> ¹ <u>hingstoni</u> Iraq	<u>E. b.</u> ¹ subsp. NE Iraq	<u>E. b.</u> subsp. SW Iran	<u>E. b.</u> ² <u>ognevi</u> Chelmir, Iran	<u>E. b.</u> ³ <u>ognevi</u> USSR
TL	108.3 (12) 102-114	115.2 (4) 107.8-120.7	118.3 (3) 111-126.5	93.0	92.7 (6) 81-102.5
T	47.8 (12) 43-52	48.6 (4) 45.8-52.3	46.7 (3) 45-48.5	44.0	39.9 (6) 35.2-44.5
HF	8.8 (18) 7.2-10.1	8.8 (4) 7.8-9.4	9.7 (3) 9-10	9.0	8.1 (6) 7.5-8.6
E	15.9 (12) 14-18	16.7 (4) 15.9-18	16.8 (3) 16.5-17	16.0	16.5 (6) 15.5-17.3
FA	45.7 (16) 43-50	48.2 (4) 46.2-51.7	47.9 (3) 46.3-49.1	42.2	44.8 (6) 42-46.6
GL	17.4 (12) 16.6-18.2	17.8 (4) 17.2-18.3	18.5 (2) 18.4-18.5	17.1	16.5 (5) 15.5-17.5
CBL	16.8 (12) 16.1-17.5	17.1 (4) 16.5-17.8	17.8 (3) 17.6-17.9		15.9 (5) 14.5-17.1
ZW	11.2 (8) 10.9-11.8	12.3	12.8 (3) 12.7-13.0	10.6	11.1 (3) 10.4-11.8
IO	3.6 (12) 3.3-3.9	3.6 (4) 3.4-3.8	4.0 (3) 3.9-4.1	3.9	4.2 (5) 4-4.7
C-M ³	6.0 (12) 5.7-6.3	6 (4) 6-6.1	6.5 (3) 6.2-6.7	6.3	6.6 (5) 6.4-6.7
C-M ₃	6.7 (12) 6.5-6.8	6.8 6.8-6.9	7.4 (3) 7.4-7.4		
ML	12.5 (12) 11.6-13.4	12.9 (4) 12.6-13.2	14.0 (3) 13.9-14.1		

¹ Harrison (1964); HF(su)

² Farhang-Azad (1969); HF(su)?

³ Ognev (1928); HF(su)

then there is no available name for these larger, montane forms of E. bottae.

Specimens Examined

I have examined the three specimens from southwest Iran as well as the types of E. b. innesi and E. b. hingstoni.

Eptesicus serotinus Schreber, 1774

TYPE DESCRIPTION: Vespertilio serotinus Schreber, 1774. Säugeth. I:pl.53 (text, p. 167). TYPE LOCALITY: France.

Identification

Eptesicus serotinus is the largest Eptesicus in Iran (FA 52.0 to 57.9 mm; CBL 19.0 to 21.6 mm). The dorsal pelage is the same color from base to tip or only slightly lighter at the tip (Gaisler 1970:27).

World Range

In Africa E. serotinus is known only from Morocco, Tunisia and Libya (Hayman 1967:88). It ranges through all of Europe except the northern British Isles and Scandinavia (van den Brink 1968:67) and has been reported from Turkey (Çağlar 1965) and the Levant (Harrison 1964:140). In the USSR it ranges from Europe to eastern Kazakhstan south of 55°N (Bobrinskii et al. 1965). To the east of Iran it has been reported from Afghanistan (Gaisler 1970), Mongolia and northern China (Allen 1938), Korea (Won 1961:52), Kashmir and Rajputana (Ellerman and Morrison-Scott 1951:156).

Iran Distribution

PREVIOUS RECORDS: De Filippi (1865:343) reported specimens from Sarcham (=Sar Cham) and Zinjan (=Zanjan), Ghilan Province. Dobson (1871:459) and Blanford (1876:21) both reported specimens from Shiraz, Fars Province. Vereshchagin (1959:653) mapped a record in West Azarbaijan Province which Lay (1967:145) interpreted as near Khvoy. Harrison (1963:303) cited a specimen from the Sulphur Caves at Guter-Su (Kutur Su), north of Mt. Sabalan, East Azarbaijan Province and a specimen from "the foot of the Elburz Mountains, SE Caspian," Mazanderan Province. In March 1970 I discovered two specimens in the collections of the British Museum labeled "foot of Elburz Mts. SE Caspian." One is also labeled "N Side of Mt. Demavend." One of these is very likely the specimen mentioned by Harrison.

Etemad (1967:278) reported this species from Shahr-Abad village, 10 km E of Mashad (=Mashhad), Khorassan Province. Lay (1967:145) reported one specimen from Sama, and 12 from Pahlavi Dezh, both Mazanderan Province, collected by the 1962 Street Expedition, a specimen from Karaj, Tehran Province in the collections of the Karaj Agricultural University Museum and another from Zarghum, Fars Province in the British Museums collections. Farhang-Azad (1969:731) reported a specimen from Chelmir, Khorassan Province.

RANGE: Eptesicus serotinus has been reported from several locations in northern Iran and from Shiraz in SW Iran. It probably occurs throughout the Zagros Mountains north of Shiraz as well.

Subspecies

The taxonomy of the larger serotine bats, Eptesicus serotinus, is, in Iran, only slightly less confused as that of E. bottae. Four forms of large serotines have been reported from southwest Asia.

The nominate form has been reported from Israel, Jordan (Harrison 1964:139) and the Caucasus (Bobrinski et al. 1965:112). Harrison (1963:303) said that the specimens from Kukur Su and the Elburz Mountains are probably referable to the nominate race.

The form turcomanicus Eversman, 1840, was described from "between the Caspian and Aral Seas, Russian Turkestan." It has been reported from the Transcaspien region of the USSR (Ognev 1928; Bobrinski et al. 1965), from Afghanistan (Gaisler et al. 1968; Gaisler 1970), and from Mongolia and northern China (Allen 1938). In Iran De Filippi (1865) reported turcomanicus from Sar Cham and Zanjan.

The form mirza De Filippi, 1865, is discussed in the Subspecies section under E. bottae. If this form is, in fact, allied to E. serotinus it may be a distinct subspecies but is more likely synonymous with one of the other three forms discussed here.

The form shiraziensis Dobson, 1871 was described from Shiraz and has been reported only from the Shiraz area of Fars Province, Iran.

Gaisler (1970:28) accepted Ellerman and Morrison-Scott's (1951) tentative inclusion of mirza as a synonym of E. s. turcomanicus. He distinguished the other three forms as follows: E. s. serotinus, "dorsal side dark brown or greyish brown, sometimes with feeble golden tinge, ventral side paler, testaceous. Auricles and wing membranes black."; E. s. turcomanicus, "pale 'desert' brown on the dorsum; lower

side of body dirty white. Auricles and wing membranes light brown."; E. s. shiraziensis, "Coloration identical with ssp. turcomanicus. Although the holotype and the topotype are more robust than the specimens of ssp. turcomanicus examined, it is possible that shiraziensis is synonymous with turcomanicus."

The Iranian specimens from Pahlavi Dezh; Sama; Elburz Mountains SE Caspian, N side Mt. Demavend; and Kutur Su all have dark pelage and are referable to the nominate form, E. s. serotinus. This is to be expected since the fauna of the north slope of the Elburz Mountains has a greater similarity to that of the Caucasus than to the more arid areas of Iran and Transcaspia.

Chelmir and Shahar-Abad are on the north edge of the Iranian Plateau near the border of Soviet Turkmeniya. Neither Farhang-Azad (1969) nor Etemad (1967) designated subspecies or provided descriptions for the E. serotinus which they reported. However, their specimens most likely are E. s. turcomanicus, the form which has been reported from Turkmeniya near each of these localities (Bobrinskii et al. 1965: Map 35).

Dobson (1876:21) said with respect to shiraziensis, "I found this bat abundant close to Shiraz. I shot several in the evening just outside the city." However, only two specimens are to be found in the British Museum: the type of shiraziensis Dobson, collected at Shiraz by W. T. Blanford with its tag dated "1/5/17," (probably should be 1/5/71) and a specimen labeled "Topotype of E. shiraziensis, Zarghum, 52°44'E, 29°48'N about 5150 alt., by Lt. Col. J. E. B. H." and dated "2.7.20."

Gaisler (1970) considered shiraziensis to be very similar to, and

probably synonymous with, turcomanicus. On the basis of color the two forms are very similar, however, the only two specimens of shiraziensis are definitely larger than turcomanicus. This is not evident from the measurements presented as shiraziensis by Gaisler (1970:30, 32) which include other forms as well. Of the four "schiraziensis [sic], Iran, Coll. BMNH" listed by Gaisler for external measurements only one, the Zarghum specimen, is in fact shiraziensis. The other three are the smaller serotines discussed under the preceding species, which Harrison (1964) considered to be E. bottae. These specimens are intermediate in size between E. bottae and E. serotinus, and are equal in several dimensions to the smaller forms of E. serotinus (e.g., pachymus and pallens). They average smaller than either turcomanicus or the nominate form and are considerably smaller than shiraziensis, the form with which they are presumably sympatric. In his table of cranial measurements, Gaisler (1970:32) presented those of the type of shiraziensis then listed three specimens as "shiraziensis, Iran Coll. BMNH." The first of these is one of the above three E. bottae and most of its measurements are smaller than any other specimen in Gaisler's table. The second is the Zarghum specimen of shiraziensis and the third is the Kutur Su specimen which by color is referable to E. s. serotinus. If these extraneous specimens are eliminated from Gaisler's table and the two remaining specimens of shiraziensis are compared to the other measurements presented, shiraziensis is seen to be conspicuously larger than turcomanicus and the nominate form in all measurements of cranial length (GL, CBL, C-M³, C-M₃, ML), and to average larger in other cranial measurements and in forearm length.

While shiraziensis may prove to be synonymous with turcomanicus

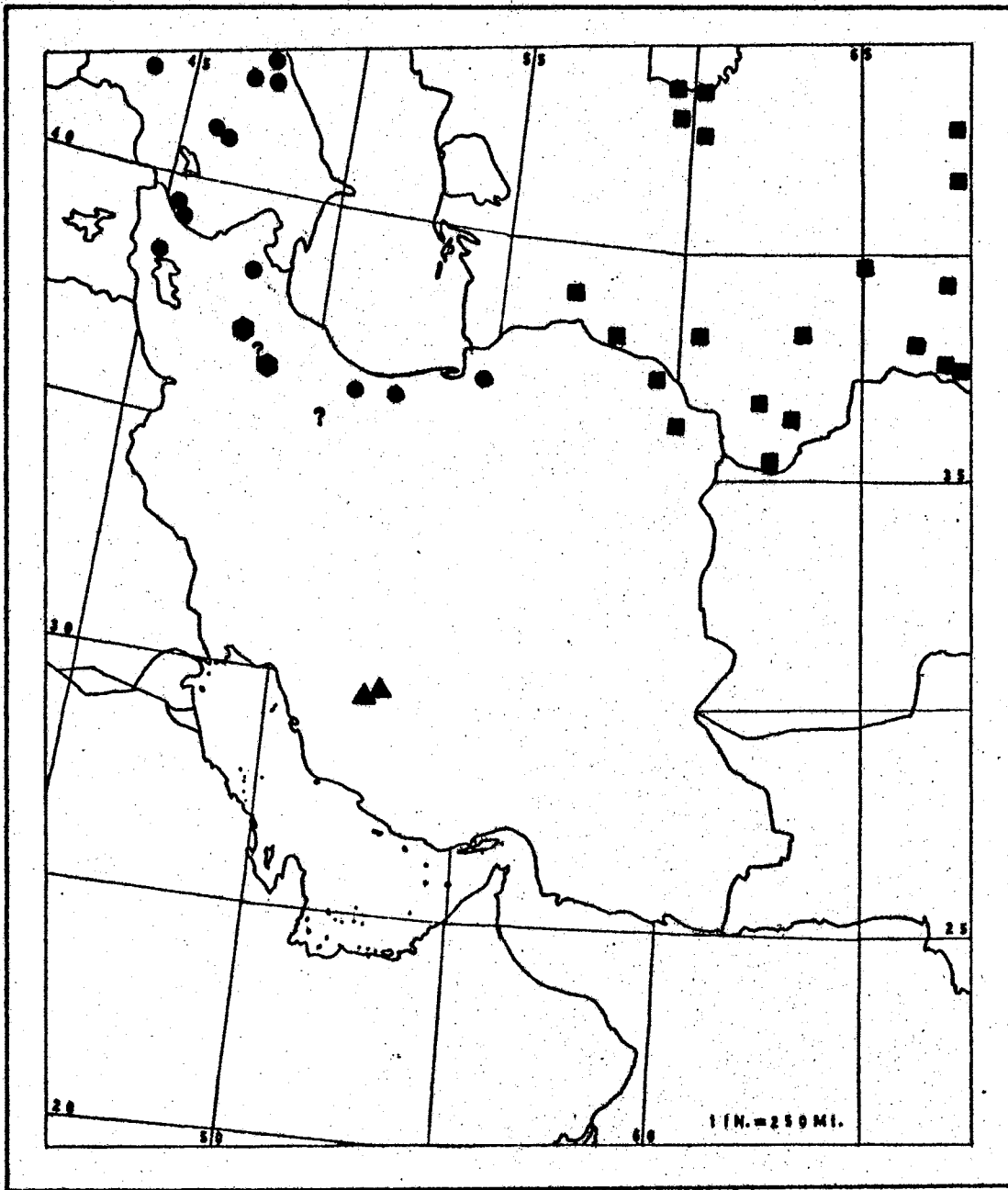


Figure 31. Distribution of *Eptesicus serotinus*

- = *E. serotinus serotinus*
- = *E. serotinus turcomanicus*
- ▲ = *E. serotinus shiraziensis*
- ? = *E. serotinus* subsp.
- = *E. mirza*

TABLE XVIII
MEASUREMENTS OF EPTESICUS SEROTINUS

Mea- sure	<u>E.s.serotinus</u> ¹ Caucasia	<u>E.s.serotinus</u> N Iran	<u>E.s.shiraziensis</u> SW Iran	<u>E.s.turcomanus</u> ¹ USSR
TL		128.5 (2) 125-132	125	
HB	73.3 (4) 70.0-79.0	77 (2) 75-79	73	71.2 (7) 67.0-80.0
T	56.2 (3) 46.7-62.0	52.8 (4) 46-57	54 (2) 52-56	54.4 (7) 50.0-59.0
HF	11.6 (2) 11.0-12.2	12.3 (4) 11-13	13.5 (2) 13-14	
E	19.2 (4) 18.0-21.5	18.3 (4) 17-20	17 (2) 15-19	18.4 (7) 15.5-19.5
FA	51.3 (5) 50.0-52.5	53.7 (9) 51.1-57.1	55.9 (2) 53.8-57.9	51.3 (7) 49.7-53.0
Tr	9.0 (2) 9.0-9.0	7	8	8.6 (7) 8.0-9.0
GL	20.7 (4) 20.1-21.5	21.4 (6) 21.1-21.5	23.1 (2) 23.0-23.2	20.3 (8) 19.8-21.2
CBL	19.8 (3) 19.5-20.2	20.5 (6) 20.1-20.7	21.4 (2) 21.1-21.6	19.8 (8) 19.2-20.5
ZW	14.0 (4) 13.8-14.3	14.5 (5) 13.9-15.2	15.0	13.5 (8) 12.8-14.0
IO	4.4 (5) 4.1-4.6	4.3 (7) 4.2-4.6	4.3 (2) 4.3-4.35	4.4 (8) 4.2-4.6
G-M ³	7.7 (5) 7.3-7.9	7.6 (7) 7.2-7.8	8.5 (2) 8.4-8.5	7.6 (8) 7.3-8.1
G-M ₃	8.5 (4) 8.2-8.7	8.6 (7) 7.9-8.8	9.3 (2) 9.3-9.3	8.3 (8) 7.9-8.6
ML	15.8 (4) 15.3-16.3	15.9 (7) 15.2-16.1	17.6 (2) 17.5-17.6	15.2 (8) 14.7-15.6

¹ Gaisler (1970); HF(su)?

when more specimens are known, the larger size of the two presently known and their separation from the closest known turcomanicus by almost 1,000 km, indicate that E. s. shiraziensis should continue to be regarded as a valid subspecies.

The specimens of turcomanicus reported by De Filippi (1865) are from Zanzan and Qazvin, localities in the northwestern mountainous area of Iran. This area is probably not inhabited by turcomanicus. These specimens may be E. s. serotinus or perhaps are northern representatives of E. s. shiraziensis.

Specimens Examined

I have examined 16 of the nominate form from northern Iran and two from Greece, and have seen the type and topotype of E. s. shiraziensis. I have also examined six E. s. pashtonas from Afghanistan including the type.

Nyctalus leisleri Kuhl, 1818

TYPE DESCRIPTION: Vespertilio leisleri Kuhl, 1818. Ann. Wetterau Ges. Naturk. 4, 1:46. TYPE LOCALITY: Hannau, Hessen-Nassau, Germany.

Identification

Nyctalus leisleri is the smallest of this genus in Iran (FA less than 47 mm; CBL less than 17 mm). The hairs of the dorsal pelage have bases distinctly darker than their tips.

World Range

In Europe N. leisleri is known from scattered areas in the west

(Ireland, England, the Netherlands, France, Portugal) and south (Italy, Yugoslavia, Bulgaria, Greece, Thrace) and extends through central Europe from Switzerland to the USSR (van den Brink 1968:71). In the USSR it is found throughout the area west of the Caspian Sea and south of 58°N latitude. To the east of Iran it has been reported from Kashmir, Punjab (Gaisler 1970:36) and Afghanistan (Neuhauser, in press).

Iran Distribution

PREVIOUS RECORDS: None.

NEW RECORDS: Lay (1967:144) reported three specimens collected at Sama, Mazanderan Province as N. noctula. I have re-examined this series and found them to agree in size, pelage, and dental characters with N. leisleri.

RANGE: Nyctalus leisleri is known from Caucasia and Afghanistan. It probably occurs throughout the northern mountains of Iran which link these two areas.

Subspecies

Gaisler (1970) and Neuhauser (in press) have shown that N. montanus Barret-Hamilton, 1906, is a valid species and not a subspecies of N. leisleri, thus, only the nominate form is recognized.

Specimens Examined

I have examined the three specimens known from Iran and the one from Afghanistan.

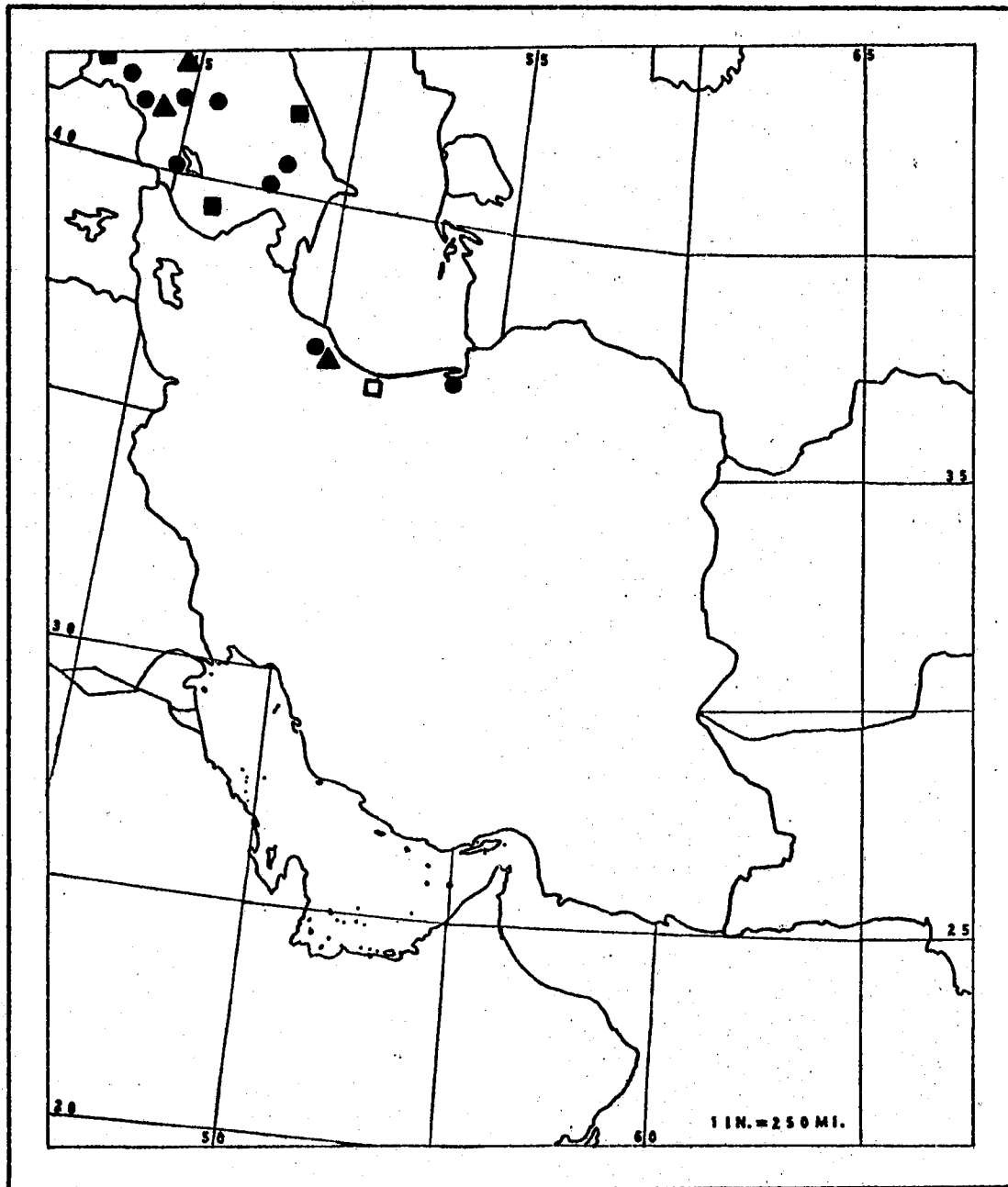


Figure 32. Distribution of Three Species of Nyctalus

- - N. leisleri, previous records
- - N. leisleri, new record
- - N. noctula
- ▲ - N. lasiopterus

TABLE XIX
MEASUREMENTS OF THREE SPECIES OF NYCTALUS FROM IRAN

Mea- sure	<u>N. leisleri</u>			<u>N. noctula</u>		<u>N. lasiopterus</u>
	Sama			Rasht		Roudsar ¹
	♀	♀	♀	♂	♂	
TL	106	105	112	125	129	134.2
T	44	43	49	47	50	45.3
HF	10	9	10	11	11	12.6
E	16	17	17	18	17	14.5
FA	44.8	42.8	45.2	50.5	51.6	64.2
GL	15.7	16.0	15.9	18.4	18.6	
CBL	15.3	15.0	15.6	18.2	18.3	
ZW	10.2		10.3		12.7	
IO	4.6	4.5	4.7		5.1	
C-M ³	5.5	5.3	5.7	7.1	7.0	
C-M ₃	6.1	6.0	6.2	7.6	7.6	
ML	11.6		11.7	13.6	14.7	

¹ Etemad (1970:547); HF(su)?

Nyctalus noctula Schreber, 1774

TYPE DESCRIPTION: Vespertilio noctula Schreber, 1774. Säugeth. I: pl 52 (text, p 166). **TYPE LOCALITY:** France.

Identification

Nyctalus noctula is the medium-sized representative of this genus in Iran (FA 47 to 60 mm; CBL 17 to 21 mm). Hairs of the dorsal pelage are uniformly colored from tip to base or are slightly lighter at the base.

World Range

In Africa N. noctula has been reported from Morocco and Mozambique, but the Mozambique specimen "must be regarded with suspicion" (Hayman 1967:75). This species occurs throughout Europe except for northwest Spain, Ireland and northern Scandinavia (van den Brink 1968:71). It has been reported only from European Turkey according to Çağlar (1965), but Harrison (1964:117) reported it from the Levant and mapped a record from southern Anatolia. In the USSR it is known from all of the area south of 60°N latitude and west of 55°E longitude and is also found near the southern Soviet border from the Aral Sea to the Ob River (Bobrinskii et al. 1965: Map 29). To the east of Iran it has been reported from China (Allen 1938), Japan (Wallin 1969), Nepal, Kashmir and Burma to the Altai Mountains (Ellerman and Morrison-Scott 1951).

Iran Distribution

PREVIOUS RECORDS: Thomas (1907:197) reported this species from

Resht (=Rasht), Ghilan Province and Bianki (1917:viii) reported it from Ashraf (=Behshahar), to the south of Astrabad Bay, Mazanderan Province.

Lay (1967:144) reported three specimens from Sama, Mazanderan Province, however these three specimens are N. leisleri and not N. noctula.

RANGE: In Iran N. noctula is probably restricted to the Elburz Mountains and perhaps the mountains of northern Azarbaijan.

Subspecies

Harrison (1962:338) said that the N. noctula from northern Iran are "clearly referable to the typical race," but in his discussion he did not mention N. n. princeps Ognev and Worobiev, 1923. Ognev (1928:389) keyed N. n. princeps from N. n. noctula on the basis of size, with N. n. princeps having "Dimensions relatively large. Condylbasal length 19.1-20.1 (average 19.4) mm; zygomatic width 13-14.5 (average 13.8) mm. Upper toothrow 7.4-8.3 (average 7.7) mm. Length of body and head 70-85 mm." and N. n. noctula having "Dimensions somewhat smaller. Condylbasal length 17.4-19.4 (average 18.27) mm; zygomatic width 13-14.5 (average 13.03) mm. Upper toothrow 6.8-7.4 (average 7.1) mm. Forearm 51-54 (average 52.5) mm. Length of body 69-79 mm."

Kuzyakin placed N. n. princeps in synonymy with the nominate form in 1950 (p. 334), but in 1965, as a co-author of Bobrinskii et al. (1965:102), he recognized only N. n. princeps from the western USSR and said that this form is slightly larger in skull measurements than the nominate western European form.

Measurements of the two specimens from Rasht in the collections

of the British Museum (BM 7.7.14.1-2) are given in Table XIX. By Ognev's (1928:389) key both of these specimens are N. n. noctula. Thus, I agree with Harrison (1962) in listing the nominate form for Iran.

Specimens Examined

I have examined two N. noctula from Iran, one from the USSR, three from Bavaria, and the type and paratype of N. n. lebanoticus from Lebanon.

Nyctalus lasiopterus Schreber, 1780

TYPE DESCRIPTION: Vespertilio lasiopterus Schreber, 1780, in Zimmerman; Geogr. Gesch. 2:412. **TYPE LOCALITY:** None given "?Northern Italy (Chaworth-Musters)" (Ellerman and Morrison-Scott 1951).

Identification

This is the largest species of Nyctalus (FA greater than 60 mm; CBL greater than 21 mm). The hairs of the dorsal pelage are uniformly colored or only slightly lighter at the base.

World Range

Nyctalus lasiopterus is known in Europe only from a few scattered localities in central France, Switzerland, Spain, Italy, Dalmatia, Croatia, Rumania, Bulgaria (van den Brink 1968:72), and Greece (Wolf 1964:183-184). It is known from several localities in European Russia from Moscow to the Caucasus (Bobrinskii et al. 1965: Map 28). It is unknown in central Asia, but in the East has been reported from Japan,

Korea, Shawsishan Island off the mouth of the Yangtsekiang River, China, and Manchuria (Wallin 1969:317).

Iran Distribution

PREVIOUS RECORDS: Etemad (1970:547) reported a specimen from "near Roudsar, northern part of Iran, near 37°N latitude" (Ghilan Province?) which was collected on 11 October 1969.

RANGE: The above record is the southernmost point for this species in western Eurasia (Etemad 1970:547). In Iran it is probably restricted to the Elburz Mountains and Caspian coastal plain.

Subspecies

Only the nominate form is recognized in western Eurasia (Ellerman and Morrison-Scott 1951:161).

Specimens Examined

None.

Pipistrellus pipistrellus Schreber, 1774

TYPE DESCRIPTION: Vespertilio pipistrellus Schreber, 1774. Säugeth I, pl 54 (text, p. 167). TYPE LOCALITY: France.

Identification

This species is the smallest pipistrelle in Iran (FA 27 to 34 mm; CBL 10.4 to 11.5 mm). The first upper incisor is distinctly bicuspid and the second upper incisor is more than half the length of the first. The anterior upper premolar is small but equals the second incisor in

crown area and is visible in labial view through the gap between the canine and second upper premolar. The greatest width of the tragus is much less than the length of the anterior edge. The wing and interfemoral membranes may or may not be edged in white, the interfemoral membrane is not striped.

World Range

In Africa P. pipistrellus is known only from Morocco (Hayman 1967:81). It ranges throughout Europe except for southern Portugal and northern Scandinavia (van den Brink 1968). Çağlar (1965) reported it from Turkey and Harrison (1964) reported it from Lebanon. In the USSR the species is known from most of European Russia south of about 57°N latitude and west of 50°E longitude, and from Turkmeniya, Uzbekistan, Tadzikistan and Kazakhstan in Transcaspia. Neuhauser and DeBlase (in press) mentioned it from Afghanistan, Kashmir and northern China. Ellerman and Morrison-Scott (1951:163) also listed Japan, Formosa and Korea, but Wallin (1969) made no mention of the species there.

Iran Distribution

PREVIOUS RECORDS: Thomas (1907:197) reported a specimen from the south coast of the Caspian Sea, 150 feet elevation. Vereshchagin (1959:651) mapped a record from West Azarbaijan Province which Lay (1967:142) interpreted as Khvoy. Etemad (1967:278) reported the species from Babol, Mazanderan Province. Lay (1967:142) reported two specimens from Sama, three from 8 km N of Gorgan, and nine from 4.8 km W of Pahlavi Dezh, all Mazanderan Province which were collected by the

1962 Street Expedition, 10 from Barfurush (=Babol), Mazanderan Province in the collections of the British Museum and four from Gombad-i-Kobus (=Gonbad-i-Kavus), Khorassan Province in the collections of the Stuttgart Museum. Farhang-Azad (1969:731) reported 123 specimens from Loft-abad and two from Hessar near Loft-abad, Khorassan Province.

Neuhauser and DeBlase (in press) reported P. pipistrellus collected by the 1968 Street Expedition from 8 km NW Kuh Rang and from Sar Dasht village near Loredegan, both in Isfahan Province; from Shahpur Cave and from Jahrom, both in Fars Province; from Ilam and from 6.4 and 7.2 km N of Kermanshah, all in Kermanshahan Province; and from 1.6 km S of Khurramabad, Lurestan and Khuzistan Province.

Neuhauser and I referred Pipistrellus aladdin Thomas, 1905, to P. pipistrellus and added its type locality, Derbent (=Darband), Isfahan Province, to the list for this species in Iran. We also reported that two specimens from Maku, West Azarbaijan Province previously reported as P. kuhli (Lay 1967:143), and six specimens from Shiraz, Fars Province, previously reported as P. mimus (Cheesman 1921:576) are, in fact, P. pipistrellus.

RANGE: Pipistrellus pipistrellus appears to range throughout Iran with the probable exception of the Khuzistan Plain, the southern coastal strip, the central deserts, and perhaps Baluchistan.

Subspecies

Neuhauser and DeBlase (in press) have shown that the form aladdin Thomas, 1905 is synonymous with P. p. bactrianus Satunin, 1905 and that the former has priority. The nominate form, P. p. pipistrellus, occurs through the north slope of the Elburz Mountains and the adjacent

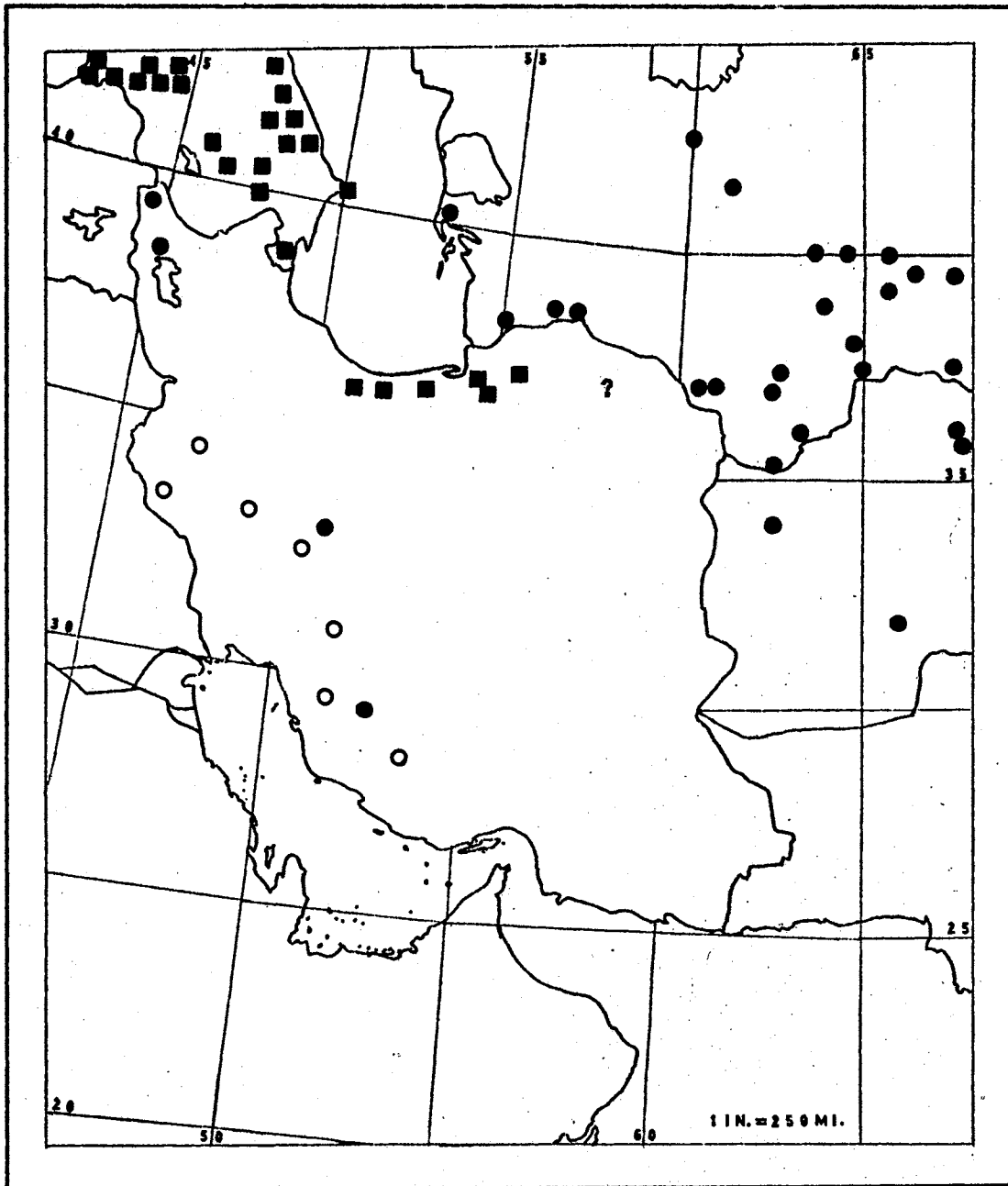


Figure 33. Distribution of *Pipistrellus pipistrellus*

- - *P. p. pipistrellus*, previous records
- - *P. p. aladdin*, previously reported specimens
- - *P. p. aladdin*, 1968 Street Expedition specimens
- ? - *P. pipistrellus* subsp. *Luft-abad*, N Khorassan Province. Co-ordinates not located

Caspian coastal plain. Pipistrellus p. aladdin has been collected in the Zagros Mountains from Maku in the north to Jahrom in the south. Since this form is the most common bat in the Kopet Dagh and Russian Turkestan (Ognev and Heptner 1928) and is equally common in northern Afghanistan (Neuhauser 1969), it very likely also occurs in Khorassan Province and through the area south of the Elburz Mountains divide.

Specimens Examined

From Iran I have examined 29 P. p. pipistrellus and 28 P. p. aladdin including the type of P. aladdin Thomas. I have also seen the comparative material listed by Neuhauser and DeBlase (in press).

Pipistrellus kuhli Kuhl, 1819

TYPE DESCRIPTION: Vespertilio kuhlii Kuhl, 1819. Ann. Wetterau. Ges. Naturk. 4, 2:199. TYPE LOCALITY: Trieste, Italy.

Identification

Pipistrellus kuhli is a medium-sized pipistrelle (FA 33 to 39 mm). The first upper incisor usually lacks a second cusp and the second upper incisor is less than half the length of the first. The anterior upper premolar equals the second upper incisor in crown area but is not visible in labial view of the skull. The canine and second upper premolar are in contact. The greatest width of the tragus is much less than the length of the anterior edge. The wing and interfemoral membranes are broadly edged in white and the interfemoral membrane has conspicuous parallel, light stripes running from the tail to each leg.

World Range

In Africa P. kuhli ranges through the eastern portion of the continent from Cape Province north to the Mediterranean coast (Hayman 1967). In Europe it ranges through the Mediterranean region from Portugal to Greece and extends north to central France (van den Brink 1968:63). Çağlar (1965:131-132) reported it from several areas of Turkey and Harrison (1964:152) listed it from most of the Arabian Peninsula. In the USSR it is known from several localities on the Crimean Peninsula and in Transcaucasia, and from one locality south of the Aral Sea in Uzbekistan (Bobrinskii et al. 1965: Map 32). Gaisler (1970:46) and Neuhauser (1969) reported it from several areas in Afghanistan, Siddiqi (1969) listed it from West Pakistan and Ellerman and Morrison-Scott (1951:168) mentioned Kashmir.

Iran Distribution

PREVIOUS RECORDS: De Filippi (1865:343) "Southern Persia."
 Dobson (1871:460-61) Shiraz, Fars Province. Blanford (1876:23) Bampur and Kerman, Kerman Province; Niriz (=Neyriz), E of Shiraz, Fars Province. Thomas (1905:520) Ahwaz (=Ahvaz) and Dizful (=Dezful), Lurestan and Khuzistan Province. Thomas (1907:196) Tehran, Tehran Province. Satunin (1909:283-84) Badzhistan and Nusi, Khorassan Province; Ismailabad (=Esmailbad) and Meigun, Kerman Province; and Nasrieh (=Ahvaz), Lurestan and Khuzistan Province. Cheesman (1920:327) Shuster (=Shushtar), Lurestan and Khuzistan Province. Wroughton (1920:316) Nag, Seistan and Baluchistan Province. Cheesman (1921:574) Komarij, Dashistan, Fars Province. Werner (1929:238) Tagi-abad, ? Province.

Etemad (1967:278) Kazerun (=Kazarun), Fars Province. Lay (1967:143) Faraman village, Kermanshahan Province; 19.3 km S of Shush, and Ahvaz, Lurestan and Khuzistan Province; Ahram, 5 km SE Pol-i-Abgineh, Shahpur Cave, Jarghum (=Jahrom?), and Bandamir, all Fars Province; Jiroft, Kerman Province; and Iranshahr and Seistan (no exact locality), Seistan and Baluchistan Province. Etemad (1968:19) Zabol, Seistan and Baluchistan Province.

The two specimens from Maku reported as P. kuhli by Lay (1967:143) are actually P. p. aladdin.

NEW RECORDS: The 1968 Street Expedition collected P. kuhli at the following localities: (the number in parentheses is the number of specimens) 4 mi N Kermanshah (1), Kermanshahan Province; 1 mi S Khurramabad (1), Meshrageh, on the Jahari River about 85 km SW Ahvaz (1), Shush (45), Lurestan and Khuzistan Province; Persepolis (6), Shiraz area (5), Jahrom (15), Bastak (2), and Chah Moslem (7), Fars Province.

RANGE: Pipistrellus kuhli is the best known and perhaps most widely ranging bat in Iran. It has been reported from numerous localities east, south, and west of the central deserts and from one point in the north. However, it is conspicuously absent from northern Khorassan Province and from northwest Iran, both areas in which it could be expected to occur in view of its distribution in the USSR.

Subspecies

Pipistrellus kuhli, like P. pipistrellus and several other bat species, has a much lighter color in the arid regions of central and southwestern Asia than it does in Europe. Pipistrellus lepidus Blyth,

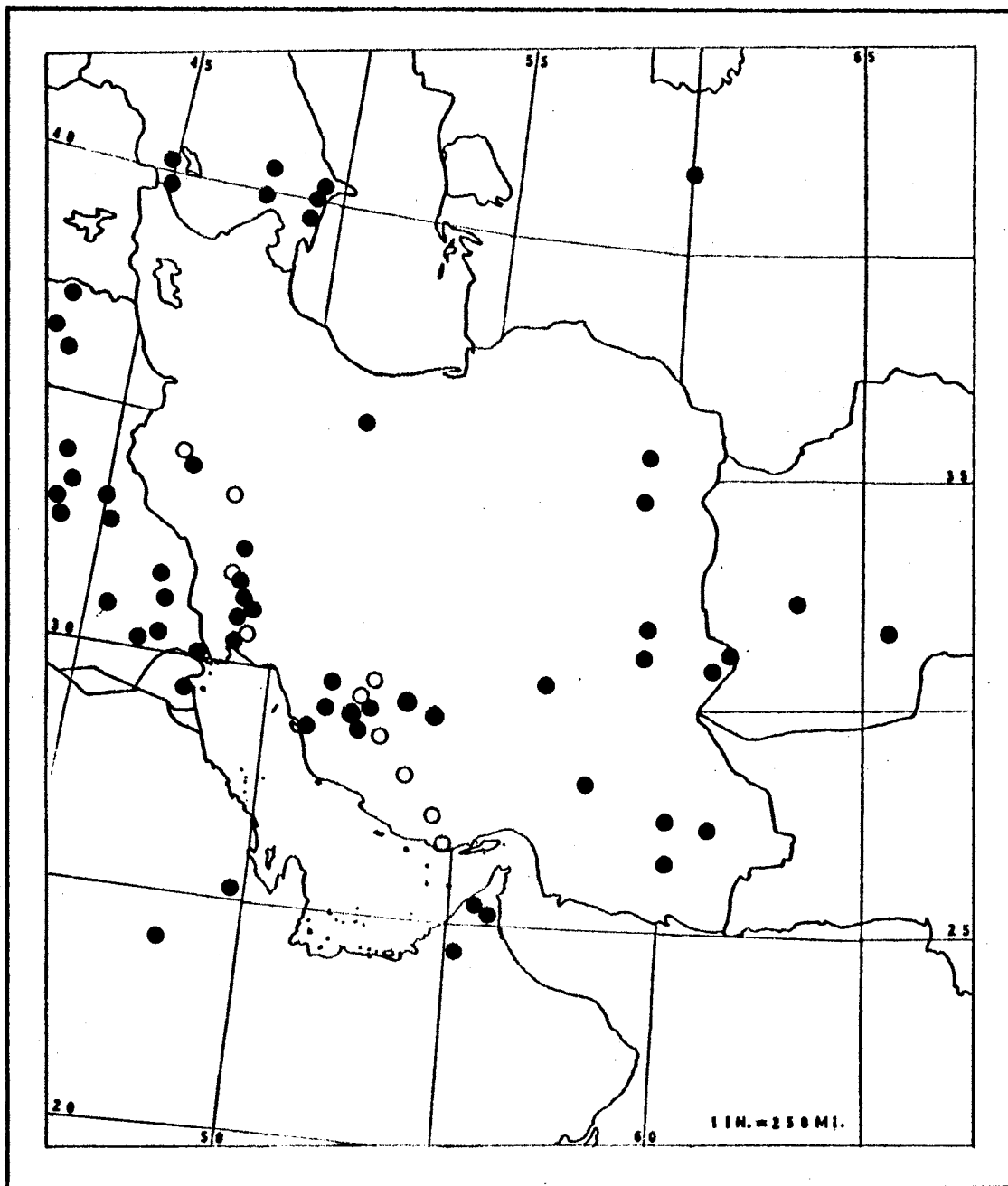


Figure 34. Distribution of Pipistrellus kuhli

- - Previous records
- - 1968 Street Expedition specimens

1845, is generally considered to be a subspecies of P. kuhli. Bobrinski et al. (1965:109) listed P. k. lepidus as the form from the Caucasus and central Asia. Gaisler (1970:47) listed P. k. lepidus from Iraq, Iran, Afghanistan and West Pakistan. Harrison (1964:152), however, considered all specimens of this species from the Arabian Peninsula, including those from Iraq, to be Pipistrellus kuhli ikhwanus Cheesman and Hinton, 1924. This latter form also is distinguished from P. k. kuhli on the basis of its lighter color, but comparisons of the two light forms, lepidus and ikhwanus, are absent from the literature. It is likely that these two are synonymous but many more specimens must be examined. The older name is lepidus and I therefore follow Gaisler (1970:46) in provisionally designating all Iranian specimens P. k. lepidus.

Specimens Examined

I have examined 105 P. kuhli from Iran and 31 from Afghanistan.

Pipistrellus savii Bonaparte, 1837

TYPE DESCRIPTION: Vespertilio savii Bonaparte, 1837. Faun. Ital. I:fac. 20. TYPE LOCALITY: Pisa, Italy.

Identification

Pipistrellus savii is a medium-to-large pipistrelle (FA 33 to 39 mm; CBL 12.2 to 13.1 mm). The first upper incisor is bicuspid and the second upper incisor is at least half the length of the first. When present, the first upper premolar is minute, smaller in crown area than the second upper incisor. This tooth is absent in some

individuals, resulting in a dental formula identical to that of Eptesicus. The upper canine and second upper premolar are in contact. The greatest width of the tragus is about equal to its height at the anterior edge and the wings and interfemoral membranes are never striped or edged in white.

World Range

Pipistrellus savii is known from Morocco and Algeria in Africa, and from the Canary Islands (Hayman 1967:79). In Europe it is predominantly a Mediterranean species ranging from southern Spain to Greece (van den Brink 1968:53). Osborn (1963:216) reported a specimen from Tarsus in Anatolia and Harrison (1964:162) listed three from Ainab, Lebanon. In the USSR it is known from several localities in Crimea and from scattered records from the Black Sea east to Tadzhikistan (Bobrinskii et al. 1965: Map 32). Neuhauser (in press) reported it from Afghanistan and Ellerman and Morrison-Scott (1951:169) listed Mongolia and tentatively listed Sikkim, Assam and Burma.

Iran Distribution

PREVIOUS RECORDS: Farhang-Azad (1969:731) reported seven specimens from Ghelmir, Khorassan Province. DeBlase (1971) listed a specimen from 1 km SE of Maku, West Azarbaijan Province and another from Sar Dasht village near Lordegan, Isfahan Province.

NEW RECORDS: On 11 November 1969 a female P. savii was mistnetted by Youton Bataloff on Quyon-Daghi Island in Lake Rezaiyeh, West Azarbaijan Province.

RANGE: Pipistrellus savii is now known from the extreme northwest,

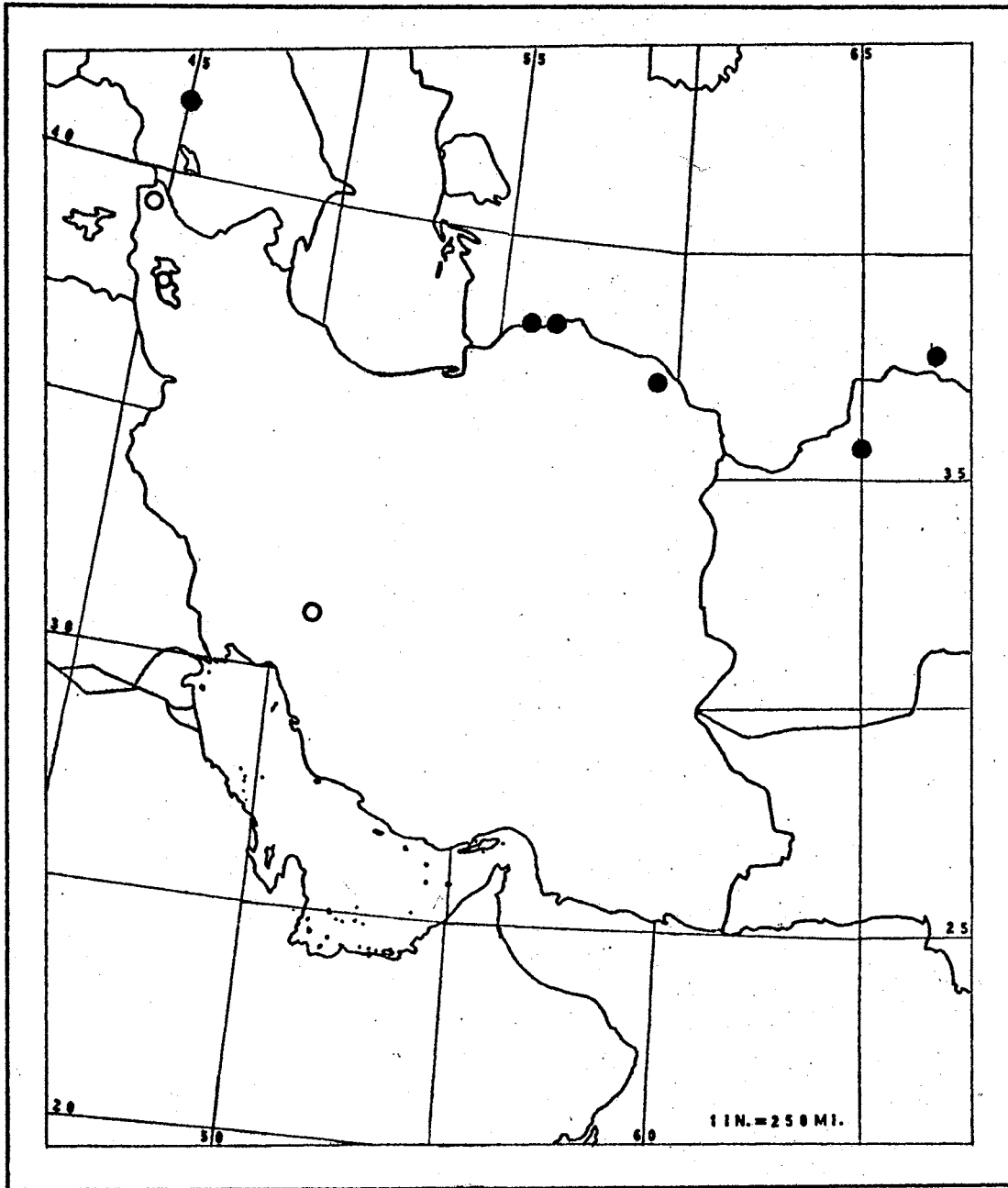


Figure 35. Distribution of Pipistrellus savii

- = Previous records
- = New records

TABLE XX
 MEASUREMENTS OF PIPISTRELLUS SAVII CAUCASICUS FROM IRAN

Mea- sure	Maku	Lake Rezaiyeh	Sar Dasht	Chelmir ¹		
	♀	♀	♂	♀	♀	♂
TL	89		91	80	83	
T	36		37	33	35	
HF	7	7.1	7	7.0	7.8	
E	14		13	12.2	11.3	
Tr	5		5			
FA	34	32	34	35.0	33.2	
GL		12.9	13.4	14.3	13.9	13.4
CBL		12.5	12.7	12.3	12.8	12.2
ZW	8.2		8.2	8.9	8.7	8.1
IO	3.3	3.6	3.4	3.3	3.1	3.0
G-M ³	4.6	5.0	4.5	4.4	4.7	4.5
G-M ₃	4.9	4.7	4.7	5.0	4.9	4.9
ML	9.5	9.0	9.3	9.9	9.7	9.2
P ¹	absent	absent	present			

¹ Farhang-Azad (1969); HF(su)?

the extreme northeast, and the southwest of Iran. It probably occurs throughout the Zagros Mountains north of Shiraz and extends across the northern part of the country from Turkey to Afghanistan.

Subspecies

Pipistrellus savii caucasicus Satunin, 1901, is recognized by Harrison (1964:163) and Bobrinski et al. (1965:109) as the form which occurs in central and southwest Asia. They distinguished caucasicus from the nominate race by its lighter color, longer forearm (FA 33 to 37 mm in P. s. caucasicus versus 31 to 33 mm in P. s. savii) and shorter condylobasal length (CBL 12.5 to 13.7 mm in P. s. caucasicus versus 13 to 14 mm in P. s. savii). The color and measurements of the Maku, Lake Rezaiyeh and Sar Dasht specimens, and the measurements of three specimens from Chelmir agree with those characteristics of P. s. caucasicus (Table XX).

Specimens Examined

I have examined three P. savii from Iran and three from Afghanistan.

Barbastella leucomelas Gretzschmar, 1826

TYPE DESCRIPTION: Vespertilio leucomelas Gretzschmar, 1826, in Rüppell, Atlas Reise nördl. Afrika, Säugeth. 73, Pl 28b. TYPE LOCALITY: Arabia Petraea (=Sinai). TYPE SPECIMEN: Senckenberg Museum, Frankfort am Main. Lectotype SMF 4373, Sinai; Lectoparatype SMF 12393 "Linares de Riofrio, Salamanca," Spain (Kock 1969:177).

Identification

Barbastella leucomelas has been distinguished from B. barbastellus by its somewhat larger ear which lacks the small fleshy lobe on its outer margin, and by its dorsal pelage which has conspicuous yellowish or white tips giving an overall "frosted" appearance. Kock (1969) has discussed the similarities between B. barbastellus and B. leucomelas in Africa, Arabia and Europe, and has concluded that since the nominate subspecies occasionally also lacks the small lobe on the ear, since south European specimens sometimes also have a pale coloration, and since the measurements of Arabian specimens do not differ significantly from those of European specimens, leucomelas should be regarded as a subspecies of B. barbastellus. In B. b. leucomelas Kock appears to have included all specimens from Africa and Arabia as well as those from Mediterranean Islands, southern Europe, and the Crimean Peninsula. All specimens from the USSR and northern Iran lie north of the line on Kock's map and apparently are included as the nominate subspecies. However, Bobrinskii et al. (1965:100) reported both B. leucomelas and B. barbastella from Caucasia and Transcaucasia. In this area of sympatry they distinguished B. leucomelas from the nominate species by ear and pelage color and by size. The dark specimens with smaller, lobed ears have smaller dimensions (FA 36 to 41 mm; CBL 13 to 13.6 mm) than the light-colored specimens with larger, unlobed ears (FA 41.5 to 45 mm; CBL 14.2 to 14.9 mm). Three specimens from Sang-e-Sar, Tehran, and Mahallat, Iran, fit in the size range of B. leucomelas as given by Bobrinskii et al. (FA 44.4, 42, 42.8 mm; CBL 14.9, 14.3, 14.8 mm respectively), lack the lobe on the ear, and are comparable in coloration to

the specimen of B. leucomelas from the "Coast of Arabia" in the British Museum (BM 7.1.1.346).

I cannot agree with Kock, and must regard B. leucomelas as a valid species.

World Range

Barbastella leucomelas has been reported from Eritrea (Hayman 1967:92), Sinai and the "Coast of Arabia" (Harrison 1964:178), Caucasia, Transcaucasia and Russian Turkestan (Bobrinskii et al. 1965: Map 27), Afghanistan (Meyer-Oehme 1965), China (Allen 1938:256), Japan (Wallin 1969), northern India and Indo-China (Ellerman and Morrison-Scott 1951).

Iran Distribution

PREVIOUS RECORDS: Barbastella leucomelas has been reported from Azad-Khan Cave near Mahallat, Isfahan Province (Etemad 1964:653), and from Tehran, Tehran Province (Etemad 1967:278). Lay (1967:147) reported a specimen from 2 km NE Sang-e-Sar, Tehran Province.

RANGE: In view of its distribution in the USSR, B. leucomelas could be expected to range across northern Iran.

Subspecies

Two subspecies of B. leucomelas are currently recognized: the nominate form from Arabia and B. l. darjelingensis Hodgson, 1855, from eastern Asia. Bobrinskii et al. (1965) have refrained from designating a subspecies for B. leucomelas in the USSR, and considering the extreme confusion with respect to this species which is reviewed by Ognev

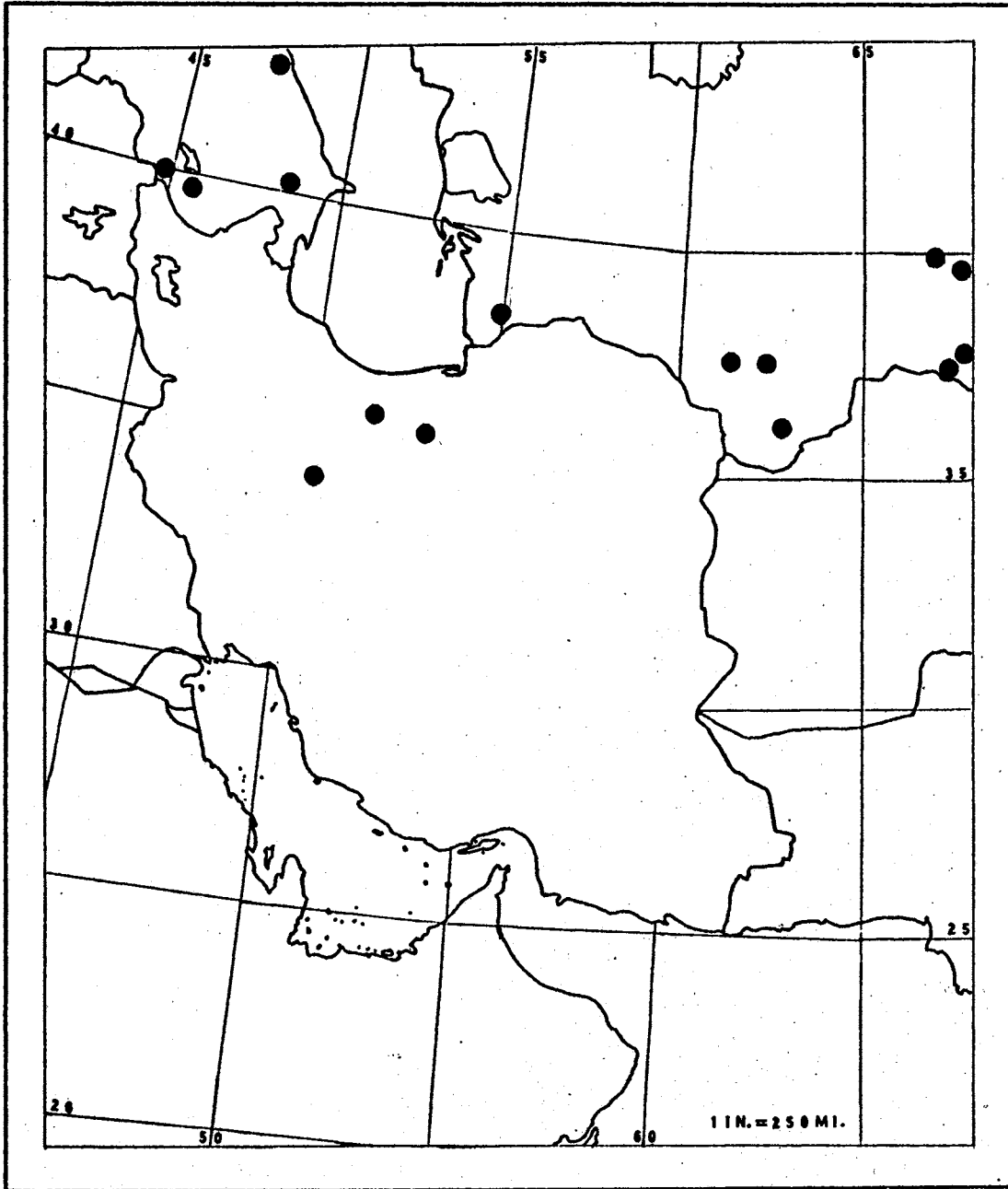


Figure 36. Distribution of *Barbastella leucomelas*

● = Previous records

(1928:590), I believe that they are justified in their restraint. If the central Asian form of B. leucomelas proves to be distinct from the Arabian and east Asian forms, the name B. l. caspica Satunin, 1908, is available.

Specimens Examined

I have examined three B. leucomelas from Iran, one from the "Coast of Arabia," and the type of B. dargelinensis [sic] Dobson from India.

Otonycteris hemprichi Peters, 1859

TYPE DESCRIPTION: Otonycteris hemprichi Peters, 1859. Mber. k. preuss. Akad. Wiss. Berlin p. 223. **TYPE LOCALITY:** None given, ". . . probably from some part of North-Eastern Africa" (Ellerman and Morrison-Scott (1951:180); restricted by Kock (1969:215) to the Nile valley between northern Aswan, Egypt, and Chondek, northern Sudan. **TYPE SPECIMEN:** According to Dobson (1878:182) "in the Berlin Museum."

Identification

Otonycteris hemprichi is a distinctive bat of large size (FA 57 to 66 mm; CBL 20.0 to 22.4 mm) with ears one-half to two-thirds as long as the forearm. It has a single, large, unicuspid upper incisor and its last upper molar is greatly reduced.

World Range

The monotypic genus Otonycteris ranges through North Africa from Algeria to Egypt and Sudan (Hayman 1967:101; Kock 1969:186), and has

been reported from several localities in the Arabian Peninsula (Harrison 1964:174), North and east of Iran it ranges through Russian Turkestan from the Caspian Sea to the western Pamir Mountains (Bobrinskii et al. 1965:Map 36), and occurs in northern Afghanistan (Meyer-Oehme 1965:50; Neuhauser 1969:87). A single specimen is known from Gilgit, Kashmir (Dobson 1878:182).

Iran Distribution

Satunin (1901) described the form cinereus from specimen ZMAS 5444 which he reported as being from Nukendzaga (=Nauk-i-Jahan) village, Ge District, Persian Baluchistan. Ognev (1928:582) said that the specimen of cinereus recorded as ZMAS 5444 has a catalog entry corresponding to the data cited by Satunin (1901) but that:

Unfortunately the correspondence of the data ends with this: "According to the register of 1901, this specimen originated from a different geographical area - Zurakkuh country, near the Bamrud irrigation ditch in Khurasan (21 July 1901)." Undoubtedly the Khurasan specimen is precisely that described by Satunin. Regretably the author, due to some error, provided an incorrect site for the finding of O. cinereus.

Misonne (1959) and Lay (1967) reported Satunin's Baluchistan locality, however Etemad (1968:19) has accepted Ognev's emendation.

Farhang-Azad (1969:731) reported five specimens mistnetted over a stream at Chelmir, Khorassan Province.

RANGE: In view of the distribution of O. hemprichi in Iraq, Arabia, Turkestan and northern Afghanistan, this arid land species could be expected throughout western and southern Iran.

Subspecies

Ognev (1928:582) regarded O. cinereus as a full species

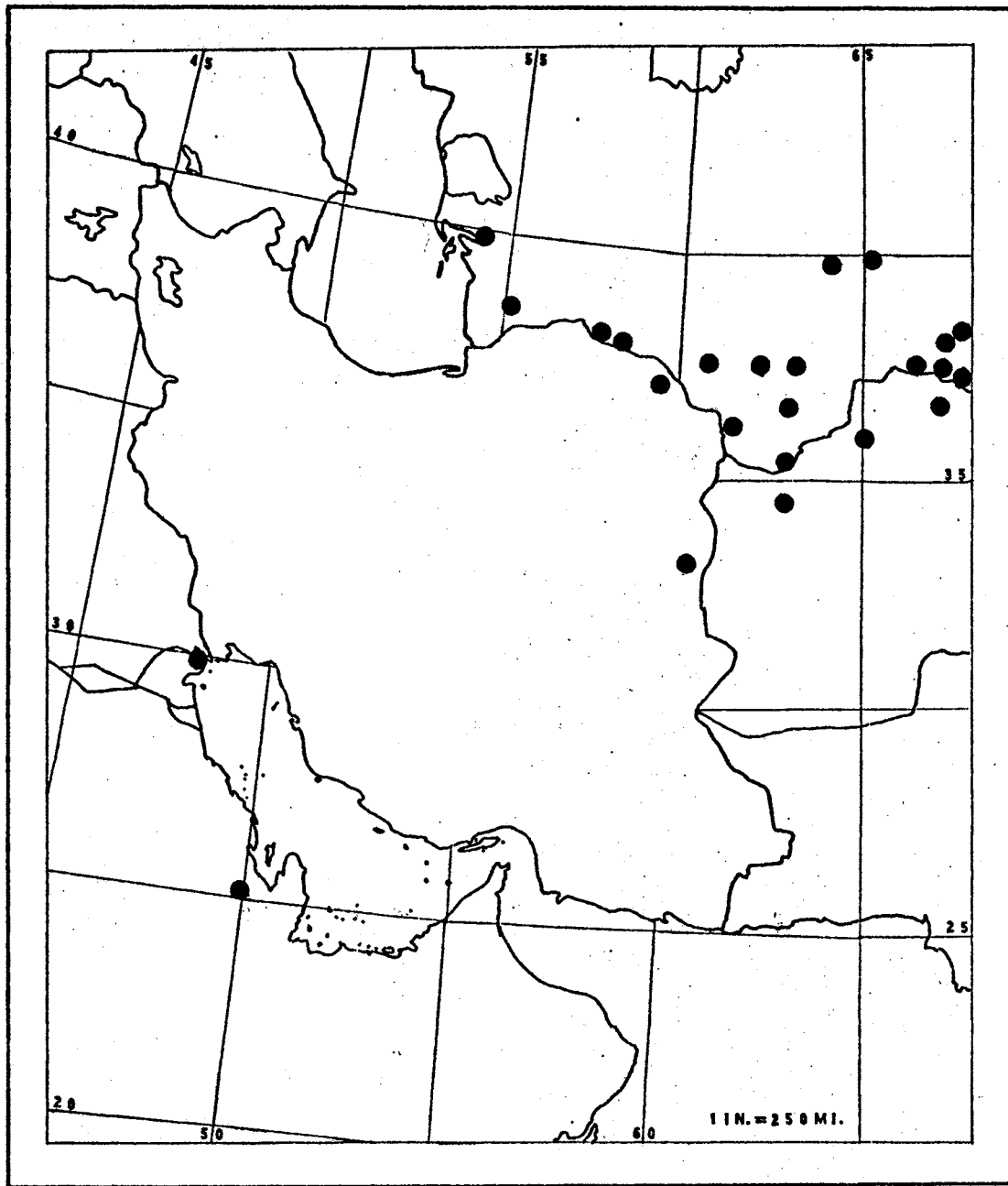


Figure 37. Distribution of *Otonycteris hemprichi*

● = Previous records

distinguishable by its darker color, longer ears and larger dimensions. However his indication of the geographic distribution of cinereus in relation to that of the nominate form is, at best, unclear. Ellerman and Morrison-Scott (1951:180) tentatively listed cinereus as a valid subspecies but mentioned only the incorrect locality in Baluchistan for its distribution. They included Russian Turkestan and Gilgit in the range of the nominate form. Bobrinski et al. (1965:113) did not designate subspecies for the Soviet specimens and I feel that until this entire genus is reviewed none can be designated for the Iranian specimens.

Specimens Examined

I have seen no Iranian specimens, but have examined two from Afghanistan, two from Arabia, and one from Palestine.

Plecotus austriacus Fischer, 1829

TYPE DESCRIPTION: Vespertilio auritus austriacus Fischer, 1829.
Synops. Mamm. 117. TYPE LOCALITY: Vienna, Austria.

Identification

This species is a small-to-medium sized vespertilionid (FA 39.4 to 43.9 mm; CBL 15.7 to 16.1 mm) with very long ears (34 to 42 mm) which are joined across the forehead.

World Range

Plecotus austriacus and P. auritus have only recently been shown to be sibling species and through much of their range the relative

status of these two forms has not been ascertained. Both are known from Europe but apparently those from Africa and southern Asia are all P. austriacus. Gaisler (1970:49-50) reported the range for austriacus as: "Western, central and southern Europe . . . Ukraine, Caucasus, Transcaucasia, and Soviet Central Asia; Asia Minor, Israel, Syria, Iran, Afghanistan, West Pakistan, Kashmir, Mongolia, western China, northern Africa . . . probably also Abyssinia and northern Sudan (Harrison 1964; Hanak 1966)."

Iran Distribution

PREVIOUS RECORDS: Peters (1866:18) reported that Plecotus was collected in Iran by the Prussian Envoy but no precise locality was given and no specimens were mentioned. Harrison (1963:305-06) reported three Plecotus from the Sulphur Caves at Guter-Su (=Kutur Su), north of Mt. Sabalan and Aberdeen University (1965:6) reported three specimens from the Shah Abbas Caves, near Kuh Rang, Isfahan Province. Etemad (1967:278) reported a colony of this species in an old tomb at Hamadan, Kermanshahan Province.

RANGE: In view of its distribution in surrounding countries, Plecotus austriacus probably occurs in all of the mountainous portions of Iran.

Subspecies

Etemad (1967:278) used the name P. austriacus wardi Thomas, 1911 for his specimens from Hamadan. Gaisler (1970:50) and Meyer-Oehme (1965) both used this name for the Plecotus from Afghanistan. Harrison (1964:178) assigned the specimens from the Arabian Peninsula to P.

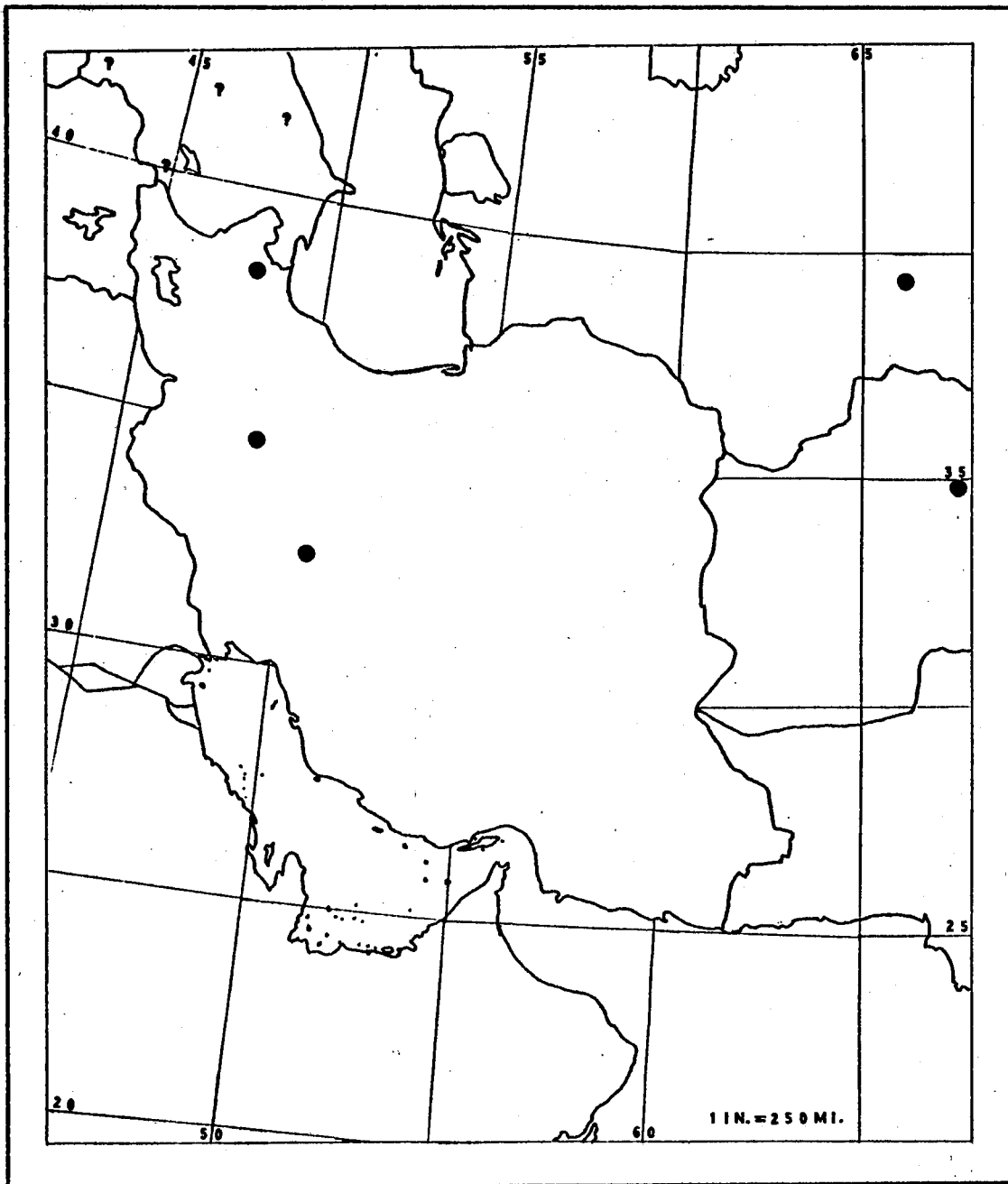


Figure 38. Distribution of Plecotus austriacus

austriacus christiei Gray, 1838.

Bobrinski et al. (1965:99) did not recognize P. austriacus as a distinct species and listed four subspecies of P. auritus from the USSR: P. a. auritus from Europe to Caucasus, P. a. sacrimontis G. Allen, 1908, from East Asia; P. a. wardi from the Transcaspien region and P. a. macrobullaris Kuzyakin (subsp. nov.) from the Caucasus. The relationships between these several forms is not yet clearly understood. I do not feel that it is possible to designate subspecies of P. austriacus in Iran at this time.

Specimens Examined

I have examined the six P. austriacus from Iran in the British Museum collections.

Miniopterus schreibersi Kuhl, 1819

TYPE DESCRIPTION: Vespertilio schreibersi Kuhl, 1819. Ann. Wetterau. Ges. Naturk. 4, 2:185. TYPE LOCALITY: Kulmbazer Cave, mountains in SE Bannat, Hungary.

Identification

Miniopterus schreibersi is a small-to-medium-sized vespertilionid (FA 42 to 49 mm) with a long tail (mean = 55.7 mm) and interfemoral membrane. The ear is short and rounded and the tragus is short and wide. The second phalanx of the third manual digit is about three times as long as the first.

World Range

Miniopterus schreibersi ranges through most of sub-Saharan Africa and, north of the desert, has been found in Morocco, Algeria and Tunisia (Hayman 1967:113). It ranges throughout southern Europe (van den Brink 1968:59), Turkey (Çağlar 1965:133), and the Levant (Harrison 1964:183). Harrison (1964:183) also reported a locality in Iraqi Kurdistan. In the USSR this species has been reported from southwest of the Carpathian Mountains, from the Crimea, Caucasia, Transcaucasia and from the Kopet Dagh in southern Turkmeniya (Bobrinskii et al. 1965:98). To the east of Iran it has been reported from Afghanistan (Gaisler 1970), China (Allen 1938:264), Japan (Wallin 1969:344), Formosa, Hainan, Ceylon, India, Nepal, Burma, Java, Borneo, Sumatra, Philippine Islands, New Guinea, and northern Australia (Brosset 1962:739).

Iran Distribution

PREVIOUS RECORDS: Thomas (1907:197) reported this species from the southern coast of the Caspian Sea; Lay (1967:147) restricted this to the vicinity of Bandar-e-Gaz, Mazanderan Province. Etemad (1967:279; 1968:20) reported it from Azad-Khan Cave, Mahallat, Isfahan Province; Moghan Cave, 110 km E Meshhad (=Mashhad), Khorassan Province, and Allsard Cave, Kabutar-Ahang, near Hamedan (=Hamadan) Kermanshahan Province. Lay (1967:147) reported nine specimens from Ganjan Kuh Cave, 3 km N Jochdi, Khorassan Province; one from 8 km N Gorgan, Mazanderan Province; two from Maku and 31 from 44 km SE Maku, West Azarbaijan Province; and eight from Shahpur Cave, Fars Province. Farhang-Azad

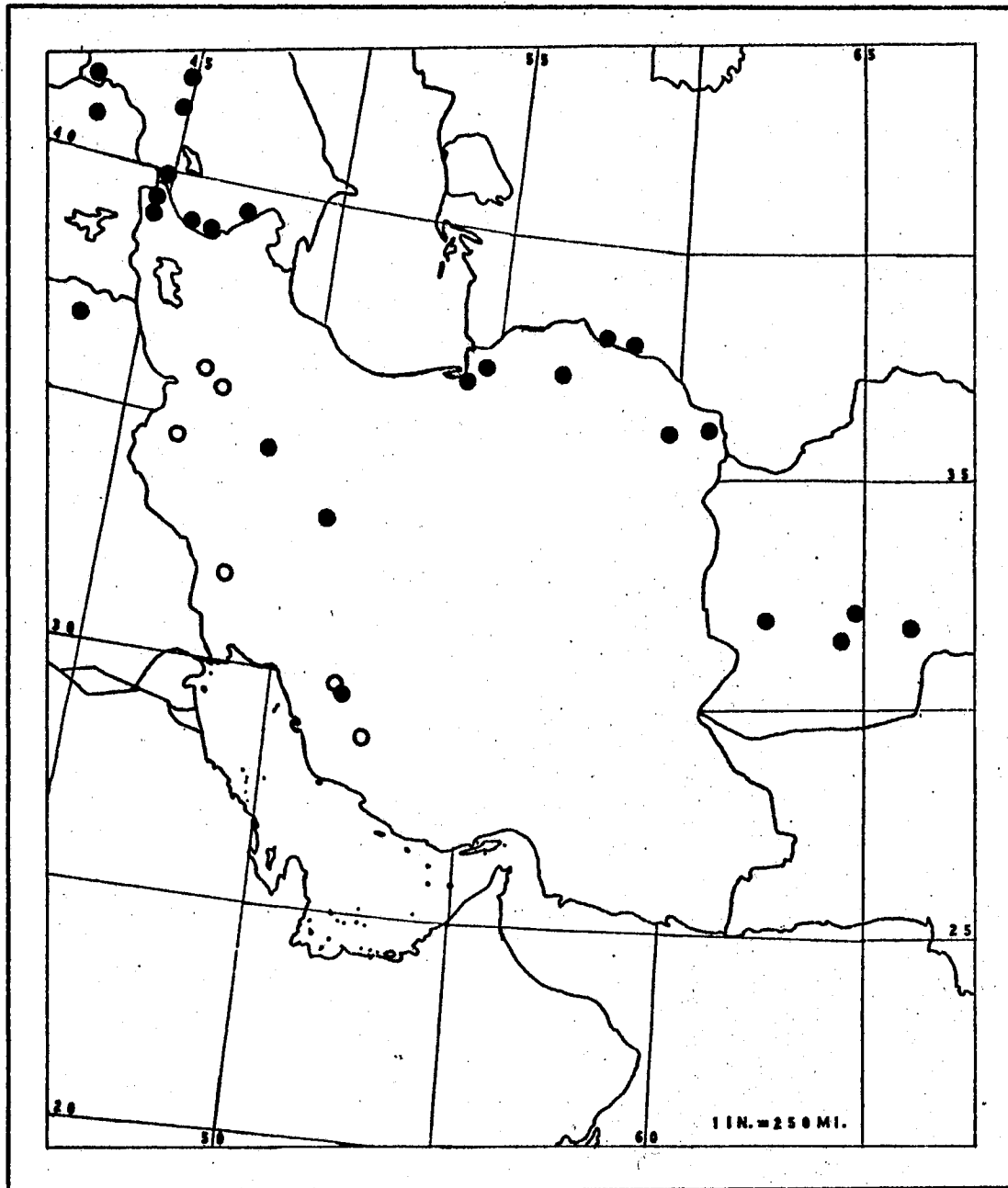


Figure 39. Distribution of *Miniopterus schreibersi*

- - Previous records
- - New records

(1969:732) reported 46 specimens from Moghan Cave, Mashad (=Mashhad), Khorassan Province.

NEW RECORDS: The 1968 Street Expedition collected 26 Miniopterus schreibersi from Gara Tarik about 4 km N Qareh Darreh village; eight from Karaftu, a cave and abandoned cliff dwelling complex near Dashbologh village, about 32 mi N Divandarreh; and 17 from a large wet cave about 15 mi NW Ravansar, all Kurdistan Province. We also collected 14 from Sarin Ab-Garma cave at Dehloran, Lurestan and Khuzistan Province, and 45 from Shahpur Cave, Fars Province.

While examining bat specimens collected by the 1962 Street Expedition, I discovered that six of the 19 specimens preserved in spirit from 5 mi SE Pol-i-Abgineh, Fars Province, reported by Lay (1967:141) as Myotis capaccinii, are actually Miniopterus schreibersi.

RANGE: The records listed above and the distribution of this species in adjacent countries indicate that it ranges throughout the mountainous areas of western and northern Iran.

Subspecies

Lay (1967:148-150) reviewed the evidence that there is distinct seasonal variation in the color of M. schreibersi and concluded that the two lighter forms (M. s. pallidus Thomas, 1907, described from the southern shore of the Caspian Sea, and M. s. plucher Harrison, 1956, described from Ser'Amadia, Kurdistan, Iraq) "represent different stages in the annual pelage color change of M. s. schreibersi Kuhl, and should be regarded as synonyms of it."

The color of the three specimens of plucher is within the range of variation of pallidus and even Harrison (1964:182) agreed that the

two forms should be synonymized. However, while color variations of the nominate form from Europe and of pallidus from southwest Asia overlap, the lightest pallidus are much lighter than the lightest of the nominate form and the darkest pallidus are not as dark as the darkest of the nominate form.

Lay (1967:149) cited Kuzyakin (1950:289) and "the authority on bats in Bobrinsky et al. (1944, p. 86)" as stating that "considerable seasonal variation occurs in the pelage of this species and that the color of the type M. s. pallidus is a result of fading." Yet Kuzyakin, as a co-author of Bobrinski et al. (1965:98), listed M. s. schreibersi as the form found in European Russia, the Crimea and Caucasia, and M. s. pallidus as that found in Transcaucasia, Iran and Turkmeniya.

Therefore, I must partially reject Lay's conclusions and retain M. s. pallidus as the appropriate name for this species in Iran.

Specimens Examined

I have examined 78 plus Miniopterus schreibersi from Iran including the type of M. s. pallidus, 49 from Afghanistan, one from Lebanon and the type of M. s. plucher from Iraq.

CHAPTER X

DISCUSSION

Although 37 species of bats are presently known from Iran the record remains sketchy and incomplete. Only two species, Myotis blythi and Pipistrellus kuhli are known from more than 20 locations and only seven more are known from more than 10 locations. Fully 22 of the species are known from fewer than five localities and six of these from only one locality. In spite of this incomplete distributional documentation it is possible to draw some conclusions on faunal composition.

Misonne (1968:296) pointed out that an important characteristic of the mammalian fauna of Iran is the high proportion of endemic species. He placed this at 18%. However, exactly the opposite is true if only the Chiroptera are considered. Of the 37 species of bats known from Iran none is restricted to the political boundaries of the Iranian nation, and none is restricted to the main physiographic feature of the area, the Iranian Plateau.

Faunal Affiliations

The Iranian bat fauna is definitely Palearctic in its affinity. Twenty-four species are entirely, or almost entirely, restricted to the Palearctic faunal region. Of the remaining 13 species one, Miniopterus schreibersi ranges widely through all four faunal regions in the Eastern Hemisphere. Two species, Myotis mystacinus and Barbastella

leucomelas, range widely in both the Palearctic and Oriental faunal regions and two others, Rhinolophus blasii and Pipistrellus kuhli, range widely in both the Palearctic and the Ethiopian faunal regions.

Triaeonops persicus has a rather restricted range but seems to be more widely distributed in the Ethiopian region than in the Palearctic. Rhinolophus clivosus is an Ethiopian species but, (if bocharicus is correctly placed in this species) a population also occurs in central Asia.

The remaining six species, Rousettus aegyptiacus, Rhinopoma microphyllum, Rhinopoma hardwickei, Rhinopoma muscatellum, Taphozous perforatus, Taphozous nudiventris and Tadarida aegyptiaca, range widely through the Ethiopian region and through India, but are found in the Palearctic only in a restricted portion of Southwest Asia. Three of these, R. microphyllum, R. hardwickei and T. nudiventris continue through India well into the Oriental region.

While many mammals in other orders have come to Iran from the Oriental region none of the 37 species of bats presently known from Iran is primarily Oriental in distribution. However, as stated above, the fauna of Iran is still poorly known and that of the southeastern portion is known the least. It is quite possible that Oriental species such as Megaderma lyra and Hipposideros fulvus, which are known from western West Pakistan (Siddiqi 1969), and Rhinolophus lepidus, which is known from western Afghanistan (Neuhauser, in press), will be found in Iran.

Several other species not yet collected in Iran have been reported from areas adjacent to Iranian borders. Myotis bechsteini, Barbastella barbastellus and Pipistrellus nathusii all occur in the Caucasus

(Bobrinskii et al. 1965) and will likely eventually be found in adjacent portions of Iran. Eptesicus walli and Pipistrellus rüppelli are found in the Mesopotamian Plain in Iraq (Harrison 1964) and probably occur in the Khuzistan Plain of Iran.

Internal Groupings

Almost all Iranian bat species fall into one of three geographic groups in Iran. Nineteen species are primarily "northern" in their distribution. Nine species are primarily "southern" and six are widely ranging in both north and south.

The "northern" species are found on the Caspian Coast, in the Zagros Mountains south to about the area of Shiraz (29°36'N 52°32'E), in the Elburz Mountains, in northeastern Iran, and on the margins of the Iranian basin flanking these areas (Fig. 40). The following 19 species occur in this area of comparatively higher precipitation and cooler summers (see Chapter II):

<u>R. euryale</u>	<u>E. serotinus</u>
<u>R. mehelyi</u>	<u>N. leisleri</u>
<u>R. blasii</u>	<u>N. noctula</u>
<u>M. mystacinus</u>	<u>N. lasiopterus</u>
<u>M. nattereri</u>	<u>P. pipistrellus</u>
<u>M. blythi</u>	<u>P. savii</u>
<u>V. murinus</u>	<u>B. leucomelas</u>
<u>E. bobrinskoi</u>	<u>P. austriacus</u>
<u>E. nilssoni</u>	<u>M. schreibersi</u>
<u>E. bottae</u>	

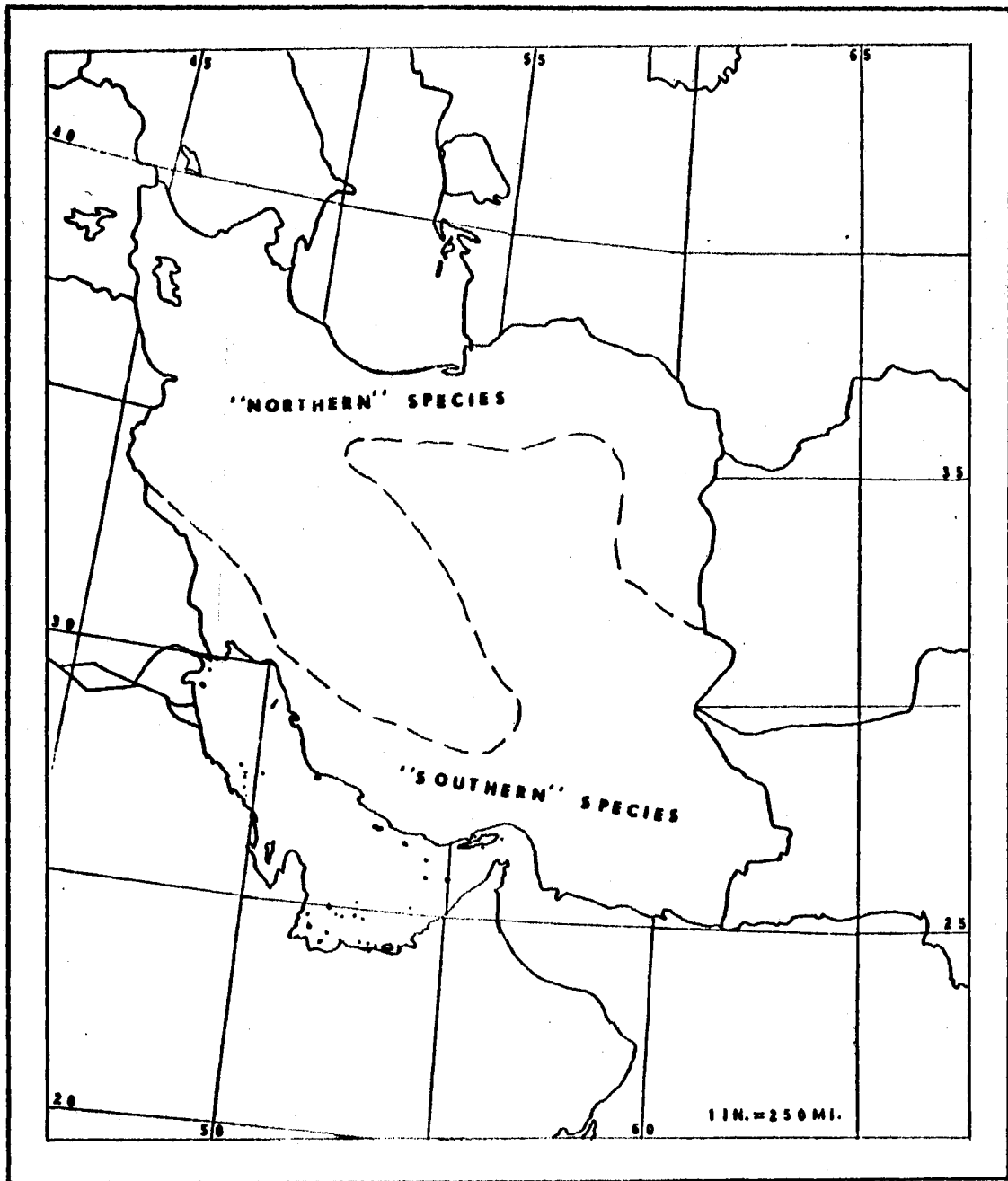


Figure 40. Geographic Groups of Bat Species in Iran

The "southern" species range primarily through the Khuzistan Plain; the southern coastal strip; the lower, more arid mountains south of the vicinity of Shiraz; Baluchistan; and Seistan. No bats are known from the central deserts but this is probably the result of a lack of collecting rather than an absence of bats. On the basis of habitat it seems reasonable to assume that bats from this region would be more similar to the "southern" group than to the "northern." The following nine species occur in this relatively hotter, more arid southern portion of the country:

<u>R. aegyptiacus</u>	<u>A. tridens</u>
<u>R. microphyllum</u>	<u>T. persicus</u>
<u>R. hardwickei</u>	<u>T. aegyptiaca</u>
<u>R. muscatellum</u>	<u>E. nasutus</u>
<u>T. perforatus</u>	

In the southern Zagros Mountains there is no sharp line of demarcation between these two groups and there is much overlap. One species, Myotis capaccinii, is found in Iran only in this area of overlap.

Six species are found at widely scattered points in both the "northern" and "southern" regions.

<u>T. nudiventris</u>	<u>T. teniotis</u>
<u>R. ferrumequinum</u>	<u>M. emarginatus</u>
<u>R. hipposideros</u>	<u>P. kuhli</u>

Two species, R. clivosus and O. hemprichi, would appear, from existing records, to fall into the "northern" group. However, the distribution of these species in Arabia and/or West Pakistan indicates that they are more correctly characterized as wide-ranging.

Distribution of Subspecies

Of the seven species which are known to be represented in Iran by more than one subspecies, none have the subspecies divided between the "northern" and "southern" regions as defined above. In four cases one form, R. h. hippsoideros, T. t. teniotis, E. s. serotinus or P. p. pipistrellus, is restricted to the relatively lush Caspian coastal regions, while the other form occurs in the other, drier portions of the country. Of the remaining three species, R. muscatellum occurs as its nominate form through most of the "southern" region and as the form seianum in Seistan. Eptesicus bottae is represented by the subspecies ognevi in northeastern Iran and by a larger form (mirza?) in the Zagros Mountains in the southwest. Myotis emarginatus is represented in Baluchistan by the form desertorum and in the Zagros by the nominate form.

Summary

When the recorded distributional patterns of all 47 forms (37 species and 10 additional subspecies) presently known from Iran are considered three major regions are evident. The "northern" and "southern" regions (Fig. 41), distinguished by elevation, temperature and precipitation, have very different species groupings of bats. Within the "southern" region most species are represented by only a few records and no subdivision is at once apparent. Within the "northern" region the most conspicuous subdivision is the relatively lush Caspian coastal plain and the adjacent north slope of the Elburz. This area correlates with subspecific differences in at least four

species and contains four additional species which have not, to date, been taken elsewhere in Iran.

LITERATURE CITED

- Aberdeen University. 1965. Expedition to Iran Summer 1965. Preliminary Report. 19 pp. + 2 photographs (mimeo.).
- Aellen, V. 1955. Rhinolophus blasii Peters (1866), chauve-souris nouvelle pour l'Afrique du Nord. *Mammalia*, Vol. 19, pp. 361-366.
- Aellen, V. 1959. Contribution à l'étude de la faune d'Afghanistan. 9. Chiroptères. *Rev. Suisse Zool.*, Vol. 66, No. 21, pp. 353-386.
- Allen, G. M. 1938. Natural History of Central Asia, Vol. XI, The Mammals of China and Mongolia, Part 1. *Amer. Mus. Nat. Hist.*, 1938, xxv + 620 pp.
- Alekperov, Kh. M. 1966. Mlekopitaiushchie iugo-zapadnogo Azerbaidzhana [Mammals of SW Azerbaijan]. *Baku: Inst. of Zool. Azerb. Acad. Sci.*, 148 pp.
- Andersen, K. 1905. On some bats of the Genus Rhinolophus, with Remarks on their Mutual Affinities, and Descriptions of Twenty-six new Forms. *Proc. Zool. Soc. London*, 1905, Vol. 2, pp. 75-145.
- Andersen, K. 1907. On the Geographical Races of the Lesser Horseshoe Bat (Rhinolophus hipposideros). *Ann. Mag. Nat. Hist.*, Ser. 7, Vol. 20, pp. 384-389.
- Andersen, K. 1918. Diagnoses of new Bats of the Families Rhinolophidae and Megadermidae. *Ann. Mag. Nat. Hist.*, Ser. 9, Vol. 2, pp. 374-384.
- Anderson, J. 1881. Catalogue of Mammalia in the Indian Museum, Calcutta, Part I, xv + 223 pp. *Indian Museum Publ.*
- Anderson, J. and W. E. de Winton. 1902. *Zoology of Egypt, Mammalia*. London, 374 pp.
- Bate, D. M. A. 1903. The Mammals of Cyprus. *Proc. Zool. Soc. London*. 1903, Vol. 2, pp. 341-348.
- Bianki, V. 1917-1921. Neizvestnyya v literature mestonakhozhdeniya russkikh Chiroptera [Notes on the Chiroptera of Russia]. *Ehzhegodnik Zool. Muz. Akad. Nauk*, Vol. 22, pp. viii-ix.
- Blanford, W. T. 1875. Descriptions of new Mammals from Persia and Baluchistan. *Ann. Mag. Nat. Hist.*, Ser. 4, Vol. 16, pp. 309-313.

- Blanford, W. T. 1876. *Eastern Persia, an Account of the Journeys of the Persian Boundary Commission 1870-71-72*. Vol. II, The Zoology and Geology. London, vii + 516 pp.
- Bobek, H. 1968. Vegetation. pp. 280-293, In W. B. Fisher (Ed.), *The Cambridge History of Iran*. Vol. I: The Land of Iran. Cambridge.
- Bobrinskii, N. A., B. A. Kuznekov and A. P. Kuzyakin. 1965 (2nd Ed.). *Opredelitel Mlekopitaiushchikh SSSR [Mammals of the USSR]*. Moscow, 382 pp.
- Brosset, A. 1962. The Bats of Central and Western India. *J. Bombay Nat. Hist. Soc.*, Part I, Vol. 59, no. 1, pp. 1-57; Part II, Vol. 59, no. 2, pp. 583-624; Part III, Vol. 59, no. 3, pp. 706-746.
- Cabrera, A. 1901. Viaje del Sr. Martinez Escalera a Persia: Mammiferos. *Bol. Real. Soc. Espan. Hist. Nat.*, Vol. 1, pp. 117-121.
- Çağlar, M. 1961. *Myotis e. emarginatus* (Geoffroy, 1806), in der europaischen Türkei. *Rev. Fac. Sci., Univ. Istanbul, Ser. B*, Vol. 26, No. 3-4, pp. 107-109.
- Çağlar, M. 1965. Chiropterenfauna der Türkei. *Rev. Fac. Sci., Univ. Istanbul, Ser. B*, Vol. 30, No. 3-4, pp. 125-134.
- Chasen, F. N. 1960. A handlist of Malaysian mammals. *Bull. Raffles Mus.*, Vol. 15, i-xx, pp. 1-209.
- Cheesman, R. E. 1920. Report on the mammals of Mesopotamia, collected by members of the Mesopotamian Expeditionary Force, 1915-1919. *J. Bombay Nat. Hist. Soc.*, Vol. 27, No. 2, pp. 323-346.
- Cheesman, R. E. 1921. Report on a Collection of Mammals made by Col. J. E. B. Hotson in Shiraz, Persia. *J. Bombay Nat. Hist. Soc.*, Vol. 27, No. 3, pp. 573-581.
- Coon, C. S. 1952. Excavations in Hotu Cave, Iran Preliminary Report. *Proc. Amer. Phil. Soc.*, Vol. 46, pp. 231-249.
- DeBlase, A. F. 1971. New Distributional Records of Bats from Iran. *Fieldiana: Zoology*, Vol. 58, No. 3.
- De Filippi, F. 1865. Note di un viaggio in Persia nel 1862. viii + 396 pp. Milan.
- Dobson, G. E. 1871. On a new genus and species of Rhinolophidae with descriptions of a new species of *Vesperus*, and notes on some other species of insectivorous bats from Persia. *Proc. Asiat. Soc. Bengal*, Vol. 40, No. 2, pp. 455-461.
- Dobson, G. E. 1878. Catalogue of the Chiroptera in the Collection of the British Museum. London, 567 pp.

- Eisentraut, M. 1959. Der Rassenkreis, Rousettus aegyptiacus E. Geoff. Bonn. Zool. Beit., Jahr. 10, Heft 3/4, pp. 218-235.
- Ellerman, J. R. and T. C. S. Morrison-Scott. 1951. Checklist of Palaearctic and Indian Mammals 1758 to 1946. Brit. Mus. Nat. Hist., London, 810 pp.
- Etemad, E. 1963. Two new Bats for Iran. Zeit. Säugetierk., Vol. 28, No. 2, p. 309.
- Etemad, E. 1964. On three new Mammals from Iran (One rat and two bats). Mammalia, Vol. 28, No. 4, pp. 652-654.
- Etemad, E. 1967. Notes on bats from Iran. Mammalia, Vol. 31, No. 2, pp. 275-280.
- Etemad, E. 1968[?]. [The Bats of Iran]. (In Farsi, English preface and summary, pp. 1-25). Tehran.
- Etemad, E. 1970. A Note on the Occurrence of the Giant Noctule, Nyctalus lasiopterus Schreber, 1780, in Iran. (Chiroptera: Vespertilionidae). Mammalia, Vol. 34, No. 3, p. 547.
- Farhang-Azad, A. 1969. Bats from north Khorassan, Iran. Mammalia, Vol. 33, No. 4, pp. 730-732.
- Fisher, W. B. (Ed.) 1968. The Cambridge History of Iran, Vol. I: The Land of Iran. Cambridge, 783 pp.
- Gaisler, J. 1970. The Bats (Chiroptera) collected in Afghanistan by the Czechoslovak Expeditions of 1965-1967. Acta Sc. Nat. Brno, Vol. 4, No. 6, pp. 1-56.
- Gaisler, J., D. Povolný, Z. Šebek, and F. Tenora. 1968. Faunal and Ecological Review of Mammals Occurring in the Environs of Jalal-Abad, with Notes on Further Discoveries of Mammals in Afghanistan. II. Chiroptera. Zool. List., Vol. 17, No. 1, pp. 41-48.
- Ganji, M. H. 1968. Climate. pp. 212-249. In W. B. Fisher (Ed.), The Cambridge History of Iran. Vol. I: The Land of Iran. Cambridge, 783 pp.
- Gmelin, S. G. 1774. Reise durch Russland. 508 pp. 57 illus. St. Petersburg.
- Harrison, D. L. 1955. On a Collection of Mammals from Oman, Arabia, with the Description of two new Bats. Ann. Mag. Nat. Hist., Ser. 12, Vol. 8, pp. 897-910.
- Harrison, D. L. 1956. Mammals from Kurdistan, Iraq, with description of a new bat. J. Mamm., Vol. 37, No. 2, pp. 257-263.

- Harrison, D. L. 1962. A new subspecies of the Noctule Bat (Nyctalus noctula Schreber, 1774) from Lebanon. Proc. Zool. Soc. London, Vol. 139.
- Harrison, D. L. 1963. Report on a collection of bats (Microchiroptera) from N. W. Iran. Zeit. Säugetierk., Vol. 28, No. 2, pp. 301-308.
- Harrison, D. L. 1964. The Mammals of Arabia. Vol. I, Insectivora, Chiroptera, Primates. London, 192 pp.
- Harrison, D. L. 1968. On Three Mammals new to the Fauna of Oman, Arabia, with the Description of a new Subspecies of Bat. Mammalia, Vol. 32, No. 3, pp. 317-325.
- Harrison, D. L. and R. E. Lewis. 1961. The Large Mouse-eared Bats of the Middle East, with Description of a new Subspecies. J. Mammal., Vol. 42, No. 3, pp. 372-380.
- Harrison, J. 1966. An Introduction to Mammals of Singapore and Malaya. Singapore, 340 pp.
- Hatt, R. T. 1959. The Mammals of Iraq. Misc. Pub. Mus. Zool. Univ. Mich., No. 106, pp. 1-113.
- Hayman, R. W. 1967. Smithsonian Institution Preliminary Identification Manual for African Mammals. Vol. 11. Chiroptera. Washington, 155 pp.
- Hill, J. E. 1961. Indo-Australian Bats of the Genus Tadarida. Mammalia, Vol. 25, No. 1, pp. 29-56.
- Kahmann, H. and M. Çağlar. 1960. Beiträge zur Säugetierkunde der Türkei. 1-Fledermause aus der Landschaft Hatay. Rev. Fac. Sci. Univ. Istanbul, Ser. B, Vol. 25, No. 1-2, pp. 1-23.
- Kock, D. 1969. Die Fledermaus-Fauna des Sudan. Abh. senckenberg. naturforsch. Ges., Vol. 521, pp. 1-238.
- Kuzyakin, A. P. 1950. Letuchie Mishi [Bats]. Moscow, 443 pp.
- Lay, D. M. 1967. A Study of the Mammals of Iran Resulting from the Street Expedition of 1962-63. Fieldiana: Zoology, Vol. 54, 282 pp.
- Lewis, R. E. and D. L. Harrison, 1962. Notes on Bats from the Republic of Lebanon. Proc. Zool. Soc. London, Vol. 138, pt. 3, pp. 473-486.
- Maerz, A. and M. R. Paul. 1950. A Dictionary of Color. 2nd Edition. New York.
- Meyer-Oehme, D. 1965. Die Säugetiere Afghanistans (Teil III) Chiroptera. Science, Quart. J. Fac. Sci., Kabul Univ., (Special Edition), pp. 42-59.

- Miller, G.S. 1912. Catalogue of the Mammals of Western Europe. Brit. Mus. Nat. Hist. London, xv + 1019 pp.
- Mirza, Z.B. 1965. Four new Mammal Records for West Pakistan. Mammalia, Vol. 29, No. 2, pp. 205-210.
- Misonne, X. 1959. Analyse zoogéographique des mammifères de l'Iran. Mém. Inst. Roy. Sci. Nat. Belgique, Deuxième série, Fasc. 59, 157 pp.
- Misonne, X. 1968. Mammals. pp. 294-304. In W. B. Fisher (Ed.), The Cambridge History of Iran. Vol. I: The Land of Iran. Cambridge, 783 pp.
- Murray, J. A. 1884. Additions to the present Knowledge of the Vertebrate Zoology of Persia. Ann. Mag. Nat. Hist., Vol. 14, pp. 97-106.
- Neuhauser, H. N. 1969. The Bats of Afghanistan. A Study Resulting from the Street Expedition of 1965. University of Georgia (Master's Thesis), 111 pp.
- Ognev, S. I. 1928. Mammals of Eastern Europe and Northern Asia. Vol. 1 Insectivora and Chiroptera. English translation by A. Birron and Z. S. Cole, Israel Program for Scientific Translations 1962. 487 pp.
- Ognev, S. I. and W. G. Heptner. 1928. Einige Mitteilungen über die Säugetiere des mittleren Kopet-Dag und der anliegenden Ebene (Russisch-Turkestan), Zool. Anz., Vol. 75, pp. 258-266.
- Osborn, D. J. 1963. New distributional records of Bats from Turkey. Mammalia, Vol. 27, No. 2, pp. 210-217.
- Pallas, P. S. 1778. Novae Species Quadrupedum e Glirium Ordine. 338 pp., Erlangen.
- Peters, W. 1866. Über einige neue oder weniger bekannte Flederthiere. Monatsb. Akad. Wiss. Berlin, pp. 16-25.
- Ridgway, R. 1912. Color Standards and Color Nomenclature. Washington.
- Sanborn, C. C. and H. Hoogstraal. 1955. The Identification of Egyptian Bats. J. Egypt Pub. Health Ass., Vol. 30, p. 103.
- Satunin, K. A. 1905. Säugetiere aus dem Kaukasus und Transkaspien [in German and Russian]. Mitt. Kaukas. Mus., Vol. 2, pp. 45-86.
- Satunin, K. A. 1906. Die Säugetiere des Talyschgebietes und der Mugansteppe. [in German and Russian]. Mitt. Kaukas. Mus., Vol. 2, pp. 87-394.

- Satunin, K. A. 1909. Beiträge zur Kenntnis der Säugetierfauna Kaukasiens und Transkasiens xii-xvi. [in German and Russian]. Mitt. Kaukas. Mus., Vol. 4, pp. 1-32.
- Setzer, H. W. 1952. Notes on Mammals from the Nile Delta Region of Egypt. Proc. U. S. Nat. Mus., Vol. 102, No. 3305, pp. 343-369.
- Siddiqi, M. S. U. 1969[?]. Fauna of Pakistan. Karachi, 160 pp.
- Sinha, Y. P. 1970. Taxonomic Notes on Some Indian Bats. Mammalia, Vol. 34, No. 1, pp. 81-92.
- Strianti, P. and V. Aellen, 1958. Confirmation de la Présence de Rhinolophus mehelyi Matschie Dans le sud de la France. Mammalia, Vol. 34, No. 1, pp. 81-92.
- Thomas, O. 1905. On a Collection of Mammals from Persia and Armenia Presented to the British Museum by Col. A. C. Bailward. Proc. Zool. Soc. London, 1905, Vol. II, No. 35, pp. 519-527.
- Thomas, O. 1907. On Mammals from Northern Persia Presented to the National Museum by Col. A. C. Bailward. Ann. Mag. Nat. Hist., Ser. 7, Vol. 20, pp. 196-202.
- Thomas, O. 1913. Some new Ferae from Asia and Africa. Ann. Mag. Nat. Hist., Ser. 8, Vol. 12, pp. 88-92.
- Thomas, O. 1919. Some new Mammals from Mesopotamia. J. Bombay Nat. Hist. Soc., Vol. 26, No. 3, pp. 745-749.
- Thomas, O. 1920. Scientific Results from the Mammal Survey No. XXI:A.- Some new Mammals from Baluchistan and north-west India. J. Bombay Nat. Hist. Soc., Vol. 26, pp. 933-938.
- Times of London. 1967. The Times Atlas of the World, Comprehensive Edition. Boston, xliii + 272 pp., 123 plates.
- Trouessart, E. L. 1904. Catalogus Mammalium, tam viventium quam fossilium. Quinquennale supplementum. Berlin, 929 pp.
- U. S. Government Printing Office. 1956. U. S. Board on Geographic Names, Gazetteer No. 19, Iran. Washington. 578 pp.
- van den Brink, F. H. 1968. A Field Guide to the Mammals of Britain and Europe. Boston, 221 pp.
- Vereshchagin, N. K. 1959. The Mammals of the Caucasus, A history of the evolution of the fauna. English translation by A. Lerman and B. Rabinovich, Israel Program for Scientific Translations, 1967, No. 1704, 816 pp.
- Villalobos-Dominguez, C. and J. Villalobos. 1947. Colour Atlas. Buenos Aires, xv + 74 + 12 pp., 38 plates.

- Wallin, L. 1969. The Japanese Bat Fauna. Zoologiska Bidrag Från Uppsala, Vol. 37, Nos. 3-4, pp. 223-440.
- Werner, F. 1929. Beiträge zur Kenntnis der Fauna von Syrien und Persien. Zool. Anz, Vol. 81, no. 10, pp. 238-245.
- Wolf, H. 1964. Der Grossabendsegler-Nyctalus lasiopterus (Schreber 1780) - in Griechenland. Säugetier. Mitt., Vol. 12, No. 4, pp. 183-184.
- Won Pyong-oh. 1961. Studies on the Avi-Mammalian Fauna of Korea from the Viewpoint of the Forestry Protection. pp. 33-135. In Avi-Mammalian Fauna of Korea. Institute of Agriculture. Suwon, Korea, 135 pp.
- Wroughton, R. C. 1919. Scientific Results of the Mammal Survey. D.- On the Genus Tadarida (Wrinkle-lip Bats). J. Bombay Nat. Hist. Soc., Vol. 26, pp. 731-733.
- Wroughton, R. C. 1920. Bombay Natural History Society's Mammal Survey of India, Burma and Ceylon. Report No. 32, Baluchistan. J. Bombay Nat. Hist. Soc., Vol. 27, No. 2, pp. 314-322.

APPENDIX A

SPECIES QUESTIONABLY OR INCORRECTLY REPORTED FROM IRAN

Pipistrellus nathusii Keyserling and Blasius, 1839, was included in the list of bats from Iran by Lay (1967:232) and by Etemad (1968:16). However, there appear to be no specimen records documenting the presence of this species in Iran. Both of these authors cited Ellerman and Morrison-Scott (1951:184) who listed "?Persia" in the range for this species and Etemad also cited Ognev (1928:489) who said merely that ". . . it has also been obtained in . . . southern Persia, Baluchistan" The evidence does not seem sufficient to include this species on the faunal list of Iran.

Pipistrellus mimus Wroughton, 1899 was reported from Shiraz, Fars Province by Cheesman (1921:576). Lay (1967:233) and Etemad (1968:17) both included this species in their lists. However, Neuhauser and DeBlase (in press) have shown that the Shiraz specimens are Pipistrellus p. aladdin rather than P. mimus. Thus P. mimus should be removed from the Iranian faunal list.

Pipistrellus coromandra Gray, 1838 was reported from Shiraz, Fars Province by Dobson (1871:461) who listed "Several spirit specimens of immature individuals referable to this species." Lay (1967:233) and Etemad (1968:17) both included this species in their faunal lists but Lay expressed the possibility that these could be a species of Pipistrellus other than coromandra.

I have searched the spirit collections of the British Museum in an attempt to locate these specimens but failed to find any immature spirit specimens labeled from Shiraz. I did locate an ancient jar containing three small Pipistrellus in a poorly preserved condition (fur slipping badly, specimens almost denuded). The specimens are not cataloged and a label on the exterior of the jar states, "2 ♂ + ♀ imm." "Pips. coromandra" "G. E. Dobson" "T. G. Jerdon." No locality data or other information is given. These could, conceivably, be the specimens to which Dobson referred. However, while the jar label says "imm.", the specimens are adults. The epiphyses are fully ossified and the teeth are fully erupted and slightly worn. Because of the poor condition of the specimens I was unable to identify them to species, but was able to establish that they are not one of the three species of Pipistrellus presently known from Iran, P. pipistrellus, P. kuhli, or P. savii. Exclusion of these was made by size, dental characters, coloration, and penis shape. If these are the specimens to which Dobson (1871:461) referred and if they are from Shiraz, they represent a species new to the country. P. coromandra should be included only very tentatively on the faunal list of Iran.

APPENDIX B

SUMMARY OF COLLECTING SITES OF THE 1968 STREET EXPEDITION

Between 24 July and 7 December the 1968 Street Expedition established base camps at several locations in western Iran. We collected in various habitats in the area of each camp and made special overnight excursions for collecting at specific localities. Bats were collected from thirty-nine different sites. Figure 40 shows the locations of these collecting sites. The letters and numerals on this map correspond to those in the list below.

In the following list location and inclusive dates of collecting activity for each camp are given. Co-ordinates are provided for all major towns or other reference points. Listed under each base camp are the locations from which bats were collected as well as the date collected, identification of specimens, number of specimens (in parentheses) and circumstances of collection.

Camp A. 2.2 mi W Maku ($39^{\circ}17'N$ $44^{\circ}31'E$), West Azarbaijan Province.

25 July to 29 July 1968

1. Under overhanging cliff at N edge of Maku.

26 July:

Rhinolophus blasii (1), found decomposing in water-filled tunnel in cliff.

Myotis nattereri (1), found dead (fresh) in garden at base of cliff.

2. Zangamar River cave, about 1 mi E of Maku.

28 July:

Myotis blythi (1), mistnetted at cave entrance.

Pipistrellus savii (1), mistnetted at cave entrance.

- Camp B. 5.8 mi SW Rezaiyeh ($37^{\circ}33'N$ $45^{\circ}04'E$), West Azarbaijan Province.

30 July to 5 August 1968

3. Man made cave, 20.6 mi SSE Rezaiyeh.

1 August:

Myotis blythi (16), hanging in "cave".

4. Cave about 10 mi NNW Rezaiyeh.

4 August:

Rhinolophus ferrumequinum (4), hanging in cave.

Myotis blythi (1), hanging in cave.

5. Vicinity of camp (5.8 mi SW Rezaiyeh).

4 August:

Rhinolophus ferrumequinum (1), purchased.

6. Basket Mountain, 26 km NE Rezaiyeh.

5 August:

Taphozous nudiventris (7), roosting in crevices in the mountain.

- Camp C. 1 mi S of Divandarreh ($35^{\circ}55'N$ $47^{\circ}02'E$), Kurdistan Province.

7 August to 18 August 1968

7. Mosque in Sanandaj ($35^{\circ}19'N$ $47^{\circ}00'E$).

12 August:

Myotis blythi (21), hanging in dark room.

8. Gara Tarik (=Dark Cave), 4 km N of Qareh Darreh village, about 20 mi N Divandarreh.

13 and 14 August:

Rhinolophus mehelyi (40), hanging in cave.

Myotis blythi (25), hanging in cave.

Miniopterus schreibersi (26), hanging in cave.

9. Karaftu, a cave and abandoned cliff dwelling complex near Dashbologh village, about 32 mi N Divandarreh.

16 August:

Myotis blythi (7), hanging in cave.

Miniopterus schreibersi (8), hanging in cave.

- Camp D. 4 mi N Kermanshah ($34^{\circ}10'N$ $47^{\circ}04'E$), Kermanshahan Province.

20 August to 25 August 1968

10. Camp (as above) and adjacent village.

20 August:

Myotis mystacinus (1), mistnetted over stream.

Pipistrellus pipistrellus (2), shot over camp.

Pipistrellus kuhli (1), shot over camp.

21 August:

Pipistrellus pipistrellus (2), shot over camp.

22 August:

Myotis mystacinus (1), purchased.

Pipistrellus pipistrellus (9), hanging behind sign attached to building in village.

25 August:

Myotis mystacinus (1), purchased.

11. 9 mi NE Kermanshah.

20 August:

Rhinolophus hipposideros (1), flew in open front window
of moving jeep.

12. Cave, 15 mi NW Ravansar ($34^{\circ}43'N$ $46^{\circ}41'E$), Kurdistan Province.

23 August:

Myotis blythi (26), hanging in cave.

Miniopterus schreibersi (17), hanging in cave.

13. Mar Ab Canyon, 38.5 mi W Shahabad ($34^{\circ}06'N$ $46^{\circ}31'E$),
Kermanshahan Province.

25 August:

Rhinolophus ferrumequinum (23), hanging in spaces under
huge boulders.

Myotis emarginatus (2), hanging in spaces under huge
boulders.

- Camp E. Edge of Ilam ($33^{\circ}38'N$ $46^{\circ}26'E$), Kermanshahan Province.

25 August to 4 September 1968

14. Cave, about 20 mi SE of Ilam.

28 August:

Myotis blythi (21), hanging in cave.

15. Garden in Ilam.

1 September:

Pipistrellus pipistrellus (1), mistnetted.

16. Cave near river about 40 mi S Ilam.

1 September:

Rhinopoma muscatellum (4), shot over river.

4 September:

Rhinopoma muscatellum (10), hanging in cave.

17. House in Mehran ($33^{\circ}07'N$ $46^{\circ}10'E$).

4 September:

Asellia tridens (1), found mummified.

18. Sarin Ab-Garma (=Beginning of the Hot Water) cave, N Dehloran ($32^{\circ}41'N$ $47^{\circ}16'E$), Lurestan and Khuzistan Province.

4 September:

Rhinopoma microphyllum (4), hanging in cave.

Asellia tridens (7), handnetted in cave.

Miniopterus schreibersi (14), handnetted in cave.

- Camp F. 1 mi S Khurramabad ($33^{\circ}30'N$ $48^{\circ}20'E$), Lurestan and Khuzistan Province.

6 September to 14 September 1968

19. Cave in mountain at west edge of Khurramabad.

6 September:

Rhinolophus euryale (4), mummified.

Myotis blythi (3), mummified.

20. Cave about 2 mi N Khurramabad.

6 September and 13 September:

Rhinolophus ferrumequinum (3), hanging in cave.

Myotis blythi (16), hanging in cave.

21. Camp (see above), poplar grove and adjacent river.

9 September:

Pipistrellus pipistrellus (1), mistnetted in poplar grove.

Pipistrellus kuhli (1), mistnetted in poplar grove.

10 September:

Pipistrellus kuhli (1), shot over river.

Camp G. 3 mi SE Aligudarz ($33^{\circ}24'N$ $49^{\circ}41'E$), Lorestan and Khuzistan Province.

15 September to 17 September 1968

No bats collected from this camp.

Camp H. 6 mi NW of town of Kuh Rang (near $32^{\circ}18'N$ $50^{\circ}13'E$), Isfahan Province.

22 September to 26 September 1968

22. At camp (see above).

25 and 26 September:

Myotis nattereri (1), shot over camp.

Pipistrellus pipistrellus (7), shot over camp.

Camp I. At village of Sar Dasht SW of Lordegan ($31^{\circ}31'N$ $50^{\circ}48'E$), Isfahan Province.

28 September to 2 October 1968

23. At camp (see above).

1 October:

Vespertilio murinus (1), shot at camp.

Pipistrellus pipistrellus (1), shot at camp.

Pipistrellus savii (1), shot at camp.

Camp J. Several brief camps in northern Fars Province.

24. Persepolis ($29^{\circ}57'N$ $52^{\circ}52'E$), Fars Province.

3 October:

Myotis capaccinii (3), shot over pool.

Pipistrellus kuhli (6), shot over pool.

25. Vicinity of Shiraz ($29^{\circ}36'N$ $52^{\circ}32'E$), Fars Province.

6 and 7 October:

Pipistrellus kuhli (5), shot over fields.

26. Shahpur Cave ($29^{\circ}48'N$ $51^{\circ}37'E$), Fars Province.

9 October:

Rhinolophus ferrumequinum (3), hanging in cave.

Rhinolophus hipposideros (5), hanging in cave.

Myotis capaccinii (3), hanging in cave.

Pipistrellus pipistrellus (1), hanging in cave.

Miniopterus schreibersi (35), hanging in cave.

- Camp K. 2.5 mi NE Yasoodj (near $30^{\circ}53'N$ $52^{\circ}02'E$), Fars Province.

10 October to 16 October 1968

No bats collected from this camp.

- Camp L. Meshrageh on the Jarahi River, about 85 km SW of Ahvaz
($31^{\circ}19'N$ $48^{\circ}42'E$), Lurestan and Khuzistan Province.

17 October to 24 October 1968

27. At camp (see above).

17, 18, 19, and 21 October:

Rhinopoma microphyllum (1), shot.

Rhinopoma hardwickei (9), shot.

Rhinopoma muscatellum (2), shot.

Eptesicus nasutus (10), shot.

Pipistrellus kuhli (1), shot.

28. Building in Bandar-E-Shahpur ($30^{\circ}25'N$ $49^{\circ}05'E$).

22 October:

Taphozous nudiventris (2), mistnetted as they flew from building.

29. Building in Shush ($32^{\circ}11'N$ $48^{\circ}15'E$).

24 October:

Pipistrellus kuhli (40), hanging in loft.

- Camp M. East edge of Jahrom ($20^{\circ}31'N$ $53^{\circ}33'E$), Fars Province.

7 November to 15 November 1968

30. Camp and vicinity of Jahrom.

8, 9, and 11 November:

Pipistrellus pipistrellus (1), shot at camp.

Pipistrellus kuhli (20), shot on outskirts of town and found hanging in building in town.

31. Numerous small caves 4 to 5 mi W Jahrom.

8, 12, and 14 November:

Rhinopoma muscatellum (7), hanging in caves.

Rousettus aegyptiacus (1), hanging in cave.

32. Canae Gabru (=House of the Zoroastrians) cave, near the village of Tar Divon, about 65 km N Jahrom.

10 November:

Rhinopoma microphyllum (32), hanging in cave.

Rhinopoma muscatellum (11), hanging in cave.

Rhinolophus hipposideros (2), hanging in cave.

Rhinolophus euryale (9), hanging in cave.

Rhinolophus blasii (5), hanging in cave.

Myotis capaccinii (1), hanging in cave.

33. Cave 1 mi NW Ahmad Mahmoudi ($28^{\circ}20'N$ $53^{\circ}42'E$), Fars Province.

15 November:

Rhinopoma muscatellum (5), hanging in cave.

Camp N. 2.5 mi N Bastak ($27^{\circ}14'N$ $54^{\circ}22'E$), Fars Province.

17 November to 20 November 1968

34. At camp (see above).

19 and 20 November:

Pipistrellus kuhli (2), shot over field.

35. Cave, 6 mi WNW Bastak.

20 November:

Rhinopoma microphyllum (1), hanging in cave.

Rhinopoma muscatellum (17), hanging in cave.

Camp O. SW edge of Chah Moslem (near $26^{\circ}44'N$ $54^{\circ}35'E$), Fars Province.

21 November to 26 November 1968

36. At camp (see above).

21, 22, 23, and 25 November:

Taphozous perforatus (1), shot over open area.

Tadarida aegyptiaca (2), shot over open area.

Pipistrellus kuhli (7), shot over open area.

37. Cave, about 6 mi E Chah Moslem.

25 November:

Rhinopoma hardwicki (1), hanging in cave.

Rhinopoma muscatellum (9), hanging in cave.

Camp P. In Minab ($27^{\circ}09'N$ $57^{\circ}05'E$), Kerman Province.

29 November to 2 December 1968

38. Dozdan River at west edge of Minab.

29 and 30 November:

Taphozous perforatus (1), shot over river.

Tadarida teniotis (1), shot over river.

Eptesicus nasutus (1), shot over river.

Camp Q. NE edge of Sa'idabad ($29^{\circ}28'N$ $55^{\circ}42'E$), Kerman Province

3 December to 7 December 1968

39. Cave about 35 mi SE Sa'idabad.

6 December:

Rhinolophus ferrumequinum (1), hanging in cave.

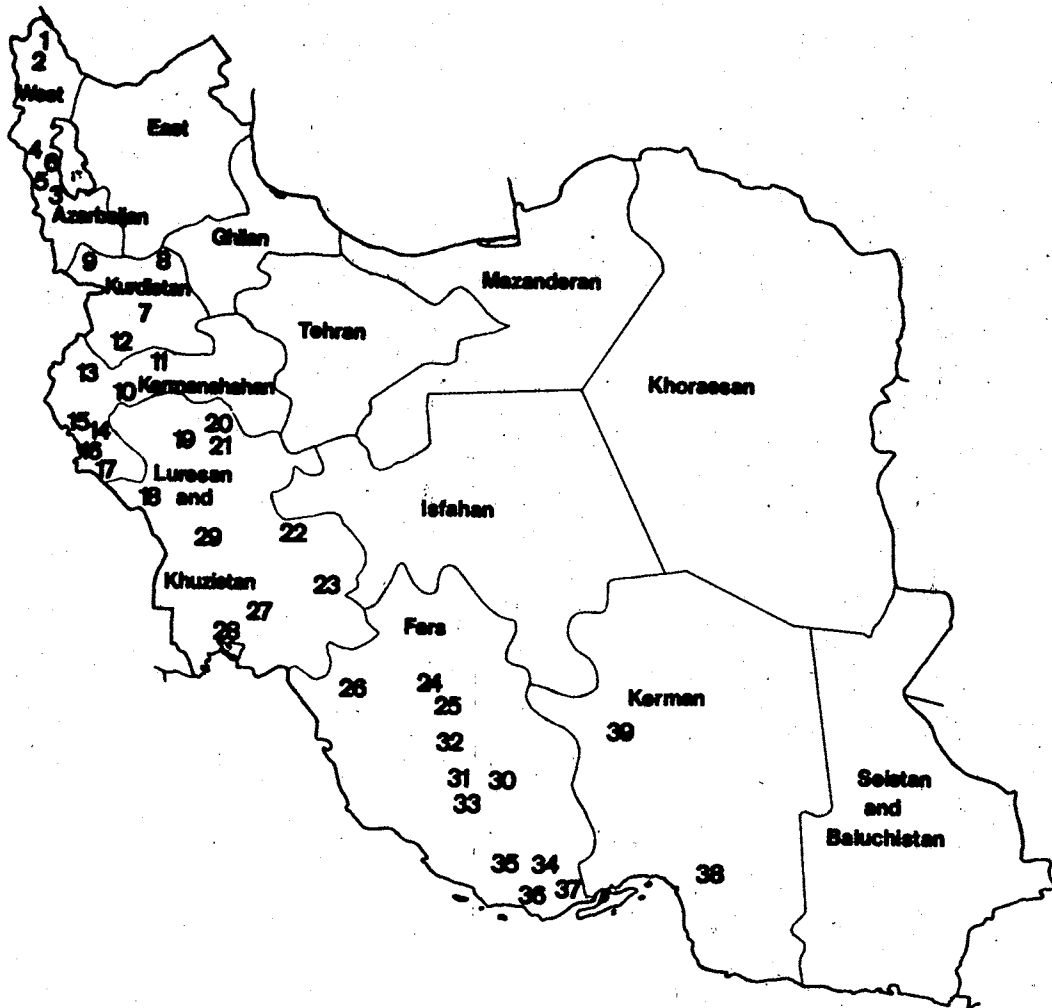


Figure 41. Sites from which bats were collected by the 1968 Street expedition. Numbers one through 39 represent collecting sites listed in Appendix B. Provincial boundaries and names presented on this map are those used throughout this paper.

VITA

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