A STUDY OF THE MAMMALS OF IRAN

RESULTING FROM THE STREET EXPEDITION OF 1962-63

DOUGLAS M. LAY

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INTRODUCTION

Iran's geographical location makes it a proverbial bridge between the Middle East and India, and parts of central Asia. Palaearctic mammal species comprise the majority of the forms known to make up its fauna; however, in the southern parts of the country species typical of the Indian and Ethiopian realms occur.

At the inception of the Street Expedition to Iran a rather complete knowledge of the mammal species inhabiting the country existed. Even so, many of these species were very poorly represented in collections and knowledge of their habits and the nature of the country was either unknown or only poorly recorded. There was a distinct need for skeletal and alcoholic material of many Iranian forms in order that the systematic relationships of these forms could be studied in greater detail and comparative material could be provided for the identification of mammal bones rapidly accumulating from the current boom in archaeological exploration in Iran and nearby areas of Iraq, Turkey, and Afghanistan. No single comprehensive collection of mammals from Iran had ever been made and Iranian specimens accessible to American students were exceedingly scant.

The object of the Street Expedition thus became procurement of a representative collection of all typical Iranian mammals, including as much life-history data as was feasibly obtainable during the field work.

The expedition remained in the field more than seven months, mid-June 1962 until mid-February 1963, during which time most of the important distributional and zoogeographical areas were visited. The mammal collection included slightly over 1700 specimens, representing 97 species, in addition to other material, such as birds, reptiles, amphibians, fishes, and miscellaneous invertebrates.

The present paper provides: a narrative itinerary paying particular attention to the nature of the country traversed between collecting localities; a detailed account of the ecological situation at each collecting locality; an annotated list of species obtained by the expedition in which all previous locality records are summarized for each

species; a list of species reliably reported from Iran but not collected by the Street Expedition; a gazetteer of all Iranian localities from which specimens are known.

Much remains to be learned concerning the distribution, systematic relationships and natural history of Iranian mammals, and it is hoped that this study will provoke greater efforts toward a more complete knowledge of this very interesting fauna.

ACKNOWLEDGEMENTS

I wish to acknowledge my indebtedness to William S. Street and Janice Kergan Street whose combined enthusiasm for the furtherment of scientific knowledge of Middle Eastern mammals was responsible for the expedition to Iran. Having found that collections of study specimens of mammals from Iran then available for research in American museums were extremely limited, Mr. and Mrs. Street supported and led an expedition to Iran for the Field Museum of Natural History. They provided for an Expedition Fellowship to enable a graduate student in Mammalogy to share in the observation of ecological relationships and collection of specimens with proper data, and to have six months at the museum for study of the specimens and the writing of a report on the results of the expedition.

We had been told of baffling barriers to free access to many parts of Iran but the successful acquisition of specimens for this study attests to the help we received from many enthusiastic persons in Iran, as well as to the diplomacy of Mr. Street in gaining access to all parts of the country. (See Field Museum of Natural History *Bulletin*, November and December of 1962, January of 1963.) I am fortunate to have been selected for that fellowship and to have shared this grand experience with them. Throughout the expedition working with Mr. and Mrs. Street remained a real pleasure.

First among those who were helpful in the work of the expedition was the Game Council of Iran headed by H.I.H. Prince Abdul Reza, its president; Eskandar Firouz, Treasurer; M. Riahi, Secretary; and Mohammad Shadloo, Chief of Inspectors. These men encouraged the support of their entire staff throughout Iran, headed by Colonel Golosorky, Director, and Khosrow Sariri, Adjutant Chief of Inspectors. The Game Council members appreciated our problems and to them we are particularly grateful. In addition, we wish to single out General Jahanbani who opened many areas to us in Ba-

luchistan and advised us generously from his tremendous knowledge gained through a lifetime of experience there.

Through Mr. Street's membership on the National Advisory Board of CARE, and his interest in CARE's work in Iran, we were fortunate to have the assistance of Frank Goffio, Executive Director, and the CARE organization in Iran for logistic support in the forwarding of shipments and the warehousing of the expedition's materials.

Drs. M. Baltazard and M. Bahmanyar of the Institut Pasteur de l'Iran made many of the facilities of that institution available to us, generously donated a small but important collection of mammals to the Field Museum of Natural History, and helped us in many other ways for which we are extremely grateful.

We wish to acknowledge the courtesies extended us by the American Embassy in Tehran.

We are indebted to Mr. Frank Jenks, then President of the International Harvester Company for his interest in the success of our expedition, manifested by donating an International Carryall as one of the expedition's vehicles. It served us very well indeed.

We are grateful to Reverend and Mrs. O. C. Burris of the Faraman Orphanage near Kermanshah, for their hospitality to us during our brief stay there.

I am indebted to Dr. In Cho Chung, then of the Field Museum of Natural History Botany Department, for providing the identifications used here of the plants collected in Iran.

To the following persons who have made available to me materials entrusted to their care, I wish to express sincere thanks: Dr. Kurt Bauer, Naturhistorische Museum Vienna; Dr. D. H. Johnson, United States National Museum; Dr. D. H. Harrison, Kent, England; Mr. J. E. Hill, British Museum (Natural History); Dr. X. Misonne, Institut Royale de Sciences Naturelle de Belgique; Dr. E. Nevo, Saar Galil, Israel; Dr. F. Petter, Museum National d'Histoire Naturelle, Paris; Dr. C. A. Reed, Peabody Museum, Yale University; Dr. Ernst Schuz, Staatlichen Museum für Naturkunde, Stuttgart; Dr. R. Van Gelder, American Museum of Natural History.

Dr. Joseph Curtis Moore has critically read the manuscript in its entirety and his suggestions have materially improved the report. Any errors appearing in this report are solely attributable to me. During the course of the preparation of the report Mr. Philip Hershkovitz and Dr. Moore have patiently provided counsel and have been a constant source of encouragement for me.

I am grateful for support by a Thomas J. Dee Fellowship of the Field Museum of Natural History during six months (February–July 1964) of the preparation of this report.

The Expedition

Personnel

Mr. Street, the leader of the expedition, Mrs. Street, and I, as the expedition fellow, composed the American contingent. After arrival in Iran, Mr. Street employed a full-time driver-interpreter, Mr. Nicolai Haroutounian, and cook, Mr. Bahram Najafi. Following the initial six weeks in the field, Mr. Street hired Mr. Ali Niqui to assist in the preparation of specimens. The expedition engaged additional local hunters, guides, and camp help as needed and as available at the collecting localities.

Equipment

Two International Harvester C130 Carryall trucks provided our transportation. These vehicles were especially equipped with heavy duty chassis, 4-wheel drive, oversize tires, power winch, and a quarter-inch steel storage platform and rack the full length of the outside top. These trucks gave us a dependable mobility without which the accomplishments of the expedition could not have been achieved.

We camped throughout Iran and employed two 12′ x 12′ and one 9′ x 9′ umbrella tents, two 7′ x 7′ wall tents, and various fly arrangements.

Methods

The principal goal of the Street expedition was to obtain a geographically representative collection of Iranian mammals, including complete skeletons of as many species as possible, and whole alcoholic specimens of nearly all of the small species. To best accomplish this we employed a variety of methods. The following pattern became a standard procedure at each new camp. Mr. and Mrs. Street, with the aid of local hunters and guides, sought the larger species of mammals. I trapped to obtain small mammals. Museum special snap traps and rat-size snap traps were employed daily. Mole traps, various sizes of steel traps, Sherman live traps, and Japanese mist nets were used for species that would, or might, be missed with snap traps. We all participated in night hunting, on foot with 6-volt headlights and by truck using two 12-volt spotlights. Our technique of hunting from the truck seems worthy of elaboration. In the hubs of each of

the two spare tires that were mounted horizontally on a rack above the cab, we placed cushions. One person sat on a cushion in each tire (see cover FMNH Bull. **33**, no. 11). From this vantage point the surrounding country could be scrutinized with the 12-volt light while the driver used the headlights and spotlights of the truck to watch for animals on the road. Mammals detected in shotgun range were collected. Carnivores seen out of range we attempted to lure into gun range, frequently with success, by using predator calls. If this failed, the animal was often approached on foot and collected. The truck-top hunting method proved highly successful for collecting jerboas, hares, jackals, foxes and wild cats.

At each collecting locality we located camp near a village. One of the expedition's first objectives was to spread the word among the villagers that any animal brought to us would be purchased. Although the "common" species usually composed the major part of specimens acquired in this manner, it seldom failed that some specimens of the more elusive species were brought in.

Another aim was to record observations on the ecology of the parts of the country through which we traveled and especially where we collected. To this end we kept notes, took photographs and attempted to collect examples of the predominant plants at virtually every collecting locality.

We took and recorded the following external measurements for specimens to be preserved dry:

Total length—The greatest length from the anteriormost tip of the nose to posteriormost tip of the last caudal vertebra when the animal was placed flat in prone position.

Tail length—Greatest length of tail vertebrae.

Hind foot length—Greatest length between the posteriormost extension of the calcar (heel) and the tip of the claw on the longest toe.

Ear length—The distance between the most proximal point of the anterior notch and the most distal point of the tip.

Forearm length (taken for bats only)—The greatest length between the posteriormost point of the elbow and the anteriormost point of the wrist taken with the wing in retracted position.

See Hall and Kelson (1959, pp. 1040–41) for illustrations of the method for taking the first four of these measurements.

Weights were recorded for most of the specimens weighing less than three kilograms. Both Mr. and Mrs. Street participated in taking and recording measurements and weights. Ectoparasites were saved from representatives of the majority of species collected. Stomach contents and the female reproductive tract were grossly examined and the findings recorded.

The Country

Location

Iran, frequently referred to synonymously as Persia in this paper, lies in the Middle East between 25° 06′ and 39° 46′ N latitude and 44° 01′ and 63° 16′ E longitude. In the north from east to west, Iran borders on the Turkmen SSR, the Caspian Sea, Azarbaijan SSR, Armenian SSR, and Nakhichevan ASSR. The Persian and Oman gulfs bound Iran on the south. From north to south, the eastern frontier borders on the Turkmen SSR, Afghanistan and W. Pakistan, while Turkey and Iraq abut Iran on the west. Iran has an average length of approximately 1302 km. and an average width of about 1023 km. The total land area approximates 1,625,000 sq. km., which is nearly as large as the portion of the United States east of the Mississippi River, or as Queensland, or as Italy, Spain, France, and British Isles combined.

Physical Geography

Iran occupies the western and larger part of a vast highland (ca. 2,722,500 sq. km.) known as the Iranian or Persian Plateau. This plateau rises between the valley of the Indus River in the east and the Tigris River in the west and comprises an important section of the great Alpine–Himalayan (Euro-Asiatic) Mountain fold. The Armenian and East Turkish highlands connect the plateau with the Taurus Range of southern Turkey. The Caucasus Mountains represent the northwesternmost extension of the plateau proper. The Paropamisus and Hindu Kush Ranges link it with the Himalayas on the east, and the plateau terminates along the Persian and Oman gulfs and the Arabian Sea on the south.

Orography constitutes an important factor in the physical geography of the plateau. Intensive uplift and orogenic folding, beginning about the Middle Miocene raised a large part of the present plateau from beneath a Miocene sea (Furon, 1941). Basically the plateau now consists of a peripheral mountainous zone and an enclosed central basin area. This central basin region, however, should

not be considered a flat, featureless plain. During our travel on the plateau, mountains were never absent from view, although it seems possible that mountains might not be visible from the center of the Dasht-i-Kavir basin. The principal ranges in Iran are the Elburz along the north end of the Iranian Plateau, the Zagros along the west side of the plateau, and their southern extension, the Makran.

The Zagros fold system forms the western and southwestern scarp of the plateau. One can consider this range to originate with Mt. Ararat in Northeast Turkey and extend southeast to and along the Persian Gulf. Along the Gulf of Oman these mountains merge imperceptibly into the Mekran range. The Zagros system segregates structurally into three sections. The area north of the 35th Parallel consists of fault blocks which are associated with Mts. Ararat and Sabalan, the principal cones of considerable volcanism. The great erosion of mountains in this area resulted in the evolution of several interior basins, some in Turkey, some in Iran. The Lake Urmiah basin of Iran constitutes the largest of these (Blanchard, 1929).

The second section, the central Zagros, consists of a region of parallel ridges which attains a breadth of at least 322 km. between the 27th and 32nd parallels. Throughout this vertical anticlinorium, overthrust and erosion have left the oldest rocks at the highest elevations and transition into progressively younger strata occurs in descent. Axes of the majority of the Zagros folds lie oriented northwest to southeast. The average height declines to the southeast, but peaks 3046 m. and higher appear throughout the range (Blanchard, 1929; Furon, 1941).

The third section of the Zagros, the Mekran range, is considered to originate approximately at the Strait of Hormoz (see map p. 14) and may be distinguished from the main Zagros chiefly by the east-west directed axes of its folds. This range continues east along the Arabian Sea to the Indus River valley where it joins the northeast-southwest oriented folds of Sulieman range in West Pakistan (Blanchard, 1929).

The Elburz Mountains rise in a crescent along the southern end of the Caspian Sea. In the west, these mountains originate in the Armenian massif, as do the Zagros. This range is relatively narrow, being approximately 120 km. in breadth at its widest point just east of Tehran. The Elburz reach their greatest heights (3075 m.–4310 m.) in the central portion of the crescent culminating in Mt. Demavend, a 5666 m. volcanic peak, then gradually diminish in height to the

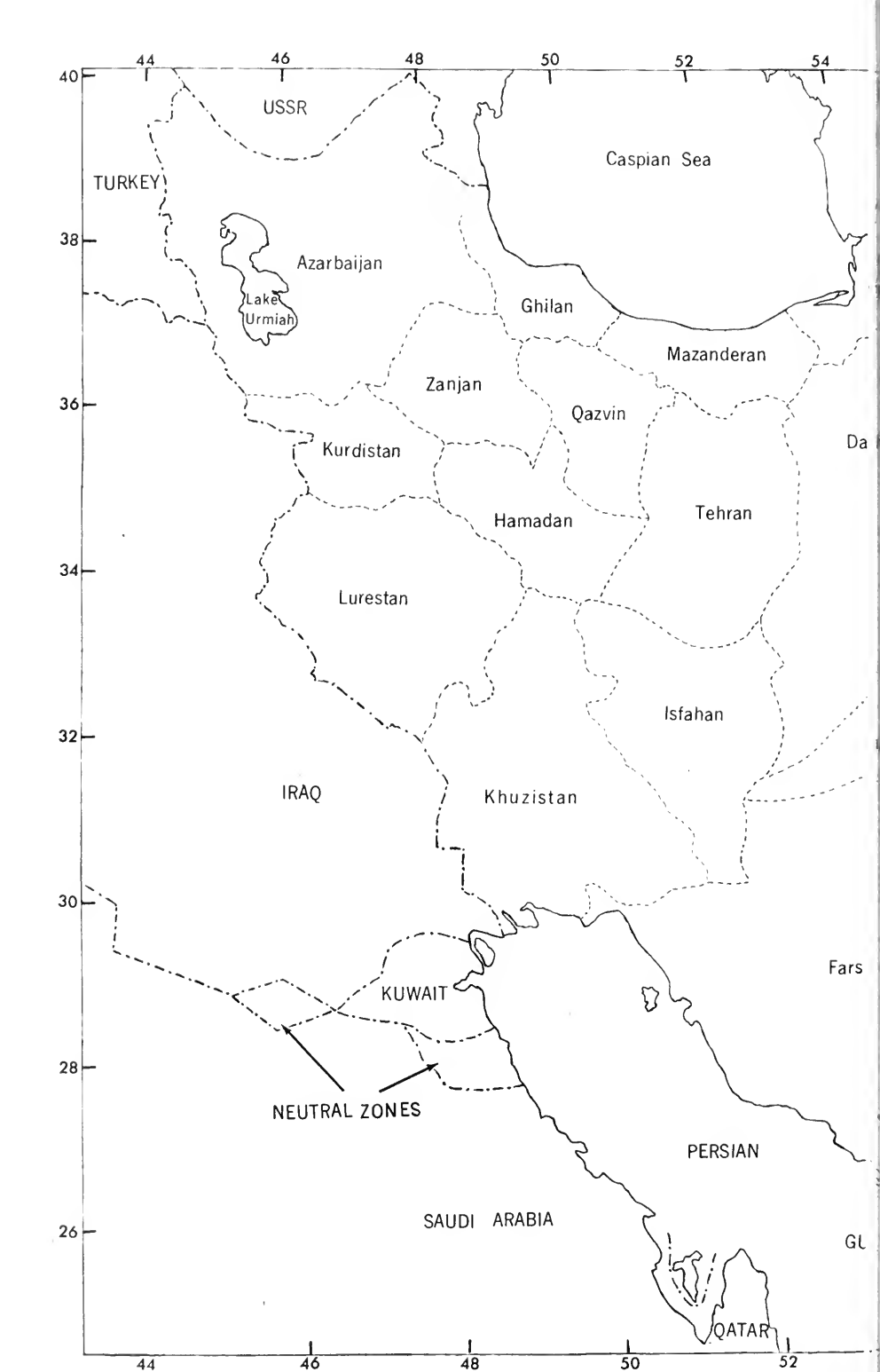


FIG. 1. Map of Iranian Provinces—adapted from the map published by A. H. Ham

anian Information Center, New York. *ca.* 1960.

east (down to ca. 2130 m.) and terminate along the Atrak River valley north of Bojnurd. Although the confluence of this system with that of the Kopet Dagh range on the north side of the Atrak Valley might be claimed, the folds of this latter system orient predominantly northwest-southeast, and the Atrak Valley is properly accepted as the eastern end of the Elburz (Blanchard, 1929). The Kopet Dagh Range lies along Iran's northeast border with the Turkmen SSR. Southeast of Mashhad, the Kopet Dagh merge into the Paropamisus Mountains of Afghanistan, which in turn link with the Hindu Kush system in the northwest part of that country.

Two great internal basins lie within the mountainous rim of the Iranian plateau, the Iranian basin, composed principally of the Dasht-i-Kavir and Dasht-i-Lut depressions, and the Hirmand, or Seistan, Basin. Iran's eastern frontier passes for all practical purposes between these depressions. The entire Iranian basin and the westernmost end of the Hirmand Basin rest inside Iran. A series of disjunct mountain ranges with axes oriented roughly northeast-southwest rise out of the plateau between Torbat-i-Haidariyeh, Khorassan Province and Zahedan, Kerman Province and separate the Iranian and Hirmand depressions.

Internal depressions form a common feature of the eastern half of Iran. Broad gravel-covered detritus slopes decline gently away from peripheral mountain ranges, while finer deposits such as silt and sand accumulate in the central part of these depressions. The lowest areas receive the drainage of the surrounding highlands and are frequently covered with shallow lakes, usually salty, when there is precipitation. Throughout most of the basin country precipitation usually comes in amounts too small to maintain these lakes for longer than two or three months annually before evaporation and percolation transform these lakes into "kavirs", the Persian term for an area in which a dry salty crust covers soft mud. Fields of mobile sand dunes usually characterize the southern ends of these basins.

St. John (1876, p. 4) provides the following data regarding the drainage of Iran's 610,000 sq. mi.=1,580,000 sq. km.[1]

Into the ocean	130,000 sq. mi.=337,000 sq. km.
Into Caspian and Aral Seas	100,000 sq. mi.=259,000 sq. km.
Into Seistan Lake	40,000 sq. mi.=103,500 sq. km.
Into Lake Urmiah	20,000 sq. mi.= 51,750 sq. km.
Into interior drainage	320,000 sq. mi.=830,000 sq. km.

[1] This is 18,000 sq. mi. less than the present estimate of the total area.

Despite any correction that St. John's figures may or may not need, I think they correctly suggest that about 60 per cent of the area of Iran drains internally.

Skirting the plateau are the relatively narrow Caspian Sea and Persian-Oman Gulf coastal plains and the Turkmen and Khuzistan plains. A small portion of the Turkmen plains extends into northern Iranian territory along the southeast coast of the Caspian Sea. These plains are geographically and ecologically part of the Kara Kum Desert. The Khuzistan plains, a geographical part of Mesopotamia, lie at the head of the Persian Gulf.

Climate

The prevailing winds flow either from the northwest or southeast over Iran. The location of the Black Sea to the northwest and the Arabian Sea to the southeast and the general northwest-southeast axes of the mountain ranges, which tend to guide the air currents passing over them, largely determine wind direction (St. John, 1876, pp. 6–7). Radiant energy from the sun heats a stratum of air on the plateau which is replaced by cooler air flowing in from over the seas when the warm air expands and rises. Because the area to the northwest usually remains cooler than the area to the southeast, the northwest wind tends to be most prevalent. The southeast wind bears rain, though in very meager quantity, to most of Iran. The rainclouds coming from the Black and Caspian Seas occasionally manage to cross the Armenian and Elburz massifs respectively, and provide additional moisture to the plateau.

Bobek (1952) shows in his annual rainfall map of Iran that most of the eastern two-thirds of the country receives less than 300 mm. of rain annually and that over half of this area receives less than 100 mm. annually. To make matters worse, precipitation does not come regularly in those thirsty parts. Tehran has recorded annual precipitation extremes of 100 mm. to more than 500 mm., while Bushere has recorded even greater extremes (Ganji, 1955). When we visited Zahedan, the principal city of Iranian Baluchistan (Eastern Kerman Province), which is located near the central portion of a small basin, the governor-general commented that rain had not fallen in the last four years and added that when it did rain last, the rapid runoff from the bare surrounding heights flooded the city. Rain, when it comes to eastern Persia, usually falls in a downpour and the majority of the moisture flows rapidly down swollen freshets to the nearest basin, there to evaporate (St. John, 1876).

The heaviest precipitation falls on the northern slopes of the Elburz, where the annual amount varies from 750 mm. along the coastal plain to in excess of 2000 mm. at the highest elevations (Ganji, 1955).

The next best watered area is the crest of the Zagros Mountain Range between Shiraz, Fars Province and Rezaiyeh, Azarbaijan Province where the highest peaks usually manage to garner from 750 to 1000 mm. The northwestern part of the country (Azarbaijan, Kurdistan, and Lurestan Provinces) is, by comparison with the eastern parts, well watered, receiving an average of about 500 mm. annually. Except for the northern slope of the Elburz, the major portion of precipitation falls on the plateau from December to March (Ganji, 1955).

The Elburz and Armenian massifs prevent any maritime influence on the climate of the plateau during summer or winter. The northeast highlands, however, do not rise high enough to prevent the cold air from central Asia from flowing onto the plateau in winter. Consequently, Iran experiences a continental climate, with very hot, dry summers and a rapid transition to very cold, relatively dry, winters. The maritime influence of the Arabian Sea along the coastal plain of the Persian Gulf and the Gulf of Oman and 80 to 160 km. inland maintains a mild winter climate in this region (Ganji, 1955).

Vegetation

Lush deciduous forests clothe the northern slopes of the Elburz crescent. The altitude these forests reach seems oddly related to the height of the Elburz. They exist up to 2590 m. in the central part of the range, but where the overall altitude of the range drops considerably in the northwestern (c.f. the Talish Mountains, average altitude ca. 2000–2500 m.) and northeastern projections of this range (average altitude ca. 2000 m.) the forest reaches only 1220 m. to 1525 m.

Stunted oak forest occurs on the crest of the Zagros Mountains from the Iran–Turkey border west of Rezaiyeh southeast to Shiraz. Broadly speaking, such growth usually exists only at elevations of about 2150 m. or higher. Scattered remnants of scrub oak forest as low as 925 m. suggest that such vegetation formerly occurred over a wider area than it does at present.

Exclusive of riverine *Tamarisk* thickets in the southern one-half of Iran, sparse, xeric plant life characterizes the country.

Population

Approximately 19 million people, excluding nomads, populate Iran, some 80 per cent of them rural and 20 per cent urban. Fairly dense rural population centers exist in the better watered areas of the country. The rural area along the Caspian coastal plain, where population density exceeds 38 per sq. km. (=100 per sq. mi.) constitutes the most heavily populated area in Iran. The provinces of Azarbaijan, Ghilan, Mazanderan, Khuzistan, the part of Khorassan around Mashhad, and the area of Tehran and vicinity are well populated. The central, southern, and eastern (south of Mashhad) parts of the country, with the exception of the Hirmand River delta in Seistan, support a very sparse population.

The great majority of the populace do not possess modern firearms. This boon to wildlife has allowed most species to maintain natural populations presumably of about range-carrying capacity in many parts of the country.

Special Terms

The following words used in the text require definition:

Qanat—The ingenious system employed by Persians to obtain and transport water in an arid area is termed a qanat. This method by which water is channeled over distances of 5 to 60 km. with insignificant loss in volume, consists of a "mother well" located at the base or lower slopes of mountains, a series of vertical shafts sunk 15 to 20 m. apart between the well and the place where the water is needed, and a horizontal underground tunnel dug to connect the vertical shafts at a level enabling the water to flow naturally and unexposed to the desiccating atmosphere at the surface. Calculation of the slope between water level in the "mother well" and the elevation of the place near or on the plain where water is needed determines the depth at which the horizontal duct must be dug to bring the water to the surface exactly at the desired spot.

Dasht—Dasht translated from the Persian literally means "a flat place" and is frequently employed to refer to the seemingly flat central parts of interior basins.

Jube—Surface irrigation ditches that channel water from diverted streams are termed jubes. Because the flood plains of these streams are, in most cases, narrow, the higher-bordering areas are in demand in order to increase the area under cultivation. Due to the relatively short length and sharp downward pitch of virtually all Iranian

streams, jube systems for watering areas above the level of the stream flood plain must originate upstream. In many areas of Iran, several jube ditches may be constructed to water the entire area between the flood plain and about 60 meters above it.

Track—A poorly defined roadway that leads across unaltered terrain infrequently traveled by automobile.

Earlier Faunal Works

The four columns of Table 1 permit convenient comparison of species known in the major works dealing with the mammal fauna of Iran from Blanford's (1876) *Zoology of Eastern Persia* through Ellerman and Morrison-Scott's (1951) *Checklist of Palearctic and Indian Mammals* and Misonne's (1959) *Analyse Zoogeographique des Mammiferes de L'Iran* to the present paper. Each column is arranged in the phylogenetic order used by Simpson (1945), with a single species to the line. All four columns are organized so that each numbered line refers to a single species (e.g., *Erinaceous europaeus*). The existence of more than one specific name in the same line of a column represents my opinion on synonymy of these names and the applicable name in such cases is that provided in column four. In those cases where names in column four differ from the Ellerman and Morrison-Scott *Checklist*, the reasons for each difference are provided in the appropriate species account in the present work.

The Ellerman and Morrison-Scott *Checklist* (1951) endeavors to include all the named forms of recent mammals in the area concerned from 1758 through 1946. Although their checklist includes the mammals of Iran, it gives virtually no information on each species other than its name, what subspecies it includes, and the countries where it occurs. The other works, however, have treated the mammals of Iran more intensively. Blanford (1876) was the first worker to treat the whole mammalian fauna of Iran, and his book contains accounts of what are presently considered 66 different species (Table 1, column one). Misonne (1959) was the next worker to attempt complete coverage of the mammalian fauna of Iran. His taxonomy follows that of the Ellerman and Morrison-Scott *Checklist* with only two exceptions. Misonne lists 112 species from Iran which I reduce to 106. Misonne included one species, *Vespertilio murinus* (see species account p. 146) incorrectly and failed to take into account six species recorded by earlier workers. This paper lists 125 species from Iran of which 10 species are shown for the first time to occur in Iran.

These 10, with the two reported by Harrison (1963), represent the only additions to the fauna since 1959[1]

[1] For comment on the status of a paper published by Etemad (1963) that lists two species as new to Iran, see species accounts of *Rhinolophus euryale* (p. 136) and *Myotis capaccinii* (p. 141).

NARRATIVE OF THE EXPEDITION ROUTES

The expedition's routes conveniently divide into four trips out of Tehran. Brief periods in Tehran of reprovisioning, repairs, shipping out the acquired collections, and rest separated these four journeys. Each trip sampled a different major part of Iran, and for the reader's convenience the following accounts are divided into lesser parts headed by the names of provinces in which we worked. For localities mentioned, I provide the elevation above or below mean sea level in meters (m.). Transliterations of Persian place names have produced several spellings for particular places. The application of a variety of names to one locality on different maps and in the literature increases the burden on the student interested in problems of animal distribution, and I have attempted to ease the study of Iranian mammals by providing synonymies of such names in the gazetteer (p. 227). Elevations are those provided in approximation (in most cases) by the U. S. Army Map Service, Iran–Iraq Map Series K501, or recorded by us in the field with an altimeter accurate to the nearest 100 feet (30.48 m.). Distances are provided in kilometers (km.) and may be divided by 1.61 for conversion to miles. The accompanying map, figure 2, shows the routes taken by the expedition in Iran.

Description of the areas where the expedition camped and collected is intentionally brief. A detailed account of the collecting localities follows under the heading, *Descriptive Gazetteer of Expedition Localities.*

The Northwest Circuit

Tehran Province (July 17–August 13, 1962)

The American members of the Field Museum of Natural History Expedition to Iran, W. S. and J. K. Street and myself, arrived in Tehran (1157 m.) July 17, 1962, and spent the period from arrival until July 31 carrying out the numerous final details of preparation necessary to get the expedition out of Tehran into the field. On July 31, we left Tehran in the expedition's two trucks and drove west on the plateau (ca. 1220 m.) along the southern foothills of the Elburz Mountain Range. To the south of this route a rolling, sparsely vegetated plateau, interrupted occasionally by small mountain ridges that

rise 300 to 600 m. above plateau level, stretches to the horizon. From Karaj (1310 m.), a small town located 40 km. west of Tehran, we ascended the treeless, nearly barren southern slope of the Elburz range. Reaching Gach Sar (2130 m.), only a few kilometers from the pass over the divide, we turned off the main highway and went a short distance east to the Varang River. Here, about 3.2 km. southwest of the village called Varangrud[1] (2740 m.), our party camped. The next morning, August 1, the expedition loaded its equipment onto 17 mules and two horses and traveled some 25 km. up the Varang River valley, which cut between high rocky ranges, to an uninhabited place known locally as Doab[2] (3323 m.). With this place as a base of operations until August 10, we collected in the grassy stream beds, slopes scantily covered with low (0.3 m.) woody-stemmed plants, and alpine meadows. On August 10, I moved from Doab approximately 18 km. downstream to collect in an area of rocky but cultivated fields that lay about 2.5 km. north of Varangrud village. The Streets moved by pack animals from Doab August 11 to the site of our July 31 camp, and on August 12 proceeded by truck across the crest of the Elburz on the Chalus road.

Mazanderan Province (August 12–September 8, 1962)

About 20 km. down the northern slope (2430 m.) the Streets viewed the first forest seen by expedition members in Iran. This forest occurs all the way down onto the coastal plain. The party did not continue to the coast at this time, but turned east about 20 km. south of the sea and set up camp east of the Chalus road near the village of Sama (1150 m., and *not* the village of Sama west of the road which was mapped in error as camp no. 2 in the Field Museum of Natural History *Bulletin* for December, 1962, p. 7), located in a highly cultivated area along a stream surrounded by densely forested mountain slopes. I continued observation 2.5 km. north of Varangrud village through August 13 and joined the party near Sama on August 14. We collected mammals in the several habitats of the Sama area until August 29 when we drove down to Chalus, a town situated at the edge of the Caspian Sea (−24 m.) on the narrow coastal plain.

On August 30 we moved to a site 6 km. west of Chalus (−24 m.) near a large, second-growth forest, and camped at the edge of the

[1] *Rud* is the Persian word for "river."

[2] *Doab* is Persian for "two streams."

Caspian Sea. Most of the coastal plain we saw was cultivated. We collected in this vicinity until September 8.

Ghilan Province (September 9 and 10, 1962)

The expedition set out in a westward direction on September 9 along the narrow coastal plain to Rasht, where the plain widens considerably, then to Bandar-e-Pahlavi (−24 m.), the sturgeon and caviar processing center of Iran. Numerous reed bed marshes exist along the sea coast in this area, while a few kilometers northwest of Bandar-e-Pahlavi thickets of low, thorny bushes occasionally blotch the scantily grass-covered sand dunes bordering the sea. Our caravan camped for the night approximately 30 km. northwest of the latter city.

On September 10 our group moved north along the narrow thicket-covered coastal plain on the road to Astara (−24 m.). Forests cloaked the slopes of the Talish Mountains, a branch of the Elburz, visible in the west over the full length of this leg of the journey. From Astara to Ardabil the road traversed the Talish range, and in this passage we climbed through lush deciduous forest to an altitude of about 945 m.

Azarbaijan Province (September 10–October 7, 1962)

The forest then diminished until replaced by grass, and at the summit (nearly 1525 m.) we encountered a plant community resembling an alpine one: low green grass and numerous other low plants in flower. Shortly after crossing the summit, we descended about 500 m. into much drier, nearly barren, clay hills with cobble-sized rocks frequently covering the surface. The Talish Mountains and prominent associated spurs rose visibly to the east and south while Kuhha-ye-Sabalan, a dormant volcanic cone, reared prominently in the west. As in much of Azarbaijan, low clumps of xeric vegetation grew thinly in the uncultivated areas. Night overtook us just north of Sarab (548 m.), but we drove on to camp at a well 20 km. west of this town. Here traps in a hay field yielded a few specimens. September 11 the expedition drove through a similarly dry, rocky country to Bostanabad (518 m.) and Tabriz (ca. 427 m.). Leaving Tabriz for Marand (ca. 427 m.) our party traveled through and along the edge of the barren salt flats that lie on the east side of the northern part of Lake Urmiah. This terrain continued unchanging for about 45 km. when we climbed a low pass over rocky terrain and down again to Marand. From Marand our group proceeded in a west-northwest direction. Here a wide level area of large salt flats, a few marshes with reeds, and scattered low (0.3–0.5 m.)

green xeric plants extended to our north. A high rocky mountain range to the south paralleled our route. That night we bivouacked 29 km. east of Khvoy in a salt flat beside a salty stream. Only one kilometer west of this stream rose low rolling hills where a few specimens were trapped.

September 12 we broke camp at sun-up, drove to Khvoy, and then turned south over rather level, sparsely vegetated terrain. Some 20 km. south of Khvoy the mountains, referred to in the previous paragraph as paralleling our route to the south, connected with the main Zagros range to the west. As we approached these heights, 600 to 750 m. high, the grade from the plain steepened abruptly and the characteristic sandy clay gradually gave place to rocks. As we passed over the divide the nearer part of Lake Urmiah came into view. A broad flat basin stretched from the white salt shores of Lake Urmiah to the Zagros range some 30 km. to the west. At various points, spurs of these mountains reach out and interdigitate with the plain. We descended the rocky southern slope and entered the arid, sparsely vegetated basin. A mountain finger 30 km. to the south took on a blacker hue as we approached. After skirting this mountain ridge, the road passed very close to Lake Urmiah for some 15 km. Salt flats stretch barren and white from the lake edge for a distance of several hundred meters, then merge into less salty areas where a type of low, chenopodiaceous vegetation grows well. This chenopod growth in turn grades into tall (0.5 m.) scattered clumps of grass on its salty perimeter which eventually is transformed into a green, grass-covered, closely-grazed savannah. Here and there we passed water holes, often characterized by bubbling, sulphurous gases. Beds of tall, dense grass usually surrounded these springs. The green pasture-like area is perhaps from 0.5 to 1 km. wide and characterized by an alkaline soil. It merges on its outer fringes into a drier, more barren area that stretches westward to meet the rocky debris slopes nearer the mountains. Several monadnock mountains composed, at least partly, of a granitic rock and shale rise in isolation along the edges of Lake Urmiah. The basin extends south along the edge of the lake reaching its maximum width a few kilometers north of Rezaiyeh (1310 m.), then gradually narrowing to the south.

The afternoon of September 12 we pitched camp about 10 km. southwest of Rezaiyeh on the Rud-e-Bardeh Sur in country composed of high rugged hills that form a part of the Zagros range.

Clay and rocks generally make up the surface of the lower portions of these hills. The highly cultivated river valley contains rather lush

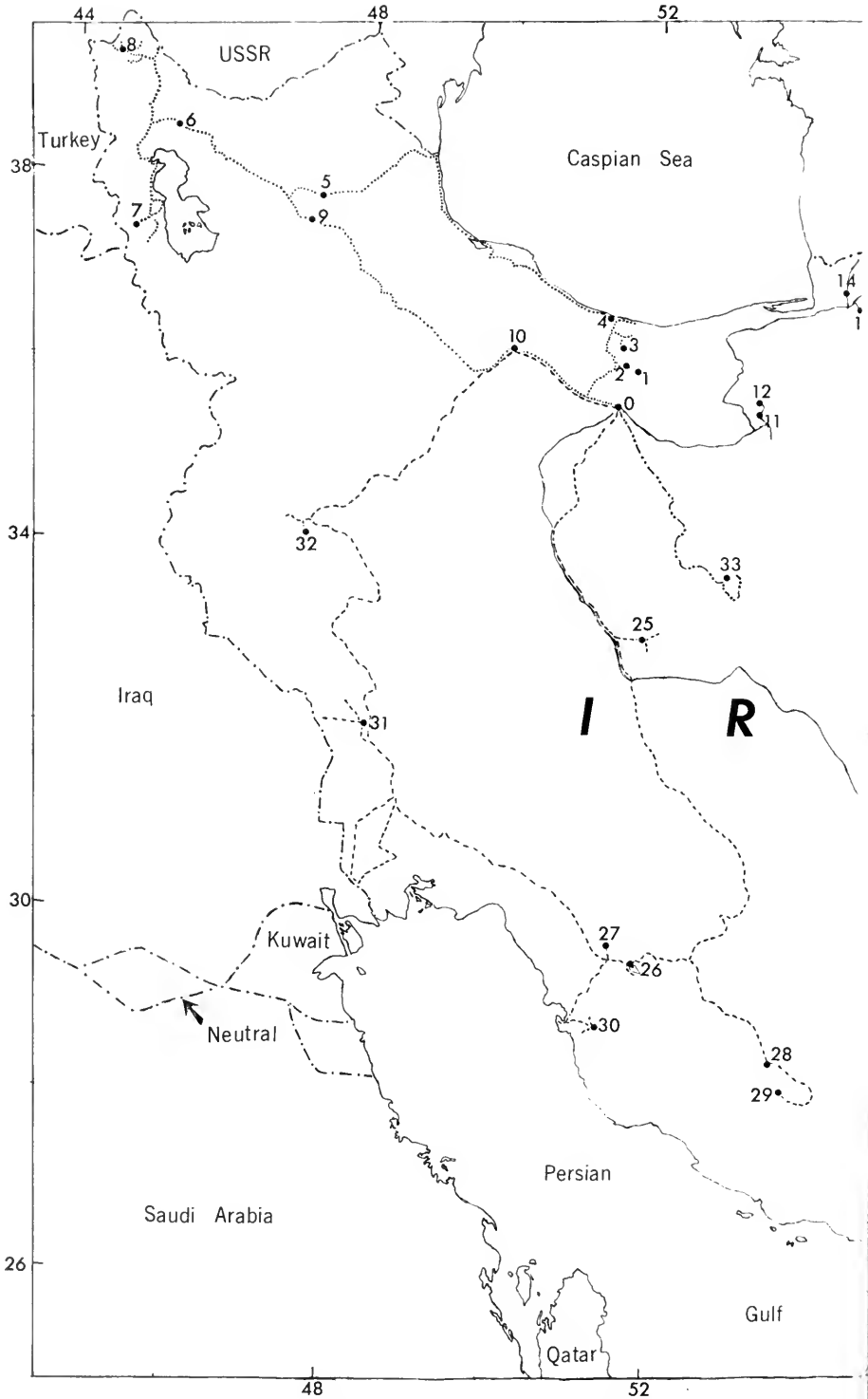
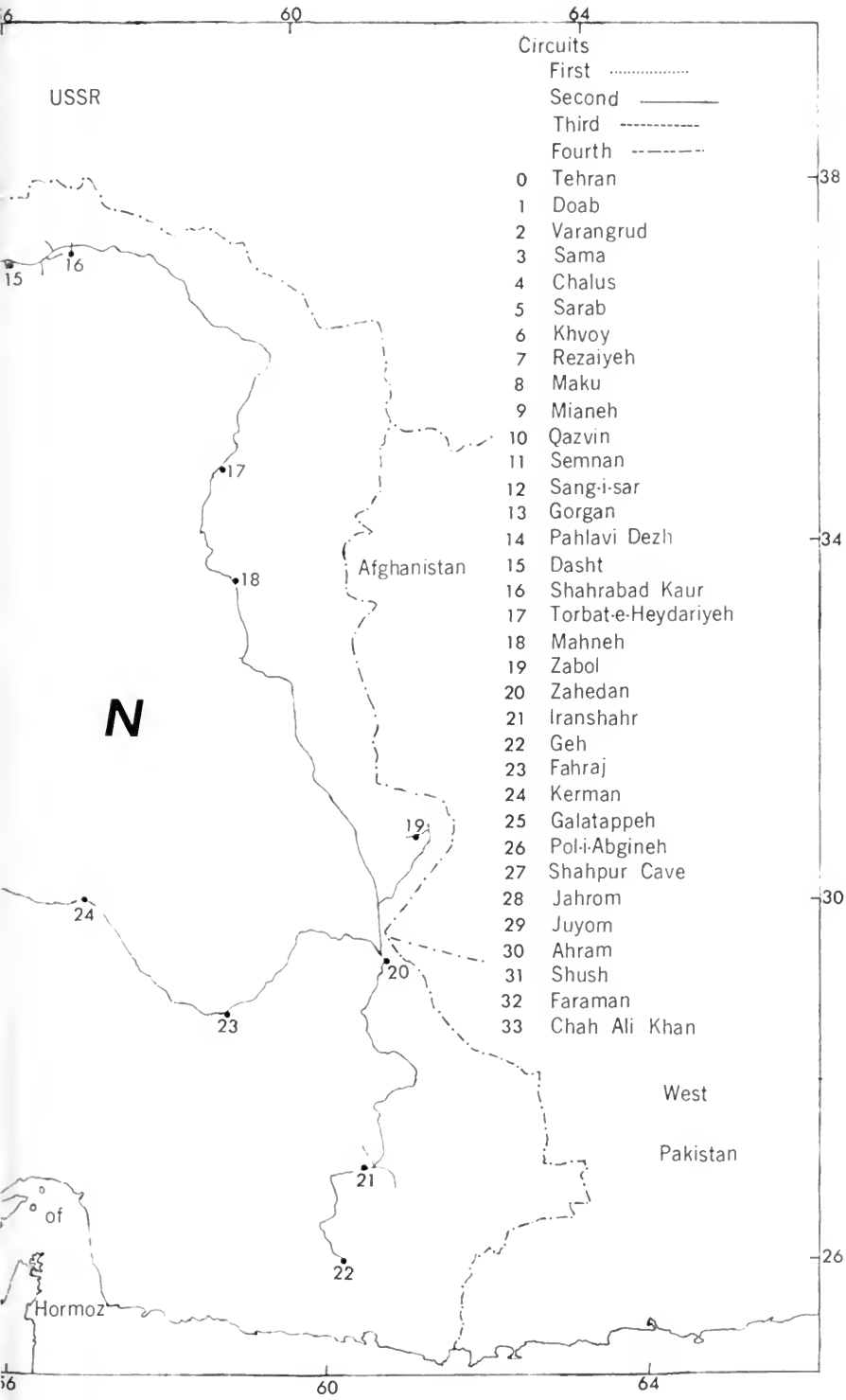


Fig. 2. Map of routes and collecting localities of Street Expedition to Iran.


Circuits
First
Second
Third
Fourth
0 Tehran
1 Doab
2 Varangrud
3 Sama
4 Chalus
5 Sarab
6 Khvoy
7 Rezaiyeh
8 Maku
9 Mianeh
10 Qazvin
11 Semnan
12 Sang-i-sar
13 Gorgan
14 Pahlavi Dezh
15 Dasht
16 Shahrabad Kaur
17 Torbat-e-Heydariyeh
18 Mahneh
19 Zabol
20 Zahedan
21 Iranshahr
22 Geh
23 Fahraj
24 Kerman
25 Galatappeh
26 Pol-i-Abgineh
27 Shahpur Cave
28 Jahrom
29 Juyom
30 Ahram
31 Shush
32 Faraman
33 Chah Ali Khan
USSR
Afghanistan
West
Pakistan
Hormoz
N
60
64
38
34
30
26

vegetation. The expedition collected both in valleys and hills until September 25 when our entourage retraced the route north along the lake to Khvoy. From Khvoy we traveled northward across more of the flat basin previously described (p. 25), but soon began a slow upgrade through a series of low hills characterized by wide, dry, stream beds. Some 30 to 35 km. north of Khvoy we turned to the northwest and passed over a high, rolling, plateau area, covered with the usual low, xeric vegetation. This rolling area lies between the Aras River, 30–40 km. to the north, and a high, rocky range of the Zagros to the southwest. From this plain Mount Ararat rises in clear view approximately 60 km. to the northwest. Twenty kilometers west across this terrain, our party descended through a series of completely bare, red clay and shale hills into an area with indications of past and present volcanic activity. At the brink of the clay hills we saw that the valley before us contained extensive piles of only slightly weathered lava. Several outflows of steaming hot water near the road were reminders of the dormant volcanism of the area. We crossed this wide valley and entered the narrow pass that cut between two massive, rather flat-topped limestone mountains about 10 km. east of Maku. Maku (913 m.) nestles against the side of the mountain on the north bank of the Zangmar River and from a distance resembles an ancient pueblo dwelling. Our party set up camp at the edge of a large, rocky but cultivated, wheatfield on the western edge of town north of the river. On the other side of the mountain to our north, lay a wide plain composed of alluvial soil and weathered lava that stretched northwestward into Turkey as far as Mount Ararat. Great heaps of rough, black lava lay piled down the sides and around the base of this well-known mountain. We collected and observed in the mountains, plains, along streams, and in caves through October 5, and on October 6 broke camp for the trip to Tehran. Leaving Maku we reached Kvoy about noon.

From Khvoy we retraced our earlier route to Marand, Tabriz, and Bostanabad. From Bostanabad the road led southwest through an area of low hills and mountains composed of clay and rock and usually separated from one another by deep, narrow valleys. This country presents a barren appearance and is known locally as "the country of a thousand valleys." We spent the night beside a small stream approximately 150 km. east of Bostanabad. To our north loomed a range of high, snow-capped peaks, a branch of the Elburz. At daybreak, October 7, the party continued in a southwesterly direction

toward Mianeh (335 m.). A few kilometers west of this town we passed through the last of the "thousand" hills. The few streams through these hills showed a salt crust along their edges. From Mianeh the road continued southwest down a wide (15–19 km.) valley between two parallel mountain ranges, the range on the north was part of the Elburz chain and the range to the south consisted of an isolated mountain fold. This valley (at Zanjan 487 m.) was dry and barren except close beside the Zanjan and Abhar Rivers that course along it, the former flowing in a northwesterly direction to join the Safid Rud system which drains into the Caspian Sea; the latter in a southwesterly direction draining into the interior of the plateau. This valley exhibited uniform features over the entire distance of approximately 250 km. from Mianeh to Seyah Dahan (ca. 389 m.). At Seyah Dahan our route joined the paved highway that runs from Tehran to Baghdad, Iraq. The 60 km. from this junction to Qazvin (389 m.) brings one out onto a more level, extensively cultivated portion of the plateau. The high Elburz lay to our north all the way from Qazvin to Tehran. We arrived in Tehran the night of October 7.

The Eastern Circuit

(Northeast, East, Southeast, and South Central Iran)

Damghan Province (October 14–17, 1962)

We spent the period of October 8 to 13 in Tehran. On October 14 the expedition left Tehran for Semnan (1279 m.). The road passed southeast from Tehran some 60 km. before turning eastward, then curved northeast 220 km. to Semnan. The plateau becomes drier to the east. Semnan lies in barren country at the northern edge of the Dasht-i-Kavir Basin. We camped 5.6 km. north of Semnan beside the only perennial stream in the area and collected from October 15 to 17 along the stream, in the nearby hills, and in the Elburz Mountains to the north. South of camp a broad gravel plain sloped gently southward. Near Semnan this plain graded into the clay and sand of the desert. Several kilometers south of Semnan salt occurred in crystalline form on the surface of the ground. North of camp lay low, rocky hills that built up into steep, rocky mountains about 10 km. distant. The expedition left the Semnan area on October 18 and drove about 15 km. southwest from town before turning northwest to cross one of the ridges of the Elburz so as to reach the pass at Firuzkuh (ca. 2130 m.) some 80 km. to the northwest.

Mazanderan Province (October 18)

Within a distance of about 30 km. from Semnan we first crossed a stretch of bare pebble plain, continuous with that described north of Semnan, then passed through a transition area where more vegetation existed, gaining altitude constantly until we reached an elevation of about 2500 m. Here the vegetation resembled the low, *Astragulus*-dominated association we noted at Doab (p. 65) and on the northern slope of the mountains north of Semnan. The road then dropped some 300 m. and paralleled a small river valley northwest between rather barren rocky mountain ridges. Thirty kilometers further in this direction it intersected the Tehran–Firuzkuh highway a few kilometers southwest of the Firuzkuh pass. A very wide valley, vegetated much like Doab, led up to this pass. Considerable soil exists in the center of the valley, but this grades to rock and scree outward from the center and up along the center toward the peaks. At about 2500 m. we crossed through Firuzkuh Pass and started down the northern slope. The situation changed immediately. Clouds hung against the northern side of these mountains and rain fell. The vegetation appeared similar to that observed on the route from Gach Sar to Chalus. Every scrap of utilizable ground appeared to be under cultivation. About 15 km. south of Shahi (ca. 0 m.) we broke out onto the coastal plain, which in this region attains a breadth of 30 to 35 km. In this region farming accounts for virtually the entire area. The width of the coastal plain narrows along lines from Shahi northwest to Chalus and northeast to Behshahr, until at the latter two localities it is only a few (3–7) kilometers wide. From Shahi we turned northeast and drove 32 km. to Sari. The 82 km. stretch from Sari to Behshahr passes generally in a northeast direction, which alters to a more easterly one in the 150 km. journey from the latter city to Gorgan. Near Kord Kuy the broad, flat, Turkmen plains become visible to the north and northeast. During the entire course of the trip from Sari to Gorgan the road follows along the northern edge of the forest-covered foothills of the Elburz and the southern limit of the agrarian coastal plain, dotted by occasional woodlots.

Gorgan Province (October 19–31, 1962)

Our party arrived in Gorgan shortly after dark and spent the night in town. On October 18 we moved approximately 16 km. east-southeast of this city and camped near the village of Qarnabad, which rests at the lower edge of the forest on the northern slopes of the foothills. From October 19 to 30 our collections and observations grew

Fig. 3. *Cupressus* forest on upper slopes of Elburz Mountains about 15 km. west of Shahrabad Kaur.

steadily in the forest along its lowest levels, in the transitional and cultivated situations on the slope below the forest, and in the desert-like Turkmen Plain. On October 31 the expedition left Gorgan and drove northeast following the juncture of the Turkmen Plain and the slopes of the Elburz.

Khorassan Province (November 1–18, 1962)

At Gonbad-i-Kavus the road turned east away from the Turkmen Plain to begin a gentle climb up the Gorgan River valley. For a distance of some 50 km. along the road the mountains (ca. 500 m.) bore dense hardwood forest, except on the many cliff facings which became more numerous as the mountains grew higher. Next in succession came a region forested mainly by oak with a partly open floor that gave it a park-like appearance. Undergrowth grew densely alongside the river bed.

Having passed through about 20 km. of this beautiful oak forest we entered an edaphic transitional vegetation zone. This zone first occurred along the river bed at an elevation around 1000 m. The clumps of low, thorny bushes that denote this edaphic zone increased in density with altitude while the oak forest decreased and disappeared. The areas between shrub clumps were covered with dense

brown grass (0.2–0.3 m. high). As we progressed higher, thinly scattered evergreens grew in a zone of perhaps 200 m. in elevation above the thorny brush; above the zone of evergreen trees only low grass or bare rock existed. A high snow-capped mountain range, Kuh-i Almeh, reared loftily to the north, and to the south lay a series of low rolling hills covered thinly with clumps of low, rounded plants. Several broad, flat basins surrounded by low hills occur in the vicinity. We camped in one of these dashts near Dasht (937 m.), which derives its name from the environs, from the night of October 31 until the morning of November 2. During this time we collected in a variety of habitats in the surrounding area. From Dasht our caravan moved about 60 km. east-northeast and camped a few kilometers south of Shahrabad Kaur village (915 m.). Ranges of rugged, rocky mountains that are distinctly separated from adjacent ranges by extensive areas of flat and gently rolling plain (913–1523 m.) characterize this region. Xeric vegetation consisting mainly of large *Artemesia* grows on these inter-ridge dashts. Here and there, usually along the north faces of these mountains, grow areas of the same low scrub found on the slope north of Dasht. We collected mammals from November 3 to 13 in the mountains, fields, plains, and scrub areas in the vicinity of our camp.

November 14 our party left the Shahrabad Kaur area and drove about 30 km. northeast down a broad river valley surrounded by mountain ranges (800 m.) before turning southeast toward Bojnurd. We climbed steadily southeastward over low, rounded mountains covered with thin grass up to a level of 1400 m. From this vantage point we viewed Bojnurd (300 m.) 15 km. away in a wide dasht encircled by high mountain ranges.

The expedition left Bojnurd traveling northwest along a tributary of the Atrak River which passed through a gorge in the mountain range lying northeast of that city. After driving about 11 km., we reached the Atrak and turned east-southeast up this river valley. To the north rose the high, rocky, Kopet Dagh Mountains and a lower range, the Aleh Dagh, lay to the south. The country along this part of the Atrak valley appeared rocky and barren, with little vegetation outside the river valley. About 18 km. west-northwest of Shirvan (ca. 1096 m.) at an altitude of about 1004 m. we entered a wide (10–11 km.) valley that stretched southwest past Shirvan to Quchan (ca. 1150 m.). On both sides of this broad valley rose the mountain ranges which stretched the entire 60 kilometers to Quchan; west of this town the mountains are named Kuh-i-Shah Jehan. Scant

vegetation characterized this valley; grass often covered low rises, lending them a steppe-like appearance. We covered the 140 km. from Quchan to Mashhad (1000 m.) after dark, but moonlight on the landscape made possible a few observations. The valley became generally wider (15–25 km.) as we progressed toward Mashhad and mountain ranges continued to flank it on both sides. About one-third of the distance between Quchan and Mashhad the Kuh-i-Shah Jehan terminates and another range, Kuh-i-Binalud, rises and stretches southeast to Mashhad. Dry grass appeared to cover some of the low, gently rolling hills between Quchan and Mashhad. Near Mashhad this valley widened and became nearly flat. We arrived in Mashhad about 9:00 P.M. and spent the night. The next day, November 15, we reprovisioned and serviced the trucks and early the next morning, November 16, we left Mashhad and drove in a south-southeast direction. A few kilometers outside of this city the highway turned south then southwest away from the flat plain surrounding Mashhad. Arid barrenness, the most apparent change we noticed, typified the surrounding country. The local inhabitants cultivated small plots along a few intermittent streams and irrigated a few others by means of qanats, but outside such places few plants grew. Indeed, we found all of the country from here to southern Baluchistan (eastern Kerman Province) desiccated. The eastern region of Iran from Mashhad south to Geh remains fairly uniform physiographically and is especially characterized by many small mountain ranges, usually with northwest–southeast axes, which rise out of the flat plateau. This plateau was widely separated from the nearest escarpments by interior basins.

Traveling south-southwest from the Mashhad valley (1000 m.) we climbed gradually up to 1370 m. where we crossed a steep, narrow (21 km. wide) mountain range (2440 m.) to a broad basin (1530 m.). Twenty kilometers across this stretch to the south rose another low (1825 m.) and narrow (11 km.) mountain range, oriented east-to-west. Descending the southern slope we drove onto the flat area north of Torbat-e-Heydariyeh (ca. 1430 m.). Southwest of this city the road gradually dropped to about 910 m. where a pebble-strewn, sandy, clay plain stretched as far as the eye could see to the east, west, and south—its apparent evenness broken occasionally by low gravel hills. Vegetation did not exist in most places, and grew scantily in those few areas of its occurrence. In such an area 43 km. southwest of Torbat-e-Heydariyeh the expedition camped for the night and trapped on the pebble plain, around dirt masses thrown

up by digging qanats and along the diked edges of a few dry, bare fields which paralleled the dry bed of an intermittent stream.

We broke camp November 17 and drove 73 km. south across this basin, which graded from time to time into areas of sand, to Juymand. Along the sandy edges near the center of this basin xeric vegetation grew fairly thickly. Thirty kilometers north of Juymand (1140 m.) we crossed the widest (24 km.) and last basin in this area. A few kilometers south of Juymand lies a high, rugged, rocky mountain range oriented northwest to southeast. The road passed around the eastern edge of this range to the small town of Khidri (1680 m.), then turned sharply to the east to pass between an intermittent river valley on the north and a mountain range on the south. Forty-eight kilometers south-southeast of Khidri the road crossed the lower parts of the eastern end of this range. We camped for the night in these desiccated hills 7 km. north of Qayen (1446 m.) and collected around the abundant rock outcrops and undercut clay banks. The farther south we traveled the drier the country became. We broke camp the morning of November 18 and descended to Qayen. Leaving this town, we drove 34 km. south to Rum (1721 m.). The expedition traversed xeric plateau (1675 m.), the generally level surface interrupted in many places by low mountains. From Rum we proceeded 17 km. in a south-southeast direction before ascending a high, dry, rocky, mountain range. At 2100 m. we stopped and collected pikas in an area of idle gardens surrounded by rock walls. The little vegetation present in this area stood dried and withered. Just south of this place the road reached the height of its ascent and about 20 km. farther, at the end of the descent, we arrived at the city of Birjand (1523 m.).

Kerman Province (November 18–December 9, 1962)

The road from Birjand to Zahedan (1430 m.) traversed rather uniform terrain in its course of 446 km. Eight kilometers northwest of Shusp (1370 m.), a small town located about 157 km. southeast of Birjand, we encountered an area approximately 22 km. by 28 km. of pure sand. Here we observed a unique situation. Large, dense clumps of dry brown grass (1–2 m.) and some xeric plants containing chlorophyll covered this entire tract. After passing Shusp, we continued to Zahedan through the most barren country yet observed, which consisted of low, rough, rocky mountains rising out of flat, pebble-strewn plain. About 160 km. north of Zahedan the road broke out of the mountains and hills to the north and passed along the eastern edge of a black, rocky, mountain range (Kuh-i-Malak Siah)

Fig. 4. Barren country about 1500 km. north of Zahedan is typical of vast areas in eastern Kerman Province.

to an oasis village, Humuk (760 m.), about 50 km. north of Zahedan. Over this entire course the broad gravel plain, virtually devoid of plant life, stretched to the eastern horizon. A small stream sustained an area of fruit trees, date palms, and gardens at Humuk. From the oasis we continued south and on ascending the mountain range, with which Kuh-i-Malak Siah connects, the city of Zahedan came into view. Our party spent the afternoon and night in Zahedan repairing one of the trucks and late the morning of November 20 left Zahedan for Zabol, Seistan[1] (335 m.). In journeying to Seistan we returned 83 km. north over the road to Birjand before turning onto the road that passed northeast across the wide plain that stretches to the east from Kuh-i-Malak Siah. We found this plain almost covered with pebbles and practically devoid of vegetation. About 32 km. after turn-off we threaded between extensive barchan sand dunes for several kilometers. Having passed this area of mobile dunes, the party continued approximately 20 km. northeast across pebble plain. About 48 km. southwest of Zabol the road left this higher plain and descended about 215 m. into the Seistan basin. This basin graded from pebble-strewn areas supporting little vegetation along the edges of

[1] Seistan is commonly used in reference to the entire Hirmand River delta region within the territorial boundaries of Iran.

the higher plain into dry, sandy, clay tracts interiorly, which were covered with a fine layer of sand that tended to accumulate in low piles (0.5 m.) and which were continuously shifted and reshaped by the wind. Those areas watered by the Hirmand River supported considerable vegetation. Beyond the low areas along the river channels this growth, however, tended to concentrate around the edges of dry, irrigated fields and consisted primarily of xeric plants. Grass existed only along the banks of irrigation ditches or well-watered pastures.

We arrived at Zabol late that afternoon and spent the night. Date palms, citrus trees, and flowers gave Zabol a tropical aspect. November 21 the expedition drove to a locality 24 km. southwest of Zabol and set up camp about 2 km. east of the dry bed of Daryacheh (Lake)-ye-Seistan, collecting in the fields and around the lake bed through November 24. On November 25 our party returned to Zahedan over the route on which we had come, and reprovisioned there November 26. On November 27 we left Zahedan for Iranshahr (550 m.), approximately 250 km. due south. The road led southeast from Zahedan across a wide gravel-covered basin and climbed to pass between two granitic mountains. Beyond these mountains the road passed along a broad, flat plain (1670 m.) largely covered with pebbles. Low, circular mounds of earth topped with woody-stemmed xeric plants (*Artemesia*?) typified areas along this route. Generally, this plateau region appears similar to the areas described south of Mashhad. Wide tracts of more or less level, rocky country, supporting low, bushy plants, similar to those observed between Bojnurd and Mashhad in the northern part of the country, separate mountain ranges. The only active volcano in western Asia (Huntington, 1903, p. 232) Kuh-i-Taftan, rises 54 km. north of Khash and towers above all nearby peaks. About 38 km. northwest of Khash the road passed within 18 km. of Kuh-i-Taftan. At this distance we observed steam blowing from the summit.

The road continued south from Khash across rocky steppes about 14 km. before turning southwest. Travelling in this direction for 34 km., we approached a black, saw-toothed mountain range. A few kilometers before reaching this ridge the road descended steeply into a canyon-like river bed. Travelling along this river bed we descended 520 m. from the higher plateau to a lower one through a well-watered region relative to the parts of this region previously crossed. A striking change in vegetation occurred about half way down this slope, and was most evident along water courses and stream beds.

Around springs and along beds of both perennial and intermittent streams thick clusters of a palmetto-like plant varied in density from scattered clumps to impenetrable masses covering substantial areas. Tall (1–2 m.) grass usually occurred with these palmetto-like associations. Along the intermittent, rocky stream beds, grew the first naturally occurring trees (*Acacia* sp.?) that we had seen south of Shahrabad Kaur in northern Iran. These trees, always widely dispersed, looked rather stunted and never exceeded the height of 6 to 9 m. Scattered clumps of thorny shrubs (1–2 m.) grew in the areas between them.

From the place where we left the higher platau, through most of the 127 km. to Iranshahr, the road followed the dry Karavandar river bed. Forty kilometers north of Iranshahr at Damin this small river and another joined to form the Bampur River. At this point water flowed through both. Irrigated plots along the Bampur River supported considerable gardens. Away from the river bed, barren, rocky desert supported a paucity of xerophyllic vegetation. Somber black mountains formed the ubiquitous background of this region. These features characterize the terrain from 50 km. south of Khash to Iranshahr. We reached Iranshahr after dark and camped 18 km. west of town and collected in the fields, desert, mountains, gardens, and along the river in this vicinity from November 28 through December 5.

On November 30 I travelled to Geh (314 m.), a small town approximately 125 km. south-southwest of Iranshahr. The journey by road, however, covered approximately 240 km. In the vicinity of Bampur (546 m.), located 22.5 km. west of Iranshahr, the country above the river valley flattens into gently rolling pebble desert. Here and there, usually in eroded gulleys, scattered vegetation occurred. After fording the Bampur River several kilometers west of Bampur, the road paralleled the river about 15 km. before turning south across pebble flats. These pebble flats soon became dotted by irregularly-sized mounds of sandy soil (1.0–1.5 m. high) bearing leafless, woody-stemmed plants. Distances between these piles varied from few to many meters. After crossing this habitat, the road passed through an area of high sand dunes, then along a dry, sand-filled stream bed for a distance of about 16 km. before reaching low, pebble-covered hills. In this part of Iran there is no regular road maintenance and the stream beds are easiest to travel, so we drove along the track of one stream bed after another for most of the remaining trip (125 km.) to Geh. Shortly after leaving the sand-filled stream bed

and crossing the low rolling hills, we entered another stream bed, along the edges of which grew thickets of low, green trees. Although not oaks, these bore resemblance to the live oak of North America (*Quercus virginiana*). By leaving traps to be picked up the following afternoon, December 1, around these tree clusters we collected a few specimens. For 69 km. the road paralleled the same small stream. It flowed south about 24 km., then west to skirt around an escarpment. The country we passed through on this route consisted primarily of barren rocky desert; however, in several places people eke out a living by growing dates in small irrigated groves along the stream. Eventually it coursed southward through a group of rugged mountains. The road followed along this treacherous canyon-like water gap, flanked on both sides by nearly vertical rock mountains. The only signs of life existed along the edges of this stream bed. Occasional thickets of tall grass (2–3 m.) covered fair-sized tracts, or disjunct date palms and other green vegetation grew in areas of sufficent soil accumulation. We followed along this river for 36 km. until the road climbed out onto a very dry, rocky plain (675 m.) sandwiched between mountains and thinly covered with desiccated vegetation. Six and a half kilometers farther east we entered another river bed, dry except for a few scattered pools, and travelled 17 km. south to Geh where we spent the night of November 30. I spent the morning of December 1 collecting in the extensive date palm groves around this village. These palms, the grass that grows beneath them, and the shrubs and other plants associated with the grove, gave a tropic-like verdure to the area, yet scarcely 50 m. outside of this watered garden it is arid. We left Geh about noon December 1 and returned to Iranshahr that afternoon.

After breaking camp at Iranshahr on December 6 we drove north to Zahedan, but I stopped 37 km. south of this city to set traps, which procured a few specimens around the rock outcrops on the southern edges of the mountains south of Zahedan. About mid-morning of December 7, accompanied by two Iranian assistants, I left Zahedan and drove west toward Bam.

Leaving Zahedan, we travelled northwest up a wide valley between high, rocky mountains to Nosratabad (1151 m.), a small town situated in open, dry plain. Just west of this town we crossed a small mountain chain and passed southwest across the southern end of the Dasht-i-Lut. Once out onto the barren, rocky stretches of this great desert, the only mountains, in addition to those just crossed, consisted of a few visible very far to the south and southwest. Vegeta-

tion became extremely scarce as we travelled west. Some 70 km. east (by way of the road) of Fahraj (ca. 1000 m.) we crossed a hamada 30 to 40 km. wide, supporting no visible life. Only occasional gentle rises broke the monotonous flatness of this desert, the only one of its kind we saw in Iran. Continuing beyond this region, the highway paralleled a small stream some 20 km. into the city of Fahraj. This rivulet cut a deep gorge (ca. 20 m.) through the desert, rendering its water virtually inaccessible for irrigation purposes. However, along either side of this stream chenopodiaceous vegetation seemed to grow much more abundantly than in areas farther from the banks. Perhaps a greater amount of subsurface water accounted for this phenomenon. We camped that night at Fahraj on the north bluff overlooking this waterway and collected specimens in sandy situations, in gulleys, and around adobe walls. The country between Fahraj and Bam (1065 m.) consisted of more or less uniform, rocky, dry plain. Dates and citrus flourished under irrigation. Bam ranks as the citrus center of Iran. Considerable water seemed available for irrigating many large orchards in the vicinity of Bam. Outside this city along the road to Kerman, large, irrigated fields produce grain and alfalfa. These areas stretched to the barren, rocky slopes of the low mountains to the north and a high mountain range, Kuh-i-Hezaran, that rose in the south, oriented northwest to southeast in a long chain.

From Bam the road passed northwest between these two ranges and climbed steadily to a pass at 2350 m. As we ascended the rocky slopes, snow became visible on the high peaks in the southwest. The landscape along the approach to the pass became increasingly vegetated with low xeric growth. Reaching the pass, we found frozen soil and the remains of a light snowfall. Kerman lies approximately 94 km. northwest of this place. We descended to Mahan (1945 m.), a small town situated near the edge of the broad, flat basin of Kerman. We spent the night of December 8 in Kerman, the city world-renowned for rug making. I collected a few rodents in a vegetated area of the basin several kilometers east of town and took several bats from a deep rock fissure in the low mountain a few hundred meters east of the city. On December 9 we drove on to Yazd, about 310 km. northwest of Kerman. The road led us southwest out of Kerman across the lower part of the basin. Its appearance, similar to that of a dried lake bottom, led us to suppose that water stands here during some part of the year. After crossing this part of the basin, we turned northwest over dry plateau and the country along the route to Yazd differed little from that between Mashhad and Birjand.

Yazd Province (December 9), *Damghan and Isfahan Province* (December 10–12), *Tehran Province* (December 12, 1962)

We arrived in Yazd after dark during a howling dust storm and spent the night. December 10 we left this city and drove to Nain (1570 m.), a small town 160 km. northwest of Yazd and 137 km. east of Isfahan. The terrain we traversed from Yazd to Isfahan was typical of the central plateau. We spent the night of December 11 in Isfahan and the morning of December 12 drove via Saveh to Tehran.

The Central and Southwest Circuit

Isfahan Province (December 18–25, 1962)

The expedition remained in Tehran from December 12 through 17, and December 18 drove south to Qom (975 m.). Enroute we crossed wide, rolling plain from which rose occasional groups of low mountains (up to 1825 m.). Low xeric plants sparsely covered most of this region. After we had crossed the first mountain range some 70 km. south-southwest of Tehran, the lake of Qom came into view. This shallow body of salt water lay in the center of a large basin that covered many square kilometers. The road proceeded up the Qom River valley southeast for a short distance before it swung west around the northern end of the high mountain ranges that extended in an unbroken chain from Qom to far southeast of Isfahan. Reaching the west side of this range, we turned south toward Isfahan. The highway passed over plain flanked west and east by high mountains, many of them snow capped. The usual xeric vegetation grew thinly on this very rocky terrain. We reached Isfahan that afternoon and spent the night. The morning of December 19 our party left Isfahan and drove 60 km. north to the small town of Morcha Khurt (1645 m.). From there we followed a track east across rolling plain toward the mountains and camped near an old stone caravansarai, known as Galatappeh, in low foothills some 38 km. east-northeast of Morcha Khurt. We collected in the mountains and plains in this vicinity through December 24. December 25 the expedition broke camp and drove south toward Persepolis. Our caravan continued across typical plateau country (such as described above for our route between Qom and Isfahan) until we reached a high mountain (2745 m.) approximately 130 km. south of Isfahan. A uniform growth of woody-stemmed plants (*Artemesia*?) blanketed the mountain top. These plants grew larger and more densely than any plants seen at the lower altitudes between Isfahan and the pass. Darkness overtook us on

the long descent of the southern slope of this range. The altitude drops from this high point (2745 m.) to Shiraz (1525 m.) very gradually. From this pass the road descended gently through 80 km. of dry, rocky country to Abadeh (2435 m.) and continued 70 km. on through similar environment to Deh Bid (2285 m.).

Fars Province (December 26–January 13, 1963)

From Deh Bid the highway principally followed the heavily cultivated Pulvar River valley 130 km. to Persepolis. We spent the night of December 25 and morning of December 26 at this famous ruin, located on the side of a rocky mountain overlooking the 21 km.-wide Pulvar River valley. The Pulvar is perhaps the largest perennial stream in this region of Iran and its diverted waters irrigate the valley.

Shiraz lies approximately 33 km. southeast of the Pulvar valley across a low, gravelly mountain range and is situated at the northwestern edge of a wide, flat basin. We entered Shiraz the afternoon of December 26 and spent the night, leaving the next morning for Kazerun (812 m.). Over this 105 km. trip westward, we observed an increasing divergence from the type of vegetation we had come to consider characteristic of central plateau.

For a distance of several kilometers our party travelled across the flat Shiraz basin and followed the road that wound through a series of low, rocky hills between high mountain ranges to the north and south. Passing westward and gaining altitude, we noticed an increase in vegetation. Low hills were scantily covered with grass, thistles, and scattered thorny bushes 3.5–4.0 m. high. On the higher slopes scattered stunted oaks grew.

After a few kilometers the road made a slight descent into the Rud-i-Mand River valley (ca. 1825 m. at this point). For the next 18 km. the road paralleled this river upstream between gently rising hills on the north and a long, mesa-like mountain on the south. Vertical cliffs of this mountain presented an unbroken, unclimbable face along the several kilometers of its northern and western sides. Thickets of thorny bushes grew between the bases of these cliffs and the river to the north. Low, hardwood forest covered the flattened dome-like top of the mountain and thin patches of snow lay on the ground beneath the trees.

A little farther west the road turned south across a rounded basin named Dasht-i-Arzhan, surrounded on all sides by high, rocky mountains. A cat-tail marsh enclosed a small lake in the southwest corner

of this dasht. Most of the ground not under cultivation possessed a thick cover of grass.

The road passed out of the southwest corner of the basin and immediately began a sharp ascent to 2440 m. Throughout most of this ascent, the road climbed through stunted oak forest. Low oaks, *Quercus aegilopifolia*, perhaps averaging 5–6 m. in height and usually standing apart, comprised the principal large vegetation, with the ground beneath these trees rather heavily covered with grass, vines, and thistles. We learned from a local inhabitant that this same area 15 to 20 years earlier supported a forest of larger oak trees and denser growth than at present. Blanford (1876, pp. 30–31) quotes a description of this same area by Major O. St. John who stated that in 1867 thick forest grew there. The demand for building materials, firewood, and charcoal seemingly brought about the destruction of much of the original oak forest. Few, if any, of the trees we observed would support a man 20 feet above the ground, as would those in Major St. John's description. From the summit (2440 m.), we viewed Lake Famur a short distance southwest across a low mountain ridge.

Descending the steep western slope of this range, the expedition travelled through oak forest down to about 1220 m. From this level to the oak-forested valley below (915 m.) a transition area of sparser vegetation existed. The leafless *Prunus spartoides* grew as one of the more typical plants and oak was almost absent. From above, this valley appeared rather thickly forested, but on reaching it, we discovered that the trees stood widely separated and that the ground supported a fair cover of grass. The road angled 8 km. across this vale, then made a treacherous drop to the Kazerun valley (853 m.). Going down, we noticed a marked change in ecological conditions. Large clumps of green moss and clusters of leafy green vines grew on the rocky cliffs around available surface moisture. Viewed from a distance, the countryside appeared as dry as the truly more xeric parts of Iran, but closer examination revealed moist soil and denser vegetation.

Large, shallow Lake Famur lies approximately 14 km. southeast of Kazerun. The expedition pitched camp near the northwestern edge of this body of water on December 27 and collected in the surrounding valley and mountains through January 4, 1963. During the period of December 30–January 2 the Streets remained at this camp while a guest and I took one of the vehicles into the former province of Lar (south central Iran), now Fars, primarily to investigate reports of large bat caves in that area.

We returned to Shiraz on December 30 and proceeded from there on a 156 km. trip southwest to Jahrom. Shiraz lies in a basin roughly shaped like a "U," surrounded on all sides by mountains, with the city located at the base of the "U." A mountain range leading southeast rises between the arms of this "U." Low, marshy salt flats occupy the portions of the plain on either side of the northern end of this range. From Shiraz the road passed 24 km. down the center of the "U" to the north end of this range then turned to the west side and skirted along its lower slopes for 35 km. to the Rud-i-Mand River valley which cuts across the west arm of the "U" from the west. The road then paralleled this river 50 km. southeast. A fairly complete cover of low xeric vegetation grew on the slopes along the bases of a mountain chain and considerable grass and a few low trees grew along the lower stream bed though the amount of vegetation in these areas varied. Outside the canyon-like river bed the inhabitants of the region cultivated date palms and citrus where water was available. Approximately 31 km. northwest of Jahrom the Rud-i-Mand River changed course to the northwest and passed around a high, east–west oriented mountain ridge. The road climbed out of the valley at this point and led around the eastern edge of this mountain onto a broad, flat, very dry, gravel plain. The oasis of Jahrom with its extensive date and citrus groves lay a few kilometers to the south. We reached this city after dark, spent the night, and the following morning, December 31, set out to explore the vicinity. We found a number of bats in some of the old houses in town and in shallow caves along a canyon. We searched the waste lands southwest of Jahrom which were very dry and rocky and consist of the usual alternating ranges and plain. Low, xeric plants grew here. Along a few stream beds, where only some stagnant pools existed, grass and thorny shrubs appeared rather plentiful.

The night of December 31 we drove 68 km. southeast to Juyom (ca. 1065 m.). During most of this trip (53 km.) the road more or less followed a dry stream bed between mountain ridges and was little more than a widened path following a course of least resistance. *Tamarisk* sp. thickets occasionally broke the uniformity of the desiccated rocky land along the stream. Just north of Juyom the roadway entered a dasht. Juyom lies a few kilometers west of the road across an area of low, clay, spoil mounds of the numerous qanats which supply water to the environs of this town. Arriving about midnight we spent the remainder of the night in town and the next morning, January 1, acquired a guide to direct us to the village of

Ahmad Mahmoudi. To reach this village we went around a low (100 m.), long (several kilometers), rocky ridge southwest of Juyom and turned west up a wide (about 8 km.), flat area limited by high, rugged mountains lying to its north, south, and west. A ditch bisected this flat into east and west portions. Tracts covered uniformly by dried xeric plants, areas liberally sprinkled with rocks the size of grapefruit, plots formerly and presently cultivated, and both moist and dry-cracked salt flats occurred in this drab plain. After driving some 32 km. west, we turned north and drove 3 km. to Ahmad Mahmoudi, situated at the base of the mountains at the northern edge of the plain. To accomplish this we passed over a low, isolated, rock hillock that lay parallel to, and about 2 km. south of, the high mountain range. Irrigation of the basin between these elevated areas by means of an artesian well produced lush green fields of various crops unique in this area. We collected specimens in several of the caves explored in the high range. Our threesome returned to Juyom in the late afternoon. Enroute from Juyom to Jahrom we stopped at the point where the road enters the mountains to collect a specimen of *Capra hircus*. We arrived in Jahrom shortly after dark and spent the night there. January 2 we continued explorations in the vicinity of Jahrom and in the early afternoon returned to Shiraz. We returned to the main camp at Lake Famur January 3.

The expedition moved camp January 5 from Lake Famur to Ahram, a small village located at the western edge of the Persian Gulf coastal plain about 36 km. east of Bushehr (0 m.). One of the roughest mountain crossings that we experienced in Iran occurred on the route between Kazerun and Borazjan. After leaving Lake Famur we drove to Kazerun, then 17 km. northwest to the Shahpur River (ca. 850 m.). The road then turned south away from this river and climbed up through a narrow valley (ca. 913 m.) flanked by mountains on the east and west. Ephemeral grass, the result of recent showers, had sprung up covering all but the rocks on these mountains. The road next turned west and descended precipitously to the Shahpur River valley (525 m.). We crossed an oval plateau dotted with date groves before beginning the descent through the last portion of mountains separating this area from the coastal plain. The first and steepest part of this descent zig-zagged down the side of one mountain to the salty Dalaki River (300 m.), which cut below high rocky crags.

The gradual descent to the coastal plain along this valley followed a 6 km. course out of the mountains. A large percentage of the

outer (toward the coast) and lower portions of these mountains were of clay and bore more vegetation than the higher inland areas. Passing from the mountains onto the coastal plain, the road crossed a gently sloping, gravel debris shelf which gradually gave way to flat sandy plain that sloped imperceptibly to the sea. A paucity of vegetation and numerous hot springs distinguish the debris slope. This slope reached maximum width a few kilometers south of Borazjan, where it stretched almost 15 km. seaward. The coastal plain also attained its greatest breadth (ca. 48 km.) near Borazjan, perhaps because of the nearby presence of the mouth of the Dalaki River. This plain narrowed to approximately 38 km. at Bushehr and farther south at Ahram to about 24 km., where a long (90 km.), narrow (13–15 km.), mountain range rose along the edge of the Persian Gulf separating the coastal plain from the gulf. From Borazjan we drove to Bushehr, a small seaport situated on a sandy spit. Virtually no variation in habitat exists on this peninsula, so our party moved inland and pitched camp at the small town of Ahram located about 45 km. southeast of Bushehr. Date groves, cultivated plots, vast stretches of coastal plain, debris slope, and low, rounded foothills of very high (1200 m.) rock mountains that seemed to spring vertically from the plain, occurred in the immediate vicinity. We made collections in this area from January 6 through 11. The expedition broke camp January 12 and returned to Kazerun. Several kilometers west of that city the road forked and we followed the branch leading 160 km. northwest to Behbehan. This stretch of road is fairly new and does not appear on maps printed prior to 1960. Leaving the Kazerun valley, we crossed the Shahpur River and followed the valley of one of its tributaries, probably the Shekastan River. For the next 50 to 75 km. we drove along a wide valley between rocky mountain ridges. The smoothly-rounded tops and even slopes lay cluttered with large boulders. Widely scattered, usually single, oak trees grew in the valley, on the slopes, and on the mountain top. These trees possibly persist as remnants of a once flourishing forest. Much of this valley is cultivated. Fresh green grass, evidence of recent rains, carpeted several disjunct areas through this region and indicated localized showers. Other places, seemingly identical ecologically, lay barren and brown. I noted several caves in the mountains on both sides of the valley. A much higher snow-capped range loomed to the northeast beyond the low mountains bordering that side of the valley. About sundown we left this valley and entered a maze of low, rocky hills. There are large oil extraction and

pipeline operations over the entire distance of several hundred kilometers from these hills to Ahvaz and Abadan. Continuing through this barren hills district we reached Behbehan where we stopped for the night. The next morning, January 13, our party resumed the northwest trek toward Ahvaz. The low clay and conglomerate hills persisted some distance west beyond Behbehan followed by an area of sandstone protuberances. A few areas west of Behbehan had also received showers recently and flaunted a light cover of new grass, but outside such areas few plants existed. North of these sandstone prominences rose higher mountain ranges of the Zagros.

Khuzistan Province (January 13–January 21, 1963)

Eventually the highway reached the sandy Khuzistan Plain that stretched south to the Persian Gulf and west to the Karun–Tigris–Euphrates River valleys. This road passed through areas of shifting sand on its way west along the southern face of sandstone hills. These tracts had recently received showers and lay clad with a thin grass, masking the otherwise desert appearance. Twenty or 30 km. farther west the mountain range and bordering sandstone hills veered sharply to the north and soon faded from sight as we drove west across the low rises in the flat sandy plain. Here, for the first time during our journey across Iran, we lost sight of mountains. In crossing this territory we observed considerable dried vegetation, very little cultivated land, and large numbers of domestic sheep and goats.

The expedition arrived in Ahvaz in the afternoon and spent the night there. The next morning, January 14, our group drove south over the Karun flood plain along the east side of this river. Water stood in scattered low-lying areas indicating recent rains. A uniform cover of low plants and dry grass blanketed the area except for bare places where water probably stands during the wetter periods of the year. Having traversed some 61 km. of such plain we turned southeast off the main road onto a track across these flats, where, after a few kilometers, the low plants gave way to bare dry areas. Farther along in a dried marsh we observed a large wolf, *Canis lupus*, walking nonchalantly through tall grass. Continuing through this area, which during some seasons becomes inundated by meter-depth water, our party arrived at a village situated in an area slightly higher than the marsh about 21 km. east of the highway. Low, green grass covered the perimeter of this region and a little farther north and east vast date groves grew. A maze of broad ditches about 3 to 4 m. deep, much deeper than any seen in any other date groves, supplied

water to these trees. Though this place held promise of a few mammalian species, we desired a more accessible area offering a greater variety of habitats. Therefore, we retraced our path across the marsh and took a southwest course across bare, damp flats and intersected the Ahvaz–Abadan Highway 16 km. north of Abadan. We paralleled a large-diameter, heavily-weighted oil pipeline over most of this jaunt, another indication that this area probably floods to a rather high level at least part of the year. Reaching Abadan we drove 13 km. north to Khorramshahr, the modern seaport of Iran. Our party left this city after dark and drove north along the west side of the Karun to Ahvaz, then continued another 75 km. farther north and crossed to the west side of the Karkheh River, which more or less paralleled the Karun but did not join it. Several kilometers northwest of this crossing we lost the track and slept on the open plain. The following morning, January 14, we re-located the track and proceeded to a small village located 16 km. south of Shush (76 m.) at the western edge of the Karkheh River flood plain. We collected in the flood plain and surrounding desert from January 15 to 20. We left this camp at noon January 21 and returned to the highway connecting Ahvaz and Shush, then turned north to the latter city. Between this famous archeological site and Andimeshk (152 m.), there is a gradual alteration to drier and rockier conditions in the plain. At Andimeshk mountains are visible to the north, west, and east, and 16 km. north of this town the road passed into rocky hills. Bright green plants flourished along several streams but negligible vegetation grew among the desiccated rock areas. The road continued through 39 km. of such terrain to the Karkheh River valley.

Lurestan Province (January 20–25, 1963)

Through the remainder of the 156 km. to Khurramabad (1026 m.), the road paralleled the courses of the Karkheh and Kashgan Rivers. High rocky ranges of the Zagros surrounded these rivers. We covered most of the distance along the stream beds to Khurramabad after dark, and it was not possible to make botanical observations. Our party left this town the morning of January 22 and drove to Kermanshah, a city located 150 km. to the northwest, but 180 km. via the highway. This stretch traversed broad valleys between mountains. During the trek north from Khurramabad the temperature became noticeably colder, the mountains snow-capped, and we noted ice along several streams. After reprovisioning in Kermanshah we drove 24 km. southwest to the village of Faraman, located on the

Qareh Su River. We headquartered in the Faraman orphanage and collected in fields and thickets along the river, and in the low hills of this area from late afternoon of January 22 until the morning of January 25. We then drove via Bisitun, Hamadan, and Qazvin to Tehran, arriving around 2:00 A.M. The country we passed through conformed to the usual terrain of the high plateau, but seemingly was better watered than areas farther to the east. We arrived at Hamadan after dark, after crossing several high mountain ranges enroute. A drizzling rain in Hamadan changed to a howling snowstorm as we crossed the last high mountain range of the Zagros on the way to Qazvin. We continued northeast past this range, across the plateau, in the only downpour we witnessed south of the Caspian slopes.

The Central Desert Circuit

Tehran Province (January 27–28, 1963)

We spent January 26 and most of the 27th in Tehran reprovisioning and selecting a light load of equipment for our final field trip. Late in the afternoon of January 27 our party left Tehran, driving first to Varamin, a small town located 42 km. to the southwest, then 84 km. in the same direction across part of the northeastern extension of the Dasht-i-Kavir Basin to an old caravansarai named Shah Abbas, after the Persian king who, about 350 years ago, had many such hostels constructed at convenient intervals along the trade routes of Persia. Irrigated fields of alfalfa, wheat, tomatoes, and other crops abounded from Tehran to the edge of the desert, about 19 km. southwest of Varamin.

The country became progressively drier and nearly devoid of plants from Varamin to Shah Abbas. After crossing a flat southwest of Varamin, the track continued through low, bright-rust, yellow, red, brown, blue, green, and black hills. These blended hues create an indescribably beautiful landscape. The more common plants consisted principally of dry *Artemesia* sp. and *Prunus spartoides*. The old Shah Abbas caravansarai was at the northern edge of a tall (ca. 2000 m.) mountain named Siah Kuh.[1] A few kilometers up the mountainside from this old rest-house, a deep, clear, perennial spring furnishes water for the shepherds, their flocks of sheep and goats, and probably some of the wild animals inhabiting this territory. Grass covered the area around this spring and the small stream it formed, while cat-tails grew along the stream edge. This small area

[1] *Siah Kuh* means "black mountain" in Persian.

was an unusual exception. The miles of country surrounding this mountain did not support enough plant life to maintain animals as unparticular about their food as domestic sheep and goats. All of the several hundred such animals observed by us in this area were exceedingly thin, and numerous individuals had starved to death. Our party arrived at the caravansarai near midnight and remained there for the night. The next morning, January 28, we proceeded toward a mountain range 135 km. to the southwest. To reach this range we drove 170 km., picking our way across country where not even tracks existed. Over this entire route ranges jutted up, isolated from other nearby ranges by sloping plain. The brilliant colors described above attracted our attention here also. Immediately west of Siah-Kuh a salt flat occurred in the center of a small basin. After skirting this particular low spot, we crossed a long, rock-strewn, incipient peneplain to another kavir.[1] Passing around the north and western radius of this kavir, our safari passed through dense growth of several varieties of chenopods unlike any observed elsewhere in Iran. This growth covered several hectares.

Damghan Province (January 28–31, 1963)

A well, Chah Shur, dug in this area reached briny subsurface water about 1.5 m. down. From this basin we proceeded up onto high plain formed by debris slopes between two ranges and followed a dry water course to the vicinity of the mountain range where we planned to camp. We drove up the gulley-eroded, debris slope to a slightly brackish well, Chah Ali Khan, dug in a little valley between two rocky ridges. Completion of this 170 km. trip required 10 hours. Our average of 17 km. (=10.6 miles) per hour serves to partially indicate the ruggedness of the terrain traversed. We attempted, with some success, to collect in this desiccated place from January 29 through the morning of January 31. Our party left for Siah Kuh that morning and arrived late that same night.

February 1 we returned to Tehran and stayed there through February 15, working on the many details concerned with concluding the expedition. We planned to drive to Paris when all of our matters in Tehran were cleared and on February 16 we left Tehran for Maku. That night we camped at the identical spot west of Mianeh described on page 28. I trapped a few specimens along the road embankment near this camp. The next morning we drove through Tabriz and Khvoy to Maku, arriving about dark. February 18 we crossed into

[1] The Persian word *kavir* refers to salt flats, usually the moist ones.

Turkey, ending the W. S. and J. K. Street Expedition of the Field Museum of Natural History to Iran.

DESCRIPTIONS OF EXPEDITION LOCALITIES

Detailed descriptions are provided here of 26 of the immediate areas in which most of the Street Expedition's mammal specimens were collected. They are arranged alphabetically for easy reference from the species accounts, with dates to assist in referring from these descriptions to those in the *Narrative of the Expedition Routes.*

Ahram: The Persian Gulf Coastal Plain and Mountainous Edge of the Iranian Plateau

January 5–January 11, 1963 (Altitude 60 m.)

The expedition camped at Ahram, a small town located about 61 km. southeast of Bushehr. Four kilometers to the east, the first step of the Zagros range rose abruptly from the coastal plain (91 m.) to 1218 m. At the base of the mountains a series of rounded hills (91 m.) reaches about one kilometer seaward. Debris slope extended about 3 km. toward the Persian Gulf from the lower edges of these hills and joined the ostensibly flat, sandy, coastal plain. Ganji (1955) maps these coastal regions as receiving less than 20 cm. annual rainfall, and the mountains 20–30 cm. Warm days and cool nights prevailed during our stay. Prolonged drought had created shortages of grass severe enough to distress the shepherds and their flocks.

Three communities existed in the area. The sandy coastal plain had the lowest community altitudinally. It extended from sea level to approximately 60 m. elevation. The portion of this close along the Persian Gulf lacked plant life. Several kilometers inland Chenopodiaceae form the predominant cover. *Salsola, Haloxylon,* and unidentified forms, commonly represented this family here. Density of this cover varied. On the plain near Ahram chenopods formed a thin, uniform coat, except on salt or alkali-encrusted flats, which remained bare. A relatively high water table existed here. Moist sand usually lay at the surface or beneath a dry crust 2 to 3 cm. thick. A few gulleys drained this area of the plain and a trickle of salt water appeared in the bottom of primary channels. *Jaculus jaculus* inhabited these expanses. We collected *Vulpes vulpes* as they hunted these

flats by night. Late in the afternoons *Gazella subgutturosa* emerged from daytime retreats to browse here. A fresh skin of *Felis catus libycus* that we purchased form a local hunter probably came from this plain.

Another community existed in the territory between the above one and the mountains, which consisted of detritus slope approximately 3 km. wide, seemingly produced by alluvial activity, and a series of hills about 1 km. wide which paralleled the mountains. These hills may have persisted as remnants of an earlier coastal plain that lay at least 30 m. above the present lower plain. Erosion has exposed the sedimentary composition of these hills. Sedimentary rock strata beneath tilted up toward the mountains, indicating that these raised beaches no longer parallel the present one. Hot sulphur springs flowed onto the surface in several widely separated places along the outer edge of this hilly belt. *Alhagi, Lycium, Zizyphus,* and several kinds (unidentified) of Cruciferae, provided a representation of the straggly plants growing in this dried out area. *Meriones crassus* and *Gerbillus nanus* inhabited these desolate places and we also noted that *Hyaena hyaena, Vulpes vulpes,* and *Canis aureus* coursed over them after dark.

Small streams flowed seaward from the mountains. These provided mineral-tainted moisture for a strip of date groves and gardens on the fringe of the debris slope at the edge of the sandy coastal plain. Most of the villages are in close proximity to this fertile strip. Dates account for a large portion of the agricultural economy here, but not to the exclusion of grain and garden crops. In the village date groves and gardens we found *Tatera indica* rampant and *Mus musculus* almost as common. Aids dug one *Nesokia indica* from its burrow in a date orchard. *Herpestes edwardsi* frequents these gardens diurnally. *Vulpes vulpes* and *Canis aureus* hunt and scavenge this zone after dark. We received one leveret hare and a badly decomposed *Paraechinus hypomelas* from the environs of Ahram. *Pipistrellus kuhli* frequented the villages and date groves at twilight.

Jagged mountains rose almost vertically, delineating the relatively narrow coastal plain from the plateau. Clay surfaced the lower parts of these heights with thick crust overlying a powdery subsurface. Thousands of small holes, some large enough for a man to crawl into, pocked these clay facings. Each evening at dusk many *Triaenops persicus* began their crepuscular and nocturnal flights near these pocked inclines. Some of these holes, though none explored by us, probably served as roosts for these bats. At higher elevations shale

and boulders surfaced these mountains. Plant life appeared almost entirely absent in these desiccated places. This habitat seemed identical with that occupied by *Meriones persicus* and *Calomyscus bailwardi* in other areas (e.g., Kazerun). A survey of several such boulder-strewn slopes revealed evidence of habitation, at least by *Calomyscus bailwardi*, but traps yielded no specimens. Herds of *Capra hircus* and *Ovis orientalis* restricted their activities to the high mountain reaches, and, as we had learned elsewhere in Iran, the goats frequented the cliff facings and sheep the less precipitous surfaces. One indigenous trapper informed us that in times past he had trapped the "shah rubah" (= *Vulpes cana*) and marten (= *Martes foina*?) in these lonely escarpments. Our efforts and those of this trapper failed to produce these species during our brief stay.

Chah Ali Khan: The Western Edge of the Dasht-I-Kavir

January 28–30, 1967 (Altitude 1614 m.)

Chah Ali Khan[1] lay 61 km. northwest of Anarak and 68 km. northeast of Ardestan in the low mountains along the western boundary of the great eastern basin country. Ganji (1955) indicated that this area receives about 10 cm. of precipitation annually. It is not surprising then that we found the region desiccated. The surroundings viewed from atop one of the mountain peaks reflected a beautiful and awesome emptiness. Finely weathered black, green, and turquoise-colored rock fanned out onto the plain from the mountains like extended Maypole ribbons. Plants grew thinly everywhere. The greatest amount of vegetation, though far short of densities considered abundant in country with greater rainfall, grew along the temporary water courses. We collected the following plants along the upper portion of the debris slope where the mountains meet the plain: *Halacenemon strobilaceum*, *Salsola*, *Artemesia*, unidentified Compositae, *Convovulus*, unidentified Cruciferae, *Acantholium*?, and *Prunus spartoides*.

We set up camp by the slightly brackish well called Ali Khan and located within low, rocky hills around the base of a high (ca. 650 m.) rock escarpment. An extensive trapline operated for small mammals in this area for three nights did not catch a single mammal, even though pains were taken to place traps in the recesses most likely to house rodents. Indeed, signs of occupancy appeared in several places, but the xeric conditions preserve old signs remarkably well. In a

[1] The Persian word *chah* means "well."

crevice beneath an overhang of shale strata, pellets of some owl contained skeletal remains of *Meriones crassus* and *Lepus capensis*. One member of our party frightened a hare from its resting place, but did not collect it. The animal had taken refuge under a large, dry, xeric plant growing along the edge of a gully. Such plants grew commonly, but not thickly, along the dry stream beds.

We observed an individual and a group of five wild asses, *Equus hemionus*, on the plain and two small groups of *Gazella gazella*. The mountains were as ruggedly rocky as any we had explored and supported many wild *Capra hircus*. We collected two specimens of this species from a group feeding above a small seep of water. Several such places where water seeped from rock strata and vegetation grew to a stage luxuriant for this locality existed along the several meters of the resultant water course. *Prunus spartoides* was the common plant here. We did not see wild sheep, *Ovis orientalis*, in the area but Mr. Khosrow Sariri gave us specimens that he had collected there at an earlier date.

At Chah Shur,[1] 88.6 km. northwest of camp, we noted large numbers of rodent burrows in an area covered by dense chenopod growth of *Salsola*, *Seidlitzia*, and *Sueda*. These holes appeared to be about the size of those produced by the giant gerbil *Rhombomys opimus*. Seemingly recent tracks of hyaena appeared in mud around the shallow salt well described on page 49. As a light shower fell for about half an hour after dark, two jerboas crossed the road between the well and Shah Abbas, 61 km. to the north. These jerboas occur in areas of rocky plain that bear some vegetation. On the night of January 27, as we made our way south from Varamin to Shah Abbas, we collected two *Jaculus blanfordi* and one *Vulpes rüppeli* in an area of low clay hills roughly 32 km. north of the Shah Abbas caravansarai.

Chalus: The Caspian Coastal Plain

September 31–October 8, 1962 (Altitude −8 m.)

The expedition pitched camp 6 km. west of Chalus at the edge of a grass-covered, sandy plain overlooking the Caspian Sea (−24 m.) and its sand beach. Rice paddies covered most of the narrow (2.5–3.5 km.), rich, coastal plain. This entire expanse was once forest; only a few scattered second-growth woods remained. Small hummocks, yet forested, rose disjunctly out of the flat fields. Lush forests clothed the northern slopes of the mountains looming in the

[1] The word *shur* means "salty."

south. Many streams cut across this plain on their way seaward from these mountains. Where the plain was narrowest these streams rushed down boulder-filled beds to the sea, and in wider regions slowed to meander, forming sand and mud bars. The Caspian coast appears tropical with its cultivated palms and citrus groves. This district has a recorded average annual temperature of 63.5° F. and receives heavy rainfall, between 100 and 200 cm. annually (Ganji, 1955), in addition to the water available from the mountain streams. Four plant communities occurred here.

A littoral zone prevailed along the Caspian Sea coast. The Caspian seal, *Phoca caspica*, intermittently frequents this area, as does the common otter, *Lutra lutra*, according to statements made by the local populace. An ecotone between this situation and the forest 150 to 250 m. inland showed a transition from grass, thistle, and sand burrs to thickets of boxwood, *Buxus servirens*, 1.8 to 3.5 m. high. Serried moss draped the limbs and trunks of these shrubs and carpeted the sandy ground beneath. *Sus scrofa* took refuge in these dense growths and the mole, *Talpa caeca*, burrowed beneath them.

The tract of forest approximately 12 km. west of Chalus, though probably not virgin, has reached maturity. We noted a few giant oaks (1.8 to 2.4 m. diameter), which probably persist as primeval remnants. Beech, hornbeam (*Carpinus*), and oak, in that order of abundance, comprised the principal trees. These, averaging approximately 50 to 75 cm. in diameter, formed a leafy canopy 21 to 30 m. high, which little direct sunlight penetrated. A litter of decomposing leaves rested on the sandy, humus-covered floor. Ferns, mosses, violets, trailing commelinaceous plants (spiderwort?), and patches of *Ruscus aculeatus* grew on the forest floor, the first three species generally around rotting logs. Patches of *Buxus* stood disjunctly beneath the more open portions of the forest canopy. Most of the trees exhibited a veneer of moss, and many were hollow. The beech and hornbeam bore abundant seed which may account for the presence of many fat dormice, *Glis glis*. Acorns and wild figs evidently lured herds of wild *Sus scrofa* that rooted up large areas of ground. *Talpa caeca* had pushed up tell-tale burrows everywhere we went in the entire forest. Jungle cats, *Felis chaus*, frequented these woods. Shrews, *Crocidura russula*, inhabited abandoned buildings at the forest edge, but traps in the forest yielded none. This habitat seemed suitable for *Apodemus sylvaticus*, but we failed to acquire any.

Mimosa and thorny locust trees laced with spiny *Smilax*-like vines made up the principal vegetation where subclimax forests existed on

Fig. 5. Caspian coastal plain south of Chalus. Coastal plain pasture looking toward the forested northern slopes of the Elburz. The animals are water buffalo.

the coastal plain here. Dense undergrowth abounded in such situations. *Sus scrofa* also inhabited these areas.

Deforested land, the major part of the coastal plain, consisted of both cultivated and fallow areas. The principal crops produced were rice, tea, and cotton, in that order of abundance, but rice production far outstripped all other crops in the vicinity of Chalus. Dense thickets of weeds and blackberries grew around the peripheries of many of these fields. *Mus musculus*, *Rattus rattus*, and *Rattus norvegicus* inhabited these thickets and the nearby, often contiguous, villages. Occasionally, *Nesokia indica* and/or *Talpa caeca* inhabited dry rice fields.

Fallow tracts lay overgrown by weeds and vines that often reached 1.8 m. in height. Elderberry (*Sambucus*) and hogweed grew with blackberry and other *Rosaceae* as common plants in the more open areas, and thickets of young beech and locust laced with blackberry existed in many places. After three days of rain, water stood 5 to 15 cm. over these flats. Several nights trapping around thickets and old buildings produced only *Crocidura russula*. Several old barns housed Lesser Horseshoe bats, *Rhinolophus hipposideros*, which coursed the roads and forest clearings at night. *Canis aureus* occu-

pied this habitat day and night and *Sus scrofa* paused randomly to root as it passed between forest and cultivated fields.

During our stay temperatures approached 90° F. on clear days and fell at night to around 70° F. Humidity remained high (average 80–90%) with heavy dew forming each night. One weather front, moving inland from the sea, dumped several centimeters of rain on the coastal plain during three days.

Daryacheh-I-Famur: Mountain and Basin Country in the Southern Zagros

December 27–January 4, 1963 (Altitude 762 m.)

Our entourage pitched camp near the north shore of Lake Famur beneath the towering, anticlinal, limestone fold bounding the north side of this elongate valley, the Kazerun, which attains an average width of 9 km. over its length of approximately 68 km. A similar mountainous fold delineates the south side. Lake Famur is just north of the center of this valley. Temperatures climbed into the high 80's (F.) or low 90's during the warmest part of the day and descended into the 60's at night. Clear weather prevailed for the most part, but on several occasions clouds filled the sky. Early one morning a trace of rain fell in camp, and considerably heavier precipitation wet the high (2437 m.) Zagros a few kilometers to the northeast. Ganji (1955) mapped the valley in a 30 cm. per annum zone and the Zagros to the northeast in a 40 to 50+ cm. zone. This differential precipitation presumably accounts for the *Quercus agilopifolia* forest atop the Zagros and its absence in the Kazerun valley. The slow temperature descent after sundown suggested a rather high humidity, though we did not measure it.

Two communities appeared in the vicinity of this camp. The limestone mountains supported one. These well-weathered, rapidly decaying protuberances shed boulder, cobble, and pebble into the lacustrine valley below. Scattered depressions and cracks accumulated sufficient soil to support small quantities of grass, weeds, occasional green-leafed vines, or even a rare *Prunus spartoides*. Scree slopes supported greater quantities of this vegetation. Huge boulders, many cracks, and small holes or pockets provided bountiful cover for mammals. *Calomyscus bailwardi*, *Tatera indica*, *Meriones persicus*, and *Acomys cahirinus* were in the area, the first two species occurring much more commonly than the latter two. *Vulpes vulpes*,

Fig. 6. View of part of Lake Famur showing cattail beds and mud flat surrounding the lake. The expedition camp appears near the center of the picture at the edge of the cattails.

Felis chaus, and *Hystrix indica* den in crevices and small caves in these situations.

Valleys exhibited another community to which lacustrine, fluvial, and rolling hill physiography contributed.

Prolonged drought had shrunken Lake Famur to extremely low proportions at the time of our investigations. The local populace stated that a rock beach 1 to 3 m. above the lake level constituted the shores during normal times. A water line visible on limestone strata several meters above this rock shore implied an even greater expanse in the recent geological past. Numerous springs fed into the lake from the base of the adjacent limestone cliffs. Tall cat-tails (ca. 3 m.) grew out of the mud flats ringing the lake. Between these cat-tails and the water lay a strip of muck. Cat-tail beds extended out to the water's edge in places along the north side of the lake, at the foot of the mountains. The lake attained a depth exceeding several centimeters where the influx of spring water swept sediment out into the lake creating depths of about 1 m. Thousands of carp swam slowly about or darted in schooled unison. These attracted flocks of gulls, herons, kingfishers, pelicans, and cormorants, while hundreds of shore waders, ducks, coots, and flamingoes sought food

on the rich mud flats. Many of these birds roosted among the cattails, others on the banks. That *Felis chaus*, *Vulpes vulpes*, and owls tax these flocks for many meals, seemed implied by carcasses we observed. Although otters supposedly inhabited the lake, we observed none. Many *Pipistrellus kuhli* hawked over the lake at twilight. Several other sizes of bats coursed the lake after nightfall, but they eluded our nets and guns.

Immediately peripheral to the cat-tail beds local farmers had painstakingly cleared the abundant small boulders and cobble from the rich lacustrine soil and piled them as walls around the edges of plots. To insure the effectiveness of these as barriers to livestock, they placed spiny *Prunus* and other spiked plants atop these walls. Tomatoes, cucumbers, and melons made up the principal crops grown in such places. *Tatera indica* and *Calomyscus bailwardi* were trapped along these walls.

Large grain fields covered the low rolling hills over most of the valley from Lake Famur to Kazerun. Date and citrus groves grew where permanent water supplies existed. Isolated *Prunus* or the date palm provided the few shade trees of this area. *Centaurea*, *Astragulus*, and *Acantholium* are a few of the more common plants which grew in uncultivated areas or along thorn and rock rows. *Tatera in-*

Fig. 7. Lake Famur valley showing cleared plots and mountainous rim.

dica predominated in these valley expanses and, to our surprise, *Calomyscus bailwardi* lived here also. *Mus musculus* and *Tatera indica* were abundant in and around villages. *Vulpes vulpes, Canis aureus, Sus scrofa,* and *Hystrix indica* evidently foraged over this country by night.

The Shahpur River valley seldom exceeded 300 m. in width. Where orange orchards or cultivated fields did not exist along its banks, a rather dense growth of low hardwood trees, shrubs, and tall grass occurred. Tracks in the sandy mud accumulations revealed that a mongoose had passed along the river's edge. We found one *Herpestes edwardsi* dead in the road near the Shahpur River. Footprints of a large rat, perhaps *Nesokia indica,* also appeared here.

Nineteen kilometers northwest of Kazerun the ruins of the ancient city of Shahpur crumble on the spot where it once guarded the entrance to a narrow (6.5 km.), long, cut between two high mountains. Near the top of the northwest rim (467 m. above the river) and midway up along the valley, Shahpur's huge cave surveys the entire valley from a strategic position. This cave was the largest visited by us in Iran. The 45 m. wide, 15 m. high entrance opened down into a chamber approximately 91 m. long and 45 m. wide and 30 to 45 m. high. Water dripping from the ceiling accumulated in ancient grooves cut by man into the limestone floor. The water was channeled to several large rectangular storage pools, also cut out of the rock floor. Four other orifices opened off this room. Two dry, tunnel-like chambers more or less paralleled each other about 50 m. off the back of this room in a line that leads further into the mountain. These chambers eventually tapered off and terminated. Both remaining chambers exited from the right side of the central chamber. One of these, a circular hole, led horizontally, from near the entrance toward the outer cliff, at an angle roughly 45° away from the entrance. It was a room some 45 m. long and interrupted by a massive central column. The fourth recess opened off the main upper room at a right angle to the main entrance. An almost vertical, slippery precipice was the only access to a circular room roughly 45 m. vertically below the floor of the main room. This high-ceilinged (ca. 23 m.), chamber, 30 m. in diameter, housed a colony of some 500 *Rhinolophus euryale* and *Miniopterus schreibersi,* in a ratio of approximately three of the former species to one of the latter. Numerous small inter-connected tunnels led down from this last chamber toward the Shahpur valley side where we entered the cave. To this point the cave possessed a cool (ca. 60°–65° F.), moist atmosphere. Paralleling

the valley, another steep, slippery incline ascended to a level some 15 m. higher and terminated in a small 9 by 9 m. chamber with a ceiling 1–1.5 m. high. A temperature of approximately 80° F. contrasted this small portion to the rest of the cave. A colony of about 30 *Myotis capaccinnii* occupied the ceiling of this space.

Wells in the valley near camp consisted of round holes of 1 to 2 m. diameter penetrating down to ground water at about the level of Lake Famur. Dependent on topography, these varied in depth from 3 to 10 m. A ring of piled or cemented rocks, both covered and uncovered, surrounded each orifice. A colony of *Myotis capaccinnii* lived in one of the deeper shafts. We took some 50 individuals from it. The mummified remains of 50 to 100 *Asellia tridens* lay in a pile on the floor of an abandoned mud house located south of the lake. A man from this same vicinity brought three *Rhinopoma hardwickei*, but, in our absence, the camp help failed to obtain details of the origins of these bats. Each night we heard, but were only able to glimpse, large bats that behaved in the manner of freetails, and which may have been *Tadarida taeniotis*.

Dasht: The Wooded Northeastern Elburz Slopes and Rain Shadow Country to their South

October 31–November 2, 1962 (Altitude 944 m.)

Dasht, type locality of *Meriones persicus gurganensis*, *Meriones iranensis*, *Microtus arvalis khorkoutensis*, *Rhombomys opimus sodalis* and virtual type locality of *Calomyscus elburzensis*, derives its name from the proximity of a large "dasht." The expedition camped at 940 m. in a part of the basin situated east of this village. The headwaters of the Gorgan River flowed from the side of the ridge which formed the eastern limit of the basin. Low clay hills rose around the outer margins and met the lower slopes of the surrounding mountain ridges. Cool, rainy weather brought moderately steady precipitation in sufficient quantity to raise the small Gorgan River above its banks, inundating large parts of this basin and transforming the remainder into a pool of mud.

Three communities existed in the vicinity of Dasht. One was a mature oak forest on suitable portions of northern slopes of the mountains which rose northwest of Dasht. Species of *Quercus* dominated only as the large trees, and *Parrotia persica* and *Crataegus* seemed to prevail among the lower growing trees. At the time of our visit, oak

trees showed a range of color between dark green and bright yellow. Many of the lower plants prevailing in cutover and extremely rocky areas had already shed their foliage. Leaves and scanty grass littered the floor beneath large oaks, and grass and low herbaceous plants covered small open areas. Decaying logs provided shelter for *Crocidura leucodon, Crocidura suaveolens* and *Apodemus sylvaticus.* A copious acorn crop seemed to furnish part sustenance for an apparently profuse population of *Apodemus sylvaticus,* and rootings beneath oaks suggested that *Sus scrofa* also consumed these morsels. *Parrotia persica* and *Paliurus aculeatus* seemed to replace *Quercus* on rocky slopes. Bare vertical rock escarpments commonly interrupted the forest community. *Palirus aculeatus* and tall, thick grass (0.5 m.) covered the rockiest inclines up to about 1370 m., above which thin grass and occasional *Juniperus* grew on the rock strewn surface. At elevations of approximately 700 to 800 m. oak forest gave way to the altitudinally lower *Fagus-Carpinus* dominated forest.

We observed a small cat, probably *Felis chaus,* and *Sus scrofa* in these woods and found horns of both wild sheep and goats on a game trail in the forest. According to accounts of resident hunters and game council officials, bear, leopard, tiger, marten, roe deer, red deer and wild sheep occured here. Kennion (1911), and Ilkhani Shadloo (*personal communication*) reported the collection of tiger in this vicinity.

Forest existed up to approximately 1600 m. in this northeastern tip of the crescent-shaped Elburz range. The orographic barrier to the prevailing northerly winds formed by these mountains (Ganji, 1955) causes precipitation as these air currents rise. Thus, low-lying plains to the north and rainshadow districts to the east and south receive little moisture. Further northeast two factors influence precipitation. First, the prevailing winds have not passed over the Caspian Sea picking up moisture, and second, the height of the Elburz has declined, resulting in diminished precipitation and forest.

A second community existed on the drier southern slopes of these mountains. Numerous rock outcrops characterized the steep ridges and small boulders (150-250 mm. in diameter) surfaced the more gentle lower slopes. A paucity of scattered grass clumps, thistle and plants of xeric affinity denoted this biome. Small patches of *Paliurus aculeatus* persisted in ecotone between this drier habitat and the deciduous forest. We found *Meriones persicus, Calomyscus bailwardi, Apodemus sylvaticus* and *Cricetulus migratorius* here. These animals seemed to prefer places strewn with large boulders around rock outcrops.

A third community occurred in the basins. These generally are landlocked, but the Dasht basin possessed an outlet via the Gorgan River valley and part of it, unlike most in Iran, received a steady

Fig. 8. Dasht camp. Camp as viewed from the south southwest. The grassy area around camp which lies in the central part of the basin is typical habitat of *Microtus socialis*.

supply of fresh water from this river. Grass, sagebrush-like plants, and thistle covered much of the eastern ramus of this basin furnishing pasture for domestic sheep, goats and cattle. Additionally, grain fields covered large tracts. Large colonies of *Microtus socialis* occupied these pastures. Low clay hills scantily clad with the chenopod *Salsola* ringed the basin. Great numbers of *Rhombomys opimus* and its seemingly less common cohabitant *Meriones libycus* inhabited these hills.

We took a single hibernating *Vespertilio murinus* from its refuge in the attic of a house in Dasht.

A small herd of *Gazella subgutturosa* ranged over this dasht and adjacent hills and we glimpsed foxes on several occasions during our brief stay.

Doab: The High Elburz

August 1–10, 1962 (Altitude 3320–4000 m.)

The expedition's first camp, Doab, nestled in a 3321 m. valley beside a cold, rushing stream surrounded by steep, towering, rocky peaks. A short distance downstream this rivulet joined another, hence the name Doab, Persian for "two waters." This country in the heart of the central Elburz mountains impresses one with rugged vastness. Vegetation here, although without trees, lends a verdure seldom seen on the vast Iranian plateau to all but the bare rocks of the area. Everywhere mountains rose steeply to heights above 3960 m., often at angles steeper than 45 degrees. Tops of bare rock cliffs rested beneath a cover of loose rock. Those areas immediately under such crags usually retained huge boulders shed from above. Rock size becomes progressively smaller down these inclines. Scree accumulations formed unstable covers on many grades. Thousands of domestic sheep and goats grazed here.

Several plant communities existed in this region. One lush type straggled along stream beds where water was adequate to nurture it. In relatively level places at Doab the streams had formed meanders: the greater force of the current on the outer side of a curve cut high banks, and calmer flow deposited low banks on the inside. On the inside of most bends in the stream these flat areas of alluvial soil had grown to 50 to 100 m. long and 20 to 30 m. wide. Here carpets of green grass grew, kept short by constant grazing. Rodent runs and burrows, exhibiting much evidence of use, honeycombed the ground in the least accessible portions of the stream edge community which supported dense, high plants. *Canna, Campanula, Cousinia, Ligularia, Tragopogon, Bromus,* and a nettle flourished as common plants in this relatively undisturbed part of the community. If grazing of the more accessible parts of this community did not occur, the entire stream bed area would probably support such tall, thick growth. Near a rock outcrop about 1.5 km. northeast of camp a dense bed of *Ligularia,* which proved a favorite rodent haunt, grew along the course of a spring-fed brook. Many springs located along the outer portions of the stream valley fed the stream. Around these springs and along their streamlets grew thick moss and delicate plants, such as *Polygonum,* adapted to wet soil. The following small mammals inhabited this community: *Microtus arvalis, Apodemus sylvaticus, Microtus nivalis* and *Cricetulus migratorius.*

In the ecotone between the verdant stream bed and drier slopes *Salvia* and *Chichorium* were two dominant plants.

Fig. 9. Doab camp in the crest of the Elburz. Sheep crossing the streambed community (lower right hand corner to middle foreground) to pass through the clay-slope community (elevation about 3300 m).

A second community occurred on the slopes above the area with a high water table produced by the stream. These slopes varied in the amount and size of stone present at the surface, and the abundance of rocks in any given area inversely affected the plant density. Thistle, *Cousinia, Chichorium, Salvia, Thymus, Astragulus,* nettleweed, and grasses grew to heights of 0.3–0.5 m. The numerous rocks at the surface prevented the formation of a vegetation blanket covering these slopes; thus, plants seldom occupied more than a small (0.25 sq. m.) area. Large outcrops of rock strata, the long axes of which usually followed the direction of the slope, protruded in many places. There were large cracks in them and weathered rock fragments collected in piles along their bases. Cracks in these outcrops fostered only a few plants, but enough soil had accumulated around the rocks piled along their bases to support a considerable flora. The ample vegetative cover and the shelter provided by piles of rock fragments scattered down the slopes and around outcrops created a habitat utilized by *Apodemus sylvaticus, Microtus nivalis, Cricetulus migratorius,* and *Calomyscus bailwardi,* in that order of apparent abundance. Less-rocky clay slopes differed little from the rocky

Fig. 10. The clay-slope community in the Elburz Mountains (elevation about 4000 m.) about 5 km. east of Doab camp. The vegetation darkening the mountainside beyond the horse is largely **Astragulus.**

slopes but provided substrate for an almost uniform blanket of *Thymus, Astragulus,* and *Stellaria,* which grew dome-shaped, each dome usually 0.25 to 0.30 m. high in the center. *Achillea, Potentilla, Pedicularis, Trifolium, Cousinia,* and grasses associated closely with the above-mentioned plants. *Achillea, Potentilla* and *Pedicularis* present a spiny external surface, and individual plants occupied as much as 0.3 sq. m. The outer spiny leaves, woody stems, and dried under-leaves appeared to provide excellent cover for mice, and several mice nests and numerous well-used runways attested to their use as such. *Microtus arvalis* and *Apodemus sylvaticus* appeared commonly, and *Microtus nivalis* and *Cricetulus migratorius* less commonly, in these clay slope communities. *Thymus, Astragulus,* and *Stellaria,* with their bushy tops and large, woody roots, furnished fuel for the fires of the migratory shepherds who inhabited these highlands in the summer. During the months from May through mid-September sheep and goats constantly grazed this plant community and laced its landscape with innumerable, randomly-crisscrossed paths.

Below the bare cliffs so common to this region, large boulders surface considerable areas of the clay slopes. In these places proportionately less of the clay slope vegetation subsisted. Low grass,

scattered legumes, *Achillea*, a whitish-leaved plant, and scattered thistles grew in such situations. *Calomyscus bailwardi* and some *Microtus nivalis* inhabited these rocky abodes or subcommunities within the clay slope community.

At approximately 3650 m. and higher the situation became very complex. We found the clay-slope community, rock strewn cirques supporting clumps of grass (*Bromus*) 0.5–0.75 m. tall, an alpine community, and bare rock peaks closely associated here. Mr. and Mrs. Street observed that the clay-slope community persisted to elevations of at least 3810 m. Between 3504 and 3657 m., however, I detected a change in the composition of the clay-slope community, though the diagnostic *Thymus*, *Astragulus*, and *Stellaria* persisted to the edge, but not into a cirque, at 3657 m. The floor of the cirque lay covered with fine rock out of which grew clumps of *Bromus*. Mr. and Mrs. Street found the alpine community among scattered snowfields at approximately 4000 m. Here, Mrs. Street collected examples of *Tragopogon*, *Sedum*, *Jasmium*, and *Oxyria*. They advised me that the alpine community intergraded at a lower elevation with the clay-slope community.

Fig. 11. **Bromus** in cirque basin (elevation about 4000 m) about 3 km. south of Doab camp.

We observed large boulders, or boulder fields, probably glacial eratics, scattered about in some of the high cirque basins, far from the nearest rock outcrops. In an area of this type located in the ecotone between the clay-slope and *Bromus* basin communities, investigation revealed numerous rodent burrows, runways, and feces under and around large rocks and plants; traps yielded one *Microtus nivalis*. We caught several *Microtus arvalis* in the clay-slope community at altitudes near 3810 m.

Herds of wild sheep, *Ovis ammon*, roamed over all this country about Doab. We observed these animals in, or crossing through, all the communities described above. Wild goats, *Capra hircus*, on the contrary, seemed to restrict their abode to the high rocky cliffs.

During our sojourn at Doab we observed temperatures ranging from near freezing at night to about 80° F. at midday. Temperatures rose to 80° F. and above on a few clear days, while on several overcast days they hung between 50° F. and 60° F. Nights were invariably cold. Several weather fronts pushing south from the Caspian Sea enshrouded the higher peaks with fog, and hail and light rain fell in camp. On one occasion a brief, heavy shower caused the small mountain stream to overflow its banks. Snow covers this entire area from October through March. Several glacial ice masses, which had persisted through summer, occurred near camp, the lowest at about 3200 m.

Fahraj: In the Southern Edge of the Dasht-i-Lut

December 7, 1962 (Altitude ca. 701 m.)

My party of three, having left in advance of the expedition at Zahedan, camped at the outskirts of Fahraj. Fahraj was built on both sides of the small Fahraj Rud that cut a deep gorge along its northeasterly course to the Dasht-i-Lut basin. The inhabitants managed to obtain enough water to irrigate a few date palms, yet grass and reeds grew lush in the lower stream bed, where at this time the flow of water had diminished to a trickle. We trapped eight *Gerbillus nanus* and two *Tatera indica* around a series of weather-worn mud walls and gullies. Scanty grass and weeds covered the area and rodent runs showed clearly in the little-disturbed sand. Traps along the river bed and in the date grove yielded no specimens.

Some 10–20 km. to the east we traversed a sandy area vegetated only by chenopods. Brief examination of this tract indicated that

rodents existed there, but in very scattered groups. Time did not allow us to sample this association

Faraman: The Qareh Su Valley in the Central Zagros Mountains

January 23–25, 1963 (Altitude 1249 m.)

Faraman village lay approximately 23 km. southeast of Kermanshah on the banks of the Qareh Su (Su=River). This small river pursued a writhing course south through the Zagros and flowed into the Karkheh in Khuzistan. The area around Faraman was typical of the apparently rather homogeneous area surrounding Zagros. Steep mountain ridges rose to heights of 2437 to 3350 m. The intervening spaces contained stream valleys, high hills, rolling plain, or any combination of these. Snow capped the highest peaks. Mild, cloudy weather reigned during our stay. Light showers transformed the newly plowed fields into expanses of gummy mud. Ganji (1955) shows that this area receives between 40 to 50 cm. of precipitation annually. Although the stay was brief, our observations denote much concerning the local fauna. Perhaps three communities existed in these environs.

Low, thin, oak forest, similar to that described at Dasht-i-Arzhan (p. 42) vegetates the mountain slopes around 1675 m. and above. We did not sample this community, but the local residents described bear and wolves as occurring there. The villagers exploited the oaks for firewood.

An artificial community was maintained by man in the irrigated tracts planted in poplar and willow which paralleled the stream. In many of the terraced irrigation ditches that water this area the water table was very high, and blackberry thickets and other coarse growth covered their bog-like floors. We caught *Crocidura russula*, *Mus musculus*, and *Cricetulus migratorius* in these ditch-bottom bogs. A wildcat, *Felis catus*, which we shot along the stream's edge, had an *Arvicola terrestris* in its stomach. We also recognized burrows and runs of this species. Otter, *Lutra lutra*, inhabited the Qareh Su and I found one of their trails leading from the river bank into a briar and reed patch. In the vicinity of Faraman the Qareh Su was a river 90–100 feet wide, swift flowing, rock-bottomed, and possessing small willow-covered islands. We flushed several *Lepus capensis* from the outer edges of these riparian thickets during daylight hours.

Another community occurred in the vertical space between the preceding two, and consisted of high, steep-sided hills surrounded by low, rolling country. The rolling country, though rocky, contained sufficient soil for cultivation; consequently large areas were planted in grain crops. The evenly-rounded hills supported considerable low vegetation and served to pasture thousands of domestic sheep and goats. Shale outcrops protruded in many places. These slopes generally contained a high percentage of rock at the surface. Sprawling networks of dirt mounds denoted *Ellobius fuscocapillus* colonies along the bases and lower parts of these hills. A herd of 12 to 15 wild *Ovis ammon*, which we observed on several occasions, ranged widely over these hills at this time of year. Wolves, *Canis lupus*, inhabited the area, and the local populace frequently reported seeing them. We did not observe any live individuals but salvaged a specimen shot by a hunter several days prior to our arrival.

Specimens of *Meriones persicus* and *Cricetulus migratorius* attest that these rodents live among the rock outcrops, and this habitat seemed suitable for *Calomyscus bailwardi*; however, we failed to obtain positive evidence.

Our party collected *Lepus capensis* and *Vulpes vulpes* by headlighting in the newly cultivated wheat fields. We commonly observed both species in such places.

A single bat, *Pipistrellus kuhli*, flew into the building in which we had set up our field headquarters and was collected.

According to local reports, gazelles, probably *Gazella subgutturosa*, occur in the area.

Galatappeh: The Edge of the Isfahan Basin Influenced by the Zagros Mountains

December 18–25, 1962 (Altitude 2010 m.)

The Street Expedition camped at Galatappeh village, 58 km. north-northeast of Isfahan among the low, outlying ridges associated with the high chain that runs from Qom southeast to Kerman. Throughout this distance, these mountains were separated from the nearest western ranges by a wide plain which, southeast of Isfahan, we noted to be characterized by numerous small salt basins. This plain stood approximately 1523 m. above mean sea level. The contiguous mountains rose amid their own wastes, which streamed down onto the plain in great screes. Many low (300–600 m.), narrow, elon-

Fig. 12. Mountains east of Galatappeh. The mountainside in the immediate foreground is habitat of *Meriones persicus* and *Calomyscus bailwardi*.

gated mountains rose as islands in the plain. Their connections with the principal range had eroded away and become subsequently buried under scree from the mother range, which attained an elevation of 3870 m. in Kuh-i-Khargiz, 32 km. north of Galatappeh. Ganji (1955) shows this region as receiving 10 to 20 cm. annual precipitation—the heights of the Zagros, principally to the west, get 40 to 60 cm. Although this vicinity impinged upon the eastern arid basin zone, the cloud-reaching Zagros locally countered the aridness of this region, creating an area that expressed vegetative conditions intermediate between 40–60 cm. and 10 cm. of rain. During our stay we observed for the most part clear, pleasantly cool days, and cold nights with light freezes. When we arrived, the remnants of a light snow had not disappeared on the north slopes of a ridge south of Galatappeh, and snow still capped the higher peaks.

The relatively poor biota of this region seemed distributed as two communities. Outlying elongate ridges and major mountain masses bear one of these. All show the consequences of weathering by their extensive cloaks of shale scree and bare, decaying limestone. Vegetation grew thinly except along water courses, which carry water only when the snows melt. Smoothed limestone, shale strata worn

smooth, and large boulders broken away from bed rock typified these runs. Thin soil had accumulated in places, particularly along the edges, and *Cousinia, Festuca, Boissera pumilo, Hordem, Elymus, Bromus,* and *Peganum hormala* seemed to grow well in it. *Calomyscus bailwardi* occurred as the most common mammal species in this community followed by *Meriones persicus,* then *Cricetelus migratorius.* The first two of these species confined their habitat to these rocky situations. Wild *Capra hircus* appeared to range over all the mountains of the area visited by us, even into areas above snowline, but regularly frequented rugged cliff facings. We found *Ovis ammon* only on the higher rolling slopes near snowline. Diffuse xeric plants vegetated these high slopes.

The plain between these two mountain ranges sustained the other community. Gravel-covered debris slopes inclined gently away from the eastern and western ranges meeting in a common level middle ground. This incipient peneplain had accumulated very thick gravel deposits near the mountains. Freshets have dispersed these particles far out onto the plain; in fact, the advances from the opposite ranges have met in a few places. These areas, viewed from afar, appeared perfectly smooth; however, innumerable shallow freshet beds that alter course with each storm broke the surface and served as the agencies for distributing gravel into the basins. Widely scattered clumps of xeric plants (e.g., *Artemesia* and *Peganum*) straggled in the silt-saturated gravel. Fine alluvial deposits existed only in the central portions of the basin, for example, as around Isfahan. Outside these central deposits water became a scarce commodity. Several brackish springs existed in the Galatappeh area, each flowing to a fruit orchard, e.g., pomegranate and cherry, where evaporation crusted the surface with alkaline residues.

Jaculus blanfordi inhabited the open gravel outwash plain. *Meriones crassus* lived here also but more often frequented those areas surfaced by low gravel-content substrate. *Lepus capensis* ranged widely over these tracts. *Gazella subgutturosa* reportedly existed in small herds, and we collected one young male on the plain. In a sheltered watercourse in one of the small mountains out in the plain we picked up the horn of an older male. We sighted foxes each night but failed to collect a specimen. *Cricetulus migratorius* utilized the niche usually occupied by *Mus musculus* in the villages.

To our surprise, *Meriones persicus* appeared to be the only mammal denizen of two small limestone caves in the area. Exploration of the virtually horizontal duct of the qanat supplying water to Gala-

Fig. 13. Basin habitat 4 km. south of Galatappeh. *Jaculus blanfordi* and *Meriones crassus* normally inhabited the habitat in the foreground.

Fig. 14. Camp, 16 km. east southeast of Gorgan. View is south towards the Elburz Mountains. Note deciduous forest on north slope behind camp.

tappeh provided a single *Rhinolophus ferrumequinum*. Water approximately 0.3 m. deep flowed through this duct hollowed from compacted gravel at least 10 m. below the surface. The water, channeled several kilometers from the mountains, remained warm and maintained a humid, warm atmosphere within the duct.

Gorgan: The Caspian Forest, the Turkmen Plains, and the Ecotone Between

October 19–31, 1962 (Altitude −8 m. to ca. 305 m.)

The city of Gorgan (116 m.) lies 32.5 km. east of the Caspian Sea between two distinct communities. North of town the Turkmen plains extend into Russian Turkestan, and south the Elburz Mountains begin their steep ascent reaching heights of 2742 m. within 20 km. The desert plains sharply contrast with the forest-clad mountains.

Our party camped 16 km. east-southeast of Gorgan at the forest edge (305 m.). From this base we worked the forest, the plains to the north, and the ecotone between. Warm, balmy weather persisted throughout our stay, except for three cool, rainy days that drenched the forest and enshrouded our campsite with dense fog. Considerably less rain fell on the Turkmen plains and, due to their low altitude, clouds passed high over them. Bobek (1952) shows that annual pricipitation in the forest varies between 1000–2000 mm. dependent on elevation, whereas it alters between 200 mm. at the Atrak River to 750 mm. at the southernmost extension of the plain a few kilometers north of Gorgan. Day and night temperatures remained noticeably higher on the low plains than at camp. Winds prevailed from the north. Many small streams gravitated rapidly down rock-bottomed beds to the plain, where they flowed into slow-moving, larger streams which crossed the plain west to the Caspian or became diverted into irrigation systems.

Forests grew on these northern slopes of the eastern Elburz between approximately 300 and 2500 m. This forest community differed little in general appearance from the forest at Sama. Both cut-over and mature forest existed. The mature forest consisted of *Quercus*, *Fagus*, and *Carpinus*, with examples of the beech and hornbeam outnumbering those of the oak. During this time, the lower forest remained predominantly green, but light gold tinted the woods above approximately 900 m. Trees 0.5–1.0 m. in diameter formed a

high, dense canopy sheltering open floor. Occasional fallen trees left openings in this canopy beneath which tangles of blackberry vines (*Rubus*) prevailed, until second growth trees rose to fill these gaps. Rotting logs, surrounded by weeds and *Rubus*, randomly littered the floor which otherwise lay under rotting leaves and low-growing herbaceous plants. Fallen logs and hollow trees provided haunts for *Apodemus sylvaticus* and *Crocidura russula*. One *Neomys anomalus* came from alongside a small stream. A fresh skin of the marten, *Martes martes*, purchased from a Gorgan fur dealer was said to have come from a forested area near this city. I found the skull of a badger, *Meles meles*, within the forest. Local people described *Glis glis*, *Ursus arctos*, *Felis pardus*, *Cervus elaphus*, and *Capreolus capreolus* as living in the forest, but our search for them yielded no supporting evidence. *Hystrix indica* evidently roamed both forest and field. *Mus musculus* penetrated woodland fringes but was conspicuously absent within the woods. *Canis aureus*, *Felis chaus*, *Sus scrofa*, and *Lepus capensis* appeared to utilize the woods as a daytime refuge and emerged to forage through fields and around villages by night.

Clearing land for agricultural purposes has eliminated most forest below approximately 304 m. Woods probably grew down the northern Elburz slopes to the edge of the Turkmen plain (slightly higher than the present level of the Caspian Sea) in earlier times. Goodwin (1940, p. 1) intimates that this was the case when he visited the area in 1938. This cleared area now consisted of pastures, cotton and rice fields, and fallow areas divided by thorny hedgerows and interrupted by thicket-bounded water courses. There are occasional small woodlots, but about ninety per cent of the land is cleared. Though forest no longer exists, the mammal fauna of this area showed a closer alliance with the forest fauna than with that of the plains to the north. In this agricultural area we found *Mus musculus* and *Apodemus sylvaticus* abundant. *Nesokia indica* inhabited stream edge or irrigation ditch edge situations up to the forest level. *Mus musculus*, *Apodemus sylvaticus*, *Rattus rattus*, and *Rattus norvegicus* abounded in villages. Twenty traps placed for a single night in one house in Qarnabad village, located 1 km. north of camp, yielded 28 specimens of these four species, with *Rattus rattus* and *Mus musculus* represented in largest numbers. A few bats flew along the forest edge and over certain open fields, but we collected none of these. An otter skin, *Lutra lutra*, was purchased from a Gorgan fur dealer, who said it originated from a small stream 13.8 km. east of town. Jackals, wild pigs, and hares frequented these cleared areas in large numbers at night.

A few kilometers north of Gorgan, the mountain slope met the flat Turkmen plain where another flora and fauna existed. During early and mid-Pleistocene times (Huntington, 1903; Furon, 1941) this area lay submerged beneath the Aralo-Caspian Sea which gradually diminished leaving these plains exposed between the two present-day seas. Altitude varies between −15 and +15 m. mean-world-sea-level. A uniform community occurred on the plains and the undulating hills (50 m.) which rose sporadically from them. Chenopodiaceae 0.3–0.6 m. high dominated this community. These plants grew in disjunct clumps over most of this territory, but were absent principally from low-lying moist places and hills. The desert appeared daubed almost equally with the reddish hue of *Salicornia*, the green of *Salsola*, and light brown of the saline, friable, sandy-clay soil. Other chenopods growing here were *Halostochys* and *Gamanthus*. The spiny legume, *Alhagi*, occurred commonly but diffusely scattered throughout this area. Hedgehogs, *Hemiechinus auritus;* shrews, *Crocidura sauveolens* and *Suncus etruscus;* jerboa, *Alactaga elater* and *Alactagulus pumilio;* porcupine, *Hystrix indica;* badger, *Meles meles;* wildcats, *Felis catus;* and foxes, *Vulpes vulpes*, inhabited the plain.

Hills, invariably dry, supported less vegetation than plains, though occasional clumps of *Salsola* existed mainly in ravines and dry water courses. Above these lower places dry lichens provided the only vegetative cover on these hills. In these elevations *Rhombomys opimus* and *Meriones libycus* maintained large integrated colonies and *Vulpes vulpes* visited these environs.

Eptesicus serotinus and *Pipistrellus pipistrellus* roosted in the attics of buildings in the Turkomen village of Pahlavi Dezh, situated on the banks of the Gorgan River 19 km. north of Gorgan. We shot several *Pipistrellus pipistrellus* and single examples of *Miniopterus schreibersi* and *Myotis mystacinus* as they flew over a pool in the Qareh Su drainage on the plains 9 km. north of Gorgan. Large bats, very possibly *Eptesicus serotinus*, also passed over the pond in their rounds, but efforts to collect them did not succeed.

Any ecotone between the Turkmen desert and the forest communities did not survive as such, due to agricultural endeavors in the zone and adjacent portions of the two biomes. The descent from 300 m. to the plains below mean sea level occurred gradually over 8–20 km. and local people have converted this territory into farmland. Modern irrigation methods have produced fertile fields in the desert as far as 9 km. north of Gorgan. Species of both major communities ranged into this broad interbelt. Forest forms which ranged

Fig. 15. Turkoman plain about 5 km. north of Pahlavi Dezh. View looking south towards the Elburz Mountains. Chenopodiaceae, saltworts, comprise most of the vegetation in this photograph and predominate as the principal plants of this region of the plain.

Fig. 16. Turkomen plain about 25 km. north of Pahlavi Dezh. Habitat of *Rhombomys opimus-Meriones libycus* colonies. The darkness of parts of these hills is due to the presence of dried lichens. Note paucity of vegetation.

into this zone are enumerated above. Plains species which occurred here include *Vulpes vulpes, Lepus capensis,* and *Felis catus. Canis aureus* seemed to characterize this disturbed zone, for its range seemed to us almost confined to this area, though it did frequent the edges of both natural communities.

Iranshahr: Edge of the Jaz Murian Basin in Southern Iranian Baluchistan (Kerman Province)

November 28–December 5, 1962 (Altitude 549 m.)

The expedition camped 18 km. west of Iranshahr, an oasis town situated in the extreme eastern edge of the Jaz Murian depression. This inland basin typically received the discharges of streams draining the surrounding highlands, principally as temporary freshets. These formed a central lake whose contents would have readily evaporated into the dry atmosphere, but like the Seistan basin, this one contained a body of fresh water fed by a perennial river, the Bampur. Annual rainfall within this basin reputedly averaged 10 cm., while the surrounding mountains are thought to receive 15-20 cm. (Ganji 1955). This region seemingly showed the lowest humidity of all the places we visited in Iran. An abrupt drop in temperature from above 80°F. at mid-afternoon into the 50's shortly after sunset, and the chaffing and cracking of one's exposed, unoiled skin, attested to this low humidity. A gravel-covered alluvial terrace rose about 1 km. north of the present Bampur River bed.

Four closely related biotic communities exist in this area. One of these prevailed in the Bampur River valley. This stream flowed within a bed cut deeply into underlying strata and, although it achieved an average width of 30 m., its depth seldom exceeded 1 m. Sandy meander necks sloped from stream edge to the delimiting bluffs. Thickets of salt-crusted *Tamarisk* clothed these moister areas with trees ranging up to 0.1–0.2 m. in diameter and 9–10 m. high.

High sand dunes topped by scattered *Acacia* generally paralleled the river, obscuring the gravel layer at the bottom of the former flood plain except along vertically eroded bluffs. Gravel plain flanked these sandy areas out to the old fluviatile terrace. A lowhead dam across the Bampur Rud at a place 5.2 km. southwest of Iranshahr raised the water level sufficiently to provide irrigation downstream. Thus, considerable portions of the valley west to Bampur, situated 18.5 km. downstream, were cultivated. Outside these cultivated

Fig. 17. A date grove near Iranshahr.

areas, but with the floodplain between the outer fluvial terraces, low *Acacia*, *Gymnocarpus decanter*, and *Haloxylon* predominated in thick but scattered clumps. *Gerbillus nanus* seemed the most common occupant of this niche and *Meriones libycus* resided here also. We saw a jerboa, probably *Jaculus blanfordi*, cross the road in a bare, gravelly area just west of Iranshahr.

Tatera indica occupied the *Tamarisk* thickets of the meander necks, and we acquired one *Vulpes vulpes* there. Traplines run among the *Acacia* on the dunes for two consecutive nights yielded no mammals.

Within the cultivated fields we obtained *Nesokia indica*, *Mus musculus*, and *Vulpes vulpes*.

Date grove oases accounted for a small fraction of the cultivated area. These gardens, carefully grown around all perennial water sources, provided the principal sustenance for man in this vicinity. Tracts varied in size from one to about fifty acres, and each tract was subdivided into small plots of about 10 sq. m. Deep irrigation ditches carrying a constant flow of water ringed each little plot, and date palms lined these life-giving arteries at intervals of 3 to 5 m. Water was diverted as needed into the small central plot where citrus or vegetables grew. *Nesokia indica* appeared to thrive along the

banks of these ditches. *Mus musculus* was another common occupant. *Herpestes edwardsi,* undisturbed by man, was found here also. The people who work these gardens declared that sloth bears, *Selenarctos thibetanus,* raid the groves during the season that the dates ripen for food. Although we did not observe *Funambulus pennanti* in the groves around Iranshahr, these squirrels occur commonly in the oasis at Geh, 118 km. to the south.

The portions of the Jaz Murian basin outside the Bampur valley to the limiting mountain ridges showed another community. This association consisted for the most part of gravel-covered plain, called hamada, devoid of vegetation but for diffuse plants growing in deep gullies. *Gazella gazella* ranged widely over these stretches. Deep, wind-blown sand surfaced vast portions, particularly those lying north of the mountainous rim of the basin to the south and southwest of Iranshahr and Bampur. Our maps showed these conditions over large areas of this basin which we did not explore. We saw *Gazella gazella* in these dunes and collected *Jaculus blanfordi* and *Gerbillus nanus* within one such tract.

The vicinity 25 km. southwest of Bampur was a region of flat, black-gravel hamada. Silt mounds of uniform height (ca. 1.0–1.5 m.) but varied size, invariably topped with thick, leafless, woody-stemmed plants, rose randomly from this plain. Two explanations for this phenomenon seem possible: either the plants hold these mounds as remnants of an earlier lacustrine deposit, now largely deflated; or they accumulate this soil by forming a resistance to eolian forces. The silty nature of these mounds suggests the former hypothesis. *Jaculus blanfordi* and *Gerbillus nanus* inhabited this silty mound area on the hamada.

Another association existed in the jagged mountain escarpments of this region which represent the extreme southeastern limits of the Zagros range. These heights of black rock usually rose about 900 m. above the plain. Plants grew meagerly over these desiccated altitudes. Numerous dry water courses filled with rock extended from the mountains toward the basin center. Clusters of 2.0–2.5 m. tall palmetto-like palms often forming thick, impenetrable barriers, and scattered *Acacia* trees were confined to these stream beds. We found patches of grass 3 m. tall associated with these palm thickets in moister areas.

These mountains were the habitat of *Ovis ammon, Felis pardus* (two individuals seen by two of our hunters but uncollected), *Selenarctos thibetanus, Hyaena hyaena, Vulpes vulpes,* and occasional

Fig. 18. Outer edge of the Jaz Murian basin looking north from the expedition camp 18 km. west of Iranshahr.

Canis aureus. Unfortunately, time did not allow sampling of the small mammal fauna of this community.

Jahrom and Juyom: Caves in Central Fars

December 31–January 2, 1963 (Altitude 1127 m.)

Our primary interest in visiting this region stemmed from reports that large caves housing "thousands" of bats existed near Jahrom. Beyond the limits of the oasis towns and villages of this district existed some of the most desolate country of Iran, an area that Ganji (1955) maps as receiving less than 20 cm. of annual precipitation. During our visit daytime temperatures stood in the pleasantly warm range and at night, due to the extreme dryness of the atmosphere, rapid radiation resulted in much cooler temperatures, probably between 40° and 50° F. The country consisted of rolling hamada and rocky mountains, both exceedingly desiccated. Flat-topped limestone mesas dissected by canyons rose about 4 km. west of Jahrom. We explored one of the canyons that reportedly contained several caves. A small stream, ephemeral with local rains, wound along the vertex of the V-shaped lower portion of this ravine. Nearly vertical

walls rose 30 to 50 m. above the V, and rimmed the canyon. Several of the numerous small caves we found in this exposed limestone housed bats. In one cave a large orifice led up to and terminated in an apex 15–20 m. above the bottom of the opening. The apical chamber was totally dark and over 80° F. in contrast to indirect light and cool temperatures approaching the 50° to 60° F. of the lower chamber. A group of 15–20 *Rousettus aegyptiacus* occupied this hothouse, but flew outside when disturbed. One *Rhinopoma hardwickei* roosted in the lower, cooler portion of this cave. Another bat of this species inhabited a small dome-shaped cavity. Two of the *Rousettus aegyptiacus* fled some 200 m. to another cavern, but hung in nearly full light at the top of the high entrance. Investigation of the cool, dry interior of this cave revealed a fault crevice some 30 to 60 cm. wide situated high and in the back. I eased into this passage, blocking it so that bats could not fly past, and managed to grab several *Rhinopoma hardwickei* and could have readily caught all of the 30 or so individuals present.

The lower portion of the canyon supported scanty plant life. Diagnostic piles of vegetation in cracks and beneath boulders provided evidence that *Meriones persicus* and *Calomyscus bailwardi* inhabited this place, even though we trapped no specimens.

Just after dusk the jackals (*Canis aureus*) around Jahrom set up a yowling chorus of such intensity that our first thoughts were that the city would soon be overrun by them, but they did not intrude upon us.

During the night of December 31, we saw several foxes and a wolf in an area where a *Tamarisk*-covered stream bed paralleled the road approximately midway between Jahrom and Juyom. We collected a specimen of *Capra hircus* from a herd of 11 on a dry, rocky ridge which paralleled the road 13 km. northeast of Juyom.

A series of small caves existed about 2 km. northeast of Ahmad Mahmoudi at the base of an overhanging limestone cliff. Water trickled from the strata forming the roof as at Shahpur cave, and flowed by a series of ducts cut into the rock floors to several large storage basins. Lush vegetation, at least for this area, flourished on those slopes watered by considerable seepage. Beyond this small area desolation resumed. Moss covered the limestone floors and walls exposed to some sunlight. Numerous small cat-like tracks remained in the dust under some of the ledges, and in a small cubbyhole of one cave numerous bird feathers and bone fragments marked the spot of some carnivore's favorite eating place. Remains of a *Vulpes cana*

lay on the mountain slope near the reservoirs. The largest cave of this series consisted of one room roughly 30 m. long and 15 to 20 m. wide with an opening 15 m. wide by 5 m. high. The anterior half was very dry, and, about halfway in, the floor inclined sharply toward the rear. Water dripped from the ceiling creating a slippery coating of mud and guano. A cluster of eight *Rousettus aegyptiacus* occupied the largest of several cone-shaped pockets in the roof, and left the cave upon disturbance. Uniformly moderate temperatures prevailed in this cave. Fifteen to twenty *Rhinopoma hardwickei* hung scattered across several dry posterior recesses. These bats declined to leave the cave when disturbed, usually moving from the rear dry areas to similar places in the front. We took a number of this species and one individual, which seemed to be the only *Rhinopoma microphyllum* present, in a small, dry chamber to the left of the main entrance.

Karkheh River: the Khuzistan Plain

January 15–20, 1963 (Altitude 30 m.)

Our group camped on the west bank of the Karkheh River near the village of Sheik Ali Zamul, situated 18.5 km. south of Shush. This vast plain, extralimital to, and below, the Iranian plateau and physiographically a part of Mesopotamia, exhibits a variety of physical features. Marine sediments make up the Mesopotamian plains. The rivers are of paramount influence in the physiography of this region. The Tigris, Euphrates, Karun, Dez, and Karkheh cut across the plains and confluently enter the Persian Gulf via the Shatt-al-Arab. The area of this confluence comprises a vast delta at the head of the Persian Gulf, but located largely in Iraq. Alluvial deposits outside this part of the Mesopotamian plains are confined to relatively narrow flood plains of these streams. Six meters below the dry Khuzistan plains the Karkheh has cut a new, better-watered flood plain sharply bounded by terraces. Ganji (1955) maps this area as receiving less than 20 cm. of rain yearly. Annual floods and irrigation dams partially compensate in the lower-lying portions. Outside of these lower places local people dry farm suitable tracts. Ganji (1955) reports a mean annual temperature of 25° C. (77° F.) for Ahvaz over a thirteen-year period. Khuzistan has acquired a reputation for fiercely hot summers, but we experienced pleasantly warm weather during our winter sojourn. Daily baths in the cool waters of the Karkheh River afforded an unusual luxury. Nightly tempera-

Fig. 19. Karkheh River valley about 15 km. south of Shush. *Tamarisk-Populus euphraticus* "jungle" along the river, which is the habitat of *Dama mesopotamica* appears in background.

tures dropped several degrees lower in the lower floodplain than on the higher surrounding desert plain and dense fog blanketed the low floodplain several mornings.

Two biotic communities appeared in this region—one on the low, present Karkheh floodplain consisted of the flat land periodically inundated by the Karkheh and lay between alluvial terraces approximately 6 m. high. Its width varies between 1.6 and 4.8 km. Sandy loams comprised the upper substrate. The Karkheh meanders through this area leaving numerous ox-bows, some filled with silt. Haltenorth (1961) describes this area in his cursory ecological study on *Dama mesopotamica*. *Tamarisk-Populus euphraticus* "jungle", as it is called in the terminology of some authors (Hatt, 1959, p. 13), grew along the stream. This growth reached heights of 9–12 m. and at ground level formed an almost impenetrable thicket in areas undisturbed by man. *Tamarisk* seemed to predominate in low flats along the river, but gave way to *Populus euphraticus* on the slightly higher ground within the low floodplain. Such vegetation probably covered the entire floodplain in the recent past. The resident Arabs have cleared trees from large tracts to prepare this rich bottom land

for cultivation of grain, melons, and other crops. Areas left fallow along the stream edge soon took on *Tamarisk* cloaks, whereas slightly higher tracts grew up in annuals and perennials, including Compositae, and in spine-bearing vines and low, spiny shrubs. Idle irrigation ditches crisscrossed these cultivated areas. Inhabiting the clearings we found *Hemiechinus auritus, Lepus capensis, Mus musculus, Nesokia indica, Gerbillus nanus, Meriones crassus, Meriones libycus, Hystrix indica, Sus scrofa, Vulpes vulpes, Canis aureus,* and a species of cat, which we never managed to collect. Herds of *Sus scrofa* seemed to prefer the *Tamarisk-Populus* community, the floors of which appeared as a single mass scar, so numerous were their rootings. This community formed the habitat of the last remnants of *Dama mesopotamica* (Haltenorth, 1961, see account of *D. mesopotamica*, p. 307), but we did not observe this rare animal. Some *Vulpes vulpes, Canis aureus,* and *Felis chaus* made their daytime refuges in these thickets. Many *Nesokia indica* occupied large burrow systems in the *Tamarisk* underbrush.

The Karkheh River attained an average width of around 90 m. in the vicinity of Shush in January, volume and consequent width varying with the season. In one straight stretch at camp the water depth varied between 1 and 1.65 m. Sand bars characterized low banks, and vertical bluffs (6 m.), which exposed gravel strata below 3 m. thick silt deposits, characterized the high banks. Otter tracks and slides appeared commonly along both high and low banks, but our endeavors to collect them yielded no specimens. On several occasions I noted bats flying over the river after sunset. Several bats made daily crepuscular rounds over a shallow (avg. 0.3 to 0.5 m.) ox-bow lake surrounded by poplars. We collected *Pipistrellus kuhli* here, but our concentrated efforts to down a larger, *Eptesicus*-like bat failed.

A desert community existed atop the terrace 6 m. above the present flood plain. A drastic difference existed between these two communities. Sand dunes often piled up along the edges of the terrace or bluff and may have extended 1 to 2 km. into the plain. Vast dune fields lay on the open plain, which was also occasionally interrupted by bare gravel hills. Other than a thin coat of ephemeral grass, sprouted from dormant seeds by recent showers, a paucity of vegetation characterized these sandy areas. Scarce clumps of leafless, thorny *Zizyphus* grew where alluvial substrates remained unburied. Plant cover on the alluvial plains varied from virtual absence for some stretches to wide tracts rather heavily vegetated by cheno-

pods and xeric growth. *Gerbillus cheesmani* occurred only among the sand dunes. *Gerbillus nanus* and *Jaculus jaculus* were the only other rodents we found in this community. We noted, however, many burrows, apparently abandoned, of the type associated with large gerbils (e.g., *Tatera, Meriones*). We collected *Hyaena hyaena, Vulpes vulpes, Canis aureus,* and *Lepus capensis* on this arid area. We saw *Gazella subgutturosa* and *Sus scrofa* far out on the plain. *Canis lupus,* too, supposedly was a common inhabitant of this area.

Kerman: A High Interior Basin

December 8, 1962 (Altitude 1766 m.)

Kerman lies at the edge of an unusual interior depression totally inundated by low sand dunes. Investigation of parts of this basin revealed few indications of rodent inhabitation, a fact probably influenced by sparse vegetation and ubiquitous shifting of sand by wind. Small, disjunct tracts of exposed silty substrate and, doubtless, the numerous spoil mounds of qanats, which led across this basin from the surrounding mountains to the city, provided areas suitable as rodent habitat. Thirteen kilometers southeast of Kerman an isolated rock extrusion about 30 m. high interrupted the flatness of the basin. Sand dunes surfaced the area north of this elevation, while lacustrine deposits lay exposed to its south. *Peganum hormala* and a few other xeric plants formed a scanty cover over this lacustrine area and we found a small *Meriones crassus* colony associated with the occurrence of these plants.

Ganji (1955) includes this region in his 10–20 mm. precipitation zone but the high peaks to the south are in the 30 mm. range. The snow fields whitening these peaks figure importantly in the water economy of this thirsty region.

About 60 m. up the side of a rock extrusion 1.5 km. east of this city, a small cave opened southward. The opening divided into two shallow chambers. The southeast chamber led down into a fissure that varied in width between 0.6 and 2 m. I was unable to determine the absolute depth of this fissure but it appeared to descent more than 50 m. below the 20 m. depth to which I penetrated. Silt deposited on the ledges of the fissure faces suggested earlier presence of water. The atmosphere within this parture was warm and dry in contrast to the cool dryness of the paired upper chambers. Apparently the temperature of these upper chambers fluctuated with outside tem-

Fig. 20. Salt flat 29 km. east of Khvoy. Mountains to the south, scarcely discernable through clouds of a dust storm, separate this basin from the Lake Urmiah basin.

peratures, wheras the mountain rock within this fissure, lacking a direct exterior opening, maintained a nearly constant temperature by absorbing radiant energy at a greater rate during the day than it radiated at night. Seven *Rhinolophus blasii* were hibernating at a depth of approximately 15–20 m. in this crevice.

Khvoy: A Salt Flat
(29 kilometers east of Khvoy)

September 11, 1962 (Altitude 1000 m.)

Late in the afternoon of September 11, the expedition halted beside a salty tributary of the Zonuz Chay (=river) (1000 m.) approximately 21 km. east of Khvoy and 8 km. north of Kuh-i-Mishab, one of the large mountains along the northern end of Lake Urmiah. The surrounding area consisted of salt flats of fine, sandy clay, in most places crusted by a parched coating that often reflected the white of crystalline salt. These flats constitute part of the headwaters drainage of the Zonuz Chay, which eventually flows into the Aras River. Plants largely of the family Chenopodiaceae grew in sporadic clumps

over these flats and provided sustenance for small numbers of domestic sheep and camels.

Trapping and digging burrows on the flat produced no specimens. Approximately 1.5 km. west of camp rose a series of low (30–60 m.) hills. Just before daylight, September 12, I observed a jerboa, probably *Allactaga williamsi*, in an area near these hills at the western edge of the flats. Bleached remains of a hedgehog (sp.?) lay on flat, salty ground. Halfway up the nearest of the hills west of camp, water seeped out of rock strata. Dense masses of tall, thick-stemmed grass covered moist ground, and low grass, its flat leaves showing a large amount of rhodophyll, dominated soggy areas. A trapline across both types of vegetation produced single specimens of *Crocidura russula* and *Apodemus sylvaticus* along the outer edge of the thick-stemmed grass.

Maku: Mountains, Plains, and Valleys of Northwest Iran

September 26–October 5, 1962 (Altitude 910 m.)

Maku lies near Iran's northwest frontiers with Turkey and Azarbaijan SSR. Mt. Ararat (5164 m.), situated just within Turkey, towers majestically above the surrounding country. The arrival of the first migrant ducks, harvest of ripened crops, and shedding of leaves by wild shrubs and cultivated trees announced the advent of fall. Temperatures rose into the 80's around mid-day, but became quite cool by late afternoon. Rapid dissipation of solar heat from the earth left a chill in night and early morning air. According to Bobek (1952), this region receives 200–750 mm. of precipitation annually dependent upon altitude; the higher places receive greater precipitation and lower altitudes receive less. The countryside, except where irrigated, appeared monotonously dry. The expedition camped between a stubble field and series of irrigated gardens and pastures 2.5 km. west of Maku. The palisaded limestone mountain which sheltered Maku reared up approximately 300 m. north of camp and the Zangmar River lay about the same distance to the south.

Two communities existed within this area, one on the limestone mountains. Generally thin grass, thistles, and a little xeric growth comprised the vegetation on these heights. However, springs occurred rather commonly around the bases of these mountains. These usually produced sufficient water to afford luxuriant growth, varying from moss, grass, vines, and weeds with an occasional low shrub similar in appearance to *Paliurus aculeatus*, to at least one instance of

dense, tall (1.8–3.0 m.) grass and scattered willows. This latter situation existed in the incipient portion of a deep gully. Vegetation extended down this rocky erosion feature 1 to 2 km. from the spring, where the flow of water diminished to a trickle and then terminated, evaporating and percolating into underlying substrate. From this point out to the break through the cliffs walling this mountain, the canyon presented a desiccated mien. *Sus scrofa* occupied these patches of vegetation. Plants similar to *Astragulus* (rounded, as described from Doab), thistles, scattered grass, and wild rose bushes vegetated the scree-strewn slopes below the palisades. *Calomyscus bailwardi* and *Meriones persicus* occupied these scree slopes. *Martes foina* supposedly inhabited this rugged, mountainous habitat and *Vulpes vulpes* utilized some of the infinite number of cracks, crevices, and shelters for refuge. The palisade cliffs, with copious narrow ledges and overhangs provided ideal situations for *Capra hircus*, which persisted in large numbers in the area. *Ovis ammon* reportedly ranged over the higher mountains in the vicinity, but our efforts to collect them proved unsuccessful.

Numerous caves existed in these mountains. Four of the few explored by expedition members housed bats. For example, one of these bat caverns occurred in the mountain south of the Zangmar River at the eastern edge of Maku. The mouth of this cavity gaped 12–15 m. wide and 3 to 4 m. high. Dry sheep and goat manure of domestic animals covered the floor.[1] This outer chamber narrowed horizontally and vertically toward the rear, so that it became necessary to crawl. Two continuations at the rear, estimated to be 46 m. from the outside entrance and just large enough for a man to crawl through, opened down into a large, cone-shaped, vertical chamber approximately 23 to 25 m. wide. Water dropped from the ceiling accumulating in a rounded depression to percolate through the limestone floor. Fine droplets coated wall and ceiling surfaces and a mixture of red clay and guano had accumulated on the floor. This room maintained a noticeably cooler atmosphere than either the antechamber or outside environment. The ceiling became cone-shaped 30 to 50 m. above the floor and spiraled out of sight. *Rhinolophus euryale* and *Miniopterus schreibersi*, the former greatly outnumbering the latter, hung, until disturbed, on the walls in this part of the cave.

Approximately 6.5 km. east of Maku a few small caves existed in the same mountain that sheltered the town. One consisted of several

[1] Goats and sheep are commonly grazed in mixed flocks in Iran. During the winter flocks are often bedded down for night in caves for protection from the weather and wolves.

interconnected, cylindrical tunnels, which extended approximately 45 m. into the mountain. These cool, dark tunnels were found to be entirely dry. A solitary *Rhinolophus ferrumequinum* hung from the ceiling of one darkened connecting tube.

Five miles northwest of town, about 150 m. up the northern face of the same mountain, a small inconspicuous opening led into a low-ceilinged chamber that continued about 25 m. straight into the mountain, then angled sharply right 15 m. and ended. Stalactites, stalagmites, columns, and ridges of calcium carbonate along the floor indicated former presence of water, but during our visit this cave was totally dry. One *Rhinolophus hipposideros* had taken residence here. Calcium carbonate coated bones, probably artiodactyl, rested at the end of the cave. These suggest the former use of this recess as a den by some carnivore.

Forty-three kilometers southeast of Maku a cave near the top of a large limestone dome, between two mountain ridges, proved the largest that I visited in this region. The entrance led immediately into a large, high-ceilinged circular room (ca. 60 x 60 m.). A passage at the back of this chamber led down into a series of tunnels about 30 m. in length. Large cavities existed below these upper tunnels but the small cracks connecting the two would not allow my passage. Water dripped through the rear tunnels creating a cool, moist situation throughout the cavern. Great numbers of *Miniopterus schreibersi* and at least one *Rhinolophus euryale* inhabited all parts of this cave.

Another community occurred along stream beds which, as at Rezeiyeh, usually support agricultural endeavors. A wide plain coursed by a stream, lay north of the mountain that sheltered our camp. At intervals dams crossed the stream traversing this area and nourished extensive beds of reed-like grass along its edges. *Arvicola terrestris* abounded in this grass along with *Crocidura russula* and *Apodemus sylvaticus*. This stream flowed southwest and emptied into the Zangmar River about 7 km. west-northwest of Maku. The political boundary places Mt. Ararat, whose lava-strewn base rose from the plain described above, in Turkey. The Zangmar River cut a canyon in this mountainous area, but nearly 10 km. east of Maku broke out from its mountain-narrowed course into a broad, flat plain that stretched 38 km. east-northeast to the Aras River. Remnant heaps of lava flows persisted over large areas of this valley. Extensive irrigated tracts grew wheat and cotton, but otherwise the country was desolately dry. We observed *Cricetulus migratorius* traversing a dry,

flat part of this valley and *Lepus capensis* in newly-sprouted and stubble fields. *Vulpes vulpes* appeared commonly in this valley, and several large jirds, probably *Meriones persicus* or *tristrami*, were seen here.

Qayen: Arid Foothills
(7 km. North of Qayen)

November 18, 1962 (Altitude 1492 m.)

Our party paused for the night of November 18 in desiccated mountains 11 km. north of Qayen and pitched camp in a dry alkali-crusted stream bed where plants straggled meagerly. Outside this channel, vegetation existed in unbelievable paucity. Cracks in, and depressions beneath, shale and conglomerate outcrops created excellent shelters for small mammals, and we obtained four specimens, two representatives of both *Meriones persicus* and *Meriones crassus*, out of 150 traps placed in these situations. The battered remains of a fox lay underneath a rock overhang walled up with stones to create a sheep shelter. After dark we hunted by spotlight about 29 km. south along the main road and returned without seeing a single mammal. That night, under clear skies, temperatures plunged to a frigid −8° C. The following morning we noted burrows presumed to be those of *Ellobius fuscocapillus* in the fields surrounding Qayen.

Rezaiyeh: The Lake Urmiah Basin and the Eastern Flanks of the Zagros Mountains

September 12–25, 1962 (Altitude 1310 m.)

Rezaiyeh (1310 m.) lies on the western side of the Lake Urmiah basin, 17 km. west of the lake edge and 40 km. east of the Turkish frontier. The common point on the Turkish, Iraqi, and Iranian borders is approximately 51 km. southwest of this city. About 30 km. west of the city stands the principal chain of the Zagros Mountains. The territory northwest, north, northeast, east, and southeast of the city is primarily level plain. Foothills of the Zagros occur in all the other directions. This country appeared desiccated in most places. Less precipitation, chiefly in the form of snow during the winter months (200–500 mm.), falls in the basin than on the heights of the Zagros (500–700 mm.) (Bobek, 1952). During our stay in the Rezaiyeh vicinity, daily temperatures rose into the 80's and fell at night

Fig. 21 The Zagros Mountains about 40 km. south-southeast of Rezaiyeh.

to the high 50's. Trees took on autumn hues and began shedding leaves. We experienced one very light, dust-settling, localized shower.

Our party camped in a small grassy pasture 10 km. southwest of Rezaiyeh near Band village in the Bardeh Sur River valley. Within a 30-mile radius of this site were four ecological communities.

The first community consisted of steep, sparsely-vegetated, rocky inclines. The outer foothills, though rising as high as 2400 m. and steeply declivitous, generally presented a weather-rounded profile, especially those which were lower and less rocky. Rock outcrops were frequent on the higher elevations of many of these fringe areas, but clay comprised the substrate at most lower elevations. Local people utilize many such rock-free areas to grow wheat. From our trapping records it appears that *Meriones persicus* occupied the rocky situations and *Meriones tristrami* the clay inclines. The inhabitants described *Meles meles* as occupying these areas, and we observed a burrow system, which probably belonged to this species, located near a large number of burrows, probably of *Meriones tristrami*. *Vulpes vulpes*, *Canis lupis*, and *Lepus capensis* seemed to range over all the country about camp. The habitat of *Calomyscus bailwardi* exists elsewhere in such deserted rocky tracts, and this little mouse probably occurs here, but we failed to collect it.

Approximately 33 km. south-southwest of Rezaiyeh we visited a region of smoothly-rounded mountains covered with low, desiccated grass. Stubble fields and tracts broken for planting wheat patchworked the mountainsides. Scattered acacia-like shrubs dotted the lower slopes, and dense pockets of these plants grew in gullies in the mountainsides. These thickets, according to the reliable accounts of Mr. Jahangiri, the Iran Game Council representative here, provided shelter for *Sus scrofa* and *Ursus arctos*, though we did not observe these species here. A small man-made room cut into solid rock housed one *Myotis blythi*, and people who lived nearby stated that "thousands" of bats sometimes occupy this refuge. Wild sheep and goats reportedly range over this country and residents graze immense domestic herds here.

Stream beds supported another association. Man has altered natural conditions by channeling river water to irrigate riverside vales and portions of their delimiting slopes, converting these into gardens of alfalfa, hay, trees, grapes, and tobacco. *Lutra lutra* ranged commonly through the Bardeh Sur River and the numerous irrigation "jubes" channeled off it. Two forms of *Mus musculus* inhabited this community. One occupied village dwellings and out-buildings, the other lived free in the fields. *Cricetulus migratorius*, *Erinaceous europaeus*, and *Lepus capensis* occur in this countryside. *Arvicola terrestris* seemed to confine its range to stream or jubeside environments. Our party collected an example of *Felis catus* along the banks of the Bardeh Sur River. We observed that *Vulpes vulpes* and *Canis lupis* visited the fruiting vineyards nightly. *Ellobius fuscocapillus* inhabited vast burrow systems in streamside fields.

North, east, and southwest of Rezeiyeh lay the flat Lake Urmiah basin. This region showed diverse ecological conditions, briefly described on page 25. Three granitic monadnocks rise 300–610 m. above the lacustrine plain, two on the west shore and the other on the east. We explored only the northern mountain on the west bank known as Basket Mountain. Approximately 150 m. up the steep east face was a unit of rock which had split, creating long, narrow cracks which penetrated the rock at random angles. Toward the outer edges, split-off rocks have weathered further, forming overhangs or falling down the slopes as shingles. The scant vegetation consisted of grass and thistle. Large numbers of *Taphozous nudiventris* retreated into these darkened cracks and isolated overhangs by day.

Two communities persisted on the flat plains of the former bed of the shrunken lake. One, the salt flat community, occupied the

Fig. 22. Basket Mountain 26 km. northeast of Rezaiyeh on the west bank of Lake Urmiah, viewed as approached from the west. This portion of the Basin is largely salt flat. Dark clumps of plants in foreground are Chenopodiaceae.

territory from the briny water's edge to 1.6–3.2 km. inland. Vegetation did not exist along the shore, but *Chenopodiacae* and meager dry grass grew farther inland. Some rodent burrows, probably *Meriones tristrami*, existed in this area, and though we obtained no specimens here, examples of this gerbil were acquired 2 or 3 km. to the west. A few gaseous salt water springs bubbled from the base of Basket Mountain. Rather dense growth of large-stemmed grass, similar to that described as occurring 18 km. east of Khvoy, subsisted around these springs and their water courses.

Landward from these salt flats the lake bed consisted of rich, cultivated land. Tobacco, grapes, wheat, and vegetables made up the main products. Adobe walls encompassed most plots (0.5–7.0 acres in area), but some wheat and tobacco fields were apparently considered too large to wall. Irrigation water came from deep wells or streams descending from the Zagros. There were many villages in this region. We found *Meriones tristrami*, *Mus musculus*, and *Cricetulus migratorius* closely associated with grain fields and threshing operations. We observed that *Lepus capensis* and *Erinaceous europaeus* frequented stubble fields and pastures in the vicinity, and residents said that *Erinaceous europaeus* and *Vulpes vulpes* often find

Fig. 23. This view of an area of the extensively cultivated portion of the Lake Urmiah basin about 20 km. north of Rezaiyeh looks northwest toward a portion of the Zagros Mountains.

Fig. 24. Sama. This cultivated valley between forested mountain slopes receives constant irrigation from jube ditches. One can be discerned on the left side of photograph as a ridge along the base of the slope. The stream bed lies to the right side of the picture.

sustenance in the vineyards during the grape season. We only verified that foxes eat grapes. Excavation of burrows in the bank of an irrigation "jube" produced two *Microtus arvalis*. Toward the outer limits, this basin became rocky and less suitable for cultivation. These fringes maintained moderate amounts of vegetation, which grew to heights of 0.5 m., but seldom blanketed the ground. *Meriones tristrami* and *Allactaga williamsi* inhabited this territory, the former apparently more common. *Vulpes vulpes, Lepus capensis, Erinaceous europaeus,* and *Cricetulus migratorius* also appeared here. This rocky area terminated rather abruptly in the eastern flanks of the Zagros.

Sama: The Forest on the Northern Slope of the Elburz

August 14–29, 1962 (Altitude 900–2400 m.)

The small, out-of-the-way village of Sama rests at approximately 1280 m. in forest on the northern slopes of the Elburz range. The mountains were draped in most places with thick forest, and valleys patchworked with irrigated plots of nearly mature grain. For 13 km. to the south, the slopes rose toward the treeless heights of the crest of the Elburz, and for 6 km. to the north the land surfaces sloped down to a treeless valley at 900 m. North of this depression a lesser (1672–2130 m.) mountain ridge jutted up, and its north slope pitched sharply down to the Caspian Sea. Our camp lay 28 km. south of the Caspian Sea and 37 km. north-northwest of Doab. This region receives an annual rainfall of 1000–2000 mm. (Ganji, 1955) which far exceeds that of most of Iran.

Seemingly, four plant communities existed in the environs of Sama. Two and perhaps three of these resulted from man's endeavors.

The forest community, most extensive and characteristic of this area, occurs between approximately 950 and 2440 m. Thick forest composed mainly of beech, *Fagus*; elm, *Ulmus*; and oak, *Quercus*, in that order of abundance, grew over the higher, less accessible, mountain reaches. We observed some virgin growth at elevations near 2400 m. In such places trees 1.8 m. in diameter appear commonly. The tops of the mountains remained smooth and rounded, though they sloped steeply. Low plants, 10–15 cm. high, dead leaves, and occasional rotting logs formed the floor cover in this park-like forest. Ferns, mosses, blackberry vines, and grass grew luxuriantly along water courses through the forest. Thickets of beech saplings and

blackberry vines bearing many ripe berries flourished in openings created by cutting of the forest to produce charcoal.

Streamlets produced by springs have cut deep ravines in the sides of the mountains here. Springs that have not emitted enough water to produce streams have created bogs. Grass and herbaceous plants dominated and grew luxuriantly in these places, and we found numerous rootings and wallows of wild hog, *Sus scrofa*, in them.

The local populace methodically trims the limbs of trees in wood lots near villages to provide fuel for cooking and heating, maintaining these in disclimax.

There are surprisingly few mammals in this forest community. The species we observed here are: *Sus scrofa, Ursus arctos, Cervus elephus, Capreolus capreolus, Glis glis, Apodemus sylvaticus, Microtus arvalis*, shrews, as evidenced by predations upon trapped mice, and

Fig. 25. Another example of irrigation via jubes. This photograph looking northwest from our camp was taken from several meters above the level of the stream which lies to the right, out of view. Barren areas of mountainsides in background seemingly result from deforestation.

several species of bats, though we collected none in this community. The jackal, *Canis aureus*, probably ranges into the forest occasionally.

Two man-made communities appeared on land formerly occupied by forests. One of these existed along stream beds, which the local inhabitants have cleared in its entire width between the steep slopes of bordering hills. By terracing fields and damming and diverting streams these people have channeled water to irrigate the gardens. Two principal crops, rice, *Oryza*, and another grain of this genus, locally called "arzan," flourished in these plots. Surface rocks cleared from these fields lay in wall-like piles, overgrown principally with thick blackberry vines bearing an abundant crop of ripe berries around the terraced borders. House mice, *Mus musculus*, lived abundantly within these confines.

The other man-made community existed on cleared hillsides above the stream beds. Examination revealed that these areas were probably denuded of forest sometime in the past. At this date, the tops and higher reaches supported an almost uniform cover of thorny shrubs up to 2 m. high with trees characteristic of the forest scattered liberally throughout. Descending from these heights the situations encountered in sequence were a thorny shrub zone where trees did not exist and a zone where the thorn shrub grew very diffusely, the rocky ground almost bare, but with scattered pockets of thick shrub and trees. Villagers frequently cleared the latter zone either for fuel or to build thorn fences. This area probably served as farmland once but now no stream flows near enough to furnish irrigation water. *Stellaria* (a different species from that at Doab), *Erysimum*, *Thymus*, *Marrabium*, *Dracocephallum*, *Astragulus* (a different species from that at Doab), *Pisun*, *Cousinia*, and *Acanthalium* grew in this dry, rocky area. We trapped *Mus musculus* and *Apodemus sylvaticus* under thorn fences and around large boulders surrounded by considerable shrub. Porcupine, *Hystrix indica*, often observed in this habitat, dug dens under large boulders. Hares, *Lepus capensis*, frequented this situation as did *Canis aureus*.

Rattus rattus, *Rattus norvegicus*, *Mus musculus*, *Cricetulus migratorius*, and to some extent *Canis aureus* occurred in the villages.

A grassy association existed below 1065 m. The break between this situation and the forest was sharp, with but a narrow ecotone existing between. North of this arid-appearing zone the above described mountain ridge rose to 1675–2130 m. On this range, forest extended only a short distance down the southern slope from the crest before giving way to grass land. It seems probable that the

Fig. 26. Dry grassland 10 km. northwest and below the elevation of Sama. Note the forest and forest-grassland ecotone interdigitations. *Meriones persicus* occupied this situation.

moisture-laden air moving south from the Caspian Sea loses precipitation in rising to pass this obstacle. This air, having cleared the barrier, continues south for several kilometers before encountering further physiographic resistance. We observed that the clouds moving across this northern range re-established contact with the mountain surface around Sama at elevations of approximately 1200–1400 m. This indicates that moisture-laden air tends to drop after clearing the northern range.

Dryness and paucity of vegetation, other than a thin veneer of grass, characterized this community, which occurs most commonly on well-drained hilltops, hillsides, and steeper slopes. Valleys and water courses extending into or through the grassy slope community supported galleries of forest or forest-grassland ecotone. Within this grassy slope community at approximately 650 m., the cypress *Cupressus* grew in scattered stands. The Persian jird, *Meriones persicus* inhabited this grassy slope association and the ecotone between it and the forest. The road from Sama to the main Chalus–Tehran highway eventually dropped to about 470 m. and followed the course of a tributary of the Chalus River. Beautiful green rice fields spanned this valley, but on the steep hillsides that bounded it thin grass and occasional stunted cypress grew in the rocky clay soil.

The ecotone between the arid grass slope and forest communities consisted of low (1.2–2.0 m.) shrubs growing in clumps separated from other clumps by grassy zones. Isolated oaks rose here and there out of this scrub. This ecotone grew denser toward the forest, becoming virtually impenetrable for man, but even there we found that grass, growing thicker than that found in the grassy-slope community, paved the floor. We observed *Meriones persicus* and *Apodemus sylvaticus* within the forest-dominated portion of the ecotone. *Lepus capensis* took refuge by day in the outer fringes of the ecotone and foraged over the grassy slope during the night. We met three *Ursus arctos* on a trail in the outer limits of the ecotone less than 75 m. from the open grass.

We observed bats flying in many places around Sama. Large and small bats frequented certain places or traveled, seemingly erratically, over all types of country. A pool in the stream near camp proved a favorite spot for these mammals. We caught the bats *Nyctalus noctula, Pipistrellus pipistrellus,* and *Eptesicus nilssoni* in a mist net placed over this pool. Another net set in a small clearing on a low bluff overlooking this stream yielded *Myotis mystacinus* and *Eptesicus serotinus.* I observed one bat in a rock crevice in a cliff surrounded by forest.

During our stay in this area temperatures remained warm. In the hottest periods on clear days the mercury soared to near 90° F. Night temperatures seldom, if ever, dropped to 50° F. We experienced a wet weather front passing south from the Caspian Sea. Clouds obscured the surrounding mountain tops, but though mist drifted down almost constantly, little heavy rain fell in camp.

Sarab: The Hills of East Azarbaijan
(20 km. West of)

September 10, 1962 (Altitude 1705 m.)

Our party reached the interior of the plateau September 10, after crossing the mountainous rim from Astara on the Caspian Sea, and proceeded southwest toward Sarab (548 m.). Dry and barren rolling clay hills characterize this part of Iran, which receives 300–500 mm. precipitation annually (Ganji, 1955). Several kilometers to the east was a branch of the Elburz Mountains. Even xeric native vegetation occurred scantily in this region, perhaps because dry farming operations occupied virtually all of the suitable land. Gardens prospered around villages where deep wells provided irrigation water.

Fig. 27. Northwest Azarbaijan Province. The irrigated plots surrounded by walls in foreground provide habitat very similar to that which we found occupied by *Microtus socialis* 20 km. west of Sarab. Vast tracts of the apparently barren country in the background are dry farmed for wheat during the spring and summer.

After dark our party observed several hares, *Lepus capensis*, one of which we collected, and foxes, *Vulpes vulpes*, in the hills east of Sarab. The expedition proceeded 20 km. west of Sarab and camped near a village surrounded by several acres of walled gardens. Most of these grew short cropped grass or alfalfa, but tall (1 m.), dense grass grew in a small plot. A large colony of *Microtus socialis*, which feed on this vegetation, were within this enclosure. Traps yielded a series of *Microtus socialis* and one *Cricetulus migratorius*. Numerous active *Ellobius* burrows existed along the road between Ardabil and Bostanabad. These usually occurred in fallow fields or around plowed fields.

Semnan: The Northern Fringe of the Great Salt Desert

October 15–17, 1962 (Altitude 1280 m.)

Semnan lay in one of the most barren environments imaginable, situated between the virtually lifeless, salt-caked flats of the northern Dasht-i-Kavir on the south, and naked rock debris that sloped gently to steep mountains, which appeared totally bare, to its north. The

expedition camped 6.5 km. northwest of town where a small stream left the hills to flow across the slope toward Semnan. Beyond this stream's basin, which in places supported a growth of thistle, occasional *Tamarisk*-like plants, and other desert plants, the surroundings presented an image of desolation. On the rock plain one scrawny plant per 15 sq. m. struggled out an existence. The stream, diverted from its bed through a narrow (1–1.3 m.) ditch passing down across the rock plain, supplied Semnan. For approximately 0.3 m. to either side of the ditch, low green grass partially covered the clay banks. Along these, several *Nesokia indica* had dug burrows, and we succeeded in uncovering one of these rats. Local inhabitants worked small plots along the river before it passed out of the hills and into the ditch. It seemed to me that the combined acreage under cultivation could not provide more than very poor subsistence for the populace. *Mus musculus* occurred in this area, cohabiting with man in dwellings and living feral in the fields. Traps yielded one *Apodemus sylvaticus* from this habitat. Three nights' trapping in the stream basin, dry hills, and in the cracked, gully-washed area between, yielded single specimens each of *Cricetulus migratorius* and *Meriones persicus* from the last area.

Fig. 28. The south slope of the Elburz Mountains viewed from about 1 km. north of Semnan. Note the extreme aridity.

The small town of Sang-e-Sar ("stony place"), located 12.5 km. north of camp, lay at the southern limits of a series of very high mountain ridges (rising to 2742 m.) of the Elburz range. Several stream valleys, converted into wheatfields and gardens, surrounded this town. In a weedy cottonwood grove near Sang-e-Sar we saw one hare. About 5 km. north of this small town a pronounced vegetation change took place, particularly on the northern slopes of the high ridges. A plant community similar to that found on the high clay slopes (ca. 3300 m.) at Doab occupied the lower (1827 m.), less rocky portions of these slopes. Several varieties of dome-shaped plants like *Astragulus* of Doab and large leafy *Verbasculum* characterized this area.

A different community prevailed on the rocky slopes. We found scattered grass, *Setania* and *Centaurea*, occasional low rose vines, thistles, lichens, and *Verbasculum*. *Calomyscus bailwardi* prevailed in these areas and, though not trapped there, *Meriones persicus* probably inhabited them also. At higher altitudes (2132–3047 m.) scree covered large areas along the bases of the ridges. *Ochotona rufescens* was plentiful throughout this region, and we observed this species along the road from Semnan to Firuzkuh at about 22 km. at 2437 m. altitude and 29 km. at 2132 m. altitude, west of Sang-e-Sar. In the valley 7.2 km. north–northwest of Sang-e-Sar the populace, in efforts to create arable land, had placed most of the large surface rocks in horizontal rows and created rough terraces. These rock walls provide shelter for large numbers of pikas. In addition, we found *Apodemus sylvaticus*, *Meriones persicus*, and *Calomyscus bailwardi* inhabiting these terraces. The extremely scattered vegetation in this area included *Setania*, *Centaurea*, *Cousinia*, *Aster*, *Malva*, *Polygonum*, and *Verbasculum*. A row of widely separated, domestic walnut trees grew along a dry irrigation jube.

I explored an abandoned mine with many branches, located 3.2 km. north–northwest of Sang-e-Sar roughly 304 m. up the southwest slope of a high, dry mountain ridge. A lone *Barbastella leucomelas* slept in one of the darkened tunnels.

Gazelles and onagers reportedly range over the dry hills and rock plain north of the desert, but we observed none during our short stay.

We experienced clear, dry, cool days and nights. Midmorning to midafternoon temperatures rose into the 80's F. Late evenings, nights, and early mornings were quite cool, especially in the altitudinal range between 2132 and 2742 m.

SHAHRABAD KAUR: THE NORTHEASTERN ELBURZ MOUNTAINS

November 3–13, 1962 (Altitude 944 m.)

Shahrabad Kaur lay 70 km. east-northeast of Dasht among the sharp ridges separated by basins in the northeastern Elburz. Cool, clear days and nights occurred during the first week of our encampment, but a cold front from the north dumped rain below about 1220 m. and snow above this altitude during our final three days here. Snow sifted silently into camp as we packed to leave. The environs consisted of rugged rock escarpments generally separated from other such features by wide valleys or interior basins. This area lay between the moist, forested heights north of Dasht and the desiccated interior to the south and east. Both flora and fauna reflected this intermediacy. Two communities existed in this region.

Basins like that at Dasht, but generally drier, and their broad peripheral slopes supported the first community. The local farmers raise winter wheat in these basins and grow cotton in those having an available water supply. Rock-strewn slopes characterized the peripheries of these basins. *Astragulus* dominates such inclines not converted to cultivation. We found *Gazella subgutturosa, Vulpes vulpes,* and *Lepus capensis* abiding in both dashts and slopes, and a stuffed *Vormela peregusna* skin purchased from a villager reportedly came from dasht habitat. Scattered colonies of *Meriones libycus* and *Rhombomys opimus* occurred in the peripheral slopes.

The location of our camp on a slope placed it midway between basin and escarped ridge in an area of irrigated gardens. Weeds, briars, and small trees flourished along jubes here. Large numbers of *Mus musculus, Apodemus sylvaticus* and *Cricetulus migratorius* inhabited these fringes along with fewer *Crocidura leucodon, Crocidura suaveolens,* and *Microtus socialis. Ellobius fuscocapillus* maintained extensive colonies in fallow wheatfields.

The other community existed on steep mountain slopes. Abundant *Astragulus* and *Artemesia* mingled with *Vorthemia persica, Centaurea, Crisium,* and *Zizypus* vegetated scree-strewn inclines, but gave way to scrub assemblages of *Acer, Juniperus,* and *Berberis* or *Berberis, Zizypus, Parrotia persica* in better watered areas. Scrub associations, however, comprised relatively small portions of this community. But *Vorthemia* and *Centaurea,* with occasional *Cirsium* and *Artemesia,* grew in the shallow soil among the omnipresent rock outcrops.

Fig. 29. Shahrabad Kaur, 35 km. southwest of. Typical plateau country southeast of the Elburz Mountains. View is south towards an isolated mountain chain south of the principle Elburz range.

Calomyscus bailwardi, *Apodemus sylvaticus*, and *Meriones persicus* seemed the principal mammal inhabitants of rocky outcrops, although *Cricetulus migratorius* also frequented such habitat. *Hemiechinus auritus*, *Lepus capensis*, *Vulpes vulpes*, and *Canis lupis* at least venture into the edges of these high ridges, and the latter two species may den among the rock outcrops. Leopard tracks appeared commonly in the higher elevations, and we were able to purchase a fresh skin. We sent the vendor to bring in the skeleton, and he reported that on his arrival at the spot where the carcass lay, a small cat and wolf were feeding on separate parts of the carcass. I saw two wolves one night, one near a village, and the other crossing one of the wide basins.

We observed that *Ovis ammon* roam this region in herds of ten to thirty individuals. Wild *Capra hircus* seemed to prefer the numerous cliff facings of these rugged mountains.

Large hibernating colonies of bats, predominantly *Rhinolophus blasii* but including considerable numbers of *Rhinolophus ferrum-equinum* and *Miniopterus schreibersi*, occupied two qanats (one at Chaman Bid, the other near Shahrabad Kaur) and a large limestone

Fig. 30. This view of the overnight camp 43 km. southwest of Torbat-i-Heydariyeh looks north. The flat area of the basin surrounding the tents was habitat of *Meriones crassus*.

cave in the mountain known locally as Ganjah Kuh,[1] which lay north of Jochdi. Jochdi is 5 km. south and 25 km. east of Chaman Bid. The cave (1220 m. high) opened into a narrow gorge that was vegetated with *Acer, Juniperus,* and *Berberis.* A tunnel roughly 6 m. long and 1.5 m. high and wide led into a rounded room about 9 m. by 9 m., beyond which was an elongated chamber roughly 16 m. by 6 m. Water dropped constantly from the ceiling and collected in clear pools on the floor. At the time of my visit, the snowline lay barely 300 m. above this cave and outside temperatures hung near freezing while cave temperature was noticeably warmer.

Torbat-I-Haidariyeh: Arid Pebble Plain
(43 km. Southwest of Torbat-I-Haidariyeh)

November 16, 1962 (Altitude 1029 m.)

Our party paused for the night on one of many stretches of flat pebble plain common to the east Iranian plateau. Blanford (1876, p. 450) describes these plains. Ganji (1955, pp. 271 and 275) classi-

[1] The Persian *Ganjah* for treasure and *Kuh* for mountain are combined to mean "treasure mountain."

fies this region climatically as arid interior desert and notes that the annual rainfall comes scantily and irregularly during the winter months. The large sizes of the dry shallow stream beds in this area indicated that much of the precipitation received flows in a torrent to interior basins, there to evaporate. Long qanats channel meager water supplies from distant mountains, and villagers direct this life-giving fluid into their alkalai-crusted fields. Some other fields lay adjacent to the stream beds and apparently derived their annual ration from these ephemeral rivulets in sufficient quantity to produce a grain crop. The vast majority of the area of this country, however, remains hostile to man. We camped on undisturbed pebble desert, not far from two small villages and their gardens.

Rodent burrows appeared in moderate numbers around qanat spoil heaps and low terraces of the fields beside the dry stream channels. Several active burrows existed in the bare pebble plain. Vegetation grew thinly, where at all, on the plain. *Alhagi* sp. and *Peganum hormala* occurred as the principal plants, mainly around the qanat piles and streamside terraces. We trapped 12 *Meriones crassus* and three *Cricetulus migratorius* on this clear night, during which the temperature fell below 0° C.

Varangrud Village: The Elburz Mountains

August 10–13, 1962 (Altitude 2742 m.)

The Varang River valley, surrounded by rugged mountains, broadens considerably by the time it reaches Varangrud village about 25 km. (west) downstream from Doab. My camp, 2.5 km. north of Varangrud at 2740 m., was approximately 580 m. lower than the Doab camp. The xeric nature of the mountains and other areas outside the stream bed and the absence of general greenery indicated less precipitation compared to the Doab vicinity. The mountainsides and slopes around Varangrud supported scanty vegetation in contrast to Doab. The same type of clouds, which hung around the higher peaks at Doab the morning I moved to Varangrud, easily cleared the highest mountains visible from Varangrud. The higher elevations of Doab apparently forced these clouds to rise and lose their moisture, which accounted for greater precipitation.

Heavy grazing prevents the stream bed community from attaining the degree of development observed at Doab. I found no indications of rodents inhabiting this community at Varangrud, perhaps due to the thinner vegetative cover here. A very rocky slope lay between the stream bed and the steeper rise of the mountainside.

Scattered thistles and grass grew between the numerous rocks, and the dormouse, *Dryomys nitedula*, inhabited this treeless situation. In many places along this area water seepage created muddy bogs and these bogs supported luxurious grass, cropped short by domestic sheep and goats. The earthen mounds of mole vole, *Ellobius*, burrows appeared around the periphery of these moistened areas.

I devoted considerable study to a large field located in a hanging valley of glacial till(?) abutting the west side of the river bed, but at least 50 m. higher. A complex system of ditches served to irrigate the field, which lay divided into a number of plots. Crops raised included alfalfa, cow pea vetch, and wheat. Portions lay fallow; others were undergoing harvest; still others supported fresh new crops. Rock piles around the edges of the plots formed a network over the field. Only those areas supporting young or immature crops received irrigation water. The fallow portions exhibited a cover of weeds, thistles, grass, and vines.

An active colony of *Ellobius* occurred over the entire field, as did one of social voles, *Microtus socialis*. These species burrow extensively and apparently prefer unirrigated areas. *Apodemus sylvaticus* occurred around the rock pile borders. Vetch and alfalfa stacked randomly about harvested tracts made refuges for the rodents.

One afternoon I investigated the fields around Varangrud village. In this area irrigation permitted cultivation of the river valley and of the slopes up the hill and mountainsides 30–60 m. above the lowest level of the stream. The villagers grew alfalfa, vetch, wheat, vegetables, and trees (alder, cottonwood, willow) in small, irrigated plots. Willows and cottonwoods line most of the usually water-filled principal channels. This whole irrigated area provided a green luxuriance that sharply contrasted with the dry, brown, mountainous background. *Ellobius* burrows occurred in these fields. My close examination revealed surprisingly few indications of rodents in this area and traps yielded no specimens. Three shrews, *Crocidura russula*, were trapped in an abandoned house, surrounded by weeds, on the village outskirts.

Zabol: Seistan Plain and Hamun-I-Seistan Lake
(24 km. Southwest of Zabol)

November 21–24, 1962 (Altitude 335 m.)

Huntington (1903) discusses the geology, physiography, and climate of the Seistan basin and presents convincing evidence that until

Fig. 31. Camp 24 km. southwest of Zabol. The basalt dome, Kuh-i-Khwaja rising out of the dry bed of the Hamun-e-Seistan, can be seen west of the camp at left of photograph.

recent time, a large body of water covered this and adjoining areas. Since then this lake has diminished in size to the ephemeral Darya-cheh-ye-Seistan of the present. The Hirmand River provides the only source of water for this vast basin and irrigation uses virtually all of the normal supply. But for one difference, as far as we observed, Huntington's (1903) documented work remains accurately applicable to the Seistan Basin of today: the changes effected by completion of a dam across the Hirmand in Afghanistan during 1960. This facility holds and diverts the annual spring flood originating in the Hindu Kush. Previously, the Daryacheh-ye-Seistan grew with the arrival of this yearly replenishment and decreased often to total dryness, or until the next spring flood. Huntington (1903) adds that on rare occasions it remained dry over a two-year period. The lake had not filled in the time since this dam's completion and by November 1962, in the immediate surrounding country, human inhabitants, and doubtless many of the mammals that we sought, suffered from the drought. Should the Afghan dam remain effective over any considerable length of time, the lake bed will likely become parched plain and an interesting mammalian invasion should result.

The Street Expedition pitched camp in the lee of a mud wall and row of *Tamarisk* planted for a windbreak approximately 24 km.

southwest of Zabol and 7.2 km. east of an important local landmark, the basalt dome, Kuh-i-Khwaja, which rose 180 m. above the surrounding reedy lake bed.

Occasional *Tamarisk* rows broke the desiccated appearance of this area. Water issued only from broad holes dug 3–4 m. below the ground surface. Seistan possesses a reputation for its dry, searing, violent winds, particularly the "bad-i-sad o bist ruzah" or wind of 120 days. Huntington's (1903, p. 227) description provides appropriate background:

> ". . . In summer the northward prolongation of the trade winds combines with the spirally inflowing winds which circle round the Asiatic center of low barometric pressure far to the northeast, and guided by the north-northwest trend of the mountains of Eastern Persia produces dry winds of the most extraordinary strength and constancy. Holdich (1901, pp. 145, 334) describes their occurrence in northwestern Afghanistan and northwestern Baluchistan, but they are most violent at Sistan [sic], halfway between the two. According to the British members of the Sistan [sic] Arbitration Commission, this wind, called the 'Wind of One Hundred and Twenty Days,' blows almost continuously day and night during the four hottest months of the year, much of the time at the hurricane rate of from 60 to 80 miles per hour. Dust and sand fill the air. The double pegged tents which withstand the blast make a noise like that of the rigging of a ship in the wildest storm. The continual hum, flap, clatter, rattle, bang, make mental work almost impossible. . . ."

Starting the second day and continuing through our four days of encampment here in November, although far removed from the four hottest months of the year, we experienced a wind that blew at a constant velocity of probably 35–40 miles per hour, interrupted by stronger gusts, and with such strength that the clouds of dust and sand limited our vision to about 100 m. Eolian transported particles permeated all of our belongings. Inside our tents, which we kept as tightly sealed as possible, a layer of dust 3 to 4 mm. deep accumulated each day. Plants like tumbleweed rolled before the wind at velocities that a running man could not match. We thought Huntington's (1903, p. 225) remarks upon Seistan as "a region shunned by those who have dwelled in a happier land" wholly appropriate.

Two communities existed in the basin. The first of these consisted of the desert presently confined to the uplifted periphery (Huntington, 1903, p. 225) where the wind shifts sand dunes over gravel-covered plain. We did not sample this habitat.

The dry lake bed may be considered a seasonally-changing community separate from the cultivated fields surrounding it. During drought *Sus scrofa* and *Canis aureus* generally take diurnal refuge

Fig. 32. Typical view of the Seistan plain seen to the east of camp 24 km. southwest of Zabol. *Tatera indica* and *Gerbillus nanus* burrows abounded in such habitat, particularly in areas as seen in the lower foreground.

among the vast community of reeds, and leave it by night to forage in the fields.

The Hirmand delta, which centers about 20 kilometers east of Zabol, covers approximately 1000 sq. km. divided into fields serviced by a complex network of canals. We camped near the outer edge of this delta, where no crops had been produced in two years because of the water shortage. Vegetation varied, but generally grew confined along the banks of the dry irrigation ditches; however, scattered clumps defied the desiccating character of the winds and emanated from the brick-hard plain. *Alhagi* sp. appeared to be one of the more typical plants. These and others are collected by local inhabitants and piled in large stacks for camel fodder. A thin layer of fine sand, ever-present on the surface, constantly fluctuated with the wind, accumulating around obstacles such as plant clumps and walls. The inhabitants constructed mud walls lined with *Tamarisk* sp. trees to shelter many of their plots. Wind-driven sand constantly erodes these walls. Consequently, cavities honeycomb their bases and provide shelter for insects, scorpions, lizards, snakes, *Crocidura pergrisea*, *Gerbillus nanus*, and *Mus musculus*.

Gerbillus nanus and *Tatera indica* possessed intricate runways and doubtless dens, though none was investigated, beneath the protection of the spiny fodder stacks. Several mice trapped and subsequently partially eaten suggested that shrews also occurred in these places. Large burrow systems showed in the hard bare ground, and both *Gerbillus nanus* and *Tatera indica* occupied these. Our attempts to excavate the burrows, however, proved unsuccessful due to the severe dust storm and the rock-like ground.

Great numbers of hedgehogs, *Hemiechinus megalotis* wandered over the plain by night.

We acquired two examples of *Herpestes auropunctatus*. One crossed the road in front of our truck, one afternoon, and the other was caught in a hen house.

Foxes and jackals frequently made their presence known. Jackals were noticed with greater frequency than were foxes, but although we collected no foxes, several permitted observation at close range.

A small cave located on the southwest side of Kuh-i-Khwaja, created by a natural slide of weathered basalt, housed a colony of approximately 200 *Rhinopoma hardwickei* in its bone-dry chambers. On the opposite side of this basalt dome a lone specimen hung in a darkened room, one of many existing about halfway up the eastern side of the mountain which archeologists produced in excavating the ancient village of Kaha-Kaha.

ACCOUNTS OF SPECIES COLLECTED

This section treats the 97 species of mammals known to occur in Iran from specimens collected or obtained by the Street Expedition. Each account begins with the accepted scientific name. The citation to the original description of the species and the type locality are provided for each species. Localities at which each species is known to occur in Iran are treated under the heading *Distribution* and the four subheadings which appear under it as follows:

Previous Records: All distribution records for a species known to be published prior to 1964. Records from several 1964 and 1965 papers have been assimilated into the text since its acceptance for publication. Where two or more works obviously refer to the same specimen(s), only the earliest is cited. The localities cited from literature are spelled as they originally appear, and have, except for places not found, been assigned to province on the basis of the map provided on pages 14–15.

Street Expedition Specimens: This lists all specimens of a species collected or obtained by the Street Expedition. Localities follow the province in which they are located. All numbers not specifically noted as "in alcohol, skin only, skull only, or skeleton only" refer to specimens constituted by skin and skull. The word skeleton in parentheses with or without a number indicates that the postcranial skeleton has been preserved in addition to skin and skull.

Additional Specimens: Any Iranian specimen that I have studied but which was not collected or purchased by, or presented to the Street Expedition, and which is from a locality not found reported for this species in the literature, is here listed by locality, an abbreviation for the name of the museum in which it is preserved, and that museum's specimen number for it (if available). The abbreviations used are:

AMNH—American Museum of Natural History, New York
BM—British Museum (Natural History), London
FMNH—Field Museum of Natural History, Chicago
IGCM—Iran Game Council Museum, Tehran
IPI—Institute Pasteur de l'Iran, Tehran

TABLE 1.—Species Reported in the Principal Works on the Mammalian Fauna of Iran.

	Blanford, 1876	Ellerman and Morrison-Scott, 1951	Misonne, 1959	Present Paper
1.	—	Erinaceous europaeus	—	Erinaceous europaeus .....[1]
2.	—	Hemiechinus auritus	Hemiechinus auritus	Hemiechinus auritus
3.	—	megalotis	megalotis	megalotis
4.	—	Paraechinus aethiopicus	Paraechinus aethiopicus	Paraechinus aethiopicus
5.	Erinaceus macracanthus	hypomelas	hypomelas	hypomelas
6.	—	Sorex minutus	Sorex minutus	Sorex minutus
7.	—	Neomys anomalus	—	Neomys anomalus .....[1]
8.	Crocidura fumigata	Crocidura russula	Crocidura russula	Crocidura russula
9.	—	leucodon	lasiura leucodon	leucodon
10.	—	suaveolens	suaveolens	suaveolens
11.	—	pergrisea	pergrisea	pergrisea
12.	Sorex gmelini	Suncus etruscus	Suncus etruscus	Suncus etruscus
13.	—	Talpa caeca	Talpa caeca	Talpa caeca
14.	—	—	—	streetorum .....[1]
15.	—	Rhinopoma hardwickei	Rhinopoma hardwickei	Rhinopoma hardwickei
16.	—	microphyllum	—	microphyllum [1]
17.	Cynonycteris amplexicaudata	Rousettus arabicus	Rousettus arabicus	Rousettus aegyptiacus
18.	—	Taphozous kachhensis	—	Taphozous nudiventris
19.	—	Rhinolophus euryale	—	Rhinolophus euryale .....[1]
20.	—	blasii	—	blasii .....[1]
21.	—	hipposideros	Rhinolophus hipposideros	hipposideros
22.	Rhinolophus ferrumequinum	ferrumequinum	ferrumequinum	ferrumequinum
23.	—	Asellia tridens	Asellia tridens	Asellia tridens
24.	Triaenops persicus	Triaenops persicus	Triaenops persicus	Triaenops persicus
25.	—	Myotis mystacinus	—	Myotis mystacinus
26.	—	capaccinii	—	capaccinii .....[1]
27.	Vespertilio murinus	myotis	Myotis myotis Vespertilio murinus	blythi
28.	—	nattereri	—	nattereri
29.	emarginatus	emarginatus	Myotis emarginatus	emarginatus
30.	—	Pipistrellus pipistrellus	Pipistrellus pipistrellus	Pipistrellus pipistrellus
31.	Vesperugo (Pipistrellus) marginatus leucotis	kuhli	kuhli	kuhli
32.	—	? coromandra	? coromandra	kuhli
33.	—	mimus	—	mimus

TABLE 1.—Species Reported in the Principal Works on the Mammalian Fauna of Iran (*Continued*)

	Blanford, 1876	Ellerman and Morrison-Scott, 1951	Misonne, 1959	Present Paper
34.	Vesperus serotinus	Eptesicus serotinus	Eptesicus serotinus	Eptesicus serotinus
	Shirazensis			
	Mirza			
35.	—	nilssoni	—	nilssoni [1]
36.	—	nasutus	nasutus	nasutus
37.	—	bobrinskii	—	bobrinskii
38.	—	Vespertilio murinus	—	Vespertilio murinus [1]
39.	—	Otonycteris hemprichii	Otonycteris ? hemprichii	Otonycteris ? hemprichii
40.	—	Barbastella leucomelas	—	Barbastella leucomelas [1]
41.	Plecotus auritus	Plecotus auritus	Plecotus auritus	Pleocuts auritus
42.	—	Miniopterus schreibersi	Miniopterus schreibersi	Miniopterus schreibersi
43.	Lagomys rufescens	Ochotona rufescens	Ochotona rufescens	Ochotona rufescens
44.	—	daurica	daurica	daurica
45.	—	Lepus capensis	Lepus capensis	Lepus capensis
46.	Lepus Caspius ?	europaeus	europaeus	capensis
47.	craspedotis	arabicus	arabicus	capensis
48.	Sciurus fulvus	Sciurus anomalus	Sciurus anomalus	Sciurus anomalus
49.	palmarus	Funambulus pennanti	Funambulus pennanti	Funambulus pennanti
50.	—	Spermophilopsis leptodactylus	Spermophilopsis leptodactylus	Spermophilopsis leptodactylus
51.	Spermophilus concolor	Citellus fulvus	Citellus fulvus	Spermophilus fulvus
52.	—	Calomyscus bailwardi	Calomyscus bailwardi	Calomyscus bailwardi
53.	Cricetus phaeus	Cricetulus migratorius	Cricetulus migratorius	Cricetulus migratorius
	isabellinus			
54.	nigricans	Mesocricetus auratus	Mesocricetus brandti	Mesocricetus auratus
55.	Arvicola amphibius	Arvicola terrestris	Arvicola terrestris	Arvicola terrestris
56.	—	Pitymys subterraneus	Pitymys subterraneus	Pitymys subterraneus
57.	mystacinus	Microtus arvalis	Microtus arvalis	Microtus arvalis
58.	socialis	socialis	socialis	socialis
59.	—	guentheri	—	socialis
60.	—	irani	irani	socialis
61.	—	nivalis	—	nivalis [1]
62.	—	Ellobius fuscocapillus	Ellobius fuscocapillus	Ellobius fuscocapillus
63.	—	lutescens	lutescens	fuscocapillus
64.	Gerbillus nanus	Gerbillus nanus	Gerbillus nanus	Gerbillus nanus
65.	—	cheesmani	Gerbillus cheesmani	cheesmani
66.	Gerbillus Indicus	Tatera indica	Tatera indica	Tatera indica
	taeniurus ?			

TABLE 1.—Species Reported in the Principal Works on the Mammalian Fauna of Iran (*Continued*)

	Blanford, 1876	Ellerman and Morrison-Scott, 1951	Misonne, 1959	Present Paper
67.	Gerbillus Persicus	Meriones persicus	Meriones persicus	Meriones persicus
68.	erythrurus	libycus	libycus	libycus
69.	—	vinogradovi	vinogradovi	vinogradovi
70.	—	crassus	crassus	crassus
71.	—	blackleri	blackleri	tristrami
72.	—	meridianus	meridianus	meridianus
73.	Gerbillus hurrianae	hurrianae	hurrianae	hurrianae
74.	—	Rhombomys opimus	Rhombomys opimus	Rhombomys opimus
75.	Mus erythronotus	Apodemus sylvaticus	Apodemus sylvaticus	Apodemus sylvaticus
76.	rattus	Rattus rattus	Rattus rattus	Rattus rattus
77.	decumanus	norvegicus	norvegicus	norvegicus
78.	bactrianus sylvaticus	Mus musculus	Mus musculus	Mus musculus
79.	—	Acomys cahirinus	Acomys cahirinus	Acomys demidiatus
80.	Nesokia Huttoni	Nesokia indica	Nesokia indica	Nesokia indica
81.	Sciurus Persicus	Glis glis	Glis glis	Glis glis
82.	Myoxus pictus	Dryomys nitedula	Dryomys nitedula	Dryomys nitedula
83.	Dipus Loftusi	Jaculus jaculus	Jaculus jaculus	Jaculus jaculus
84.	macrotarsus?	blanfordi	blanfordi	blanfordi
85.	Alactaga (sic) Indica	Allactaga elater	Allactaga elater	Allactaga elater
86.	—	williamsi	williamsi	williamsi
87.	—	hotsoni	hotsoni	hotsoni
88.	—	Alactagulus pumilio	Alactagulus pumilio	Alactagulus pumilio
89.	Hystrix cristata	Hystrix indica	Hystrix indica	Hystrix indica
90.	Canis aureus	Canis aureus	Canis aureus	Canis aureus
91.	lupus	lupus	lupus	lupus
92.	Vulpes Karagan Persicus famelicus	Vulpes vulpes	Vulpes vulpes	Vulpes vulpes
93.	—	cana	cana	cana
94.	—	corsac	corsac	corsac
95.	—	rüppelli	rüppelli	rüppelli
96.	U. sp.	Selenarctos thibetanus	Selenarctos thibetanus	Selenarctos thibetanus
97.	Ursus arctos syriacus	Ursus arctos	Ursus arctos	Ursus arctos
98.	—	Mustela nivalis	Mustela nivalis	Mustela nivalis
99.	—	Vormela peregusna	Vormela peregusna	Vormela peregusna
100.	—	Martes martes	Martes martes	Martes martes

TABLE 1.—Species Reported in the Principal Works on the Mammalian Fauna of Iran (*Continued*)

	Blanford, 1876	Ellerman and Morrison-Scott, 1951	Misonne, 1959	Present Paper
101.	Mustela Sarmatica?	foina	foina	foina
102.	—	Mellivora capensis	Mellivora capensis	Mellivora capensis
103.	Meles canescens	Meles meles	Meles meles	Meles meles
104.	Lutra vulgaris	Lutra lutra	Lutra lutra	Lutra lutra
105.	—	Herpestes edwardsi auropunctatus	Herpestes edwardsi auropunctatus	Herpestes edwardsi auropunctatus
106.	Herpestes Persicus	Hyaena hyaena	Hyaena hyaena	Hyaena hyaena
107.	Hyaena striata	Felis libyca	Felis libyca	Felis catus
108.	Felis catus	chaus	chaus	chaus
119.	chaus	manul	—	manul
110.	—	lynx	—	Lynx lynx
111.	—	caracal	caracal	caracal
112.	caracal	Panthera tigris	Panthera tigris	Felis tigris
113.	tigris	pardus	pardus	pardus
114.	pardus	leo	leo	leo
115.	leo	uncia	uncia	uncia
116.	uncia	Acionyx jubatus	Acionyx jubatus	Acionyx jubatus
117.	jubata	Phoca caspica	Phoca caspica	Phoca caspica
118.	Phoca vitulina	Sotalia plumbea	—	Sotalia plumbea
129.	—	Equus hemionus	Equus hemionus	Equus hemionus
120.	—	Sus scrofa	Sus scrofa	Sus scrofa
121.	Sus scrofa	Dama mesopotamica	Dama mesopotamica	Dama mesopotamica
122.	Cervus dama	Cervus elaphus	Cervus elaphus	Cervus elaphus
123.	maral caspius			
124.	Capreolus capraea	Capreolus capreolus	Capreolus capreolus	Capreolus capreolus
125.	Gazella Bennetti fuscifrons	Gazella gazella	Gazella gazella	Gazella gazella
126.	subgutturosa	subgutturosa	subgutturosa	subgutturosa
127.	?G. dorcas	leptoceros	leptoceros	leptoceros
128.	Capra aegagrus	Capra hircus	Capra hircus	Capra hircus
129.	Ovis cycloceros Gmelini	Ovis orientalis	Ovis orientalis	Ovis ammon
130.	—	laristanica	laristanica	ammon

[1] Recorded from Iran for the first time in the present paper.

IRSNB—Institute Royale Sciences Naturelles Belge, Brussels
KAUM—Karaj Agricultural University Museum, Karaj
MCZ—Museum of Comparative Zoology, Cambridge, Massachusetts
MHNP—Museum National d'Histoire Naturelle, Paris
NMV—Naturhistorisches Museum, Vienna
SMNS—Staatlichen Museum fur Naturkunde, Stuttgart
USNM—United States National Museum, Washington
YPM—Yale Peabody Museum, New Haven, Connecticut

Range: An estimate of the probable range of the species in Iran is given under this heading when the locality records provide a sufficient basis. The locality data from recent faunal studies of countries adjacent to Iran, which suggest that species recorded from Iran may exist in areas of Iran where they presently are unknown are also treated here.

The paragraph entitled *Remarks* may include any of the following topics as appropriate: announcements of species first recorded here to occur in Iran, comments regarding earlier records, what we learned of the habits and habitat of the species of Iran, information regarding the origin of certain specimens, and any other information originating from this study. Nonpregnancies reported imply only careful visual examination at 10× magnification in the fresh condition without sectioning.

A category headed *Taxonomic Remarks* is provided in the accounts of those species in which the taxonomy could be improved by observations made during this study.

Erinaceus europaeus Linnaeus European Hedgehog

Erinaceus europaeus Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 52.

Type locality.—Sweden: South Gothland Island; Wamlingo.

Distribution.—

PREVIOUS: None.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** Maku, 2; vicinity of Rezaiyeh, 6.

ADDITIONAL SPECIMENS: **Lurestan:** city of Kermanshah, 1 (FMNH 92894); Bijaneh village, 1 (FMNH 92893).

RANGE: The above listing constitutes the first verifiable records of this hedgehog to be reported from Iran. Vereshchagin (1959, p. 645) maps an Iranian locality (seemingly Khvoy, Azarbaijan)

for this species but as for all the Iranian localities he shows (for this and all other species that he treats), he provides no further information in his text. The records cited above, those mapped by Vereshchagin (*loc. cit.*) in Soviet territory, and those of Hatt (1959, p. 26) from northeastern Iraq suggest that the range of *E. europaeus* may penetrate most of Azarbaijan and extend southeast through the Zagros mountains at least to Kermanshah, Lurestan.

Remarks.—These hedgehogs were common around Rezaiyeh. Several specimens originated from the barren flats northeast of Rezaiyeh and we acquired others from the gardens near our camp 10 km. southwest of this city. Maku specimens came from gardens. Local inhabitants reported that these animals tend to congregate around gardens and vineyards and feed on snakes. Several individuals maintained in captivity readily ate flesh of collected birds. Hedgehog tracks in the dust often led to and from rock outcrops or piles, which possibly provided refuge. Females taken, three in mid-September and two in early October, contained no embryos. Two individuals taken 10 km. southwest of Rezaiyeh in mid-September were juveniles, one about one-half, the other one-fourth, grown.

Hemiechinus megalotis Blyth Afghan Hedgehog

Erinaceus megalotis Blyth, 1845, J. Asiat. Soc. Bengal, **14**, p. 353 (footnote).

Type locality.—Afghanistan: Kandhar.

Distribution.—

PREVIOUS: Satunin (1906, p. 182) **Kerman:** (Seistan) Hussein Abad village.

STREET EXPEDITION SPECIMENS: **Kerman:** 24 km. southwest of Zabol, 17 (1 skeleton, 1 in alcohol).

RANGE: This hedgehog is presently recorded only from the Seistan Basin.

Remarks.—A very large population of *H. megalotis* existed in the vicinity of our camp in Seistan. When word spread that the expedition paid premium prices for hedgehogs the local populace brought in more than 50 specimens in two days. *H. megalotis* took refuge by day in shallow burrows in the ground or beneath mud walls or stacks of camel thorn fodder. The only free-living individual that I observed roamed across the open plain late one night. It did not seem the least bit shy of my approach. Only when touched did it ball up,

and then only partially. None of three females taken contained embryos. A number of individuals maintained in captivity ate bird and mouse flesh, but did not thrive on this diet.

Hemiechinus auritus Gmelin Long-eared Hedgehog

Erinaceus auritus Gmelin, 1770, Nov. Comment. Acad. Sci. Petrop., **14**, p. 519.

Type locality.—USSR: Astrakan Oblast; Astrakhan.

Distribution.—

PREVIOUS: Satunin (1906, p. 184), **Khorassan:** Guljander. Misonne (1959, p. 23), **Kurdistan:** Aghbolagh Morched.

STREET EXPEDITION SPECIMENS: **Gorgan:** 3.2 km. north of Pahlavi Dezh, 2 (1 skin only). **Khorassan:** 3 km. south of Shahrabad Kaur, 1; **Khuzistan:** 19.3 km. south of Shush, 1.

ADDITIONAL SPECIMENS: **Khorassan:** Mashhad, 1 (BM 8.6.10.1). **Qazvin:** vicinity of Karaj, 4 mounted specimens (KAUM).

RANGE: These new specimens extend the known range of this hedgehog over most of northeastern Iran and into Iranian Khuzistan, although not unexpectedly, for it occurs widely in the adjacent parts of Iraq (Hatt, 1959, p. 26). The specimen from south of Shush extends the range about 100 km. eastward from Amara, the nearest of the Iraq localities given by Hatt (*loc. cit.*).

Remarks.—We did not find *H. auritus* abundant anywhere in Iran. Neither of two females collected 10 November and 20 January contained embryos. The Shush individual was taken from a shallow burrow, evidently its own, in the Karkheh River flood plain. We picked up two dried skin shells, one with the skull virtually intact, on the Turkmen desert 3.2 km. north of Pahlavi Dezh. These animals possibly fell prey to foxes, *Vulpes vulpes*, or wild cats, *Felis catus*, which we found abundant in the area.

Paraechinus hypomelas Brandt Brandt's Hedgehog

Erinaceus hypomelas Brandt, 1836, Bull. Sci. St. Petersburg, **1**, p. 32.

Type locality.—Northern Persia.

Distribution.—

PREVIOUS: Brandt (1836, p. 32 [orig. not seen]) Northern Persia "Land der Turkmanner" [probably Turkman Plain north of Gorgan], see Ognev, 1927, pp. 210–11. Blanford (1876, p. 27),

Kerman: Dizak; Mahum; Kerman. Wroughton (1920, p. 317), **Kerman:** Sib; Chabahar. Cheesman (1921, p. 579), **Fars:** Shiraz. Thomas (1922b, p. 142), **Persian Gulf:** Tumb Island.

STREET EXPEDITION SPECIMENS: **Fars:** vicinity of Ahram (partial skin, complete skull and skeleton).

ADDITIONAL SPECIMENS: **Kerman:** Boliabad, 15 miles east of Kerman (BM 13.11.19.1). **Persian Gulf:** Kharz Island (BM 26.7.42).

RANGE: With the exception of Brandt's record from the Turkmen plains (the species ranges widely in adjacent Turkmen SSR, Ognev, 1928, pp. 155–156) all the other Iranian localities lie south of the latitude of Kerman, Kerman. The wide distribution given for *P. hypomelas* by Ellerman and Morrison-Scott (1951, p. 28) provides reason to believe that the range of species possibly includes a larger part of Iran than presently known.

Remarks.—The Street Expedition specimen was found in a mummified condition in a dry ditch.

Neomys anomalus Cabrera Water Shrew

Neomys anomalus Cabrera, 1907, Ann. Mag. Nat. Hist. (ser. 7), **20**, p. 214.

Type locality.—Spain: Madrid; San Martin de la Vega.

Distribution.—

PREVIOUS: None.

STREET EXPEDITION SPECIMENS: **Gorgan:** 16 km. ESE of Gorgan, 1 (body in alcohol).

RANGE: This species is known in Iran only from the above locality.

Remarks.—This specimen, the first of *N. anomalus* recorded from Iran, was trapped beside a small, swift-flowing brook in deciduous forest at an altitude of approximately 300 m. Vereshchagin (1959, p. 646) maps the range of "*Neomys fodiens* Schr. (*s. lato*)" in Transcaucasia. His locality that seemingly is in Nakhichevan ASSR on the upper part of the Nakhichevan Chay (= River] lies closest of all his records to Iran. Two localities are shown for Kars District, Turkey at the headwaters of the Kura River near the village of Okam. Fourteen of the sixteen localities shown by Vereshchagin lie south of the Caucasus Mountains. Ellerman and Morrison-Scott (1951, p. 61)

consider that *N. anomalus* is the water shrew of Asia Minor and the Mediterranean area. Ellerman and Morrison-Scott (*op. cit.*) and Gromov, *et al.* (1963, p. 104) state that the southern limit of *Neomys fodiens* extends to northern Caucasia, skirting along the northern edge of the Caucasus Mountains. It thus seems possible that Vereshchagin's (*loc. cit.*) Transcaucasian and Turkish localities and the specimen Thomas (1905, p. 522) lists as *N. fodiens* from Turkey, 25 miles north of Erzerum, represent *N. anomalus*, though I have not examined the specimens. The Nakhichevan Chay *Neomys* locality, closest of the places enumerated above, lies approximately 840 km. (about 520 miles) west-northwest of the Iranian locality. Our Iranian record now constitutes the easternmost point in the present known range of *N. anomalus*.

Crocidura russula Hermann Common White-toothed Shrew

Suncus russulus Hermann, 1780, *in* Zimmermann, Geog. Gesch., **2**, p. 382.

Type locality.—France: Bas-Rhin, near Strasbourg.

Distribution.—

PREVIOUS: De Filippi (1863, p. 379), **Tehran:** Tehran. Thomas (1907, p. 197), south coast of the Caspian Sea. Misonne (1959, p. 24), **Ghilan:** Ramsar. **Kurdistan:** Akinlou.

STREET EXPEDITION SPECIMENS: **Mazanderan:** 12 km. west of Chalus, 9 (1 in alcohol); Varangrud, 3 (1 in alcohol). **Gorgan:** 16 km. east-southeast from Gorgan, 15 (4 in alcohol). **Azarbaijan:** 2 km. west, 2 km. north of Maku, 1; 29 km. east of Khvoy, 1; 37 km. south-southeast of Rezaiyeh, 1. **Lurestan:** Faraman village, 2.

ADDITIONAL SPECIMENS: **Ghilan:** Resht (BM 19.6.10.4 and 19.8.5.1); Tula Rud in Talish Mountains (BM 19.11.17.2). **Lurestan:** Faraman, C. A. Reed field no. 514—specimen is deposited in the Peabody Museum but is uncatalogued.

RANGE: *Crocidura russula* is presently known to range through the Elburz Mountains between Gorgan, Gorgan, and Rasht, Ghilan; from several localities in Azarbaijan thence south through the Zagros Mountains at least to Kermanshah, Lurestan. The numerous localities shown by Vereshchagin (1959, p. 647) for Transcaucasia suggest that this shrew will be found to occur much more widely in Iranian Azarbaijan.

Remarks.—This shrew was commonly taken around rotting logs in the forest southeast of Gorgan. West of Chalus we caught *C. rus-*

sula in abandoned or seldom used buildings along forest edge. In one of these buildings two of these shrews were caught in a single snap trap. The specimens trapped at Varangrud in the Elburz Mountains at 2742 m. came from in and around an abandoned house surrounded by a thicket of weeds. A very dense population of ant lion-like insect larvae existed in the house at the time the shrews were trapped there. The specimens from Azarbaijan localities were all trapped in thick grass near water. Two of these specimens were caught at the entrance of seemingly abandoned burrows of *Arvicola terrestris*. The specimens from Faraman inhabited tangles of blackberry vines in the marsh situation along the Qareh Su River (see p. 69 text).

Taxonomic Remarks.—Oldfield Thomas (1907, p. 197) described *Crocidura russula caspica* from the "south coast of the Caspian Sea," Iran, on the basis of a single specimen. Ellerman and Morrison-Scott (1951, p. 80) remarked, "It is possible that this little-known form represents *C. lasiura*." Misonne (1959, p. 24) states "Morrison-Scott (1952 [sic], p. 80) suggère que cette form est en realité un representant de *C. lasiura*; ceci est confirmé par une série de cinq specimens que j'ai capturés à Ramsar. . . ." Misonne, however, fails to say why his five specimens confirm that the shrew of the south Caspian coast is *C. lasiura*, and he adds that the skulls of all five specimens are broken.

The assertion that *C. lasiura* occurs in Asia Minor, the Caucasus, and northern Iran stems from Bobrinsky *et al.* (1944, pp. 57–58). These authors state that *C. lasiura* is divided into two well-marked subspecies: *C. l. lasiura* Dobson in the "eastern part of the range," shown in their map no. 8, and *C. l. lasia* Thomas in the "Irano-Caucasus part of the range." The eastern part of the "range" is limited to northeastern China and Korea some 6000 km. from the western part, and no specimens have been recorded between the eastern and western populations.

The problem, however, is more deeply rooted. Thomas (1906, pp. 416–417) had described another form, *C. leucodon lasia* from near Trebizond, northeastern Turkey. Later, Thomas (1907, p. 199) decided that *C. leucodon lasia* constituted a distinct species, and it thus became *C. lasia*. Ognev (1928, pp. 327–334) agreed with Thomas that *C. lasia* was a distinct species and provided the range for it in Turkey, Caucasia, and northern Iran which Bobrinsky *et al.* later (1944, p. 57) repeat for "*C. l.* [=*lasiura*] *lasia*." Ellerman and Morrison-Scott (1951, p. 84) followed Bobrinsky *et al.* (1944) in recogniz-

TABLE 2.—Measurements of Shrews of the Genus *Crocidura* Collected by the Street Expedition and Other Specimens Studied

(Measurements provided are the means and extremes in mm. unless the sample is two or less)

Name	Locality	Sample size	Total length	Tail length	Hind foot length	Greatest length of skull
C. pergrisea	Kerman Province: 24 km. SW Zabol	5 skins 4 skulls	104.2 (101–110)	44.2 (40–48)	12.6 (11–14)	18.3 (17.7–18.7)
C. suaveolens	Khorassan Province: 5 km. N Dasht; 3 km. S Shahrabad Kaur	3 skins 3 skulls	97 (93–100)	33 (32–34)	12.0 (12–12)	17.4 (16.5–18.1)
C. leucodon	Khorassan Province: 5 km. N Dasht; 3 km. S Shahrabad Kaur	6 skins 5 skulls	113.7 (105–120)	41.1 (39–44)	14 (13–15)	21.1 (20.8–21.4)
C. leucodon[1]	TURKEY: Scalita	3 skins 3 skulls	122 (116–127)	39.3 (36–42)	14, 14, 14	21.2 (20.5–21.6)
C. russula[2]	Ghilan Province: Rasht	2 skins 2 skulls	127, 132	43, 45	14, 14	20.6, 21.1
C. russula	Mazanderan Province: 12 km. W Chalus	8 skins 4 skulls	118.4 (110–126)	41.1 (37–46)	14.3 (13–15)	20.9 (20.3–21.5)
C. russula	Gorgan Province: 16 km. ESE Gorgan	12 skins 10 skulls	108 (102–117)	40.7 (35–45)	13.0 (11–14)	19.3 (17.9–20.2)
C. russula	Azarbaijan Province: Maku	1 skin 1 skull	119	45	13	19.5
C. russula	Azarbaijan Province: 23 km. SSE Rezaiyeh	1 skin 1 skull	120	46	14	19.3

TABLE 2.—Measurements of Shrews of the Genus *Crocidura* Collected by the Street Expedition and Other Specimens Studied (*continued*).

(Measurements provided are the means and extremes in mm. unless the sample is two or less)

Name	Locality	Sample size	Total length	Tail length	Hind foot length	Greatest length of skull
C. russula	Azarbaijan Province: 29 km. E Khvoy	1 skin 1 skull	101	42	14	18.4
C. russula	Lurestan Province: Faraman	2 skins 2 skulls	103, 107	43, 49	14, 14	18.7, 19.4
C. russula	Tehran Province: Varangrud	2 skins 2 skulls	105, 122	42, 39	12, 14	18.6, 19.2
C. russula[3]	IRAQ: Erbil Liwa: Almawan; Salaheddin	2 skins 4 skulls	111, 114	40.5, 45	15, 14	19.2 (18.4–20.1)
C. russula[4]	TURKEY: Lake Emir: Sapanca; Hatay	10 skins 9 skulls	114.7 (109–126)	42.2 (36–51)	14 (13–15)	19.0 (18.6–19.5)
C. lasiura[5]	CHINA: Manchuria: Kirin Prov.: Hsiaoling	2 skins 2 skulls	135, —	41, —	10(?), —	21.7, 23.1
C. lasiura	Gromov *et al.* 1963, p. 119		127–132	37–42	14.5–16.4	21.5–25.0 Condylobasal length, which in this case is very slightly less than greatest length.

[1] Topotypes of *C. leucodon lasia* Thomas, British Museum specimens: 6.3.6.8; 6.3.6.207; 6.3.6.208.

[2] BM (NH) specimens: 19.6.10.4; 19.8.5.1.

[3], [4], [5] FMNH specimens.

ing the southwest Asian form as *C. lasiura lasia*. Gromov *et al.* (1963, p. 114) nevertheless treat this form as a subspecies of *C. leucodon* as originally described.

I have compared three (BM 6.3.6.8, 6.3.6.207 and 6.3.6.208) of the original seven specimens on which Thomas based his description of *C. leucodon lasia* with Iranian specimens of *C. leucodon* from 5 km. north of Dasht (FMNH 96396, 96397), which lies 390 km. northeast of the type locality of *C. leucodon persica* Thomas in an area which seemingly is ecologically identical to the type locality, and from 3 km. south of Shahrabad Kaur (FMNH 96393, 96404 and 96408), which lies about 70 km. east of Dasht in slightly drier country. Additional comparisons of the *C. leucodon lasia* specimens were made with specimens of *Crocidura lasiura* (FMNH 46030, 49924) from Kirin Province, North Manchuria, China, as well as with *C. leucodon leucodon* from Munich, Germany (FMNH 66218, 66224) and Nieder-Osterreich, Austria (FMNH 65383). In all the examples of the species *C. leucodon* the white underparts are clearly set off from the dark brown dorsal region, the tails are sharply bicolor, and the white hairs cover the dorsal parts of all four feet. The specimens of *C. lasiura*, in contrast, possess dark underparts *not* sharply set off from the darker dorsal pelage, an *indistinctly* bicolor tail that is quite broad basally, and *dark brown* hairs thickly covering the upper surfaces of fore and hind feet. These observations reveal that Thomas' (1907) original placement of his subspecies *lasia* in the species *leucodon* was correct. They also remove part of the basis for supposing *C. lasiura* to occur in western Asia.

The available study material in 1951 and prior to that time was less than now, and since Ellerman and Morrison-Scott (1951, p. 84) had accepted the range that Bobrinsky *et al.* (1944, pp. 57–58) gave for *C. lasiura*, it was logical that they suggest that *C. russula caspica* might possibly represent *C. lasiura*, for it resembles *C. lasiura* more closely than does *C. leucodon lasia*.

Before me is a series of 30 specimens of *Crocidura russula* from the following four localities that span the south coast of the Caspian Sea: Rasht, Ghilan Province (BM 19.6.10.4, 19.8.5.1); 12 km. west of Chalus, Mazanderan Province (FMNH 96369–96377), 16 km. east-southeast of Gorgan, Gorgan Province (FMNH 96381–96395); and Ramsar, Ghilan Province (IRSNB 9871–9874, kindly sent to me by Dr. X. Misonne). The gray or white, thinly-haired fore and hind feet, the comparatively scantily-haired tail, clearly distinguish these south Caspian shrews from *C. lasiura*, in which total length and great-

est length of skull average larger than those of *C. russula*. The lighter underparts not sharply demarked from dark dorsal fur in this series shows these specimens to be *C. russula* and not *C. leucodon* (Miller, 1912, pp. 89, 100; Ognev, 1928, pp. 304, 319).

In summary, the materials listed above as *Crocidura leucodon lasia* Thomas do represent the species *C. leucodon*, and those listed above as *C. russula caspica* Thomas represent the species *C. russula*. Both of the preceding species are distinctly different from *C. lasiura*. The range given by Gromov *et al.* (1963, p. 120) as Northeastern China, the Korean peninsula and the Primorsk district of the USSR and not the two-parted range provided by Ellerman and Morrison-Scott (1951, p. 84) is therefore correct for *C. lasiura*.[1]

The measurements of *Crocidura* species in Iran provided in Table 2 show that *C. suaveolens* is readily distinguished from *C. leucodon* on a size basis, *C. leucodon* being the larger in the four characters listed, with no overlap. On a size and color basis *C. suaveolens* is very similar to *C. pergrisea*, but the latter has a much longer tail. *C. russula* is readily separable from the three preceding species by its lack of a sharply bicolor pelage.

Crocidura leucodon Hermann Bicolor White-toothed Shrew

Sorex leucodon Hermann, 1780, *in* Zimmermann, Geog. Gesch., 2, p. 382.

Type locality.—Eastern France: Bas-Rhin; Strasbourg.

Distribution.—

PREVIOUS: Thomas (1907, p. 198), Elburz Mountains near Demavend, at 6500 feet. Ognev (1928, p. 334), **Azarbaijan:** Malla-Kala. Goodwin (1940, p. 2), **Khorassan:** Dasht.

STREET EXPEDITION SPECIMENS: **Gorgan:** 14.5 km. north, 1.6 km. west of Gorgan, 2 (in alcohol). **Khorassan:** 4.8 km. north of Dasht, 2; 3 km. south of Shahrabad Kaur, 5 (1 in alcohol).

RANGE: This species ranges through the Elburz Mountains from Mt. Demavend (at 6500 ft.) eastward to Shahrabad Kaur (ca. 4500 ft.), across the Turkman Plain and is known from a single locality in northern Azarbaijan. Hatt (1959, p. 27) records it from Sarsank, Iraq (see *Remarks*), on which basis one might expect it to occur in adjacent areas of the Iranian Zagros.

[1] Bobrinsky, *et. al.* (1965, pp. 75–76, map 15) show *lasiura* to occur only in the eastern Primorsk part of their 1944 range and recognize *C. lasia* as a species known only from the type locality.

Remarks.—The two specimens from the Turkmen Plains north of Gorgan were salvaged from the stomach of a wild cat, *Felis catus*. Additional examples were trapped around fallen logs in deciduous forest north of Dasht. At Shahrabad Kaur we trapped this species in thick jube side growth around old burrows, probably of *Arvicola*. *Crocidura suaveolens* and *C. leucodon* were taken together in the oak forest at Dasht and Shahrabad Kaur. Females of *leucodon* trapped November 3, 5, and 7 contained no embryos.

Hatt (1959, p. 28) identified two shrews (FMNH 84446, 84447) collected by Reed near Salahuddin, Iraq, as *C. leucodon*. These specimens lack the sharp bicolor pattern of *C. leucodon* and are indistinguishable from *C. russula* of the adjacent parts of Lurestan and Azarbaijan Provinces, Iran. These shrews represent *C. russula* and are the first record of this species for Iraq.

Crocidura suaveolens Pallas

Lesser Bicolored White-toothed Shrew

Sorex suaveolens Pallas, 1811, Zoogr. Ross. As., **1**, p. 133, pl. 9, fig. 2.

Type locality.—USSR: Crimea; Khersones.

Distribution.—

PREVIOUS: Goodwin (1940, pp. 1–3), **Gorgan:** Dar Kaleh, ca. 40 km. east of Astrabad; Turkmen Plains, ca. 60 km. northeast of Astrabad. Ognev and Heptner (1928, p. 259), **Khorassan:** Tchai tributary of the Giurgen River in the vicinity of St. Koundus.

STREET EXPEDITION SPECIMENS: **Khorassan:** 4.8 km. north of Dasht, 1; 3 km. south of Shahrabad Kaur, 2.

ADDITIONAL SPECIMENS: **Gorgan:** Dach Bouroun (MHNP 754; 755).

RANGE: *C. suaveolens* occurs on the northern slopes of the eastern Elburz Mountains and in the Turkmen Plains.

Remarks.—Because we trapped this species alongside *C. leucodon*, it apparently occupies the same habitat (cf. p. 128), but we took it less frequently. Petter noted (on specimen labels) that the two MHNP specimens he caught at Dach Bouroun were living in the burrow systems of *Rhombomys opimus*. A female taken November 8 carried no embryos.

Harrison (1956b, p. 261) lists a specimen of *C. suaveolens* from Bebaidi, Iraq near Amadia. If this identification is correct, one might expect its range to continue into the adjacent Zagros region

of Iran. Doubt as to its correctness stems from Harrison's description, "uniform dark brown above with a greyish belly, not sharply delimited" and his failure to provide other than hind foot measurements (11.4 mm.). I show in Table 2 that adult Iranian *C. suaveolens* are usually smaller in total length and greatest length of skull (though some overlap in these measurements exists) than adult *C. russula*, and show a sharp line of demarcation between white ventrally and dark gray brown dorsally. The tail of *C. suaveolens* is consistently shorter than that of *C. russula* in the sample examined (cf. Table 2). Grayish belly not sharply delimited from the color of the upper parts is characteristic of a series of *C. russula* (see species account, p. 127) from the Zagros Mountains of Azarbaijan and Lurestan Provinces. It seems very possible that Harrison's (*loc. cit.*) *C. suaveolens* will be found to be a small *C. russula*.

Crocidura pergrisea Miller Pale Gray Shrew

Crocidura pergrisea Miller, 1913, Proc. Biol. Soc. Wash., **26**, p. 113.

Type locality.—Kashmir, 9500 feet: Skoro Loomba; Shigar, Baltizan.

Distribution.—

PREVIOUS: Ognev (1921, p. 338), East Persia (Baluchistan).

STREET EXPEDITION SPECIMENS: **Kerman**: (Seistan): 24 km. southwest of Zabol, 6 (1 in alcohol).

RANGE: The vagueness of Ognev's (*loc. cit.*) record makes our locality the only identifiable one for Iran. This species very possibly occurs at least throughout the Iranian portion of the Seistan Basin.

Remarks.—The series of this little known species was acquired by trapping around the cracks and holes which abounded along the bases of adobe walls. Scorpions, insects, spiders, lizards, snakes, and mice utilized these also. A female taken November 24 was not pregnant.

Suncus etruscus Savi Pygmy Shrew

Sorex etruscus Savi, 1822, Nuovo Giorn. de Litterati, Pisa, **1**, p. 60.

Type locality.—Italy: Pisa.

Distribution.—

PREVIOUS: Goodwin (1940, p. 1), **Gorgan**: Dar Kaleh.

STREET EXPEDITION SPECIMENS: **Mazanderan:** 14.5 km. north, 1.6 km. west of Gorgan, 1 (body in alcohol, skull separate).

RANGE: The two localities cited above constitute the only records of this shrew from Iran. Hatt (1959, p. 27) summarizes the Iraq records and, on the basis of these, one might expect this shrew to range into Khuzistan. Satunin (1905b, p. 109) and Vereshchagin (1959, p. 647) record this species from the Mughan Steppe of Azarbaijan SSR, which lies adjacent to Azarbaijan Province. As a small portion of the Mughan Steppe lies within Iranian territory, this species might possibly occur there.

Remarks.—We obtained our specimen, the second recorded from Iran, from the stomach of a wild cat, *Felis catus*, which was shot in the Turkmen Plain.

Talpa caeca Savi — Mediterranean Mole

Talpa caeca Savi, 1822, Nuovo Giorn. de Letterati, Pisa, **1**, p. 265.

Type locality.—Italy: near Pisa.

Distribution.—

PREVIOUS: Misonne (1959, p. 23), **Ghilan:** Khoman. **Kurdistan:** Sakkez.

STREET EXPEDITION SPECIMENS: **Mazanderan:** 12 km. west of Chalus, 4 (1 body in alcohol, 1 skeleton). **Ghilan:** Mahallat, 1 (skin only, gift of Institute Pasteur); Khoman, 1 (skin only, gift of Institute Pasteur).

RANGE: With the exception of Misonne's (*loc. cit.*) Kurdistan record (which seems questionable—see *Remarks*), this mole is known only from the coastal plain of the Caspian Sea from near Astara (see Vereshchagin, 1959, p. 645, map of *Talpa orientalis* [=*T. c. orientalis* according to Stein, 1960, p. 26]) southeast to Chalus.

Remarks.—Mole burrows appeared virtually everywhere on the floor of the mature forest and forest-littoral ecotone in the area 12 km. west of Chalus where we collected this species. Further westward we noted fresh mole burrows that possibly were made by this species in tea fields 2 km. east of Langarud, Ghilan and in the sandy tracts overgrown with scrub vegetation at several places along the road between Hashtpar and Astara.

The following information is recorded on the labels of the two skins given us by the Institute Pasteur in Iran: free living, found while digging in the fields near Khoman; free living, found while digging in the rice fields near Talech Mahalleh [=Mahallat].

In view of the discovery of the following species in Kurdistan, the specimen Missone (*loc. cit.*) reported from Saggez may prove identifiable with *Talpa streetorum.*

Talpa streetorum Lay[1] Street's Mole

Talpa streeti Lay, 1965, Fieldiana: Zool., **44**, p. 227.

Type locality.—Iran: **Kurdistan:** Hezar Darreh.

Distribution.—

PREVIOUS: Lay (1965, p. 227), Kurdistan Province: Hezar Darreh.

RANGE: Known only from the type locality.

Rousettus aegyptiacus E. Geoffroy Southwest Asian Fruit Bat

Pteropus egyptiacus Geoffroy, 1810, Ann. Mus. Hist. Nat. Paris, **15**, p. 96 (misprint), corrected to *aegyptiacus* in 1818, Description de l'Egypt, H. N. **2**, p. 134, pl. 3, fig. 2.

Type locality.—Egypt: Giza, Great Pyramid.

Distribution.—

PREVIOUS: Blanford (1876, p. 19), **Persian Gulf:** Namakdun, Island of Khism. Eisentraut (1959, p. 229), Iran: Baluchistan.

STREET EXPEDITION SPECIMENS: **Fars:** 1.6 km. west of Jahrom, 9 (1 skeleton, 2 in alcohol); Ahmad Mahmoudi, 2.

RANGE: The locality records given above and those of Ellerman and Morrison-Scott (1951, p. 92) from Sind and Karachi, W. Pakistan indicate that *R. aegyptiacus* may range across most of Iran east and south of Jahrom.

Remarks.—These bats roosted by day in limestone caves near Jahrom and Ahmad Mahmoudi. At Jahrom a colony of about 15 individuals hung clustered in the hot, humid apical chamber of the cave described on p. 82 of this text. These animals fled after slight provocation. Two were later detected hanging in almost full light

[1] The genitive plural ending *orum* corrects the inadvertent use of the genitive singular in the original description.

above the entrance of a cave some 200 m. distant from the one from which they were first flushed. One of these took flight before we could approach within gun range; the other was shot in flight. A smaller colony of five or six bats occupied the highest retreat in the ceiling of the large cave at Ahmad Mahmoudi (cf. p. 83). The stomachs of all the above specimens were empty, though ripe oranges grew abundantly nearby. *Rhinopoma hardwickei* shared both of the caves occupied by *R. aegyptiacus*. Three females taken December 31 contained no embryos.

The classification follows that of Eisentraut (1959).

Rhinopoma hardwickei Gray — Lesser Rat-tailed Bat

Rhinopoma hardwickei Gray, 1831, Zool. Misc., **1831**, p. 37.

Type locality.—India.

Distribution.—

PREVIOUS: Thomas (1913, p. 90), **Kerman:** Seistan; Thomas (1920b, p. 25), Sib. Wroughton (1920, p. 316), **Kerman:** Ispid Lamin.

STREET EXPEDITION SPECIMENS: **Kerman** (Seistan): 29 km. southwest of Zabol (Kuh-i-Kwjah), 22 (13 in alcohol). **Fars,** 4 km. WSW of Jahrom, 15 (6 in alcohol, 1 skeleton); Ahmad Mahmoudi, 3; Lake Famur, 3.

ADDITIONAL SPECIMENS: **Khuzistan:** Besha Daraz (BM 36.14. 14.22–23) Iran: Baluchistan (SMNS 4604).

RANGE: As Bisheh Deraz lies at 32°48′ north, and all of the other localities cited above lie south of the 32nd Parallel, the range of this species as now known extends across Iran south of the 33rd Parallel.

Remarks.—Although this species is known from areas east and west of Iran (Ellerman and Morrison-Scott, 1951, p. 102) it was heretofore known in Iran only from Iranian Baluchistan and Seistan. The above material collected by the Street Expedition provides the needed link to bridge this gap. These bats inhabited very dry, cool caves, and dark subterranean portions of the village excavated by archaeologists on Kuh-i-Khwaja. The colony observed November 22 at Kuh-i-Khwaja cave roosted in clusters. Individuals observed December 31 and January 1 invariably hung singly at Jahrom and Ahmad Mahmoudi. The samples preserved from these places are composed of approximately equal numbers of males and females.

When alarmed or disturbed these bats swish their long, thin tails back and forth over the back in pendulum-like motion. Single animals inhabited small caves despite the occurrence nearby of aggregations of many near Jahrom. No females examined from November 22 to January 1 carried embryos. Every individual examined contained heavy fat, but none appeared to be hibernating.

TAXONOMIC REMARKS.—

Rhinopoma hardwickei seianum

Rhinopoma muscatellum seianum Thomas, 1913, Ann. Mag. Nat. Hist. (ser. 8), **12**, p. 90.

Type locality.—Iran: Seistan.

Rhinopoma pusillum Thomas, 1920, J. Bombay Nat. Hist. Soc., **27**, p. 25.

Type locality.—Iran: Baluchistan; Sib.

Thomas described *R. m. seianum* and *R. pusillum* from single specimens. Ellerman and Morrison-Scott (1951, p. 102) accept both of these as subspecies of *Rhinopoma hardwickei.* I have compared and measured these type specimens in the British Museum.

R. h. pusillum is alleged to be distinguishable from *R. h. seianum* "by its small size, much smaller teeth and shorter tail" (Thomas, 1920b, p. 25). I noted on examination of the types of *R. h. seianum* and *pusillum* that the molars of the former showed much wear, while those of the latter showed little or no wear. This suggests that *seianum* is based on an older individual than *pusillum.* External measurements of a series of nine adult topotypes (means and extremes) of *R. h. seianum* collected by the Street Expedition and followed by Thomas' measurements of the type of *seianum* are (in mm.): total length 112.2 (104–124), 100; tail length 56.5 (52–63), 43. Four of 13 *R. h. seianum* adult topotypes that we preserved in alcohol (FMNH 96472–3, 96476, 96480) have the following tail lengths: 42, 43, 45, 46. The remainder have tail lengths of or in excess of 50. Cranial measurements of the same topotypic series (means and extremes), those of Thomas for the type of *seianum,* mine for the type of *seianum,* those of Thomas for the type of *pusillum,* and mine for the type of *pusillum* in that order are (in mm.): greatest length of skull, 16.2 (15.4–17.0), 16.3, 16.1, 15.5, 16.1; zygomatic breadth, 9.5 (9.1–9.9), 9.7, broken, 9.2, 9.5; length of maxillary tooth row C–M^3, 5.7 (5.5–5.9), 6.1, 5.8, 5.3; length M^1–M^2, 2.9 (2.7–3.0), 3.0, not taken, 2.6, not taken. These data show *R. h. pusillum* to fit into the range of variation observed among the Street Expedition's topotypic series of *R. h. seianum* in every character and even for the published cranial

measurements of Thomas which differ from those taken by me and that it should be considered a synonym of *R. h. seianum.*

Rhinopoma microphyllum Brunnich Greater Rat-tailed Bat

Vespertilio microphyllus Brunnich, 1782, Dyrenes Hist., **1**, p. 50, pl. 6, figs. 1–4.

Type locality.—Arabia and Egypt.

Distribution.—

PREVIOUS: Trouessart (1905, p. 372) lists Persia as part of the range. Cheesman (1921, p. 575), **Khuzistan:** Telespid, 3200 ft.

STREET EXPEDITION SPECIMENS: **Fars:** Ahmad Mahmoudi, 1.

RANGE: The above localities constitute the only records from Persia.

Remarks.—Our specimen inhabited a dry chamber of the cave at Ahmad Mahmoudi (cf. text p. 83) with a large number of *R. hardwickei.* The animal could scarcely fly and was captured when it fluttered weakly to the floor. This specimen, unlike its congeners of the same cave showed no body fat. Careful exploration indicated that this was the only *R. microphyllum* in the cave, although several dozen *R. hardwickei* inhabited it.

Taphozous nudiventris Cretzschmar Naked-bellied Tomb Bat

Taphozous nudiventris Cretzschmar *in* Ruppell, 1830 vel 1831, Atlas Reise Nordl. Afrika, Saugeth. 70, fig. 27b.

Type locality.—Egypt: Giza.

Distribution.—

PREVIOUS: Cabrera (1901, p. 118), **Khuzistan:** Mohammerah.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** Basket Mountain, 26 km. northeast of Rezaiyeh, 34 (13 in alcohol, 2 skeletons).

RANGE: This tomb bat is presently known only from the two localities cited above. Its abundant distribution in India south of New Delhi (Brosset, 1962, p. 54) and Iraq (Hatt, 1959, p. 29) suggests that it may occur more widely in Iran.

Remarks.—The specimens from near Rezaiyeh extend the known range of this species approximately 440 km. north of the Iraq localities given by Harrison (1956a, p. 1), which constitute, to the best of my knowledge, the previous northernmost point in the range of *T. nudiventris.*

Large numbers of this bat roosted together in the interiormost reaches of the narrow cracks in the granitic rock of Basket Mountain. The periodic calling and squealing of colonies readily led us to their locations and examples were obtained by grappling or prodding with long sticks. Bats acquired in this manner and freed just before dusk invariably returned to the cracks after a few short circles. Their orientation clicks were clearly audible on the approach to the cracks. Vocalizations from one group often elicited similar emissions from neighboring cells. They emit loud shrill shrieks when handled. Guano collected at the roosts contained the chitinous parts of small insects. Large guano piles beneath several nearby open overhangs suggest their use as roosts perhaps during the hot summer. Our specimens caught September 19 and 21 all showed extensive fat. Of more than 50 bats examined only two were females, neither pregnant.

Rhinolophus euryale Blasius Mediterranean Horseshoe Bat

Rhinolophus euryale Blasius, 1853, Arch. Naturgesch., **19** (1), p. 49.

Type locality.—Italy: Milano.

Distribution.—

PREVIOUS: None at the time this paper was accepted for publication. Etemad (1964, p. 653) has since reported a specimen from **Isfahan:** Mahallat. Aberdeen University (1965) lists specimens from **Isfahan:** Kuh Rang Area.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** Maku, 21 (9 in alcohol). **Fars:** Shahpur cave, 14 (6 in alcohol, 1 skeleton).

RANGE: This species is known in Iran only from the four localities cited above.

Remarks.—The observed colonies of this species roosted in dense clusters in moist caves. Specimens obtained in late September from the group of about 200 in the cave near Maku had accumulated much fat, the entire colony, however, remained active. The assemblage of 300 to 400 of these bats in Shahpur cave were fat but active in late December. Perhaps they do not hibernate in the warmer environs of the latter locality. In our samples, males and females occurred in almost equal numbers at both places. A few *Miniopterus schreibersi* roosted among the Maku colony of *R. euryale* but at Shahpur cave these two species occurred in the ratio of approximately one *M. schreibersi* to three *R. euryale* in completely integrated clusters. None of the females grossly examined was pregnant.

This constitutes the first record of the occurrence of this species in Iran. Etemad (1963, p. 309) wrongly lists this species from Khorassan, Iran. He unscrupulously obtained a specimen collected by this expedition. The specimen which Etemad reported was captured at Shahpur cave in Fars Province in southwestern Iran several hundred kilometers from Khorassan.

Rhinolophus blasii Peters Peters' Horseshoe Bat

Rhinolophus blasii Peters, 1866, Mber. Preuss. Akad. Wiss., 1866, p. 17.

Type locality.—Southeastern Europe.

Distribution.—

PREVIOUS: None at the time this paper was accepted for publication. Aberdeen University (1965) has since listed specimens from **Isfahan:** Kuh Rang area. Etemad (1964, p. 653) has reported a specimen from **Isfahan:** Mahallat.

STREET EXPEDITION SPECIMENS: **Khorassan:** near Shahrabad Kaur (Ganjah Kuh and Chaman Bid), 51 (30 in alcohol, 2 skeletons). **Kerman:** 1.6 km. east of Kerman, 6 (1 in alcohol).

RANGE: Known only from the above localities. This bat occupies a large range in the Middle East (Ellerman and Morrison-Scott, 1951, p. 120; Aellen, 1959, p. 370; Gromov *et al.*, 1963, p. 136), thus it can be expected to occupy a larger range in Iran.

Remarks.—These specimens represent the first records known certainly from Iran. Aellen (1955, p. 362; 1959, p. 370) includes southern Iran in the range of this bat probably on the basis of Andersen's (1905b, p. 192) record from the Mekran Coast. This locality could have been in what is now West Pakistan as likely as in Iran.

Several colonies of 100 to 500 individuals were found to be hibernating near Shahrabad Kaur in early November. One qanat aggregation there contained only *R. blasii,* but another housed both *blasii* and *R. ferrumequinum.* Ganjah Kuh cave (cf. text pp. 105–106) housed in excess of 500 bats of which *R. blasii* constituted the majority. A number of *Miniopterus schreibersi* were scattered through the compact cluster hanging from the ceiling, roughly one to every ten *R. blasii.* The *R. ferrumequinum* in this cave kept well away from this ceiling aggregation, and clung to vertical surfaces. Specimens from these colonies became active when freed in our warm tents where they fared well for several days. A group of six or eight usually hung

together beneath my cot, while others hung separately. Most of the day was passed in sleeping and preening, but at nightfall they flew about the tent. Animals allowed to fly out the tent door returned quickly, perhaps because of the coldness of the air. The Kerman series were hibernating in a fault crack (cf. text p. 86) and individuals hung spatially separated. All the hibernating chambers mentioned above were considerably warmer than the ambient temperature outside.

Rhinolophus hipposideros Bechstein Lesser Horseshoe Bat

Vespertilio hipposideros Bechstein, 1800, in Pennant, Vebers. Vierf. Thiere, 2, p. 629.

Type locality.—France

Distribution.—

PREVIOUS: Andersen (1905a, p. 138), **Kerman:** Jask. Kuzyakin (1950, p. 210), **Azarbaijan:** seemingly Rezaiyeh.

STREET EXPEDITION SPECIMENS: **Mazanderan:** 12 km. west, 2 km. south of Chalus, 17 (2 in alcohol). **Azarbaijan:** 8 km. northwest of Maku, 1.

RANGE: *R. hipposideros* is recorded from three widely separated localities in Iran. I find no verification for Aellen's (1959, pp. 366–367) statement that it has been found in northwest Iran. Satunin (1905b, pp. 101–102), Vereshchagin (1959, p. 648) and Kuzyakin (1950, pp. 209–210), however, record this species from many localities in Transcaucasia, several of which lie near the Iran-Soviet border. On the basis of the broad distribution given by Ellerman and Morrison-Scott (1951, p. 115), the Soviet range shown by Kuzyakin (1950, p. 210), Cheesman's (1920, p. 326) Iraq and Aellen's (1959, p. 336) Afghanistan records, one surmises that this species will be found to occur more widely in Iran.

Remarks.—The lesser horseshoe bats observed near Chalus roosted by day in almost totally darkened lofts or rooms of little-used barns and charcoal sheds, usually hanging individually, though in close proximity to others. They always appeared very alert and could not be caught by hand. Six of the 15 prepared skins bear the gray juvenile pelage, but are virtually adult size. That only two of the nine brown adults were males suggests that this may recently have been a maternal colony. These bats emerged and began foraging at dusk, usually along the forest edge and up and down the roads through

the forest. Our observations suggest that this may have continued well into the night. The Maku specimen hung nearly torpid entirely alone in a limestone cave (see p. 90).

Rhinolophus ferrumequinum Schreber Greater Horseshoe Bat

Vespertilio ferrum-equinum Schreber, 1774, Saugeth. **1**, p. 174, pl. 62, upper figs.

Type locality.—France.

Distribution.—

PREVIOUS: S. G. Gmelin (1774), Elburz Mountains [probably near Rasht] (see Pallas, 1778, p. 125). Murray (1884, p. 98) **Fars:** Bushire. Cheesman (1921, p. 575) **Khorassan:** Turbat-i-Haidari. **Fars:** Shiraz.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** Maku, 2 (1 in alcohol). **Khorassan:** near Shahrabad Kaur (Gangah Kuh and Chaman Bid), 21 (12 in alcohol). **Isfahan:** Galatappeh, 1.

RANGE: The above cited localities establish the range of this bat as virtually all of Iran north of the latitude of Isfahan and extending south to Shiraz. No records, however, exist from southeastern Iran.

Remarks.—One individual taken near Maku hung alone in a very dry tunnel; another specimen collected by a local boy came from "the town." This species occurred in colonies around Shahrabad Kaur, and was hibernating in mid-November. One such colony occupied the horizontal duct of a qanat at Chaman Bid. The first collecting foray into this place produced a few *R. ferrumequinum* and about 30 *R. blasii*. A later visit added 30 more bats, almost all *ferrumequinum*. At Ganjah Kuh cave (cf. text p. 106) a few *R. ferrumequinum* hibernated, but never hung in clusters. One *R. ferrumequinum* near the tunnel's outside exit, where the temperature was 10° or 20° F. colder than that deep inside, displayed unusual activity in flying about. A single individual hibernated in a horizontal qanat duct at Galatappeh. Water flowing from a warm subterranean source through this duct maintained a warm moist environment in contrast to the cold and aridity outside. The five females inspected contained no embryos. Every animal examined was excessively fat.

Asellia tridens E. Geoffroy Trident Leaf-nosed Bat

Rhinolophus tridens Geoffroy, 1813, Ann. Mus. Hist. Nat. Paris, **20**, p. 265.

Type locality.—Egypt.

Distribution.—

PREVIOUS: Anderson, J. (1881, p. 113), **Fars:** Bushire. Blanford (1888–91, p. 282), "Southern Persia."

STREET EXPEDITION SPECIMENS: **Fars:** Rabatak, 9 (all mummies); Jahrom (5 skulls only, 2 mummies).

ADDITIONAL SPECIMENS: **Khuzistan:** Shush, 1 (collection of R. E. Mumford). **Kerman:** Kerman, 3 (skulls only) (NMV 8894–5, 8895–5, 8896–5); Seistan, 1 (BM 6.1.2.1); Mekran Coast [Iran?] (BM 85.8.1368).

RANGE: The records provided above and those from southern Iraq (Hatt, 1959, p. 30), southern W. Pakistan (Siddiqi, 1961, p. 116) and southwest Afghanistan (Aellen, 1959, p. 370) suggest that the range of the trident leaf-nosed bat should include approximately the southern half of Iran.

Remarks.—We did not find this species alive. The guano and mummies abundant in late December provide an indication that these bats occupy seldom used or abandoned buildings. At Jahrom they were said to be a nuisance in many houses and the people try to eliminate the colonies by burning the bats. Jahrom residents stated that the bats return every summer, which suggests that these mammals either migrate and/or hibernate. Nearly 100 mummies lay in an abandoned mud house at Rabatak, some 50 of which were brought to camp, many in nearly perfect condition. The pelages of these individuals represented many gradations of color in the range from pale brown to bright orange.

Triaenops persicus Dobson Persian Leaf-nosed Bat

Triaenops persicus Dobson, 1871, J. Asiat. Soc. Bengal, **40** (2), p. 455, pl. 18.

Type locality.—Iran: **Fars:** Shiraz (about 4,750 ft.).

Distribution.—

PREVIOUS: Dobson (1871, p. 459), **Fars:** near Shiraz.

STREET EXPEDITION SPECIMENS: **Fars:** Ahram, 16 (1 skeleton, 5 in alcohol).

RANGE: *T. persicus* is known only from the above two localities, which presently comprise the eastern limits of the range of this genus.

Remarks.—These bats emerged at dusk and were observed flying over the country around Ahram, desert and garden. Much darting

and turning characterized their rapid flight, but specimens were noticeably wary of mist nets and when caught seldom remained entangled longer than 30 seconds. These bats may possibly roost in the cavities of the clay foothills (cf. text p. 52), in cracks in the loose bark of date palms, or in the narrow spaces between the bases of the palm's leaves. None of the females examined January 6–11 was pregnant.

Myotis mystacinus Kuhl — Whiskered Bat

Vespertilio mystacinus Kuhl, 1819, Ann. Wetterau Ges. Naturk., **4** (2), p. 202.

Type locality.—Germany.

Distribution.—

PREVIOUS: Satunin (1909b, p. 284), **Gorgan:** Astrabad. Bianki (1917, p. viii), **Gorgan:** Ashur-ade. Harrison (1963, p. 302), **Azarbaijan:** Gutur Su.

STREET EXPEDITION SPECIMENS: **Gorgan:** 8 km. north of Gorgan, 1. **Mazanderan:** Sama, 1. **Azarbaijan:** 2 km. west of Maku, 1; 10 km. and 18 km. southwest of Rezaiyeh, 2.

RANGE: The above cited localities establish the Iranian range of this species as an extremely northern part of the country with southern limits about at Gorgan, Sama, and Rezaiyeh. However, the similarity of the Zagros Mountain country south of Rezaiyeh to that which we observed around Kermanshah, Lurestan and Khurramabad, Lurestan suggests that this bat may be found to range farther to the south.

Remarks.—All five of the specimens captured flew low over and along streams or lagoons. We never observed their arrival to forage until dark, when they appeared in considerable numbers. Females were taken one each in mid-August and late September, but neither contained embryos. The individual caught 10 km. south of Rezaiyeh roosted alone in a dimly lit water-powered grist mill that was operated daily.

Myotis capaccinii Bonaparte — Long-fingered Bat

Vespertilio capaccinii Bonaparte, 1837, Faun. Ital., **1**, fasc. 20.

Type locality.—Italy.

Distribution.—

PREVIOUS: None.

STREET EXPEDITION SPECIMENS: **Fars:** 5 km. southeast of Pol-i-Abgineh, 36 (19 in alcohol, 1 skeleton).

RANGE: This species is recorded in Iran only from the above locality.

Remarks.—These specimens represent the first of this species to be reported from Iran. They came from a large colony that roosted in a vertical well shaft. These bats also occupied the hot chamber (cf. text p. 61) of Shahpur cave. Several wary individuals hung singly, and two groups, located by their periodic squeaking, were jammed into shallow small-mouthed pockets in the ceiling.

Etemad (1963, p. 309) reported a specimen of this species from Fars Province. The exact locality of its origin is provided above. He unethically obtained the specimen, together with the specimen of *Rhinolophus euryale*, which we had deposited with the Institute Pasteur of Iran with the understanding that it would not be published upon.

Myotis blythi Tomes Lesser Mouse-eared Bat

Vespertilio blythii Tomes, 1857, Proc. Zool. Soc. London, **1857**, p. 53.

Type locality.—India: Rajputana; Nasirabad.

Distribution.—

PREVIOUS: Dobson (1871, p. 461) and Cheesman (1921, p. 576), **Fars:** Shiraz. Thomas (1905, p. 521), **Isfahan:** Derbent, 50 miles west of Isfahan, 6500 ft. **Khuzistan:** near Telespid. Thomas (1907, p. 197) **Ghilan:** Elburz Mountains near Resht, 400 ft. Kuzyakin (1950, p. 246) maps three localities near the southeast extent of the Caspian Sea, one each in Mazanderan, Gorgan and Khorassan Provinces. Coon (1952, p. 244), **Mazanderan:** Hotu cave near Beshahr. Harrison (1963, p. 301) **Azarbaijan:** Guter-Su. Aberdeen University (1965) **Isfahan:** Kuh Rang area.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** 4 km. west of Maku, 1; 22 km. south southeast of Rezaiyeh, 1.

RANGE: The localities provided above define the present known range of *M. blythi* as roughly encompassing Azarbaijan, thence southward through the Zagros Mountains to Shiraz, and the Caspian coastal provinces of Ghilan and Mazanderan.

Remarks.—Both specimens roosted alone in very dry, shallow caves, one man-made. The accounts of the local populace, and guano deposits at various shelters, lend credence to their statements that

large numbers of this species inhabit the Rezaiyeh area during the summer. We observed large bats, possibly this species, flying 15–30 feet above the ground over the streamside associations at Maku and Rezaiyeh.

The classification followed for this species is that of Harrison and Lewis (1961).

Pipistrellus pipistrellus Schreber Common Pipistrelle

Vespertilio pipistrellus Schreber, 1774, Saugeth., **1**, p. 167, pl. 54.

Type locality.—France.

Distribution.—

PREVIOUS: Thomas (1907, p. 197), South coast of Caspian Sea. Vereshchagin (1959, p. 651), **Azarbaijan:** [seemingly Khvoy].

STREET EXPEDITION SPECIMENS: **Mazanderan:** Sama, 2 (1 in alcohol). **Gorgan:** 8 km. north of Gorgan, 3; 4.8 km. west of Pahlavi Dezh, 9 (6 mummies, 1 skull only).

ADDITIONAL SPECIMENS: **Mazanderan:** Barfurush (BM 27.10.26.6–8, 10–16). **Khorassan:** Gombad-i-Kabous (SMNH 4052–5).

RANGE: The range of the Pipistrelle as delimited by the above localities seems to encompass northern Azarbaijan, the south coast of the Caspian Sea and the Turkmen Plains.

Remarks.—These pipistrelles were very common at the above localities but difficult to collect. Attempts to net this species over a lagoon 8 km. north of Gorgan failed; however, shooting by spotlight produced a number of individuals the majority of which proved unfiit for preservation as specimens. These bats, with *E. serotinus*, roost in attics beneath tin roofs at Pahlavi Dezh. In late October we found only two live animals in six attics, but mummies were abundant.

Pipistrellus kuhli Kuhl Kuhl's Pipistrelle

Vespertilio kuhlii Kuhl, 1819, Ann. Wetterau. Ges. Naturk., **4** (2), p. 199.

Type locality.—Trieste (Italian–Yugoslavian border).

Distribution.—

PREVIOUS: De Filippi (1865, p. 343), southern Persia. Dobson (1871, pp. 460–461), **Fars:** Shiraz. Blanford (1876, p. 23), **Kerman:** Bampur, 1800 ft.; Kerman. **Fars:** Niriz. Thomas (1905, pp. 520–21 and abstract p. 24), **Khuzistan:** Ahwaz; Diz-

ful. **Isfahan:** Derbent. Thomas (1907, p. 196), **Tehran:** Tehran. Satunin (1909b, pp. 283, 284), **Khorassan:** Badzhistan; Nusi. **Kerman:** Ismailabad; Meigun. **Khuzistan:** Nasrieh. Cheesman (1920, p. 327), **Khuzistan:** Shuster. Cheesman (1921, p. 574), **Fars:** Kamarij Dashtistan. Werner (1929, p. 238), Tagi-abad.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** 2 km. west of Maku, 2 (1 in alcohol). **Lurestan:** Faraman village, 1. **Khuzistan:** 19.3 km. south of Shush, 1. **Fars:** Ahram, 3; 5 km. southeast Pol-i-Abgineh, 31 (15 in alcohol, 1 skeleton); Shahpur cave, 3.

ADDITIONAL SPECIMENS: **Khuzistan:** Ahwaz (BM 5.10.4.7–11). **Fars:** Jarghun (BM 25.10.4.1); Bandamir (BM 25.10.4.4). **Kerman:** Iranshahr (BM 52. 1467); Jiroft (SMNS 5055–6); Seistan (BM 81.13.1).

RANGE: If the locality shown by Kuzyakin (1950, p. 360) in northeastern Iran is based on a *bona fide* specimen, this bat's range seems to include the entire area of Iran with the exceptions of the south coast of the Caspian Sea, northern slopes of the Elburz Mountains, and the Turkmen plains.

Remarks.—These small bats were common at Lake Famur where they fed on insects at dusk. By day they took refuge in small caves in the surrounding mountains, where rarely more than one or two individuals occupied the same recess. Six or eight hung separately in the hot chamber of Shahpur cave loosely associated with *Myotis capaccinii*. At Ahram we observed these pipistrelles flying about the date groves, while 19 km. south of Shush they flew over and around the Karkheh River and ox-bow lakes and perhaps fed on the abundant mosquito population. The Faraman specimen flew into our preparation room via an open window and lit on the wall shortly after nightfall. Large numbers flew over the Zangmar River nightly at Maku. Females were taken from late December to mid-January but none bore embryos.

Taxonomic Remarks.—

Pipistrellus kuhli Kuhl, 1819

Vespertilio kuhlii Kuhl, 1819, Ann. Wetterau. Ges. Naturk., **4** (2), p. 199.

Type locality.—Trieste (Italian-Yugoslavian border).

Pipistrellus aladdin Thomas, 1905, Proc. Zool. Soc. London, **2**, p. 521.

Type locality.—Iran: Isfahan Province; Derbent, 50 km. west of Isfahan.

Thomas (1905, p. 521) described *Pipistrellus aladdin* on the basis of one specimen from Derbent (= Darband). Ellerman and Morrison-Scott (1951, p. 166) placed this name in synonomy with *P. coromandra* as "*Pipistrellus* (?) *coromandra aladdin*." Thomas (*loc. cit.*) states "hinter edge of the wing from tip of the fifth finger backwards prominently white, as in *P. kuhlii* [sic]," thus in the original description the most diagnostic external character of *P. kuhli* in this part of its range is clearly described, whereas, this trait does not, to my knowledge, characterize *P. mimus* as suggested by Thomas (*loc. cit.*) or *P. coromandra* which Ellerman and Morrison-Scott (*loc. cit.*) questioningly suggest. I examined the type specimen of *P. aladdin* at the British Museum (N.H.) and compared it with specimens of *P. kuhli* from Derbent and Shiraz and with *P. coromandra* specimens from India. The type specimen of *P. aladdin* agrees in every respect with the unique morphological skin characters of *P. kuhli*. *P. aladdin* should become a junior synonym of *P. kuhli*.

Nyctalus noctula Schreber — Noctule

Vespertilio noctula Schreber, 1774, Säugeth., **1**, p. 166, pl. 52.

Type locality.—France.

Distribution.—

PREVIOUS: Thomas (1907, p. 197), **Ghilan:** Resht, Southern coast of Caspian Sea. Bianki (1917, p. viii), **Gorgan:** Ashref, to the south of Astrabad Bay.

STREET EXPEDITION SPECIMENS: **Mazanderan:** Sama, 3 (1 in alcohol).

RANGE: The three localities from which this bat is recorded lie on or near the Caspian Sea and the range can be considered as the south coast of the Caspian Sea and the north slope of the Elburz Mountains at least up to approximately 1300 m., the altitude of Sama.

Remarks.—The one female examined August 20 for embryos contained none. All these bats were caught in a mist net placed across a pool behind a jube diversion dam in the mountain stream near camp (see Sama, p. 100).

Eptesicus serotinus Schreber — Serotine

Vespertilio serotinus Schreber, 1774, Säugeth., **1**, p. 167, pl. 53.

Type locality.—France.

Distribution.—

PREVIOUS: De Filippi (1865, p. 343), **Zanjan:** Sarcham; Zanjan. **Qazvin:** Qazvin. Dobson (1871, p. 459), **Fars:** Shiraz, 4500 ft. Vereshchagin (1959, p. 653), **Azarbaijan:** [seemingly Khvoy]. Harrison (1963, p. 303), **Azarbaijan:** Guter Su.

STREET EXPEDITION SPECIMENS: **Mazanderan:** Sama, 1. **Gorgan:** Pahlavi Dezh, 12 (6 skulls only, 6 mummies).

ADDITIONAL SPECIMENS: **Qazvin:** Karaj (KAUM, mounted specimen). **Fars:** Zurghum (BM topotype of *E. s. shirazensis*).

RANGE: The presently defined range of this bat includes the Turkmen Plains, the Caspian provinces, northern Azarbaijan Province, the plateau south of the Elburz from Karaj west to Zanjan, and south to Fars. Harrison's (1956b, p. 262) records from Iraqi Kurdistan suggest that the northern and southern Iranian populations may meet in the Zagros Mountains.

Remarks.—One was netted at Sama, and other large bats, seemingly serotines, were seen often in our searchlights during night hunting around Sama. These bats roosted in attics beneath tin roofs at Pahlavi Dezh, where we obtained one live individual which subsequently escaped and many mummies. The townsmen stated that during the summer "thousands" occupied the attics which, with the observations we made in October, suggests that these bats either migrate or move to hibernating quarters for the winter.

Eptesicus nilssoni Keyserling and Blasius Northern Bat

Vespertilio nilssonii Keyserling and Blasius, 1839, Arch. Naturgesch., **5** (1), p. 315.

Type locality.—Sweden.

Distribution.—

PREVIOUS: None.

STREET EXPEDITION SPECIMENS: **Khorassan:** Sama, 1.

RANGE: This bat is known only from the above locality. Kuzyakin (1950, p. 371) and Vereschagin (1959, p. 653) show its occurrence in Transcaucasia, and Hatt (1959, p. 31) records it from Baghdad, Iraq. These reports suggest that it possibly ranges into the adjacent parts of Iran.

Remarks.—This specimen provides the first Iranian record. We netted it over a grassy bluff about 4 m. above the level of the mountain stream flowing beside it. A bat of similar appearance, which

we failed to collect, roosted in the shelter formed by a fallen boulder at the base of a cliff in second growth forest about 3 km. upstream from where our specimen was caught. *Myotis mystacinus* and *Eptesicus serotinus* were netted in this same place.

Vespertilio murinus Linnaeus Particolored Bat

Vespertilio murinus Linnaeus, 1758, Syst. nat., 10th ed., **1**, p. 32.

Type locality.—Sweden.

Distribution.—

None at the time this paper was accepted for publication.

PREVIOUS: Etemad (1964, p. 653) has since reported two specimens from **Isfahan:** Mahallat.

STREET EXPEDITION SPECIMENS: **Khorassan:** Dasht, 1.

RANGE: *V. murinus* L. is known in Iran only from the above localities.

Remarks.—This specimen provides the first record of occurrence in Iran, although not unexpectedly, for both Kuzyakin (1950, p. 380) and Vereshchagin (1959, p. 652) show its Soviet distribution at numerous places near the northern border of Iran. Ellerman and Morrison-Scott (1951, p. 152) list this bat from Persia apparently on the basis of Dobson's (1871, p. 461) and Blanford's (1876, p. 20) records; but Ellerman and Morrison-Scott (1951, p. 144) place *Vespertilio murinus* Schreber as used by "Dobson, Blanford, and earlier authors, but not of Linnaeus, 1758" in synonomy under *Myotis myotis*. Such confusion possibly accounts for Kuzyakin (1950, p. 384) and Gromov *et al.* (1963, p. 204) listing *V. murinus* from Iran. Misonne (1959, p. 25) compounded Ellerman and Morrison-Scott's error when citing Blanford's (*loc. cit.*) *Vespertilio murinus* Schreb. as *Vespertilio murinus murinus* Linné. All the previous reports of *Myotis myotis* in Iran actually refer to *Myotis blythi* (see Harrison and Lewis, 1961).

The single specimen collected, roosted in the attic of a house and was kept alive for three weeks during which it remained torpid, always hanging from its cage top. When handled, this individual made slow uncoordinated movements and never attempted flight. This bat contained a large quantity of fat.

Barbastella leucomelas Cretzschmar Barbastelle

Vespertilio leucomelas Cretzschmar, 1876, *in* Rüppel, Atlas Reise nördl. Afrika, Säugeth., 73, pl. 28b.

Type locality.—Arabia Petraea.

Distribution.—

PREVIOUS: None.

STREET EXPEDITION SPECIMENS: **Damghan:** Sang-e-Sar, 1.

RANGE: This barbastelle is known only from the above locality. Kuzyakin (1950, p. 314) maps the occurrence of this species in southern Turkmen SSR (Badghis) and in Transcaucasia; thus its existence in northern Iran fits nicely into the geographical distribution and provides a means for supposition that it possibly will be found to range throughout the Elburz Mountains.

Remarks:—The single specimen of this species, which until now was unreported from Iran, roosted alone on the wall of an abandoned mine shaft that opened about 1000 ft. up the side of a steep mountain ridge located about 2 km. northeast of Sang-e-Sar. The animal, collected October 16, was very fat and contained no embryos. Careful search of the several shafts of this mine complex failed to produce other specimens.

Miniopterus schreibersi Kuhl Bent-winged Bat

Miniopterus schreibersi Kuhl, 1819, Ann. Wetterau. Ges. Naturk., **4** (2), p. 185.

Type locality.—Hungary: mountains of southern Bannat; Kulmbazar cave.

Distribution.—

PREVIOUS: Thomas (1907, p. 197), Southern coast of Caspian Sea (probably near Bandar-i-Gaz [see *Taxonomic Remarks*]).

STREET EXPEDITION SPECIMENS: **Khorassan:** Ganjah Kuh Cave, 3 km. north of Jochdi, 9 (4 in alcohol). **Gorgan:** 8 km. north of Gorgan, 1. **Azarbaijan:** Maku, 2; 44 km. southeast of Maku, 31 (16 in alcohol). **Fars:** Shahpur Cave, 8 (1 skeleton only).

RANGE: The localities provided above segregate into two populations: one occurring at the southeast end of the Caspian Sea and ranging through the eastern Elburz Mountains and the adjacent Kopet Dagh of southern Turkmen SSR (Kuzyakin, 1950, p. 292); the other ranging through the Zagros Mountains from Maku in the extreme northwest corner of Azarbaijan southeast to near Kazerun, Fars. Harrison's (1956b, p. 262) Iraq locality falls about halfway between these last two

Iranian records. This western population forms a continuation of the Transcaucasian localities shown by Vereshchagin (1959, p. 650). It seems possible that liaison between the western (Transcaucasian-Zagros) and eastern (east Caspian-Elburz) populations will be found to occur along the northern slopes of the Elburz Mountains and the south Caspian coastal plain.

Remarks.—We made the majority of our observations on this species in caves. A few *M. schreibersi* roosted among many *Rhinolophus euryale* in the large, wet cave near Maku. Several hundred inhabited the cave 44 km. southeast of Maku. Here many hung in clusters from the ceiling, while several groups took refuge in small cavities in the ceiling in essentially the same manner as described for *Myotis capaccinii.* Although exceedingly fat, these bats remained active on September 31. Eight kilometers north of Gorgan, about 9:00 P.M., October 31, we shot one as it flew about catching insects over a lagoon. Bats of this species had entered hibernation when we examined Ganjah Kuh cave, November 12. It should be noted, however, that this later locality lies 1220 m. higher than the Turkmen Plains. Because of the difference in ambient temperatures of these two places one might expect that the *M. schreibersi* inhabiting the higher, colder locality enter hibernation earlier. At Ganjah Kuh cave *M. schreibersi* were present in the ratio of about one-to-ten *Rhinolophus blasii* in a compact, unsegregated colony that numbered in excess of 500 bats. A similar situation prevailed at Shahpur cave, but *Rhinolophus euryale* comprised the co-inhabitants, outnumbering *M. schreibersi* by about three-to-one in an active colony of approximately 500 individuals.

Taxonomic Remarks.—

Miniopterus screibersi schreibersi Kuhl (*supra cit.*)

Miniopterus schreibersi pallidus Thomas, 1907, Ann. Mag. Nat. Hist. (ser. 7), **20,** p. 197.

Type locality.—Iran: southern shore of the Caspian sea. The type specimen is labeled "S coast Caspian Sea 25 March 1907 R. B. Woosman." The type specimen of *Nesokia bailwardi* Thos. 1907 is labeled "Bandar-i-gaz, S coast of Caspian Sea 25 March 1907 R. B. Woosnam." It seems probable that the type of *M. s. pallidus* was collected in the vicinity of Bandar-i-Gaz on the southeast coast of the Caspian Sea.

Miniopterus schreibersi pulcher Harrison, 1956, J. Mammal., **37** (2), pp. 61–62.

Type locality.—Iraq: Erbil Liwa; Ser Amadiya.

Thomas (1907, p. 197) described the race *M. s. pallidus* from a single specimen from the south coast of the Caspian Sea (probably near Bandar-i-Gaz, *supra cit.*) and distinguished it from the nominate race by its paleness. Kuzyakin (1950, p. 289) and the authority on bats in Bobrinsky *et al.* (1944, p. 86) states that considerable seasonal variation occurs in the pelage of this species and that the color of the type of *M. s. pallidus* is a result of fading. Harrison (1956b, pp. 261–262) described *M. s. pulcher* on the basis of three specimens from Ser Amadia, Iraq (2) and Jerash, Jordan (1). He states (p. 262) "this animal [the type] is similar to the typical form in all respects but differs so strikingly in color that no specimen in the British Museum collection approaches it . . . It differs from the Type specimen of *M. s. pallidus* . . . as strikingly as that race differs from the typical one." *M. s. pulcher* is supposedly lighter colored than *M. s. pallidus.* Aellen (1959, pp. 377–378) possesses *M. schreibersi* specimens from Switzerland that he says show the light coloration of *M. s. pallidus* and to which, furthermore, he notes that some from Afghanistan correspond. Harrison and Lewis (1961, p. 372) and Harrison (1963, p. 302) accept the opinions of Kuzyakin (1950, pp. 242, 268) as regards the subspecific status of *Myotis blythi oxygnathus* and *Myotis nattereri araxenus,* yet ignore Kuzyakin's views regarding *M. schreibersi.* Dwyer (1963) published a careful and detailed study of molt sequence and seasonal color change in the pelage in *M. s. blepotis* in New South Wales, Australia. He recognizes and documents an exceptional color change of an annual, natural fading of the pelage in this bat.

Lewis and Harrison (1962, p. 485) describe a specimen of "unusual pelage form" of which the presence of brown-colored pelage on the head contrasts sharply with the gray pelage of the rest of the body and relegate this specimen as "probably an expression of the rufescent phase sometimes seen in this species." Dwyer (1963, p. 297) specifically recognizes it as a molting individual. The above description, modified so that the brown color on the head is present in varying proportions, fits eight males collected by the Street Expedition September 31 in a cave 43 km. southeast of Maku. The brown pelage on their heads represents fresh new pelage and is virtually the same color as the overall pelage color of *M. s. schreibersi* males from Cyprus (FMNH 44249, date unknown) and France (FMNH 47761, April).

Six females from the same cave collection near Maku show only old pelage well faded to gray. In these, molt was yet uninitiated.

Seven specimens were prepared from a large number of *M. schreibersi* collected December 29 at Shahpur Cave, Fars Province.

Six females of this series represent the extreme of annual pelage fading that Harrison terms "pulcher" and show varying lightness. The male has initiated molt and has reached approximately stage two of Dwyer's diagram (1963, p. 292). Its fresh pelage is identical in color with the typical *M. s. schreibersi* listed above (FMNH 44249 and 47761). The differences between the type of pelage characteristic of males and that of females at Maku and Shahpur support Dwyer's (1963, p. 294) observations that the sexes molt out of phase.

Constantine (1957, 1958a, 1958b) showed that considerable fading takes place annually in the pelage of three species of North American bats and that certain cave atmospheric conditions tend to lend further impetus to bleaching. *M. schreibersi* seems to dwell primarily in caves in the Middle East and would perhaps be subjected to some bleaching there. The observations of Constantine (1958b) on pelage fading in cave environments are of a localized nature, whereas the recorded changes of fading in *M. schreibersi* are of far too widespread a nature as to be attributable solely to localized cave conditions.

The evidence of molt presented by our Iranian series of *M. schreibersi* considered in the light of Constantine's (*op. cit.*) and Dwyer's (*op. cit.*) data strongly suggests that pelage color changes greatly in the period between molts. Unless fading can be eliminated as possible cause of seemingly geographic differences, pelage color is evidently therefore of no taxonomic value for defining subspecies of this bat in Europe and the Middle East. *M. s. pallidus* Thomas and *M. s. pulcher* Harrison represent different stages in the annual pelage color change of *M. s. schreibersi* Kuhl, and should be regarded as synonyms of it.

Ochotona rufescens Gray — Rufescent Pika

Lagomys rufescens Gray, 1842, Ann. Mag. Nat. Hist., **10**, p. 266.

Type locality.—Afghanistan: Kabul, near Baber's Tomb.

Distribution.—

PREVIOUS: Blanford (1876, p. 83), **Isfahan:** Kohrud, 8-9000 ft. Murray (1884, p. 100), **Fars:** Bushire (Pikas possibly exist in the Zagros Mountains 25 km. west of Bushire [=Bushehr] but certainly do not occur at Bushehr which is situated on a sandy spit extending into the Persian Gulf). Misonne (1956b, p. 2), **Khorassan:** Akhlamad. **Mazanderan:** 35 km. west of Firouz Kuh. **Isfahan:** Mahallat.

STREET EXPEDITION SPECIMENS: **Damghan:** 7.2 km. north-northwest and 9.6 km. northwest of Sang-e-Sar, 29 (5 in alco-

hol, 4 skeletons); 29 km. west of Sang-e-Sar, 1. **Khorassan:** 23 km. northwest Birjand, 4. Kurdistan: vicinity of Agbolagh Morched, 1 (gift from Institute Pasteur, Iran).

ADDITIONAL SPECIMENS: **Kerman:** Lalazar Range, ca. 97 km. southwest of Kerman (BM 4.6.14).

RANGE: The areas of distribution listed above range over most of Iran. These localities, with the nearby localities of Kopet Dagh Mountains west of Ashkhabad, 3000 ft. Turkmen SSR; (Thomas 1911, p. 762) and Mastung and Ziarat, Baluchistan Province, West Pakistan (Siddiqi 1961, p. 177), suggest that the rufescent pika inhabits all of the mountainous regions of Iran.

Remarks—Large pika colonies were observed in high, dry, rocky portions of the Elburz Mountains and the range north of Birjand in and around man-made rock terraces, walls, and slides. Hay piles or stores in the rock terraces where burrows were constructed north-northwest of Sang-i-Sar contained plants of which nine have been identified at least to genus by Dr. In Cho Chung. These are: the grass, *Setania;* asteraceous weeds, *Centaurea* and *Aster;* pepper grass, *Lepidium araba;* chicory, *Chicorium intybus;* herbaceous weeds, *Malva* and *Polygonum;* woolly-leaved mulleins, *Verbascum;* thistle, *Cousinia*. Piles of 5–15 walnuts, some of which were eaten, lay in front of several burrows, and must have been transported from a row of walnut trees 150–200 m. distant. Plant life was less luxuriant near Birjand and camelthorn (*Alhagi*) and thistle apparently provided the mainstay of the pikas there. *Meriones persicus, Calomyscus bailwardi,* and *Apodemus sylvaticus* were trapped in considerable numbers in the pika colony northwest of Sang-i-Sar, where we also captured a large viper, *Vipera lebetina* that had ingested an adult *Ochotona rufescens.*

Lepus capensis Linnaeus Cape Hare

Lepus capensis Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 58.

Type locality.—Union of South Africa: Cape of Good Hope.

Distribution.—

PREVIOUS: Blanford (1876, p. 80), **Kerman:** Pishin. Thomas (1905, p. 527), **Kurdistan:** Karun River, north of Ahwaz; Bunde Kil. Kennion (1911, p. 17), **Kerman:** Hirmand River delta near Zabol (mentions shooting hares). Robinson (1918, p. 49), **Khuzistan:** between Ahwaz and Mohammerah, Karun River. Cheesman (1921, p. 575), **Fars:** Dasht-i-Arjan. Goodwin

(1940, pp. 13–14), **Gorgan:** Dar Kaleh; main Kelah peninsula. **Tehran:** near Tehran. Misonne (1959, p. 40), **Gorgan:** Bandar-i-Gaz. **Kurdistan:** Aghbolagh Morched. "Azarbaijan, la steppe de Moghan et la vallée de l'Araxe."

STREET EXPEDITION SPECIMENS: **Azarbaijan:** 14 km. and 16 km. east, and 24–30 km. northeast of Maku, 3; 24 km. north-northeast, 14 km. east-northeast, and 37 km. south-southeast of Rezaiyeh, 3; 10 km. southwest of Rezaiyeh, 2; 12 km. east of Sarab, 1. **Mazanderan:** 4–15 km. north and northwest of Sama, 6 (1 skeleton). **Gorgan:** 16 and 21 km. north of Pahlavi Dezh, 2; 16 km. east-southeast of Gorgan, 7 (1 skeleton). **Khorassan:** Shahrabad Kaur, 2 (1 skull only). **Tehran:** Robat Karim, 1. **Lurestan:** vicinity of Faraman village, 5 (1 skull only). **Isfahan:** vicinity of Galatappeh, 4. **Damghan:** Chah Ali Khan, 1 (mandibular ramus only). **Khuzistan:** 19 km. south of Shush, 3; 46 km. west of Shush, 1. **Fars:** 6 km. northeast of Kazerun, 1; Ahram, 1.

ADDITIONAL SPECIMENS: **Mazanderan:** Mashed-i-Sar, (BM 27.10.26.43). **Khorassan:** Gombad-i-Kabous (SMNS no cat. no.).

RANGE: Hares occur throughout Iran, except for the higher mountains of Iran and the dense forest on the northern slopes of the Elburz.

Remarks.—Our observations suggest that these animals are more numerous in northern, northwestern, and west-central Iran than in the remainder of the country. We observed one live hare and recovered a complete mandibular ramus from an owl pellet near Chah Ali Khan on the western edge of the Dasht-i-Kavir. We failed to observe a single hare in the period from November 16 to December 8 during operations in southeastern Iran, though the local people assured us hares existed there. There are earlier records in Blanford (1876) and Kennion (1911).

Four females taken 28 miles west-southwest of Shush, January 20; Faraman, January 22 (2) and 24 each bore single embryos, 120 mm. total length, and 15, 18, 17 mm. in crown-rump length, respectively. Two others taken August 24 near Sama and September 10, 12 km. west of Sarab, were lactating. We acquired leverets at Reziayeh, about three-fourths grown and at Ahram, approximately one-fourth grown.

Our adult Iranian specimens show a considerable color variation in single populations. The series from the edge of the Mazanderan forests are much darker than the population inhabiting the adjacent Turkmen plains to the north, but there seem to be no other distinguishing features between our specimens of these populations.

Petter (1959, 1961) provides, respectively, a revision of the African hares and the European and Asiatic hares of the sub-genus *Lepus*, based solely on the morphology of the groove on the anterior surface of the large maxillary incisors. Later (1963) he introduces new elements in another revision of African hares in which, in addition to his principle character of the incisive groove, the presence of interparietal bones is used to a limited extent.

In attempting to use Petter's revisions I have found the following objections.

1). The morphology of the incisive grooves, the character on which the majority of Petter's conclusions are founded, is stated by C. J. Forsyth Major (1899, p. 466), whose work Petter (1959, p. 56) quotes and appears to accept, to vary with the age of the animal. Petter (1959, 1961, 1963) does not mention or seemingly consider the possibility that the observed morphological differences may be partly or wholly due to age, particularly in the study of single specimens.

2). Hall (1951, pp. 181–182) presents evidence which shows that elsewhere in this same holarctic subgenus *Lepus* (*Lepus*) the incisive grooves vary (in *Lepus californicus*) geographically from very simple ones to development at least as complicated as the most extreme condition figured by Petter (1959, pp. 57, 64). Hall (loc. cit.) shows further that although *L. californicus* is readily distinguishable from sympatric *L. townsendi* by well-marked pelage characters, skulls of *L. californicus* are indistinguishable from sympatric *L. townsendi* in their range west of the Rocky Mountains; but that east of the Rocky Mountains a consistent difference in the shape of the incisive grooves does readily differentiate the skulls of these same two species of hares. It would seem that so comprehensive a revision as Petter's (1959, 1961, 1963), based almost solely on the same character, would be obligated to discuss the potential pertinence of this variability reported in the Nearctic Region. Petter (1959, 1961, 1963) does not.

3). Petter (1959, p. 64 fig. 5; 1963, p. 243, fig. 3) shows diagrammatically some of the considerable variation that he recognizes to exist within his definition of a single species, yet is apparently content (1959, pp. 52–54; 1961, pp. 5, 7) to make broad taxonomic conclusions

after examination of single type specimens (e.g. see treatment of *Lepus ruficaudatus* 1961, pp. 7–8 and revised list of African hares 1959, pp. 53–54).

Because of the above, and other lesser, weaknesses in Petter's (1959, 1961, 1963) revisionary work on *Lepus*, it has seemed better to resort to earlier work.

Ellerman (in Ellerman and Morrison-Scott, 1951) provides a key (derived from study of the Ethiopian and Palearctic hares in the British Museum) utilizing length of palatal bridge, breadth of mesopterygoid space, and the ratio of the former to the latter, occipitonasal length, bullar length and certain obvious tail and neck colors. No indication of the sample sizes used to reach his conclusions are given.

Ellerman (*op. cit.*, 1951, pp. 429, 434) lists three species *L. capensis*, *L. europaeus*, and *L. arabicus* from Persia, and his keys distinguish these as follows (p. 426): Bullae; an average 16 per cent and more of occipitonasal length separates *L. arabicus* from both *capensis* and *europaeus*. *L. europaeus* is separated from *L. capensis* as follows: "Larger animals; always averaging larger in size of skull than the *capensis* group where the two occur together . . . In Palearctic and Indian regions, occipitonasal length averages 88 mm and more, more often over 90 mm. (*europaeus* group)." The average occipitonasal length of *L. capensis* in the Palearctic and Indian regions is normally 87 mm. and less.

Street Expedition specimens key out to both *L. europaeus* and *L. capensis*. A sample of five specimens from Faraman, Lurestan, all key to *europaeus*, mean and extremes of occipitonasal length are 96.0 mm. (93.1–100.1). Four specimens from Galatappeh, Isfahan, key to *capensis*, 80.6 mm. (78.9–82.2). Six examples from Sama, Mazanderan, key to both *europaeus* and *capensis* 88.3 mm. (77.4–94.7). Mean and extremes of occipitonasal length of a series of eight specimens from Gorgan, Gorgan, and vicinity are 85.7 mm. (79.4–89.5). Three specimens from the vicinity of Shush, Khuzistan, measured 84.2, 88.0, and 91.5 mm. in occipitonasal length. It seems notable that no diagnostic pelage or external features which will consistently separate *L. europaeus* and *L. capensis* (*sensu Ellerman*) have to my knowledge been demonstrated. The specimens in the above mentioned series from Sama, Gorgan, and Shush are so homogeneus in external appearance within each series that skins of animals with smaller skulls look identical to those of the specimens with larger skulls. Further, the skulls of these specimens do not sort into small and large hares on the basis

of occipitonasal length because the variation in this measurement evenly bridges the break Ellerman employed for separating the species. On the basis of Ellerman's (Ellerman and Morrison-Scott, 1951) criteria this Sama series is considered to provide evidence of conspecificity.

Evidence concerning the morphological variability of the skull of *Lepus europaeus* presented by Cabon-Raczynska (1965) after the present paper was in press corroborates this conclusion. His study was based on a series of 482 skulls of *L. e. europaeus*, all complete and undamaged, collected at monthly intervals over the period of December 1958 to February 1960 by a method stated to insure randomness. The animals were collected chiefly in the southeastern part of Poznan, Poland.

That the length of the nasal bones increases with age of the individuals even beyond general morphological adulthood is manifested in the following statement based on data presented on pp. 269–271, 274, 276.

> ". . . the nasal bones . . . are subject to the greatest and most intensive growth. This process probably does not cease with the halting of the growth of the other elements of the skull," p. 275, fig. 5.

Although Cabon-Raczynska does not use occipitonasal length in his study, the evidence he presents concerning variation with age in nasal bone length certainly seems sufficient to regard the use of average differences in occipitonasal length untenable as a means for distinguishing *L. europaeus* from *L. capensis*. *L. europaeus* hence becomes a junior synonym of *L. capensis*.

Ellerman (p. 422) states that he has provisionally referred *L. craspedotis* Blanford from Iranian and West Pakistanian Baluchistan to *L. arabicus*. I have examined no material pertinent to this.

Funambulus pennanti Wroughton Palm Squirrel

Funambulus pennanti Wroughton, 1905, J. Bombay Nat. Hist. Soc., **16** (3), p. 411.

Type locality.—India: Bombay Presidency; Surat District, Mandvi Taluka.

Distribution.—

PREVIOUS: Blanford (1876, p. 50), **Kerman:** Pishin. Birula (1912, p. 229) quotes Zarudny's notes as having seen striped squirrels near Bahu Kelat, Kerman. Wroughton (1920, p. 318) **Kerman:** Geh.

STREET EXPEDITION SPECIMENS: **Kerman:** Geh, 15 (1 skeleton only, 2 in alcohol).

RANGE: This squirrel is known only from the above localities. Its range seemingly encompasses only the extreme southwest portion of Kerman Province.

Remarks.—Large numbers of palm squirrels inhabited the date grove at Geh. On the single morning that we observed them, these emerged from their nests in the cavities of *Acacia* and date palm trees well past sun-up and after the chill of night faded away. Three specimens were observed emerging from a cavity in a large *Acacia* tree about 8:00 A.M. Until about 10:00 A.M. they fed on the buds and leaves of date palms. Around 10:00 it seemed they began a resting period when hanging head down on the trunks and barking was the characteristic behavior. Their light, gray color with longitudinal stripes camouflaged them perfectly on the palm trunks. Their distinctive call resembles a high-pitched metallic click usually repeated very rapidly. About noon the animals descended to the ground where they seemed to move at random, pausing occasionally to dig. When alarmed they climbed the nearest tree and hid among the bases of the leaves. These animals behaved as if accustomed to man. *Herpestes edwardsi* and domestic cats may prey on the young of the palm squirrels but large raptors, very commonly observed in the gardens, might exert more pressure on the adults. The two females taken December 1 in a series of more than 15 animals contained no embryos.

Spermophilus fulvus Lichtenstein Fulvous Ground Squirrel

Arctomys fulvus Lichtenstein, 1823, Eversmann Reise, p. 119.

Type locality.—USSR: Kirghizia; River Kuwandzaliur, east of the Mugadsharz Mountains, north of the Sea of Aral.

Distribution.—

PREVIOUS: Goeffroy (1834, pp. 155–156), **Zanjan:** Sultania (original not seen). Blanford (1876, p. 51), parts of northwest Persia, especially Sultanieh. **Khorassan:** Kafir-Kaleh hills, 30 miles south Meched. Satunin (1909a, p. 1), **Khorassan:** Kutschan. Thomas (1915, p. 423), **Khorassan:** Meched 3000 ft. [this probably should read Kain District of Khorassan as reads the label of the only specimen in the B.M., 8.12.21.1, from this region of Iran]. Misonne (1959, p. 42), **Khorassan:** Khadje Djarrah; Askanieh; Shartous; Kalate; Majdi Goli;

Abousalt; Bagherabad [all located between Mashhad and Fariman]. **Kurdistan:** Akinlou.

STREET EXPEDITION SPECIMENS: (All gifts of the Pasteur Institute of Iran) **Kurdistan:** Uzondarreh, 2 (1 skin only). No exact locality, 3 (1 in alcohol).

RANGE: Two disjunct populations of *Spermophilus fulvus* exist in Iran. The eastern one exists in Khorassan Province with records between 150 km. northwest and 290 km. south of Mashhad. The western population according to Misonne (1959, p. 42) is encompassed by a line connecting the cities of Hamadan, Bijar, Zanjan and Qazvin.

Remarks.—At the time of our visit to the areas of their occurrence these animals had entered hibernation. The Institute Pasteur of Iran gave us four specimens and a live animal captured in the summer of 1962 and maintained alive until February 13, 1963, when it was in deep hibernation.

Calomyscus bailwardi Thomas Long-tailed Hamster

Calomyscus bailwardi Thomas, 1905, Abstr. Proc. Zool. Soc. London, **1905**, p. 23; and Proc. Zool. Soc. London, **1905**, pp. 524–6.

Type locality.—Iran: **Khuzistan;** Mala-i-Mir.

Distribution.—

PREVIOUS. Thomas (1905, p. 524), **Khuzistan:** Mala-i-Mir, 70 miles northeast of Ahaz. Cheesman (1921, p. 580), **Fars:** 2 miles [*sic*] Shiraz, 5200 ft. Goodwin (1939, p. 1), **Khorassan:** Degermatie. Ellerman (1948, p. 804), **Fars:** Persepolis. Aberdeen University (1965) **Isfahan:** Zard Kuh.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** 2 km. west Maku, 7. **Tehran:** Doab, 7. **Damghan:** 7 km. northwest of Sang-e-Sar, 4. **Khorassan:** 3 to 5 km. south of Shahrabad Kaur, 9 (2 in alcohol); 4.8 km. north of Dasht, 2. **Isfahan:** Galatappeh, 12 (1 skeleton, 1 in alcohol). **Fars:** 5 km. southeast of Pol-i-Abgineh, 18 (1 skeleton, 4 in alcohol).

RANGE. The localities recorded above lie in the Elburz and Zagros Mountains. The southwestern Turkmen SSR record of Kashkarov (1925, p. 43), the Afghanistan record of Ellerman (1948, p. 804) and the W. Pakistan records of Thomas (1920a, p. 939) suggest that *Calomyscus bailwardi* will be found to inhabit most of Iran. The habitat of barren rocky mountainside

in which we consistently trapped this species exists throughout the country.

Remarks.—We repeatedly found *Calomyscus bailwardi* to inhabit barren, dry, rocky hill, and mountain sides with scant vegetation. The only exception to this that we observed was near Lake Famur, Fars, where the noticeably very high population may have resulted in a spread of these mice out of ordinary habitat into the lacustrine valley. The single long-tailed hamster nest found was built in a narrow horizontal crevice in rock strata on rocky outcrop at 11,000 ft. It consisted of a ball of fine grass and sheep wool. Little piles of cracked grass seed and occasional thistle buds under overhanging rocks characterized territory inhabited by *Calomyscus*. Some of the empty husks saved from where these mice were trapped have been identified for me as *Bromus* sp., a grass. Stomach contents appeared to be grass seeds.

The following reproductive data were recorded for females: August 5, lactating, 4 uterine scars; October 3 and 4 (2 specimens) blood clots in 7 small uterine swellings each with no visible embryos; November 6 (2 specimens) blood clots in 2 and 7 uterine swellings with no visible embryos; December 28 (2 specimens) both lactating and each with 4 placental scars; December 29, blood clots in 2 uterine swellings with no visible embryos.

Three half-grown males were trapped at Doab in early August.

The juvenile pelage of three specimens caught in early August is dark gray dorsally and white ventrally.

Our series of 61 specimens of this little known genus comprises the largest presently known.

Cricetulus migratorius Pallas Gray Hamster

Mus migratorius Pallas, 1773, Reise Russ. Reich, **2**, p. 703.

Type locality.—Western Siberia: Lower Ural River.

Distribution.—

PREVIOUS: De Filippi (1865, p. 344), Western Persia. **Tehran:** Tehran. Blanford (1876, p. 58), **Isfahan:** Kohrud. **Fars:** Shiraz. **Kerman:** Mashish. Thomas (1905, p. 524), **Kurdistan:** Sakkez. Cheesman (1921, p. 578), **Fars:** Shiraz. Goodwin (1940, p. 6), **Gorgan:** Turkmen Plains. **Khorassan:** Dasht. Ellerman (1948, p. 806), **Azarbaijan:** Menzil. Misonne (1959, p. 48), **Azarbaijan:** Astara. **Zanjan:** Soltanieh. **Kurdistan:** Sanandaj; Sameleh; Kaleh Sefid; Nagadeh; Tuiserkhan; Aghbolagh

Morched. **Lurestan:** Kermanshah. Aberdeen University (1965). **Isfahan:** Zard Kuh.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** 2 km. west of Maku, 3, Mushabad, 24 km. north-northeast of Rezaiyeh, 3; 21.5 km. southwest of Rezaiyeh, 1; 20 km. west of Sarab, 1. **Tehran:** Doab, 5; Tehran, 6. **Mazanderan:** Sama, 4. **Gorgan:** 16 km. southeast of Gorgan, 3. **Damghan:** 5.6 km. north of Semnan, 1. **Khorassan:** 3 km. east of Dasht, 3, 3 km. south of Shahrabad Kaur, 10 (1 in alcohol), 8 km. north of Mahneh, 3. **Lurestan:** Faraman, 5 (1 in alcohol). **Isfahan:** Galatappeh, 7.

ADDITIONAL SPECIMENS: **Khorassan** [?] (uncatalogued specimen in B.M.).

RANGE: The gray hamster occurs north and west of a line drawn from Shiraz to Kerman to Mashhad. It seems likely, however, that further sampling of the area south and east of this line will show that *C. migratorius* occupies virtually the complete Iranian plateau.

Remarks.—Our expedition found these omnipresent hamsters from sea level to 3656 m., in lush forest or desert, and living free or commensally with man. We encountered these mice wandering inexplicably in wide open, unprotected places on numerous nights. We noted more predation on this species by foxes and jackals than any other single rodent species. When spotlighted in the open at night, these hamsters virtually always stopped, remained motionless, and were easily captured. *C. migratorius* invaded our cooking and dining tents on several occasions. Live gray hamsters caged with *Alactagulus pumilio* (jerboa), and *Rana* sp.? (frog), viciously killed and partially ate these animals.

Pregnant females were taken August 18, November 2, November 7 (2 specimens), December 20, and January 24 (2 specimens). Embryos and measurements for the specimens collected on these dates are respectively: 7 (ca. 5 mm. each), 4 blood clots in uterine swellings with no visible embryos; 5 (21, 22, 22, 24, 24 mm.) and 4 (12, 12, 13, 14 mm.); 7 (all 2 mm.); 5 (all 5 mm.) and 7 blood clots in right uterine horn with no visible embryos.

Prior to this report Goodwin's record from Dasht constituted the northeasternmost Iranian locality for this species. Our specimens from Mahneh and Shahrabad Kaur extend the known range some 75 km. ENE and 350 km. SE, respectively.

Mesocricetus auratus Waterhouse Golden Hamster

Cricetus auratus Waterhouse, 1839, Proc. Zool. Soc. London, **1839**, p. 57.

Type locality.—Syria: Aleppo.

Distribution.—

PREVIOUS: De Filippi (1865, p. 344), **Zanjan:** Soltanieh. Ellerman (1948, p. 805). **Qazvin:** Qazvin. Misonne (1959, p. 49), **Azarbaijan:** hills bordering Moghan Steppes; Maragheh. **Zanjan:** Soltanieh. **Qazvin:** Kazvin; Kamalabad. **Kurdistan:** Aghbolagh Morched. **Lurestan:** Kermanshah. Vereschchagin (1959, p. 673) maps a locality in **Azarbaijan** which seemingly is Tabriz.

STREET EXPEDITION SPECIMENS: (All gifts of the Institute Pasteur of Iran). **Kurdistan:** Aghbolagh Morched, 1; Akinlou, 1; no. data, 1.

RANGE: The golden hamster is presently known from the plateau northwest of a line connecting Kermanshah, **Lurestan** and Karaj, **Qazvin.**

Arvicola terrestris Linnaeus Water Vole

Mus terrestris Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 61.

Type locality.—Upsala, Sweden.

Distribution.—

PREVIOUS: De Filippi (1865, p. 344), **Zanjan:** Sultanieh. Cabrera (1901, p. 118), **Khuzistan:** Chagajor. Thomas (1907, pp. 200–201), **Tehran:** Elburz Mountains near Demavend. ?**Ghilan** or **Mazanderan:** south coast of Caspian Sea. Misonne (1959, p. 56), **Ghilan:** Astara; "frontier of the Talych" [Mtns.] **Zanjan:** Soltanieh. **Kurdistan:** Akinlou; Gorveh; Kale Sefid; Marivan; Sakkez, Tuiserkhan.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** 2 km. west, 2 km. north of Maku, 1; 10 km. southwest Rezaiyeh, 8 (1 skull only, 1 in alcohol). **Kurdistan:** Aghbolagh Morched, 1 (gift of Institut Pasteur Iran).

ADDITIONAL SPECIMENS: **Lurestan:** Faraman (564, 573, 577 C. A. Reed field nos. of YPM material).

RANGE: The water vole is recorded from the east central portion of the Elburz Mountains, virtually the entire northwestern part

of Iran north of a line between Soltanieh and Saqqez, and south through the Zagros approximately to the 32nd Parallel. It seems likely that this species will be found to range through the western parts of the Elburz Mountains.

Remarks.—The local distribution of water voles seems to be determined by streams and irrigation ditches and their individual ranges seem confined to fluvatile situations. *A. terrestris* burrows that we noted were dug into stream and jube banks and the animals seemed to spend much of the day sitting at burrow entrances near the water's edge or in thick grass floating on the surface of the water. In September these rodents made runways where grass grew along the banks, and grazed on green grass. In mid-September the shallow streams around Rezaiyeh became very cold at night (ca. 40° F.) but warmed (ca. 70° F.) during the day. The observed diurnal habits of *A. terrestris* might be attributable to this temperature cycle. The stomachs of wild cats, *Felis catus*, one collected at Faraman and another 10 km. southwest of Rezaiyeh, each contained one *Arvicola terrestris*.

A female collected September 17 was lactating.

It is interesting to note that the eastern limit of the range of *Arvicola terrestris* virtually corresponds with the western limit of *Nesokia indica* in Iran. The occupation by these two species of extremely similar ecological niches suggests the possibility here of competitive exclusion between species of different subfamilies (Cricetinae *vs.* Murinae, respectively).

Misonne (1959, pp. 48, 56) seems to question the validity of Ellerman and Morrison-Scott's (1951, p. 678) decision to place *Nesokia argyropus* Cabrera in synonomy under *A. terrestris*. Cabrera's (1901, pp. 118–120) original description clearly shows by the presence of five plantar tubercles that *N. argyropus* is, in fact, *A. terrestris* and not *N. indica*, which possesses six tubercles.

Microtus nivalis Martins Snow Vole

Arvicola nivalis Martins, 1842, Rev. Zool., p. 331.

Type locality.—Switzerland: Bernese Oberland, Faulhorn.

Distribution.—

PREVIOUS: None at the time this paper was accepted for publication. Aberdeen University (1965) has since reported this species from **Isfahan:** Zard Kuh.

STREET EXPEDITION SPECIMENS: **Tehran:** Doab and vicinity (3047–3780 m.), 7 (1 body in alcohol, 2 skeletons).

RANGE: The snow vole is presently known in Iran only from the above localities.

Remarks.—These voles occurred in habitat seemingly identical to that occupied by *Microtus arvalis* but trapping produced many more specimens of *M. arvalis* than *M. nivalis*, and they seemed to be feeding principally on different plants during our brief stay. The snow voles we caught had fed on the aromatic plants *Chicorium sp.* and *Pedicularis sp.* One was caught feeding on our dried *Ovis ammon* skeletons.

A female taken August 7 contained five (4 mm. each) embryos. The series of seven specimens shows adult, three-quarter and one-half grown animals.

These specimens provide the first record of the occurrence of this species in Iran, though not unexpectedly, as Heptner (1939b, p. 193) predicted its existence in the Elburz. Doab lies about 415 km. southeast of the nearest Transcaucasian locality in the Talish Mountains just north of the Persian border mapped by Vereshchagin (1959, p. 678) and approximately 570 km. west-southwest of the Kopet Dagh locality in the Turkmen SSR reported by Heptner (1939b, p. 192). It seems very likely that the snow vole will be found to range throughout the higher portions of the Elburz Mountains. The Aberdeen University Expedition captured this species at 3367 m. on Zard Kuh, which suggests that *M. nivalis* may range southward throughout the higher reaches of the Zagros Mountains.

Microtus arvalis Pallas Common Vole

Mus arvalis Pallas, 1778, Nov. Spec. Quad. Glir. Ord., p. 78.

Type locality.—Germany.

Distribution.—

PREVIOUS: De Filippi (1865, p. 344), **Tehran:** Lar River valley in Elburz Mountains. Cabrera (1901, p. 120), **Khuzistan:** upper Karun River (referred to *socialis* below). Thomas (1907, p. 202), **Tehran:** Elburz Mountains near Demavend. Goodwin (1940, p. 8), **Khorassan:** Dasht, Gouladah. Ellerman (1948, p. 790), **Isfahan:** Derbert (referred to *socialis* below). Elburz Mountains [on the basis of specimens from Pish Kuh which is in Ghilan Province]. Vereshchagin (1959, p. 680), maps

at least three localities in Iranian Azarbaijan, seemingly Khvoy, Mt. Sahand west of Bostanabad, and Mt. Sabalan.

STREET EXPEDITION SPECIMENS: **Tehran:** Doab (3047–3800 m.), 18 (1 skeleton, 1 in alcohol). **Mazanderan:** 5 km. northeast Sama, ca. 1830 m., 1. **Azarbaijan:** 24 km. north-northeast Rezaiyeh near the village of Mushabad, ca. 1290 m., 2.

RANGE: The range of *Microtus arvalis* as presently known includes the central and eastern parts of the Elburz Mountains and approximately the province of Azarbaijan. Although as yet unrecorded, this species will likely be found to occur in the Western Elburz (cf. *Taxonomic Remarks*, for consideration of Cabrera's and Ellerman's *supra cit.* records).

Remarks.—A large population of these voles occurred along the grassy streamside situations at Doab and the more barren, higher clay slopes. I observed that voles of this species inhabiting the streamside community fed extensively on a low, broad-leafed plant, *Canna* sp. We observed numerous individuals that were active diurnally on the higher, less lushly vegetated slopes. One specimen was captured in a clearing in forest near Sama and the two animals from Mushabad were dug from their burrow in the bank of an irrigation ditch in the farmland of the Urmiah basin.

A female caught August 2 was lactating and showed four placental scars. Females taken August 4 contained three (3 mm. each) and five (3, 3, 3, 3, 8 mm.) embryos. The series acquired at Doab in early August contains specimens of nearly every size from very young to adults.

The pelage of juveniles is noticeably grayer than that of adults. Six adult specimens taken on the clay slopes at Doab (3048–3800 m.) are considerably lighter colored than the animals that inhabited the stream side situation.

Taxonomic Remarks.—I have compared the specimen from Derbent (BM 5.10.4.58), which Ellerman (1948, p. 790) attributed to *M. a. mystacinus*, directly with the FMNH series of *M. a. mystacinus*, a topotype of this race (BM 7.7.14.33) from the Elburz Mountains near Demavend, a specimen from Pish Kuh (BM 27.10.26.37) identified by Ellerman (*loc. cit.*) as *M. a. mystacinus*, and also with the FMNH series of *Microtus socialis*, as well as one of the five *M. s. paradoxus* that Ellerman (*loc. cit.*) examined. Mean and extreme tail lengths of 20 Iranian *arvalis* are 33.3 (29–38) compared to 24.9 (19–32) of 27 *socialis*. Mean and extreme ear lengths of the same Iranian

arvalis are 11.8 (11–14) compared with 10.5 (8–14) for *socialis*. Both series (*arvalis* and *socialis*) contain relatively equal numbers of individuals of equivalent age groups that vary from less than one-third grown to adults. The auditory bullae of the Derbent specimen, a young male, have been compared with specimens of equivalent size of *socialis* in the FMNH Iran series and the largest *arvalis* in the FMNH Iran series and found to resemble more closely in size and shape those of *socialis*. The Derbent specimen is here regarded to represent *M. socialis* because of its relatively short tail (27 mm.), its small ears (8 mm.), and its enlarged auditory bullae.

At hand is one of the specimens (BM 20.7.7.1) on which Cabrera (1901 p. 120) based his account, but it bears only measurements of ear and hind foot lengths, and its skull consists of two fragments, neither of which contain the auditory bullae. The short ear length (10 mm.) and the short tail (24 mm., vertebrae left in place) of this specimen lead me to question Cabrera's allotment of it to *M. mystacinus* [=*arvalis*]. It seems reasonable if not necessary to consider Cabrera's (1901, p. 120) specimens from the upper Karun River, Khuzistan Province to be *M. socialis*.

Microtus socialis Pallas Social Vole

Mus socialis Pallas, 1773, Reise Russ. Reich., **2**, p. 705.

Type locality.—USSR: Grassy regions of desert by Ural River.

Distribution.—

PREVIOUS: Cabrera (1901, p. 120), **Khuzistan:** Alto [Upper] Karoum [River] [see *Taxonomic Remarks, Microtus arvalis*]. Cheesman (1921, p. 580), **Fars:** Shiraz. Goodwin (1940, p. 8), **Khorassan:** Dergermatie, Gouladah, Dasht. Ellerman (1948, p. 787, 790), **Ghilan:** Pish Kuh. **Kurdistan:** Divandire. **Isfahan:** Derbent [see *Taxonomic Remarks, Microtus arvalis*]. Misonne (1959, p. 56), **Azarbaijan:** Moghan Steppes, Sakkez, Maragheh; Nagadeh. **Zanjan:** Soltanieh. **Kurdistan:** Aghbolagh Morched; Akinlou; Gorveh; Kaleh Sefid; Marivan; Samelleh; Sanandaj; Tuiserkhan. **Lurestan:** Kermanshah. Aberdeen University (1965). **Isfahan:** Zard Kuh.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** 20 km. west of Sarab, 15 (2 skeletons, 2 in alcohol). **Tehran:** 2.5 km. north of Varangrud, 4. **Qazvin:** Kamalabad, 7 (2 in alcohol, 1 skeleton, gifts of IPI). **Kurdistan:** Aghbolagh Morched, 1 (in alcohol,

gift of IPI). **Khorassan:** Dasht, 5; 3 km. south of Shahrabad Kaur, 3 (2 in alcohol).

NEW SPECIMENS: **Lurestan:** near Bijaneh, 1 (skeleton, field number 441, C. A. Reed in YPM).

RANGE: The social vole appears to occur through the Elburz Mountains east at least to Shahrabad Kaur; is known from five localities in Azarbaijan, but on the basis of the wide distribution that Vereshchagin (1959, p. 680) shows of this species in Transcaucasia it seems likely that this species will be found to range more widely in Persian Azarbaijan; and occurs south through the Zagros Mountains at least as far as Shiraz.

Remarks.—These voles occur in colonies in and around irrigated fields examined at Sarab, Varangrud, Dasht, and 3 km. south of Shahrabad Kaur. Burrows dug at Varangrud and Dasht were very elaborate with many openings and tiered systems of subterranean tunnels. The upper tunnel series in these was 15 to 25 cm. below ground, the lower 38 to 61 cm. deep. Social voles were noted to feed on alfalfa, grass, clover, and *Canna sp.* At Sarab they seemed to be storing grass tassles, *Bromus* sp. seeds, and thistle buds in the burrows.

One female caught September 11 showed blood clots in five small uterine swellings, but no embryos were visible. A female trapped on November 2 contained four (2 mm. each) embryos. Four half-grown animals were caught on August 10. A series obtained on September 11 showed individuals ranging from one-fourth grown to adults.

Juveniles in the Street Expedition collection which show considerable grey because they lack abundant brown guard hair molt into adult pelage when they are about one-half adult size. Fresh adult pelage is a rich, tawny brown with an admixture of black and a lustrous sheen particularly on the back, whereas worn adult pelage is much grayer and lacks any sheen.

Taxonomic Remarks.—

Microtus socialis Pallas (*supra cit.*).

Arvicola guentheri Danford and Alston, 1880, Proc. Zool. Soc. London, **1880**, p. 62.

Type locality.—Turkey: Marash.

Microtus irani Thomas *in* Cheesman, 1921, J. Bombay Nat. Hist. Soc., **27**, p. 581.

Type locality.—Iran: Fars Province; Shiraz.

The striking similarity of our Iranian series of *M. socialis* to FMNH *M. guentheri* from central Turkey (Anatolia), stimulated me to make critical examination of the relationships of these species.

Microtus socialis was described by Pallas in 1773 (*supra cit.*) and information on this species has since been contributed periodically by a number of authors. Ognev's (1950, pp. 366–401) summary of the literature concerning this species (1773–1941) and study of 361 specimens is virtually monographic. *Microtus guentheri* was described by Danford and Alston (1880, p. 62) from Marash, Turkey (Anatolia). Since then the comparatively few papers dealing with *M. guentheri* have been concerned largely with distribution and the description of new subspecies. No definitive work such as Ognev's (*loc. cit.*) for *M. socialis* exists for *M. guentheri.*

Neuhauser (1936, pp. 199, 201) proposed to distinguish Turkish *M. socialis,* of which she possessed a single specimen, from a larger sample of *M. guentheri,* on a difference in condylobasal length, "to 27.9" in the former and "to 31.1" in the latter.

Bate (1945a, p. 147), working with skulls recovered from owl pellets in Syria, concludes that *M. socialis* exists in the highlands and differs from the lowland form *M. guentheri* in depth and massiveness of skull; she, however, provides no measurements.

Ellerman (1948, pp. 787–788) separates the two as species on the basis of an average difference in the percentage that the length of the auditory bullae constitutes of the occipitonasal length, which is less than 30 per cent in *M. guentheri* (sample of 13) and greater than this in *M. socialis* (sample of 3).

Ognev (1950, pp. 367, 399) refers *M. guentheri* to the "socialis group" because of the similarity of these two forms in tooth row structure, number of plantar tubercles, short tail, and color, and makes the suggestion that *M. guentheri* is possibly only a subspecies of *M. socialis.*

Gromov *et al.* (1963, p. 620) offer the opinion that *M. socialis* is related to the similar but separate species of Asia Minor, *M. guentheri.*

The criterion of total length of the animal of 125 mm. or over in combination with a mastoid breadth of 12.8 mm. or over is utilized to assure selection of adult specimens from FMNH series of *M. guentheri* from Turkey and *M. socialis* from Iran.

New data may be tried out on Neuhauser's (1936) criterion for distinguishing the two forms. The mean and extremes of condylobasal length of 11 adult specimens of *M. guentheri* from Abant, Bolu Province, Turkey (5) and Lake Emir, Ankara Province, Turkey (6) is 28.52 mm. (26.6–30.7) compared with 11 adult Iranian specimens of *M. socialis* from 3 km. south of Shahrabad Kaur (1), 3 km. east of Dasht (4), Kamalabad (3), 20 km. west of Sarab (3) is 27.06 (25.5–30.0). These data are in conflict with the criterion established by Neuhauser (1936, pp. 199, 201) for separating these species and suggest that her means of separating these species (*supra cit.*) is questionable.

Means and extremes of the length of auditory bulla divided by the occipitonasal length of the 11 adult *M. guentheri* from Abant, Turkey (5) and Lake Emir, Turkey (6) are 0.2705 mm. (0.254–0.302). This ratio for single specimens from Aleppo, Syria, and Hasbeyis, Palestine, is respectively 0.320 and 0.288 mm. Mean and extremes of this ratio for the 11 adult specimens of *M. socialis* listed under STREET EXPEDITION SPECIMENS and NEW SPECIMENS is 0.3062 mm. (0.298–0.323). These data show considerable overlap in the length of the auditory bullae relative to the occipitonasal length of *M. socialis* and *M. guentheri* whereas those of the small sample provided by Ellerman (1948, pp. 788–789), three *M. socialis* and 13 *M. guentheri*, did not.

The nature of the reported differences between *M. socialis* and *M. guentheri* seem to be intraspecific and indicate Ognev's postulation (*loc. cit.*) that *M. guentheri* represents only a subspecies of *M. socialis* to be correct.

Ognev and Heptner (1928, p. 263) remark that *M. irani* possesses the same characteristics as *M. socialis paradoxus*. Argyropulo (1933, p. 180) treated *M. irani* as a race of *M. socialis*. Ellerman (1948, p. 787) gives *M. irani* specific rank. Ognev (1950, p. 399) revises his earlier opinion (Ognev and Heptner, 1928, p. 263) and states that it is possible that *M. irani* is a synonym of *M. mystacinus* De Filippi (a named form of *Microtus arvalis*).

I have examined the four specimens of the type series of *M. irani* in the British Museum and later compared one of that series (BM 20.5.20.10) and one of the three skulls (BM 27.10.26.32) that Ellerman (1948, p. 788) measured and listed as *M. socialis* with Street Expedition specimens. By the standards listed above, specimen BM 27.10.26.32 (total length 116 mm., mastoid breadth ca. 11.5 mm.) is

a juvenile and corresponds well in size with Street Expedition juveniles collected at Sarab, Azarbaijan and Varangrud, Mazanderan. Because Ellerman's (*loc. cit.*) distinction between *M. socialis* and *M. irani* solely on a size basis, occipitonasal length not more than 24.3 mm. in the former and not less than 25.3 mm. in the latter, is founded at least in part on juvenile specimens, it is subject to question. Occipitonasal length of three juveniles from Varangrud are 23.9, 24.2, and 25.2 mm. Means and extremes of six juveniles from Sarab are 22.81 mm. (20.4–24.7) compared with those for three adults on the basis of the criteria given above from the same place 25.2, 25.2, 25.0 mm. These data suggest that Ellerman's means of separating these species are not valid. The only difference that I find between *M. irani* and *M. socialis* is the lighter more rusty colored pelage of the latter, which is only a few shades lighter than the color of most of the Street Expedition *M. socialis*. Moreover, two of the specimens (FMNH 97053–97054) from our Kamalabad series show this same light rust color, which suggests that it may be a rather frequently occurring mutation of Iranian *M. socialis*.

I examined the type specimen of *M. mystacinus* [=*M. arvalis mystacinus*], number 910 in the Turin Museum, mounted with skull in skin, and cotypes in the British Museum, numbers 9.1.18.2 and 11.5.19.1, skins in alcohol with skulls extracted, as well as a large series of *M. arvalis* from Doab, Pish Kuh, and the Lar (River) Valley. The small skulls and long tails, dark colored above, readily distinguish *M. arvalis* as a separate species from *M. irani*. The nature of the differences between *M. irani* and *M. socialis* seem too intraspecific and indicate that *M. irani* is a form of *M. socialis*.

Ellobius fuscocapillus Blyth — Mole Vole

Georychus fuscocapillus Blyth, 1842, J. Asiat. Soc. Bengal, **10**, p. 928, *nomen nudum*, 1843, J. Asiat. Soc. Bengal, **11**, p. 887.

Type locality.—West Pakistan: Quetta.

Distribution.—

PREVIOUS: Thomas (1905, p. 526), **Isfahan:** Dumbeneh. Goodwin (1940, p. 9), **Gorgan:** Turkmen Plains, 60 km. east [=northeast] of Astrabad. Ellerman (1948, p. 781), **Qazvin:** Qazvin. Ognev (1950, p. 703) states "central Iran" seemingly in reference to Dumbeneh which he cites on page 101. Misonne (1959, p. 44), **Khorassan:** environs of Meched. **Azarbaijan:** Nagadeh, near Djulfa. **Zanjan:** Soltanieh. **Kurdistan:** Akin-

lou; Gorveh; Khaice Kandi; Marivan; Sakkez; Sameleh. **Qazvin:** Kamalabad. **Lurestan:** Qasr-i-Chirine.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** 4 km. southwest of Rezaiyeh, 4; 37 km. south-southeast of Rezaiyeh, 2. **Qazvin:** Kamalabad, 2 (gifts of Pasteur Institute of Iran). **Khorassan:** 5 km. south of Shahrabad Kaur, 5; Mashhad, 1 (gift of Pasteur Institute of Iran). **Kurdistan:** Hezar Darreh, 5 (5 in alcohol, gifts of the Pasteur Institute of Iran). Exact locality unknown, 1.

ADDITIONAL SPECIMENS: **Mazanderan:** Lar River valley (BM 45.8). **Lurestan:** Mahidasht (610, C. A. Reed field no., deposited in YPM).

RANGE: *E. fuscocapillus* seemingly ranges across all of Iran north of 35° and southeast through the Zagros Mountains as far as Khorramabad and Isfahan, with the exception of the forested northern slopes of the Elburz Mountains and adjacent Caspian coastal plain. In the eastern part of Iran this mole vole ranges south from Mashhad at least as far as Qayen and possibly farther south as specimens (BM 19.11.7.84–85) exist from Mach, Baluchistan (seemingly West Pakistan, 29° 52′N, 67° 20′ E).

Remarks.—Mole voles occupied extensive burrow systems that we observed at Faraman, Rezaiyeh, Maku, Varangrud, Shahrabad Kaur, and Qayen, and which were usually established in or around cultivated or grassy fields. However, we also noted them in very barren peneplain and in the thin soil of rocky mountain sides. These burrows consist of a complicated network of tunnels with numerous openings characterized by pyramidal heaps of dirt at the surface.

Live mole voles allowed to wander freely frequently fell into holes, over dropoffs, and into streams, an indication that they may have poor vision. One individual began to excavate immediately on release. When released four others explored the surroundings five to thirty minutes before beginning to burrow and one individual showed no inclination to dig for over an hour. This last animal covered between two and three hundred meters distance in this time, during which it tumbled into a swift flowing stream and swam readily across. A few minutes later it reswam this stream (about 9 m. wide) and on reaching dry ground scooped out a depression just long and deep enough for its body, began to wallow in the loose dry dirt rubbing its fur vigorously using the forefeet. As soon as it was dry it again set out wandering, stopping only to sniff or nibble at a

variety of plants, none of which it ate. Its normal gait was about 20 m. per minute, but occasionally increased to about 30 m. per minute.

In digging, mole voles use their proodont incisors as dirt loosening tools. Two individuals took 15 and 19 minutes to dig a tunnel in hard soil deep enough to conceal their bodies. In beginning a burrow, a depression long and wide enough for the animal's body (roughly 140 mm. long and 40 mm. wide) is hollowed out, then the mouse begins to tunnel at one end of this depression. While digging, its hind feet are braced tightly against the sides of the depression and push its rigidly held body forward. As dirt is loosened by the incisors it is simultaneously removed posteriorly to about the middle of the animal's body by the front feet. When a small pile accumulates beneath it, the mole vole brings its hind legs forward and with two or three powerful strokes throws this dirt backward out of the hole. One individual observed enlarging its established burrow brought a heap of loose dirt up to the opening of a gently sloping tunnel and, positioned with its rear toward the burrow entrance, braced its front feet and threw the dirt out into a pile with repeated strokes of its rear feet. These animals may possibly bulldoze loose dirt with their flattened rhinaria while within the burrows. The stomachs of *E. fuscocapillus* contained what appeared to be finely chewed roots and tubers.

I noted fresh *Ellobius* burrows 2.5 km. north of Varangrud, Tehran Province, at 2742 m., at several points along the road from Ardabil to Bostanabad and 37 km. southwest of Maku in Azarbaijan; along the road between Khorramabad and Kermanshah, Lurestan Province, from about 40 km. north of the former to the latter city; and at Qayen in Khorassan.

Ognev (1950, pp. 701–706) concluded that *E. lutescens* is merely a subspecies of *E. fuscocapillus*. The cranial criteria which he gives (pp. 703–704) as part of his basis for distinguishing between these two subspecies are highly variable in our material and seemingly of little value. Ognev (1950, p. 706) states that the color of *lutescens* clearly distinguishes it from *fuscocapillus*. He had not seen *E. woosmani* Thomas and was at a loss as to with which it belonged. Ellerman and Morrison-Scott (1951, p. 657) suggest that *E. lutescens* might well represent a race of *E. fuscocapillus* but recognize the two as species. Their criteria for distinguishing these forms cranially (sagittal crest reaching or not reaching the lambdoid crest) does not constantly separate our Iranian material in which this trait seems to vary with the age of the specimen, but which are separable on the basis of pelage differences.

The dorsal, orange-buff colored, winter pelage of *E. fuscocapillus* is strikingly set off by the black mask of this species. The black area begins anteriorly lateral to the nostrils and extends posteriorly surrounding the eyes and on as far as the ears. The dorsal pelage of the only two *E. lutescens* specimens (FMHN 97101. Dec. 12, 1949, C. A. Reed 610, May 20, 1960, alt. 1200–1500 m.) in winter pelage that I have seen is virtually identical to that of *E. fuscocapillus* except that the black hair on the head is confined to a small area lateral to the nostrils and extending posteriorly about half of the distance between the nostrils and eyes. The summer pelage of *E. lutescens* is considerably grayer than its buffy winter coat, due seemingly to greater exposure of the slaty colored basal parts of the hairs. This black-buff color relationship is identical to that of topotypes from Van, Turkey of *E. lutescens* (FMNH 82162–3) and our Azarbaijan series. The black head area of two specimens from Kamalabad, about 40 km. west of Tehran, extends posteriorly to about the level of the eyes while a specimen from the Lar valley, about 64 km. northeast of Tehran (BM 45.8) represents *fuscocapillus*-type pelage.

The ranges of these races can seemingly be separated by a northeast-southwest line extending from Tehran to Shushtar, Dembeneh and Kermanshah. The present southernmost localities in the range from which specimens exist and from which *fuscocapillus* and *lutescens* types are respectively known lie approximately equidistant from this line.

I have examined the type specimen of *Ellobius woosmani* Thomas 1905, from Dumbeneh. No character attributed to this form by Thomas (1905), and none seen by me, distinguish it from our specimens of *E. f. fuscocapillus*. The type locality of *woosmani* lies within the geographic range above ascribed to *E. f. fuscocapillus*, and *woosmani* is a synonym of that race.

Gerbillus nanus Blanford Baluchistan Gerbil

Gerbillus nanus Blanford, 1875, Ann. Mag. Nat. Hist., **16**, p. 312.

Type locality.—Gedrosia, further specified as Baluchistan [W. Pakistan]: Saman Dasht by Blanford (1876, p. 72).[1]

Distribution.—

PREVIOUS: Wroughton (1920, p. 319), **Kerman:** Chahabar. Heptner (1940, p. 12), **Kerman:** 17–18 km. south-southwest of Chah-i-Novar; Nodou, 20 km. southeast of Talab; Kour-ab;

[1] See *Remarks*.

Chah-Basu. Petter *et al.* (1957, p. 114), **Kerman:** Nawar; Tasuki; Kouhak; Kahourak. **Fars:** Bandar Abbas.

STREET EXPEDITION SPECIMENS: **Khuzistan:** 19 km. south of Shush, 13 (2 in alcohol). **Fars:** Ahram and environs, 3. **Kerman:** Fahraj, 8; 18 km. west of Iranshahr, 8; 100 km. south of Iranshahr, 6 (2 in alcohol); 24 km. southwest of Zabol, 11 (1 in alcohol).

RANGE: This gerbil occurs southeast of a line drawn from Zabol west of Bam and to Bandar Abbas in southeastern Iran and is known from two localities in southwestern Iran (see above). Liaison between these two populations has not been shown.

Remarks.—This gerbil and *Tatera indica* were taken more commonly in the eastern half of Kerman Province than any other rodent. Burrows which we examined existed in rather close proximity (average circa 0.5–1 m.) to one another 24 km. southwest of Zabol, 18 km. west of Iranshahr, 100 km. south of Iranshahr, Fahraj, and 19 km. south of Shush. The types of environment where these burrows existed varied considerably. Twenty-four kilometers southwest of Zabol we found their burrows in areas totally devoid of vegetation in brick-hard soil, or under large piles of camel thorn (*Alhagi* sp.) fodder. A few were found around the bases of adobe walls. Seventeen kilometers west of Iranshahr *G. nanus* burrows were located beneath low *Gymnocarpus decanter* bushes in friable sandy soil. One hundred kilometers south of Iranshahr burrows were frequent beneath the shelter of bushy thickets of trees (see p. 38) growing in pure sand. At Fahraj burrows of *G. nanus* centered in an area of sandy soil that supported a stand of salt wort. Near Ahram, Fars Province, we found their burrows only on the rocky debris slope (e.g., p. 52); while 19 km. south of Shush, Khuzistan Province, burrows existed in the Karkheh flood plain and in the sand dunes along the edge of the flood plain (e.g., p. 85). In all five localities burrows occurred in colonies.

Near Zabol *G. nanus* and *T. indica* shared the colonial burrows area. In these situations we found large and small burrows intermingled, and in one area of about 37 sq. m. we counted thirty burrow orifices. *T. indica* surely used only the larger burrows, but *Gerbillus nanus* seemed to use both.

G. nanus occurred together with *G. cheesmani* in the sand dunes west of the Karkheh River flood plain 19 km. south of Shush. As determined by examination of stomach contents, *G. nanus* fed to some extent on freshly sprouted grass in this area, but plant seeds were abundant there also.

In places (18 km. west of Iranshahr, 100 km. south of Iranshahr, Fahraj, 19 km. south of Shush) we found well-established trails used by these rodents. All trails seemed to have one character in common; they made use of all available shelter, whether it happened to be a single small salt wort, or an adobe wall, or abrupt changes of level in the ground surface.

A female trapped November 28 held four embryos (3, 4, 5, 5 mm.). Two females caught December 1 had two and four blood clots in uterine swellings but with no visible embryos, while a third showed three placental scars and was lactating. Immature animals were acquired 24 km. southwest of Zabol in late November, at Fahraj in early December and 19 km. south of Shush in early January.

Our specimens from 19 km. south of Shush and from Ahram establish the range of *G. nanus* for the first time in southwestern Iran. The Ahram series extends the known range of this species approximately 765 km. southwest of Ali Gharbi (Petter *et al.* 1957, p. 114), the closest and only locality from which this species is reported for Iraq, and narrows the hiatus between Ahram and Bandar Abbas, the nearest of the east Iranian localities, to approximately 500 km.[1]

The type locality, Saman Dasht, given by Blanford (1876, p. 72) lies just inside W. Pakistan (see St. John, 1876, p. 23 and Blanford's 1876, p. 50 itinerary) and is not the Saman, 55 km. east of Geh, given by Misonne (1959, p. 49).

Gerbillus cheesmani Thomas — Cheesman's Gerbil

Gerbillus cheesmani Thomas, 1919, J. Bombay Nat. Hist. Soc., **26**, p. 748.

Type locality.—Iraq: near Basra.

Distribution.—

PREVIOUS: Heptner (1940, p. 10), **Kerman:** Rik-i-Malik; 17–18 km. south-southeast of Chah-i-Novar. Petter *et al.* (1957, p. 113), **Kerman:** Tasuki; Kahourak.

STREET EXPEDITION SPECIMENS: **Khuzistan:** 19 km. south of Shush, 7 (1 in alcohol).

RANGE: This psammophylic gerbil is recorded from four localities in eastern Iran and one place in extreme western Iran.

[1] On 14 June 1967 I examined specimens of *G. nanus* from Lake Habbaniya (no. 101180) and Basra, Iraq (no. 101182) in the University of Michigan mammal collection. Hatt (1959, p. 87) reported these as *G. dasyurus mesopotamiae.*

Remarks.—We trapped these gerbils in sand dunes above the Karkheh flood plain. The single female acquired on January 16 bore no embryos.

Petter *et al.* (1957) refer to this species in Iran as *Gerbillus gerbillus* Olivier, but I retain the species *Gerbillus cheesmani* Thomas until a critical revision shall show that these forms are really the same.

Tatera indica Hardwicke Indian Gerbil

Dipus indicus Hardwicke, 1807, Trans. Linn. Soc. London, 8, p. 279.

Type locality.—India: United Provinces between Benares and Hardwar.

Distribution.—

PREVIOUS: Blanford (1876, pp. 63, 65), **Kerman:** Pishin. **Khuzistan:** Mound of Susa. Thomas (1905, p. 523), **Khuzistan:** Bunde-Kil, Karun River; Shush; Ram Hormuz; Mala-i-Mir. Wroughton (1906, p. 496), **Kerman:** Seistan; Kerman. Wroughton (1920, p. 319), **Kerman:** Chahbahar. Cheesman (1921, p. 580), **Fars:** Akbarabad, near Shiraz. Heptner (1940, pp. 15–16), **Khorassan:** Mudzhnabad. **Khuzistan:** Seba. **Kerman:** ca. 30 km. south of Bandan; Nokadzh village; upper or middle Bampur River. Ellerman (1948, p. 799), **Isfahan:** Dagja, 23 miles east of Isfahan. Petter *et al.* (1957, p. 115), **Fars:** Bandar Abbas. **Kerman:** Hadjiabad; Kouhak; Tasuki; Kahourak; Bam.

STREET EXPEDITION SPECIMENS: **Lurestan:** Qasr-i-Shirin, 2 (gifts of Institut Pasteur). **Khuzistan:** 19 km. south of Shush, 4. **Fars:** 5 km. southeast of Pol-i-Abgineh, 11 (2 in alcohol); 7 km. north of Kazerun, 4; Ahram, 9 (1 in alcohol,). **Kerman:** 25 km. southwest of Zabol, 18 (3 in alcohol); Iranshahr, 1; 13 km. west of Iranshahr, 2; Fahraj, 2.

ADDITIONAL SPECIMENS: **Fars:** Gach Qasa Guli on the Lukra River, 60 miles north of Bushire (B.M. 47. 1126–7).

RANGE: *Tatera indica* seems to occur throughout the southern half of Iran from sea level to approximately 1370 m. above sea level.

Remarks.—Indian gerbils seem in most cases to occur in the interior basins and the area along the coastal plain of southern Iran. We usually found *T. indica* in colonies occupying large burrow systems, but they also reside in man-made shelters, such as fodder piles and

stone fences or even dwellings. In Seistan *Gerbillus nanus* seemed to live with *T. indica* in the latter's burrow systems. Clearly defined, well-used trails spreading outward from burrow systems suggest that these jirds follow established trails in their movements. Some gerbils cannibalized trapped individuals of their own species and were trapped by baiting the traps with fresh *T. indica* flesh. In a sandy area along the Bampur River the home range of one animal, estimated from clearly established trails, extended to at least an area of 250 sq. m. At Kazerun and vicinity the *T. indica* population had reached dense proportions and these animals had presumably spread into the surrounding mountains; at least this was the only time we encountered the species in mountains. Many widespread burrows 19 km. south of Shush indicated that a dense population must also have existed there, but our sampling revealed that only a thin population remained.

A female taken January 1 bore five embryos (4, 4, 5, 7, 7 mm.). On January 7 and 8 we captured one-fifth and one-third grown individuals.

Juvenile pelage is characterized by large amounts of gray and an indistinctly marked tail in a specimen of 40 grams. Another of 63 grams shows about 80 per cent completion of molt into adult pelage with the area along the middorsal portion of the back from the neck to the rump as the last portion to retain the juvenile pelage.

Meriones persicus Blanford Persian Jird

Gerbillus persicus Blanford, 1875, Ann. Mag. Nat. Hist., **16**, p. 312.

Type locality.—Iran: Isfahan Province; Qohrud. The type specimen has Central Persia on its label. Blanford (1876, p. 66) lists as Qohrud north of Isfahan, 7000 ft., for a co-type. Chaworth-Musters and Ellerman (1947, p. 482) incorrectly locate "Kohrud" as 150 miles north of Isfahan. The point 150 miles north of Isfahan lies in salt desert where no permanent human habitations exist and is certainly not the type of habitat where one would expect to find *M. persicus*. A "Qohrud" situated at 7000 ft. at 33° 40′N, 51° 25′E lies 72 miles almost due north of Isfahan and is surely the Kohrud Blanford mentions. The type locality of *M. persicus* should be fixed as this locality.

Distribution.—

PREVIOUS: Blanford (1876, p. 66), **Kerman:** near Kerman 6000 ft. **Isfahan:** Kohrud. Thomas (1905, p. 523), **Khuzistan:**

Mala-i-Mir; Dopulan. Cheesman (1921, p. 577), **Fars:** Shiraz. Goodwin (1939, p. 2), **Khorassan:** Dasht; (1940, p. 7), Dergermatie. Heptner (1940, pp. 23–24), **Khuzistan:** Alkhorshir. **Kerman:** Chah-i-Dura; Rud-i-Kasrkend, ca. 60 km. northeast of Kasrkend. (This locality is cited wrongly if the specimen Heptner cites is correctly labeled. According to Zarudny (1902, p. vi) he was at Champ on April 3, the day the specimen was collected. Champ lies about 53 km. northwest of Qasr-e-Qand, and the itinerary of Zarudny does not indicate that he went northwest of Qasr-e-Qand.) Misonne (1959, pp. 51, 113, 139), **Azarbaijan:** Chamar; Allah Yarlou; near Djulfa. **Qazvin:** Qazvin; Kamalabad. **Kurdistan:** 17 villages in Aghbolagh Morched-Akinlou vicinity. Golvan and Rioux (1961, pp. 535, 540, 541, 544, 546, 549), **Azarbaijan:** Boukan. **Kurdistan:** Songhor; Saneh; Gorveh; Bizine. **Lurestan:** Kermanshah. Aberdeen University (1965), **Isfahan:** Zard Kuh.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** 2.5 km. northwest Maku, 2; 5 km. southwest of Maku, 1; 10 km. southwest Rezaiyeh, 10 (2 in alcohol); 48 km. west Mianeh, 5. **Qazvin:** vicinity of Qazvin, 7 (3 in alcohol, 1 skeleton). **Mazanderan:** 10 km. northwest of Sama, 14 (2 in alcohol, 1 skeleton). **Damghan:** 4.3 km. northwest of Sang-e-Sar, 4; 5.6 km. north of Semnan, 1. **Khorassan:** 2 km. north of Dasht, 1; 3 km. south of Shahrabad Kaur, 8; 11 km. north Qayen, 2. **Kurdistan:** Akinlou-Aghbolagh Morched, 8 (1 in alcohol); Sameleh, 1. **Lurestan:** Faraman, 5. **Isfahan:** 3.2 km. east of Sarvestan, 3. **Fars,** 5 km. southeast of Pol-i-Abgineh, 3.

ADDITIONAL SPECIMENS: **Isfahan:** Mahallat (MHNP 1254, 1296). **Khorassan:** Rabat-i-Qarebil (MHNP 3358).

RANGE: The Persian jird is not known to occur in the Caspian forests, otherwise it seems to range over all of the plateau portion of Iran.

Remarks.—Persian jirds generally inhabit barren, rocky hill and mountain sides where they nest beneath boulders or in cracks in exposed rock. However, where soft substrate is available in these places, they burrow. This type of habitat appears to be shared with *Calomyscus bailwardi* throughout the range, and shared further with *Apodemus sylvaticus* in the drier portion of northern Iran. We found *M. persicus* living in a small cave near Galatappeh of which at least

100 sq. ft. of the interior 15–18 m. from the entrance lay covered (in places) to depths in excess of 0.67 m. with a store of dry vegetable material that the animals had brought into the cave. Cracked grass seeds of *Bromus macrostachys* (?), *Boissiera pumilo*, *Elymus* sp., *Hordeum* sp. and *Festuca* sp. composed most of this mass, but seeds of other plants were also present. A large number of burrows pierced the clay floor in and around this heap. Similar piles were noted to be stored in another cave in the vicinity and in rocky recesses near Jahrom, in Fars Province.

Colonies of *M. persicus* occupied the dry grass community below Sama (cf. pp. 98–99), which attracts particular interest because itis a long, narrow community lying between extensive forests. A concentration of jirds occurred in a colony covering several acres on open hillsides, but their burrows also existed in the edge of the forest and animals were seen crossing a road that ran through the edge of the forest. Animals of this colony fed largely on sand burrs, *Medicago* sp., and to a lesser extent on grass seeds, *Bromus* sp., The nest chambers of the burrows in the Sama colony that we examined were lined with great quantities of *Medicago* burrs, which had been masticated into a very soft state. Hawks and owls hunted over this colony daily and nightly and several of our traps disappeared. We observed scorpions, tenebrionid beetles, toads, lizards and snakes utilizing the burrows.

None of the females taken August to January carried embryos. One trapped September 19 showed enlarged follicles in the ovaries. A juvenile about one-sixth grown was caught October 4. An adult female with two juveniles about one-half to two-thirds grown was taken from its burrow September 19 and subadult animals were caught in late August, early November and late January.

Our specimens make possible for the first time the inclusion of all of northeastern eastern Iran in the range of this species. The series from Sama constitutes the first known occurrence of this species north of the crest of the Elburz Mountains, and, apparently, the first account of this species not only existing near true deciduous forest, but actually ranging into it.

Meriones libycus Lichtenstein Libyan Jird

Meriones libycus Lichtenstein, 1823, Verz. Doubl. Mus. Berlin, p. 5.

Type locality.—Egypt: near Alexandria.

Distribution.—

PREVIOUS: Blanford (1876, p. 70), **Fars:** Shiraz; Persepolis. Lataste (1884, p. 90), **Tehran:** Teheran. Goodwin (1940, p. 7), **Gorgan:** Turkmen Plains. **Khorassan:** Dasht, Maravih. Heptner (1940, pp. 26, 28, 30), **Khorassan:** Gulyander, Kukhister, Aviz, Hussein-abad; Surun Well. **Kerman:** Dak-i-do Well; Rik-i-Malik; Kyagur; Kaskin; Tag-i-dorokh plain; Goarpusht; Duz-ab Well. **Khuzistan:** between the Tib River and Kara Tepe [=Tappeh], ca. 120 km. east Amara, Iraq. Ellerman (1948, p. 796), **Qazvin:** Kazvin. **Ghilan:** Elburz Mountains [Chesnefli]. **Khuzistan:** northeast of Ahwaz. Petter *et al.* (1957, p. 118), **Khorassan:** Gombad-i-Kabous; Dach Bouroun; Rabat-i-Qarabil; Bujnurd; Langarak. **Kerman:** Kouhak; Zahedan. Misonne (1959, pp. 53, 113, 139), **Azerbaijan:** Nagadeh; Meyandoab; Maragheh; Mughan [steppe]. **Qazvin:** Kazvin; Kamalabad. **Kurdistan:** 17 villages in Aghbolagh Morched-Akinlou vicinity.

STREET EXPEDITION SPECIMENS: **Qazvin:** vicinity of Qazvin, 7; 25 km. northwest of Karaj, 4 (2 in alcohol); Kamalabad, 5. **Gorgan:** 1.6 km. north of Pahlavi Dezh, 3; 40 km. north Pahlavi Dezh, 7. **Khorassan:** 24 km. west of Robat-i-Qarabil, 3. Khuzistan, 19 km. south of Shush, 2. **Kerman:** 37 km. south of Zahedan, 1; 17 km. west of Iranshahr, 2.

ADDITIONAL SPECIMENS: **Fars:** Rud-i-Mihran (BM 52.1479).

RANGE: *Meriones libycus* occurs throughout Iran except along the forested northern slopes of the Elburz Mountains and adjacent Caspian coastal plain.

Remarks.—In any given locality in its Iranian range *M. libycus* seems to occur in the lower parts of the valleys and or basins. Forty kilometers north of Pahlavi Dezh and in the vicinity of Rabat-i-Qarabil, *M. libycus* lived with large colonies of *Rhombomys opimus* where we found the former about in the proportion of one-to-three *Rhombomys*. There appeared to be no conflict between the two species. In the nest chamber of one burrow we found one adult *M. libycus* and an adult female *Rhombomys* with nursling young. *M. libycus* burrows were located beneath low *Gymnocarpos decanter* shrubs west of Iranshahr in an area along the periphery of the Bampur River flood plain.

A female taken October 26 contained four embryos (4, 19, 21 and 22 mm). Several animals half to three-fourths grown were captured in late October.

Taxonomic Remarks.—

Meriones libycus Lichtenstein (*supra cit.*)

Meriones iranensis Goodwin, 1939, Am. Mus. Novit. 1050, p. 3.

Goodwin (1939, p. 3) described *Meriones iranensis* from Dasht and Maravih, Khorassan Province. Ellerman and Morrison-Scott (1951, p. 647) were unable to identify this species from the original description, and I examined the type specimen and found it indistinguishable from topotypical (AMNH) specimens of *M. libycus* and others from 22 km. east of Dasht FMNH. *M. iranensis* Goodwin is therefore now placed in synonymy with *M. libycus* Lichtenstein.

Type locality.—Iran: **Khorassan:** Dasht.

Meriones vinogradovi Heptner Vinogradov's Jird

Meriones vinogradovi Heptner, 1931, Zool. Anz., **94**, p. 122.

Type locality.—Persian Azarbaijan.

Distribution.—

PREVIOUS: Heptner (1931, p. 122), **Azarbaijan:** no precise locality. Petter (1955, p. 395), **Azarbaijan:** Nagadeh. Kurdistan, Sakkez. **Zanjan:** Soltanieh. Misonne (1959, pp. 52, 139), **Azarbaijan:** Djulfa; Moghan [steppe?]. **Kurdistan:** Aghbolagh Morched; Kale Sefid. **Qazvin:** Kazvin. Vereshchagin (1959, p. 676) maps a locality in Azarbaijan Province near Serab. Golvan and Rioux (1961, pp. 534, 541, 546, 549, 562), **Kurdistan:** Aghbolagh Morched; Songhor; Gorveh; Bizine. **Qazvin:** Kamalabad.

STREET EXPEDITION SPECIMENS: **Kurdistan:** Aghbolagh Morched, 8 (1 in alcohol). **Qazvin:** Qazvin, 9 (2 in alcohol, 2 skeletons). **Tehran:** Rachtagan, 3.

RANGE: This species seemingly occupies the same general range as *M. tristrami*, but is known from fewer localities.

Remarks.—We did not collect this species in the field. The above specimens were trapped by the Institut Pasteur of Iran and presented to us alive in Tehran where we prepared them.

Meriones crassus Sundevall Sundevall's Jird

Meriones crassus Sundevall, 1842, K. Sv. Vetensk. Akad. Handl., **1842**, p. 233, pl. 2.

Type locality.—Sinai: Fons Moses (Ain Musa).

Distribution.—

PREVIOUS: Thomas (1905, p. 523), **Khuzistan:** Ahwaz. (1919b, p. 270), **Khuzistan:** Mound of Susa. Heptner (1940, pp. 33, 36), **Khuzistan:** Ziarat Seid Hassan; 70 km. north of Amara, Iraq; Alkhorshir. **Kerman:** Tag-i-dorokh. Petter *et al.* (1957, p. 118), **Khorassan:** Main; Rum. **Kerman:** Kouhak; Tasuki; Zahedan. **Isfahan:** Mahallat. **Lurestan:** Qasr-i-Shirin.

STREET EXPEDITION SPECIMENS: **Qazvin:** 25 km. northwest of Karaj, 1. **Khorassan:** 8 km. north of Mahneh, 12 (2 in alcohol); 11 km. north of Qayen, 2. **Isfahan:** Galatappeh, 8. **Damghan:** Chah Ali Khan, 3 (partial skeletons of at least 3 specimans salvaged from owl pellets). **Khuzistan:** 19 km. south of Shush, 1. **Kerman:** 9.6 km. east of Kerman, 5; 37 km. south of Zahedan, 1. **Fars:** Ahram and vicinity, 7. Exact locality unknown, 4 (2 in alcohol, 2 skeletons).

RANGE: *Meriones crassus* exists in two disjunct populations. One occurs throughout the Khuzistan Plain and south along the Persian Gulf coastal plain to Ahram, and the other is presently known from the eastern basin region.

Remarks: In the eastern basin portion of the range these jirds occur in desolate areas, e.g. we observed thriving colonies on gravel plain 11 km. north of Qayen that was virtually devoid of vegetation. The burrows of these animals were located near the thinly distributed plant *Peganum hormala* at Qayen, Kerman, and Isfahan, the seeds of which provided their sustenance, judging from the caches in and around their burrows. On two occasions in Kerman Province we caught *M. crassus* in dessicated rocky foothills. At Galatappeh one of these rodents had its nest under a large (man-made) fodder stack on rock plain. Burrows excavated proved to be rather simple, with three or four openings leading to a nest chamber sometimes located as much as 2 m. below the surface of the ground. One or two animals were found to occupy each active burrow that we excavated. Burrows occurred more in sandy clay substrate than on rocky peneplain.

One-third to one-half grown animals were trapped in mid-November and mid-December. Three adult females taken in mid-November (2) and mid-December showed blood clots in uterine swellings (4, 4, and 3, respectively) but no visible embryos.

Our new locality records from near Tehran and Kerman, together with those of Petter *et al.* 1957, strongly suggest that *M. crassus* inhabits the entire eastern basin region of Iran.

Thomas (1919b, p. 270) quotes the collector Woosman's field notes of February, 1905 as follows, "plentiful all along the flat coast plain from Bushire to the Karun River" in reference to *M. crassus*. Actual specimens have never, until now (Ahram, 40 km. east Bushehr), been reported from Bushehr or vicinity, nor does the British Museum (N.H.) possess specimens from this area.

Taxonomic Remarks.—Ellerman and Morrison-Scott's (1951, p. 647) allocation of *Meriones zarudnyi* Heptner to this species seems to be questionable [cf. account of *Meriones tristrami*, below]. Misonne (1959, p. 53) apparently on the basis of Ellerman and Morrison-Scott's work includes Heptner's (1937, p. 191) Azarbaijan locality in the range of this species.

Meriones tristrami Thomas Tristram's Jird

Meriones tristrami Thomas, 1892, Ann. Mag. Nat. Hist., **1**, p. 148.

Type locality.—Israel: region of Dead Sea

Distribution.—

PREVIOUS: Heptner (1937, p. 191), **Azarbaijan:** Sharef Khaneh. Ellerman (1948, p. 795), **Qazvin:** Qazvin. Petter *et al.* (1957, p. 117), **Kurdistan:** Sakkez. Misonne (1959, pp. 52, 139), **Tehran:** Shah Abdul Azim. **Azarbaijan:** Moghan [steppe?]; Djulfa. **Kurdistan:** Aghbolagh Morched; Kale Sefid. **Qazvin:** Kazvin; Kamalabad. Golvan and Rioux (1961, pp. 535, 541, 549), **Azarbaijan:** Boukan. **Kurdistan:** Bizin; Songhor.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** 24 km. north-northeast (2) and 32 km. north (1) Rezaiyeh, 3; 10 km. southwest Rezaiyeh, 5 (2 in alcohol). **Kurdistan:** Aghbolagh Morched, 7. **Qazvin:** Karaj and vicinity, 14 (3 in alcohol), Qazvin, 6 (1 in alcohol, 2 skeletons).

RANGE: The range of *M. tristrami* seemingly includes the northwestern portion of the Iranian plateau northwest of a line drawn from Tehran, Tehran to Aghbolagh Morched, Kurdistan.

Remarks.—We observed these jirds in the Lake Urmiah basin and surrounding clay slopes where numerous large burrow systems existed in the soft alluvial soil. Several individuals were shot alongside *Allactaga williamsi*. One animal was captured at a pile of freshly threashed wheat. According to our colleagues in the Institut Pasteur

in Iran, adults of this species will not tolerate the presence of another individual of the same or any other rodent species when caged. Even breeding pairs must be allowed only a brief time together lest one of them be killed.

A mother and three almost half-grown young were taken from their burrow on September 18.

Taxonomic Remarks.—Chaworth-Musters and Ellerman (1947, p. 487) and Ellerman and Morrison-Scott (1951, p. 647) make *M. zarudnyi* a subspecies of *M. crassus*, thus *M. c. zarudnyi*, but Heptner's original description (1937, pp. 191–192) and photographs of the type skull suggest greater affinity to *M. tristrami*. Heptner (1937, p. 192) gives 41.8 mm. as the greatest length of the skull of the type. Heptner's (1940) photographs of *M. zarudnyi*, *P. charon* (=*M. crassus*] and *P. swinhoei* [=*M. crassus*] suggest that *M. zarudnyi* is not allied to *M. crassus*. Measurement of the greatest length of skull of our Iranian series of *M. tristrami* consistently reach or slightly exceed 41.8 mm. and the mean and extremes of the greatest length of the 24 largest skulls of our series of 41 *M. crassus*, which constitutes, to the best of my knowledge, the largest and geographically most representative collection of this species from Iran, are 35.2 mm. (29.5–38.3), which suggests affinity of *zarudnyi* to *M. tristrami*. The size of the auditory bullae of *M. zarudnyi* suggests a closer affinity to *M. tristrami* but exact identification of *M. zarudnyi* must await study of the actual specimens.

After this paper was in press, the 1965 W. S. and J. K. Street Expedition to Afghanistan obtained specimens of *Meriones zarudyni* from that country. Examination of these specimens indicates that this jird unquestionably constitutes a distinct species.

Rhombomys opimus Lichtenstein Great Jird

Meriones opimus Lichtenstein, 1823, Eversmann. Reise Buchara, p. 122.

Type locality.—Kazakstan SSR: Aral-Kara Kum (cf. Bobrinsky *et al.* 1944).

Distribution.—

PREVIOUS: Goodwin (1939, p. 4), **Khorassan:** Dasht; Maravih. Heptner (1940, pp. 38–39), **Gorgan:** Astrabad and slightly farther to the west. **Khorassan:** Nardin; Farad, 120 km. south of Gorgan. **Isfahan:** Djulfa. **Kerman:** Talab Well; Chah-i-Navar. Ellerman (1948, p. 791), **Khorassan:** Meched [a specimen BM 10.1.12.1 is labeled "Meched (Turbat-i-

Haiseri)" which suggests that Torbat-e-Heydariyeh is the correct locality]. Petter *et al.* (1957, p. 119), **Khorassan:** Dach Bouroun; Robat-i-Qarabil; Sarakhs. **Kerman:** Tasuki; Gourg.

STREET EXPEDITION SPECIMENS: **Gorgan:** 40 km. north of Pahlavi Dezh, 19 (3 in alcohol, 1 skeleton). **Khorassan:** 3 km. east of Dasht, 6; 26 km. southwest of Shahrabad Kaur, 2.

RANGE: *Rhombomys opimus* inhabits the Turkmen plains, the northwestern highlands from Dasht to Mashhad and possibly the entire eastern basin region.

Remarks.—The *R. opimus* colonies which we observed north of Pahlavi Dezh and in Khorassan Province were established in areas where the chenopod, *Salsola* sp., grew abundantly. Large quantities of this plant were noted in each of several burrows excavated at our collecting localities near Dasht and north of Pahlavi Dezh. *Meriones libycus* lived in these colonies with *R. opimus* and utilized the same burrow systems. *Rhombomys* is seemingly totally diurnal in habit; *M. libycus* is seemingly largely nocturnal in populations where it exists alone. In the observed mixed colonies both species were active only during the day. Gladkina and Mokeeva (1958) studied the relationship of these species in Uzbekistan and found *Rhombomys* to be strictly herbivorous, feeding on a wide variety of plants, whereas the *M. libycus* of mixed colonies were granivorous, insectivorous and/or herbivorous. However, during the parts of the year seeds and insects were not available, *M. libycus* became herbivorous, feeding on available plants. During October we noted that *Salsola* seemed to be the principle food of both species in the Turkmen plains colonies.

Five and seven blood clots, but no visible embryos were noted in the uterine horns of females taken October 25 and 26. Three such clots were recorded for a female taken November 6. The eyes of a single nursling, dug from a burrow on October 25, had not yet opened.

Heptner (1939a, p. 100) described *Rhombomys opimus sargadensis* from southern Iran and gave the type locality as Talab Well, Iranian Baluchistan, 160–170 km. north of the city of Dizak, collector: N. A. Zarudny, January 21, 1901. This places Talab in West Pakistan, though Heptner (1940, p. 40) states Talab lies on the Iran-West Pakistan border. Neither Heptner (1939a, p. 100), Ellerman and Morrison-Scott (1951, p. 649), who list Talab in *northeastern Persia*, nor Petter *et al.* (1957, p. 119), who give 28° 45′ N, 61° 40′ E as Talab's co-ordinates, have adequately located this place. By tracing Zarudny's 1901 itinerary on the K501 map series, Talab Well was located and its co-ordinates determined as 28° 30′ N, 61° 50′ E.

Misonne (1959, p. 54) incorrectly cites Petter *et al.* (1957, p. 119) as recording this species from 20 km. south of Shiraz.

We noted a large number of rodent burrows in a salt flat located roughly 240 km. south of Tehran where the chenopods *Salsola*, *Seidlitzia*, and *Sueda* composed the dominant vegetation. These were possibly *Rhombomys* burrows, although we collected no specimens.

Apodemus sylvaticus Linnaeus Wood or Field Mouse

Mus sylvaticus Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 62.

Type locality.—Sweden, Upsala.

Distribution.—

PREVIOUS: Blanford (1875, p. 311), **Isfahan:** Kohrud. Thomas (1902, p. 491), **Fars:** near Sheoul. Thomas (1905, p. 524). **Khuzistan:** Backtyari Mountains, 100 miles northeast of Ahwaz. Thomas (1907, p. 199), **Mazanderan:** south coast of Caspian Sea; Elburz Mountains near Damavend. Goodwin (1940, p. 10), **Gorgan:** Dar Kaleh. **Khorassan:** Gouladah; Dasht. Ellerman (1948, p. 815) **Ghilan:** Ramsar. Aberdeen University (1965), **Isfahan:** Zard Kuh.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** 10 km. south of Rezaiyeh, 1; 29 km. east of Khvoy, 1; 2 km. west, 2 km. north of Maku, 1. **Mazanderan:** vicinity of Sama, 5 (1 in alcohol), Doab, 13; 2.5 km. north of Varangrud, 1. **Gorgan:** 16 km. southeast of Gorgan, 21 (2 in alcohol). **Damghan:** 7 km. northwest of Sang-e-Sar, 3; 5.6 km. northwest of Semnan, 1. **Khorassan:** 4.8 km. north of Dasht, 12; 3 to 5 km. south of Shahrabad Kaur, 10 (2 in alcohol).

ADDITIONAL SPECIMENS: **Lurestan:** Kermanshah (572 of C. A. Reed, at YPM).

RANGE: The present distribution of this mouse in Iran seems to be confined to the Elburz Mountains and adjacent portions of the Caspian Sea coastal plain and the Zagros Mountains from Maku southeast at least to Shul.

Remarks.—We found *A. sylvaticus* very abundant throughout the eastern half of the Elburz Mountains but seemingly much less numerous in the Zagros. We found nests of these wood mice in rotten stumps and logs in the forest litter. Outside forests we found them in dwellings and among rocks and low xeric vegetation on barren hill and mountain sides from about 900 to 3350 m. Pregnant and lac-

tating females were taken August 2 through November 3. Embryos numbered two to ten, averaging 5.4 for six specimens. We noted that one large *Felis chaus* contained five *A. sylvaticus* in its stomach.

Taxonomic Remarks.—Goodwin (1940, pp. 9–10) listed specimens from Hairleigh (2), Dergermatie (5), Dasht (3), Khorassan Province as *A. sylvaticus chorassanicus* and added that these pale-colored mice inhabited rocky, arid mountain slopes and were not found in lowlands or areas with dense vegetative cover. He identified specimens from Dar Kaleh (12), Gorgan Province, Gouladah (29, 12 in spirits), Dasht (3), Khorassan Province as *A. arianus*. These specimens were characterized as richly colored and inhabitants of forested country from sea level to over 5000 ft. above sea level.

My conclusion after reading Goodwin's (*loc. cit.*) account is opposite that drawn by Ellerman (1948, p. 814). Goodwin clearly indicates that the two forms of *Apodemus* occur in very different habitat, while Ellerman interprets somehow that both forms occur together in north Persia. The specimens identified by Goodwin as *A. arianus* seemed to Ellerman (*loc. cit.*) ". . . possibly in reality a form of *flavicollis*." Goodwin does not, as noted by Ellerman (p. 804), distinguish between *arianus* and *sylvaticus* principally on the basis of size. Goodwin notes that the tail of his *A. sylvaticus* exceeds head and body length and provides the following measurements of four adults: total length 190, 215, 210, 180 mm.; tail length 103, 110, 120, 90 mm. respectively. The only measurement distinguishing *A. arianus* from his *A. sylvaticus* is tail length "about equal to or shorter than length of head and body." The measurements of three adults are provided (in mm.): total length 215, 210, 215; tail length 105, 100, 105, respectively.

Larger series are available among the Street Expedition collection. Specimens with a total length of 185 mm. or greater were treated as adults. Means and extremes of total length and tail length, respectively, of richly colored forest forms from 16 km. south-southeast of Gorgan, Gorgan (10) and Sama, Mazanderan (3) are respectively 196 (188–209), 100 (92–108) and 206 (194–220), 105 (94–111). Means and extremes of total lengths and tail lengths of light colored inhabitants of rocky open habitat from Doab, Mazanderan (9), Dasht (9) and Shahrabad Kaur (5), Khorassan are respectively: 199 (185–212), 109 (97–118), 199 (186–218), 104 (95–120), 200 (188–213), 105 (99–116). These measurements show that among larger series the ratio of head and body length to tail length does not suffice to separate these two forms.

The pelage of *A. arianus* [=*A. sylvaticus* ssp.], Goodwin's form of the forest, is we agree, dark, and that of animals, *A. sylvaticus chorassanicus*, living in habitat above the forest, light. Goodwin's forms do not occur together, but their ranges meet near Dasht, at the upper limits of the forest, and specimens from Dasht appear intermediate between the extremes. Forest and upland forms seem, on this evidence, to represent ecological races situated like those described by Neuhauser (1936, pp. 181–2) distributed along the Black Sea coast of Turkey. It seems possible that the name *A. s. dichrurus* Rafinesque (1814), applicable to the race occupying the forests of the south and eastern coasts of the Black Sea in Turkey and Russia, will also apply to the Caspian coastal race. These seemingly isolated coastal regions are in reality bridged by the forests of the southern slopes of the Caucasus Mountains.

Rattus rattus Linnaeus House Rat

Mus rattus Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 61.

Type locality.—Sweden.

Distribution.—

PREVIOUS: Misonne (1956a) provides a summary of the distribution of *Rattus rattus* in Iran and the reader is referred to his paper for the numerous localities that he provides. Misonne does not cite the following localities in works that preceded his paper: Blanford (1876, p. 53), **Ghilan:** vicinity of Bandar-e-Pavlavi. Wroughton (1920, p. 321), **Kerman:** Chahabar. Thomas (1907, p. 199) south coast of Caspian Sea. Goodwin (1940, p. 11), **Gorgan:** Dar Kaleh. Ellerman (1948, p. 811), Tumb Island, Persian Gulf.

STREET EXPEDITION SPECIMENS: **Gorgan:** 16 km. east-southeast of Gorgan, 7. **Ghilan:** Rasht, 1 (from I.P.I.).

RANGE: The range of *Rattus rattus* is essentially identical with that of *R. norvegicus* (p. 187).

Habits and Habitat.—*Rattus rattus* infested Qarnabad village near our camp 16 km. east-southeast of Gorgan. Twenty traps placed in one house of this village caught 28 of these rats in a single night. We examined but did not preserve a dead specimen of *Rattus rattus frugivorus* on a street in Gorgan.

Remarks.—The remarks in the account of *R. norvegicus* (p. 187) on the distribution along the Persian Gulf coastal plain apply equally to the present species.

Rattus norvegicus Berkenhaut Norwegian Rat

Mus norvegicus Berkenhaut, 1769, Outlines Nat. Hist. Great Britain and Ireland, **1**, p. 5.

Type locality.—Great Britain.

Distribution.—

PREVIOUS: Misonne (1956a) has summarized the distribution in Iran.

STREET EXPEDITION SPECIMENS: **Ghilan:** Rasht, 1 (from I.P.I.). **Mazanderan:** Sama, 5. **Tehran:** Tehran, 2 (from I.P.I.).

RANGE: According to Misonne (1956a, p. 9) this species ranges over the Caspian Sea coastal plain from which it extends southward up the major river valleys, the Turkmen Plains, Tehran (isolated introduced population), the Khuzistan plains and the entire length of the Persian Gulf coastal plain.

Remarks.—Our specimens from Sama were trapped in the village grist mill.

The localities from which our specimens originated fall within the area indicated by Misonne (1956a, p. 9) to be the range of this species.

Rattus norvegicus has been reported from the following localities along the coast of the Persian Gulf: Adaban, Khorammshar, Ahvaz, Bushehr, and Bandar Abbas in Iran (Baltazard and Bahmanyar, 1948, pp. 334–335; Misonne, 1956a, p. 3) and Gwadar, West Pakistan (Blanford 1876, p. 53). All these localities are seaports, and the fact that rats are frequently introduced into seaports needs no documentation here. However, Misonne's (1956a, pp. 3, 9) observation that *R. norvegicus* occurs all along the Persian Gulf coast and throughout the Khuzistan plains lacks documentation; and since we did not encounter it away from seaports there, I suggest that until evidence is presented to show this range to be continuous the Norway rat be regarded as occurring at and within the environs of each of the above-cited seaports along the Persian Gulf and Strait of Hormoz.

Mus musculus Linnaeus House Mouse

Mus musculus Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 62.

Type locality.—Sweden: Upsala.

Distribution.—

PREVIOUS: De Filippi (1865, p. 344), **Fars:** Shiraz. Blanford (1876, pp. 56–57), **Kerman:** Pishin; Kalagan; Bampur; Dizak;

Mashish. Thomas (1905, p. 523), **Khuzistan:** Deh-i-Diz; Bachtyari Mountains, 100 miles northeast of Ahwaz. **Isfahan:** 30 miles south of Isfahan. **Kurdistan:** Sakiz. Thomas (1907, p. 199), **Mazanderan:** south coast of Caspian Sea; Elburz Mountains near Demavend, 6500 ft. Wroughton (1920, p. 320), **Kerman:** Chahabar. Cheesman (1921, p. 578), **Qazvin:** Kasvin. Goodwin (1940, pp. 10–11), **Gorgan:** Kaleh Peninsula; Turkmen Desert; Dar Kaleh. **Khorassan:** Dasht. Ellerman (1948, pp. 812–13), **Kerman:** Seistan. **Fars:** Meluzil. Misonne (1959, p. 47), **Kurdistan:** Akinlou.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** 10 km. southwest Rezaiyeh, 7; Mushabad, 9 (4 in alcohol). **Mazanderan:** 6 km. west of Chalus, 5; Sama, 6 (2 skulls only). **Gorgan:** 40 km. north of Pahlavi Dezh, 2; 16 km. southeast of Gorgan, 10 (2 skulls only). **Damghan:** 5.6 km. north of Semnan, 4. **Khorassan:** 3 km. east of Dasht, 1; 3 km. south of Shahrabad Kaur, 5. **Kerman:** 24 km. soushwest of Zabol, 7; Geh, 2. **Fars:** 5 km. east-southeast of Pol-i-Abgineh, 4; Ahram, 4. **Khuzistan:** 19 km. south of Shush, 2. **Lurestan:** Faraman, 13 (5 in alcohol).

RANGE: The house mouse seems to range throughout most of Iran, but it seems doubtful that these mice occur in the great eastern desert basin or in the highest mountain reaches.

Remarks.—Free living and/or commensal forms of the house mouse were caught at virtually all of our collecting localities. Specimens taken south of the Elburz and east of the Zagros are very light tan dorsally and white ventrally in both free living and commensal populations, whereas although free living animals of the Zagros Mountains retain white bellies, north of Kazerun they tend to become darker dorsally. Commensals from the Zagros seem to be consistently darker dorsally and ventrally. Our largest and darkest commensal specimens originated from dwellings in the vicinity of Rezaiyeh. Free living forms from the northern slopes of the Elburz and Caspian Plain are darker dorsally and ventrally than the plateau inhabitants. The most striking difference between the two populations is the rusty-buff ventral coloration of the coastal plain animals compared with the white for those from the plateau.

Acomys demidiatus Cretzschmar Spiny Mouse

Mus demidiatus Cretzschmar, 1826, Ruppel Atlas, p. 37, taf. 13, fig. a.

Type locality.—Sinai.

Distribution.—

PREVIOUS: Wroughton (1920, p. 320), **Kerman:** Chahbar. Ellerman (1948, p. 809), **Fars:** Bushire.

STREET EXPEDITION SPECIMENS: **Fars:** 5 km. southeast of Pol-i-Abgineh, 4.

RANGE: The spiny mouse is known in Iran from the three localities provided above.

Remarks.—We trapped this species on a sparsely vegetated, rocky mountainside overlooking the Lake Famur valley. *Calomyscus bailwardi* occurred in large numbers in the area inhabited by *A. demidiatus*.

Both Bushehr and Chah Bahar lie at sea level. The capture of *Acomys demidiatus* near Pol-i-Abgineh (762 m.), situated over 110 km. northeast of Bushehr and on the plateau suggests that spiny mice will be found to occur widely in southern Iran.

The use of *demidiatus* follows Setzer's (1959) revision of the Egyptian *Acomys*.

Nesokia indica Gray and Hardwicke Bandicoot Rat

Arvicola indica Gray and Hardwicke, 1832, Illustr. Ind. Zool., **1**, pl. xi.

Type locality.—India.

Distribution.—

PREVIOUS: Blanford (1876, p. 59), **Kerman:** Kalagan. Thomas (1907, p. 199), **Gorgan:** Bandar-i-Gaz. Goodwin (1940, p. 12–13), **Gorgan:** Dar Kaleh; Turkmen Desert; Main Kaleh Peninsula. **Khorassan:** Gouladagh. Ellerman (1948; p. 807), **Mazanderan:** Mashed-i-Sar. Misonne (1959, p. 48), **Qazvin:** Hessarek, near Karadj. **Khorassan:** Sabzwar. **Isfahan:** Mahallat. **Lurestan:** Qazr-i-Chirine. "Khuzistan."

STREET EXPEDITION SPECIMENS: **Qazvin:** vicinity of Karaj, 17 (1 in alcohol, 1 skeleton). **Gorgan:** 16 km. south-southeast of Gorgan, 2. **Damghan:** 2.4 km. northwest of Semnan, 1. **Khuzistan:** 19 km. south of Shush, 2. **Fars:** Ahram, 1. **Kerman:** 24 km. southwest of Zabol, 1; Iranshahr, 2; 18 km. west Iranshahr, 4.

ADDITIONAL SPECIMENS: **Khorassan:** Shah Pasand and vicinity of Gombad-i-Kabous (MHNP 80, 81, 92, 360, 758); Langarak (MHNP 1343).

RANGE: *Nesokia indica* seemingly ranges over the eastern basin region, the Turkmen plains, the southwestern Caspian coastal plain, the Khuzistan plain and the Persian Gulf coastal plain south at least to Bushehr.

Remarks.—All bandicoot rats that we observed seemed to confine their activities to their burrow systems, which were usually limited to stream-side situations. Each of the several burrow systems that we dug out consisted of several-to-many tunnels (the openings of which were kept plugged with loose dirt), a single enlarged nest chamber lined with finely chewed vegetation, and several enlarged, unlined nest chambers. A single rat usually occupied each burrow. Finely chewed material that resembled roots and tubers composed the principle contents in the stomachs of most bandicoot rats that I examined.

All the bandicoots that we captured alive fought fiercely.

Females taken October 21, October 23, and January 20 showed eight, two, and four swellings in the uterus, respectively, each with a blood clot but no visible embryo. A female caught December 1 bore two 16 mm. embryos. According to the records kept at the I.P.I., the colony they maintain in Tehran breeds year round. Seven pregnant females that we prepared there in early February contained from two to eight embryos.

Taxonomic Remarks.—

Nesokia indica indica Gray and Hardwicke (*supra cit.*)

Nesokia bailwardi Thomas, 1907, Ann. Mag. Nat. Hist. (ser. 7), **20**, p. 199.

Type locality.—Iran: Gorgan Province; Bandar-i-Gaz. Type, skin and skull BM(NH) 7.7.14.20.

Nesokia buxtoni Thomas, 1919, J. Bombay Nat. Hist. Soc., **26** (2), p. 422.

Type locality.—Iraq: Amara. Type, skin and skull (BM(NH) 18.8.55.

Nesokia insularis Goodwin, 1940, Amer. Mus. Novit. 1082, p. 12.

Type locality.—Iran: Gorgan Province; east end Miyan Kaleh Peninsula. Type, skin and skull AMNH 88845.

Molting specimens of *Nesokia indica* were trapped July 22, October 23, November 30, and December 1. The Street Expedition series of 16 bandicoot rats from Karaj, Qazvin Province contains molting and non-molting specimens that provide an indication of the degree of variation which may exist in a local population of *N. indica*. The variety of different pelage colors observed in this series appears to be associated with molt and individual variation. Molting animals are a darker grayish color and more thinly furred than non-molters

because of the increased exposure of the dark colored basal portion of the pile and contour hair.

Thomas (1907, p. 199) described *N. bailwardi* from a single specimen and said it differs from *N. huttoni* "by its larger size, more bowed skull and the heavier supra-orbital ridge, . . ." Subsequently, Ellerman and Morrison-Scott (1951, p. 619) placed *N. bailwardi* in synonomy with *N. indica indica.* I examined the type specimen and concur.

Thomas (1919a, pp. 422–3) described *Nesokia buxtoni,* which he said was distinguished from all forms known at that time by "its sandy coloration above and its whitish belly;" although he does not state that direct comparisons were made. Street expedition specimens fitting this description from 19 km. south of Shush (=112 km. east of Amara, Iraq, the type locality of *buxtoni*) are indistinguishable from specimens with full pelage in the above mentioned Karaj series, as well as specimens from Semnan, 16 km. southeast of Gorgan, and Zabol. I therefore, consider *N. buxtoni* to be synonomous with *N. i. indica.*

Goodwin (1940, p. 12) named *N. insularis* from a series of nine specimens from the east end of Miyan Kaleh Peninsula, which at best is only 20 km. across Astrabad Bay from Bandar-i-Gaz, Gorgan, the type locality of *N. bailwardi.* The Miyan Kaleh Peninsula does not stretch more than 70 km. from the mainland. The type specimen of *N. insularis* is characterized as a dull-brownish-gray bandicoot with short tail [measurements of three provided by Goodwin (*loc. cit.*) are 120, 120, 135 mm.; mean and extremes of the six specimens in the Karaj series with complete tails are 109.3 mm. (100–126)]. The pelage of the type specimen of *N. insularis,* which I examined proved to be that of a molting animal. No basis is seen for retaining *insularis* as a subspecies.

Glis glis Linnaeus Edible Dormouse

Sciurus glis Linnaeus, 1776, Syst. Nat., 12th ed., **1**, p. 87.

Type locality.—Germany.

Distribution.—

PREVIOUS: Gmelin, S. G. (1774, p. 379), **Ghilan:** Goodwin (1940, pp. 1, 5), **Khorassan:** Gouladah. **Gorgan:** Dar Kaleh. Taghizadeh (1946, p. 7), **Ghilan:** Roudbar. Ognev (1947, p. 467), **Gorgan:** Astrabad. Ellerman (1948, p. 775–6), **Ghilan:** Resht, Elburz Mtns. [I presume that this refers to

specimens BM 27.10.26.18–22 labeled Kuramabad, 400 m., Elburz, G. Heinrich.] Misonne (1959, p. 45), **Mazanderan:** Galander Talech. **Ghilan:** Ramsar.

STREET EXPEDITION SPECIMENS: **Mazanderan:** Sama and vicinity; 12 (1 skeleton); 12 km. west of Chalus, 7 (3 in alcohol). **Ghilan:** Rezvandeh, 1 (gift of Pasteur Institute of Iran).

RANGE: *Glis glis* ranges throughout the forested northern slopes of the Elburz Mountains and forested regions of the Caspian coastal plain.

Remarks.—We observed very dense populations of these dormice in the vicinities of Sama and Chalus in middle and late August. *Glis glis* began their activities at night shortly after dusk and ceased at dawn during the period we spent in these areas (August 14 to September 8). They fed principally on beech nuts of the tree *Fagus* sp. in the forest above Sama and on beech nuts and hornbeam seeds in the coastal plain forest 12 km. west of Chalus. They inhabited walnut orchards at Sama and fed on the nearly ripe walnuts. The squeal-like calls of these rodents could be heard at any hour of the night, but seemed to occur with greatest frequency shortly after the animals' dusk emergence. I found them quite inquisitive and they would allow one to approach to within about 10 m. before becoming alarmed. When disturbed, however, they began a saucy, rapid chatter. A sharp sound, like a gun shot or a rock thrown through the trees, aroused all dormice within earshot (seemingly as many as 20) into a loud chattering chorus. Their feeding mannerisms closely resembled those of the North American gray squirrel, *Sciurus carolinensis*. Every specimen that we prepared showed a large amount of subcutaneous fat. Fat dormice den in tree cavities, and the several cavities which we chopped open, were lined with leaves. A nest chopped open August 17 held an adult male and female and four suckling young approximately one-fourth grown. The female escaped; but in subsequent captivity the male patiently tolerated the persistent exploration of him for mammae by these young. One one-half grown male was caught in its nest in a hollow tree August 21. Pregnant females, each containing ten embryos were acquired August 21 (16, 17, 18, 18, 19, 19, 20, 20, 20, 21 mm.) and September 2 (5, 7, 7, 7, 7, 8, 8, 8, 9, 9 mm). Females taken September 2 and 3 possessed nine and seven swellings in the uterine horns respectively, each with a blood clot but no visible embryo. These data suggest the possibility that breeding takes place throughout the nonhibernating season.

The majority of our specimens taken in late August and early September possess fresh winter pelage; however, two are in short summer pelage. A specimen captured in early May by the I.P.I. shows initiation of molt into summer pelage. Though the ventral pelage is white in the majority (13) of our series, a bright russet color is present in varying amounts in the ventral pelage in six specimens.

The stomachs of a jungle cat, *Felis chaus*, and a tawny owl, *Strix aluco*, which we collected and examined, each contained a single adult *Glis glis*.

Misonne's statement (1959, p. 45) that the "Loir" [=*Glis glis*] is abundant on the plateau and each autumn causes great damage to the orchards there seems to be completely undocumented.

Taxonomic Remarks.—

Glis glis persicus Erxleben

Sciurus persicus Erxleben, 1777, Syst. Regn. Anim., p. 417.

Type locality.—Iran: Ghilan Province.

Because the Province of Ghilan encompasses considerable territory, parts of which include arid, unforested habitat unsuitable for the existence of *Glis glis*, it is proposed that the type locality of *G. g. persicus* be restricted to Rasht. Erxleben assigned the name *Sciurus persicus* to S. G. Gmelin's (1774, p. 379, fig. 43) description. S. G. Gmelin spent a considerable portion of his stay in Ghilan Province at Enzeli [=Bandar-e-Pahlavi] near Rasht and specimens of *Glis glis* have since been reported from near this place (Ellerman, 1948, p. 776).

Myoxus glis caspius, Satunin, 1905, Zap. Kauk. Otd. Imp. Russ. Geog. Obsh., **25** (3), p. 55. Emended to *caspicus*, Satunin, 1905, Isvesteya Kavk. Muz., **2**, p. 54.

Type locality.—Turkmen SSR: Chulii Gorge, near Askhabad.

Erxleben (1777, p. 417) assigned the name *S. persicus* to the fat dormice of Ghilan Province. Satunin (1905a, p. 55) described *Myoxus glis caspicus* on the basis of material from: Katar Copper Mine, Zangezur District, Former Elizabethpol Province, Azarbaijan SSR; Shara Argun, Dagestan SSR; Lagodekh and Borzhomi, Georgian SSR; and Chuli Gorge near Ashkhabad, Turkmen SSR. That Satunin was unaware that the animal S.G. Gmelin (*loc. cit.*) described and figured as a squirrel was in reality the dormouse, *Glis glis*, is obvious by his referral (1905b, p. 177) to it under the name *Sciurus* sp?. Ognev (1947, p. 47) limits the range of *G. g. caspicus* to the southeast corner of Transcaucasia [vicinity of Lenkoran, Azarbai-

jan SSR], northern Iran, and the Kopet Dagh [southwestern Turkmen SSR] but does not mention *S. persicus* Erxleben. Ellerman (1948, pp. 775–776) mentions only *G. g. persicus* from Iran, but Ellerman and Morrison-Scott (1951, pp. 547–548) list both *G. g. persicus* and *caspius* [sic] from Iran.

The oldest available name for this race is *Glis glis persicus* Erxleben, 1777, and *G. g. caspicus* Satunin, 1905, represents a junior synonym.

Dryomys nitedula Pallas — Forest Dormouse

Mus nitedula Pallas, 1778, Nov. Spec. Quad. Glir. Ord., p. 88.

Type locality.—USSR: Region of Lower Volga.

Distribution.—

PREVIOUS: Blanford (1875, p. 311), **Isfahan:** Kohrud, 7000 ft. Cabrera (1901, p. 118), **Khuzistan:** [?] Upper Karun; Chagajor. Ellerman (1948, p. 777), **Tehran:** Tehran. **Kerman:** Mahum. Misonne (1959, p. 45), **Kurdistan:** Marivan; Sameleh. Aberdeen University (1965), **Isfahan:** Zard Kuh.

STREET EXPEDITION SPECIMENS: **Kurdistan:** (gifts from Institute Pasteur of Iran): Sameleh, 3; Gezardarreh, 1. **Mazanderan:** 4 km. north of Varangrud, 2742 meters, 1 (skeleton).

ADDITIONAL SPECIMENS: **Azarbaijan:** Maragheh, (MHNP 506).

RANGE: The Transcaucasian localities (Vereschagin 1959, p. 666) and the southwest Turkmen SSR locality (Ognev and Heptner, 1928, p. 265), when considered with the Tehran and Varangrud records, suggest that this dormouse may range throughout the Elburz Mountains. All the other localities lie within the Zagros Mountains from Maragheh, Azarbaijan southeast to Mahan, Kerman.

Remarks.—Although *Dryomys nitedula* is best known in Iran as an inhabitant of gardens, we did not observe it in cultivated areas. Our four specimens from Kurdistan are said to have come from orchards, as were several mounted individuals that I saw in the museum of the Karaj Agricultural University.

The specimen caught north of Varangrud lived among boulders in an area with scant, low vegetation (see page 108, text). This dormouse's stomach contained only insects, mostly *Orthoptera* (grasshoppers).

Two round nests constructed of grass found in a thicket of the thorny shrub (*Parrotia persica* south of Shahrabad Kaur in Khorassan Province, closely resembled the nest pictured in plate 1B of Nevo and Amir (1964, p. 75). These nests contained rodent feces and were possibly constructed by *D. nitedula*. Each nest, approximately 20 cm. in diameter, was built into a fork of a bush about 1 m. above the ground, and a single entrance led to an oval chamber.

Jaculus jaculus Linnaeus Lesser Three-toed Jerboa

Mus jaculus Linnaeus, 1758, Syst. Nat., 10th ed., **1**: p. 63.

Type locality.—Egypt: Giza pyramids.

Distribution.—

PREVIOUS: Blanford (1875, p. 312), **Kurdistan**: Mohamrah. Murray (1884, p. 99), **Fars**: Bushire; Tangistan. Cabrera (1901, p. 120), **Kurdistan**: Shuster.

STREET EXPEDITION SPECIMENS: **Kurdistan**: 19 km. south of Shush, 19 (7 in alcohol, 2 skeletons); 42 km. west of Shush, 1. **Fars**: vicinity of Ahram, 7.

RANGE: *Jaculus jaculus* occupies the Khuzistan Plain and apparently the Persian Gulf coastal plain southeast at least to Ahram; however, there are no records of it between Khorramshahr and Bushehr.

Remarks.—These jerboas occupy simple shallow burrows which usually possess one or two openings leading one to two feet down to an unlined slightly enlarged chamber. The earth was usually quite moist at the nest chamber level in those we excavated. Newly sprouted grass and saltwort (Chenopodiaceae) seemed to provide their principle food source, judging from the nature of the material in the alimentary tracts examined. January 10 one female was dug from her burrow with three juveniles equal in size to their mother but readily distinguishable from her by their lighter pelage. No other females taken possessed young or embryos.

We made field observations on *Jaculus jaculus* from January 6 to 11 at Ahram, Fars, and from January 15 to 20 in the vicinity of 19 km. south of Shush. Temperatures at these localities during the periods mentioned never reached freezing but dropped at night to about 40° F. Field observations on the related species *Jaculus blanfordi* were made December 2 near Bampur, Kerman, December 21–23 around Galatappeh, Isfahan and on January 27 and

30 in the vicinity of 130–190 km. southeast of Tehran. Temperatures at both of the latter places dropped to freezing and/or below on nights that we observed or collected jerboas.

Several *J. jaculus* and one *J. blanfordi* that we kept alive for periods of three to four days in cages kept in our tents entered a deep lethargy daily from which prolonged handling (30 minutes to an hour) failed to rouse them. Each night these same animals became highly active. The female *Jaculus jaculus* and her three nearly grown young did not become torpid during three days in captivity. It seems likely that this type of torpid diurnal behavior provoked Hatt's statement (1959, p. 82) "Although jerboas [seemingly *Jaculus jaculus*] are common in Iraq, they were in hibernation during much of the season [October 1952-March 1953] we were in the field. . . ." Hatt, however, failed to state how he determined that the jerboas were in hibernation. Our observations on *Jaculus* in Iran certainly vitiate the supposition that jerboas of this genus hibernate under the conditions there.

Jaculus blanfordi Murray Greater Three-toed Jerboa

Jaculus blanfordi Murray, 1884, Ann. Mag. Nat. Hist., **14**, p. 98.

Type locality.—Persia: Bushehr.

Distribution.—

PREVIOUS: Blanford (1876, p. 74), **Tehran:** Kum. Murray (1884, p. 98), **Fars:** Bushire; Tanjak; Tangistan [Dist.]. Ellerman (1948, p. 771), **Kerman:** (Seistan) Camp Kohak. Petter *et al.* (1957, p. 120), **Khorassan:** Maine.

STREET EXPEDITION SPECIMENS: **Kerman:** 24–48 km. south of Bampur, 7 (1 in alcohol). **Isfahan:** 1.6–9.6 km. east of Sarvestan, 3 (1 in alcohol). **Tehran:** 124 and 130 km. southeast of Tehran, 2 (2 skeletons).

ADDITIONAL SPECIMENS: **Kerman:** Jaz Murian (BM 52.1478).

RANGE: The localities cited above include all that are known for the complete range of this jerboa and indicate that, with the exception of Bushehr and vicinity, the range of this species presently seems to conform to the eastern basin region of Iran.[1]

Remarks.—*J. blanfordi* inhabited very arid rocky basins at each of the three localities where we captured it. In the Jaz Murian basin this species lived in the sand dune and gravel plain areas. One animal

[1] J. B. Mirza recently reported this species from Nushki, Pakistan (1965. Mammalia **29**, pp. 208–209).

was shot in an area of bare gravel more than 100 m. distant from the nearest cover. We observed these animals abroad on nights when temperatures consistently dropped below freezing. One animal captured in late December and kept caged in my tent for three days became torpid by day to the extent described for *J. jaculus* (p. 196, text), yet was active each night. A female taken January 27 contained three embryos measuring 19, 20, and 20 mm. A desert fox, *Vulpes rüpelli*, collected 130 km. southeast of Tehran contained remains of a *J. blanfordi* in its stomach.

Our collections bring the total number of known specimens of this little known species to 26. Blanford's from Kum (=Qom), which seems to have been overlooked by most recent authors (Ellerman and Morrison-Scott, 1951; Petter *et al.*, 1957; Misonne, 1959) dealing with this species and our localities in Isfahan and Tehran Provinces extend the known range over 675 km. west of Mahneh, Khorassan, the previous northernmost locality for this jerboa.

Ellerman (1948, p. 771), although recognizing *J. blanfordi* specifically, leaves some doubt as to the distinctness of this species from *Jaculus jaculus*. However, the range of *J. jaculus* extends as far east as Khuzistan, Iran, and the shores of the Persian Gulf near Bushehr, Iran. Murray (1884, pp. 98–99) records both *J. jaculus* and *J. blanfordi* from this area and provides measurements distinguishing the two: length of hind foot, 66 mm. (*J. blanfordi* adult) and 55 mm. (*J. jaculus* adult). Measurements of Street Expedition specimens show means and extremes of hind foot length of eight *J. blanfordi* to be 68.6 mm. (62–75) and 19 *J. jaculus* 57.5 mm. (55–60). Our evidence supports specific distinction, and the difference in length of hind foot seems to provide a consistent means of distinguishing these two species, including the area of supposed sympatry.

Allactaga elater Lichtenstein — Small Five-toed Jerboa

Dipus elater Lichtenstein, 1825, Abh. Akad. Wiss. Berlin, **1825**, p. 155.

Type locality.—Western Kazakstan (see Vinogradov, 1937, p. 119) and not Eastern Kazakstan (see Bobrinsky, 1944) as cited by Ellerman and Morrison-Scott (1951, p. 529).

Distribution.—

PREVIOUS: Blanford (1876, p. 77), **Fars:** Katur; Sarjan. Cabrera (1901, p. 120), **Khuzistan:** Shuster. Wroughton (1920, p. 319), **Kerman:** Surab. Goodwin (1940, p. 733), **Khorassan:** Turkmen plains about 60 km. east [northeast] of Gurgan. Ellerman

(1948, p. 733), **Khorassan:** Kain District. **Tehran:** Tehran. Misonne (1959, p. 44), "tout l'Azarbaijan"; north slope of the Elburz mountains, "descendant jusqu'a 650 m. dans la region de Gorgan-Sharud." "Kurdistan." Siddiqui (1961, p. 189), **Kerman:** Pishin.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** ca. 40 km. southeast of Maku, 1. **Tehran:** vicinity of Karaj, 2. **Gorgan:** 8–40 km. north of Gorgan, 12 (1 in alcohol). **Khorassan:** 21 km. north of Gonbad-i-Kavus, 2.

ADDITIONAL SPECIMENS: **Khorassan:** Khorassan, 2 (uncataloged BM specimens collected by C. E. Yate who spent part of 1899 in Mashhad; Dach Bouroun (MHNP 1769, 108, 109, 110, 1355); Sabzevar (MHNP 1035, 1038); Serakhs (MHNP 1349); Maine (MHNP 1350).

RANGE: This species seems to occur throughout Iran, with the exception of the forested northern slopes of the Elburz Mountains.

Remarks.—We observed many active *A. elater* during cold nights of late October. These animals seemed to be more abundant on the higher parts of the Turkmen Plains where the soil is drier and supports more vegetation than the low, moist, salt-saturated areas. Their burrows boast but a single opening, usually under a thick clump of sandwort (Chenopodiaceae). Stomach contents indicated that these jerboas fed on the chenopod *Halostachys caspica*. Females taken October 25 and 26 each contained four embryos, respectively measuring 14, 15, 15, 17 mm., and 21, 23, 24, 24 mm. One female taken October 29 was lactating and a male about two-thirds grown was taken October 26. This suggests a rather long breeding season. Kolesnikov (1939, cited in Ognev, 1948, p. 217) observed that this species in Turkmen SSR has three litters, spring (first pregnancies noted around the first of April), summer and fall, but did not present dates of the summer or fall pregnancies. He found two to six (mean 5) young to a litter. Animals that we captured alive and subsequently caged were most active at night but did not become torpid during the day.

A number of the 22 localities included by Misonne (1959) on his distribution map of this jerboa seem to have been taken from Map VI provided by Ognev (1948), most of which are difficult, if not impossible, to identify exactly.

I have not examined the specimens that Cabrera (1901, p. 120) cites from Shuster. They are not identifiable to species from his account and are only provisionally included in this species account. The possibility that his specimens might represent *Allactaga euphratica* should be investigated before Khuzistan is definitely included within the range of *A. elater*.

Allactaga williamsi Thomas Williams' Five-toed Jerboa

Allactaga williamsi Thomas, 1897, Ann. Mag. Nat. Hist., **20**, p. 309.

Type locality.—Asia Minor (Turkey): Kurdistan; Van.

Distribution.—

PREVIOUS: Misonne (1959, p. 44), **Qazvin:** slopes of Elburz mountains north of Qazvin. **Azarbaijan:** Djulfa; Moghan steppe. **Kurdistan:** Aghbolagh Morched. Vereshchagin (1959; p. 668) maps a locality which seems to be about **Azarbaijan:** Khvoy.

STREET EXPEDITION SPECIMENS: **Tehran:** Rachtagan, 1 (skeleton). **Kurdistan:** Kohnehezar, 1. **Azarbaijan:** 10 km. southwest of Rezaiyeh, 3; 32 km. north of Rezaiyeh, 2.

ADDITIONAL SPECIMENS: **Zanjan**: Sultanieh (MHNP 455).

RANGE: All the localities cited above lie on the plateau northwest of a line connecting Tehran and Aghbolagh Morched.

Remarks.—We found *A. williamsi* rather common along outer edges of Lake Urmiah salt flats and in low hills around camp 10 km. southwest of Rezaiyeh, where it was collected alongside *Meriones tristrami*. Four females taken in mid-September bore no embryos. A specimen taken August 14 appeared to be molting into fresh pelage. The stomachs of specimens collected in the vicinity of Rezaiyeh contained finely chewed, fragrant weeds.

Taxonomic Remarks.—The skin and skull of the type and only known specimen of *Allactaga hotsoni* Thomas from Kont, Kerman Province, bears striking resemblance to specimens of *A. williamsi* in the British Museum (N.H.) from Shibar Pass, Afghanistan, with which I briefly compared it, suggests that detailed study may show *A. hotsoni* to be synonomous with *A. williamsi*.

Besides northwestern Iran, *A. williamsi* is known from eastern Turkey, Transcaucasia (Ellerman, 1948, p. 774; Vereshchagin, 1959, p. 668) and Shibar Pass, Afghanistan (Ellerman, 1948, p. 774). This Afghanistan locality lies approximately 1500 km. east of Tehran, and

it suggests that, particularly if *A. hotsoni* proves to be the same species, this jerboa may occupy a much greater range than has yet been determined.

Alactagulus pumilio Kerr Little Earth Hare

Dipus sibericus pumilio Kerr, 1792, Anim. Kingdom, p. 275.

Type locality.—USSR (?Kazakstan SSR): Between Caspian Sea and Irtish River.

Distribution.—

PREVIOUS: Petter *et al.* (1957, p. 119), **Khorassan:** Dach Bouroun.

STREET EXPEDITION SPECIMENS: **Gorgan:** from 1.6 km. south to 32 km. north of Pahlavi Dezh, 12 (3 skeletons, 1 in alcohol). **Khorassan:** 21 km. north of Gonbad-i-Kavus, 4.

RANGE: *Alactagulus pumilio* is known from the above northeastern Iranian localities.

Remarks.—The first four sentences of *Remarks* on *Allactaga elater* (p. 198, text) apply equally to this jerboa. The two species seemed to occur together in the same habitat north of Pahlavi Dezh and at Gonbad-i-Kavus, without conflict. Four females taken October 22 and 26 contained three, four, six, and seven small blood clots in swellings in the uterine horns, although no embryos were visible. The individual with three clots was lactating.

A single specimen of this species (Petter *et al.*, 1957, p. 119) taken at Dacht Bouroun on the border between Turkmen SSR and Iran provided the only previous basis for inclusion of this species in the Iranian fauna. The sixteen specimens we collected extend its known range into Iranian territory. Gromov *et al.* (1963, p. 403) state that it has a wide distribution in the adjacent and seemingly ecologically identical portion of the Turkmen SSR. This suggests that *A. pumilio* may prove to range throughout the portion of the Turkmen plain that lies in northeastern Iran.

The latest review of Russian mammals (Gromov *et al.*, 1963) employs the name *Alactagulus acontion* Pallas 1778 for this species. Actually Pallas (1778, pp. 284, 295, fig. 25, no. 4) uses the name *Mus jaculus* var. *pygmaea,* and Ellerman and Morrison Scott (1951, pp. 533–534) have correctly shown that *pygmaea* is preoccupied, and that the earliest available name for this species is *pumilio* Kerr, 1792 (*supra cit.*).

Hystrix indica Kerr Crested Porcupine

Hystrix cristata var. *indica* Kerr, 1792, Anim. Kingdom, p. 213. Based on Smellie's *Buffon*, 1781, 7, pl. 206.

Type locality.—India.

Distribution.—

PREVIOUS: Blanford (1876, p. 80), **Kerman:** Jalk, 3000 ft. Cheesman (1920, p. 342), **Khuzistan:** mound of Susa. Goodwin (1940, p. 13), [?] **Gorgan:** Menzil. Misonne (1959, p. 43), **Azerbaijan:** Moghan steppes, 15 km. west of Bilassoar. **Mazanderan:** plain of Ramsar. **Gorgan:** Tirtash near Behshahr.

STREET EXPEDITION SPECIMENS: **Mazanderan:** Sama, 3 (1 skeleton only). **Gorgan:** 14.5 km. north and 1.6 km. west of Gorgan, 1; 16 km. east-southeast of Gorgan, 1. **Khuzistan:** 20–25 km. south of Shush, 1 (skull only). **Fars:** 10 km. east of Kazerun, 1.

RANGE: The crested porcupine ranges through the Turkmen Plains, the forested northern slopes of the Elburz Mountains, the Moghan steppe, the Khuzistan Plains, and the Zagros Mountains in the vicinity of Kazerun.

Remarks.—Porcupines were common in the forests at Sama and Gorgan where they denned beneath boulders, in cracks between exposed horizontal rock strata, or in burrows. They also occurred in abundance on the Turkmen and Khuzistan Plains and at Kazerun. We noted several active burrows atop several low hills north of Pahlavi Dezh, Gorgan.

Misonne (1959, p. 43) states "Contrairement a l'opinion de Blanford, le Porc-epic n'est pas repandu dans tout l'Iran; il manque dans tout l'Ouest montagneux du pays." Field (1955, p. 60) records this species from Jabal Baradust, Iraq, in the Zagros Mountains of Iraqi Kurdistan just west of the Iranian border and ecologically identical with the Iranian Zagros. Fields' record and ours from in the Zagros Mountains at Kazerun suggest that this species possibly does range through the Zagros Mountains in western Iran and casts some doubt on the latter half of Misonne's generalization.

Canis lupus Linnaeus Wolf

Canis lupus Linneaus, 1758, Syst. Nat., 10th ed., 1, p. 39.

Type locality.—Sweden.

Distribution.—

PREVIOUS: De Filippi (1865, p. 343), **Qazvin:** Qazvin. Elburz Mountains. Blanford (1876, p. 37), **Fars:** high plateau along Shiraz-Isfahan road near Dehbid and Asupas. **Isfahan:** near Soh. Birula (1912, p. 240–1) quotes N. A. Zarudny's field notes that wolves are distributed in eastern Persia from **Khorassan** to the Persian Gulf and that they are serious pests in Seistan and Baluchistan, as well as being found in Sargad and Khudian. Baltazard and Ghodssi (1953, p. 367), **Zanjan:** Zendjan. Misonne (1959, p. 27) "all of Azarbaijan Province," specifically; Mianeh; Moghan steppes; Djoulfa. "All of Kurdistan Province," specifically: Kohneh Hezzar; Pir Badam; Aghbolagh Morched; Gazan Karreh; Shah Godar; Aghbach; Bach Goutaran; Kariz. "All of the Elburz."

STREET EXPEDITION SPECIMENS: **Lurestan:** Faraman, 1 (skeleton). **Tehran:** south of Tehran, 1 (skeleton).

RANGE: Wolves seem to occur in all parts of Iran.

Remarks.—A member of our party saw a single wolf near our Doab camp in the Elburz. We later encountered wolves at our camp 10 km. southwest of Rezaiyeh, Azarbaijan where they came to the vineyards nightly to feed on ripened grapes. At Shahrabad Kaur, Khorassan I observed two wolves one night and called one to within 35 m. with a predator call. Local inhabitants in this region reported that wolves are not uncommon there. Mr. and Mrs. Street observed three wolves to cross the road in front of their truck some 20 km. north of Persepolis, Fars. I noted one on the road between Jahrom and Juyom, Fars. Our entire party watched a large red individual in broad daylight on a wide stretch of dry marsh east of Abadan, Khuzistan.

Canis aureus Linnaeus Jackal

Canis aureus Linnaeus; 1758, Syst. Nat., 10th ed., **1**, p. 40.

Type locality.—Iran: Lar Province (former province presently located within Fars Province at about 28° N, 54° E).

Distribution.—

PREVIOUS: Linnaeus (1758, p. 40), **Fars** (former Laristan Province). De Filippi (1865, p. 343), **Ghilan,** Blanford (1876, p. 37), **Kerman:** Bampur. "Common in parts of Persia, but comparatively rare on the plateau, except in the neighborhood of large cities, where it inhabits enclosed gardens, orchards,

etc. . . . throughout the Caspian provinces." Thomas (1905, p. 522), **Khuzistan:** Shush. Birula (1912, pp. 243, 245), **Khorassan:** near Damghan. **Kerman:** Bareng; Bampur River; Basman. Cheesman (1920, p. 333), **Fars,** Shiraz. Goodwin (1940, p. 5), **Gorgan:** Dar Kaleh. Misonne (1959, p. 28), **Tehran:** Tehran. **Qazvin:** Kazvin. **Gorgan:** Bandar-i-Gaz; Caspian coast.

STREET EXPEDITION SPECIMENS: **Gorgan:** 16 km. southeast of Gorgan, 1; 8 km. north of Gorgan, 1; 10 km. east of Behshahr, 1. **Mazanderan:** Sama and vicinity, 4 (1 skeleton). **Khuzistan:** 35 km. south-southeast of Shush, 1. **Fars:** 24 km. north of Kazerun, 1. **Kerman:** 24 km. southwest of Zabol, 1; 42 km. north of Geh, 1.

ADDITIONAL SPECIMENS: **Khuzistan:** Gutvand village (FMNH 92898). **Ghilan:** Gulega (SMNS 5.814); Rezvandeh (SMNS 5.815–6); Sondian (SMNS 5.817); Kopurtschad (SMNS 5.818).

RANGE: Jackals range along the north slopes of the Elburz Mountains and Caspian coastal plain, and are known from three places, Qazvin, Tehran, and Damghan along the southern base of the Elburz Mountains. In the south they occur south of a line drawn east to west from northern Khuzistan to Seistan.

Remarks.—Jackals were abundant along the forested slopes of the Elburz from about 1230 m. down to sea level in Seistan and in Khuzistan. They took refuge diurnally in thickets or dens dug in the ground. Late each afternoon the jackals began a characteristic howl, joining in one by one until the countryside rang with their chorus. As day dawned they began a chorus which differed from that of the early evening. These morning vocalizations consisted of a rapidly repeated dog-like bark terminated with an initially loud but diminishing "br-ow-ow-ow-ow," all of which were repeated several times.

Stomach contents of several jackals included grasshoppers, grapes, blackberries, grain seed, dates, fresh water crabs, carrion, and one *Mus musculus.* We observed one jackal carrying a chicken out of a village. After dark they moved into the villages to scavenge and were completely uninhibited either by human activity, which usually dropped to a minimum at nightfall, or by the village dogs. Around midnight we observed jackals at rest lying in and about the villages. We counted between four and eight lying about Qarnabad village near camp southeast of Gorgan on several successive nights. Many times one or more responded to our predator calls, approaching within 1 to

2 m. of our vehicles before stopping to look, and frequently did not flee until we spoke.

Several half-grown pups that we collected at Sama in mid-August were each out hunting alone.

An adult female taken August 16 was the first we obtained and is, with the exception of the juveniles, the only specimen that we took that had not completely molted into winter pelage.

We saw and heard jackals daily at our camps near Ahram and 19 km. south of Shush and at Jahrom.

Foxes, *Vulpes vulpes*, seem to replace the jackals in the northern part of the plateau and might possibly exclude the jackal in some of these parts. Foxes predominated on the Turkmen Plain north of Gorgan and jackals in the lower slopes of the Elburz Mountains, but along the Persian Gulf coastal plain at Ahram and in the Khuzistan plains south of Shush we noted jackals and foxes in approximately equal numbers.

Vulpes vulpes Linnaeus Red Fox

Canis vulpes Linnaeus, 1758, Syst. Nat., 10th ed., 1, p. 40.

Type locality.—Sweden.

Distribution.—

PREVIOUS: De Filippi (1865, p. 343), "everywhere." Blanford (1876, pp. 39, 41), **Isfahan:** Isfahan. **Fars:** mountains near Shiraz; Bushire. Cabrera (1901, p. 118), **Khuzistan:** Upper Karun River. Thomas (1902, p. 489), **Gorgan:** Astrabad. Thomas (1905, p. 522), **Khuzistan:** Bunde Kil, Karun River. Birula (1912, pp. 250, 257, 260), **Khorassan:** region of Choschtadan mountains and vicinity of Kerat; Chodsha-i-du-tshagi. **Kerman:** Tangkanidan; Dshelallabad; Sarbas; Gulmirun; vicinity of Bahu Kelat. **Khuzistan:** lower Karun River. Cheesman (1920, p. 334), **Khuzistan:** Ahwaz. Wroughton (1920, p. 318), **Kerman:** Shirwan; Bamgour; Chabahar. Goodwin (1940, p. 4), **Gorgan:** Turkmen Desert. Misonne (1959, p. 29), **Kurdistan:** Aghbolagh Morched; Akinlou; Gazan Karreh. **Gorgan:** Tazehabad.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** 2 km. west of Maku, 1; 32 km. east of Khvoy, 1; 10–18 km. southwest of Rezaiyeh, 6. **Tehran:** vicinity of Tehran, 1 (skeleton). **Gorgan:** 8 km. north of Gorgan, 1 (skeleton); 40 km. north of Pahlavi

Dezh, 1 (skeleton). **Khorassan:** 3 km. south of Shahrabad Kaur, 2; 80 and 89 km. northwest of Mashhad, 2; **Lurestan:** Faraman, 2. **Khuzistan:** 5 km. northwest of Shush, 1; 19 km. south of Shush, 5 (2 skeletons); 32 km. southwest of Shush, 1. **Fars:** 40 km. northwest of Kazerun, 1; 3.2–6 km. east of Kazerun, 2; Pol-i-Abgineh, 1; Ahram and vicinity, 7 (1 skeleton). **Kerman:** 13 km. west of Iranshahr, 1; 6.4 km. east of Bampur, 1; 60 km. north of Geh, 1.

ADDITIONAL SPECIMENS: **Qazvin:** Qazvin (BM 20.2.24.1). **Tehran:** Firuzkuh, 1 (SMNS no number). **Khorassan:** Bojnurd, 1 (SMNS no number).

RANGE: Except for the forested northern slopes of the Elburz Mountains and most of the adjacent Caspian coastal plain, the common fox occurs throughout Iran.

Remarks.—This species occurs abundantly throughout most of Iran in a variety of habitat. The contents of 25 stomachs of Street Expedition specimens revealed that these animals were feeding largely on seasonal fruit (ripe grapes, apricots, and dates), insects (grasshoppers, bettles and various insect larvae) and other invertebrata (chiefly centipedes). However, mice (*Cricetulus migratorius, Apodemus sylvaticus* and *Mus musculus* were specifically identified) and small birds (none identified), lizards, fish, fresh water crabs, grain and carrion were occasionally noted. Twelve miles south of Shush most of the foxes collected had fed on Tenebrionid beetle larvae, but nightly evidence revealed their attempts to excavate the burrows of jerboa, *Jaculus jaculus,* or gerbils, *Gerbillus sp.* Here and in eastern Kerman Province foxes took a heavy toll of mice (principally *Gerbillus* but some *Tatera*) from our traplines. Dens that we observed were located in cracks of rock shelters along the bases of mountains or dug in open plain.

None of 17 females taken September 17 to January 22 were pregnant.

By comparison of original description and, in some instances, typical and topotypic material with the Field Museum of Natural History series of Iranian foxes, the following races based on the Ellerman and Morrison-Scott checklist (1951, pp. 226–227) either do occur, or conceivably can be recognized as occurring, in Persia: *Vulpes vulpes flavescens, V. v. pusilla, V. v. griffithi, V. v. alpherakyi,* and *V. v. kurdistanica.* Other middle eastern races, which I have not taken time to check in detail, possibly exist in Iran. The amount of

size (cranial and body) and pelage color variation that exists in our series (42 specimens) is very extensive. After examination of the Iranian material of *V. vulpes* in the Field Museum of Natural History from the point of view of geographic origin and variation within series from single localities, it became obvious that the criteria established for distinguishing several of the races recognized in the Ellerman and Morrison-Scott checklist (1951, pp. 226–227) require critical reappraisal.

Vulpes cana Blanford Blanford's Fox

Vulpes canus Blanford, 1877, J. Asiat. Soc. Bengal, 46 (2), p. 321.

Type locality.—W. Pakistan: Gwadar.

Distribution.—

PREVIOUS: Birula (1912, p. 267), **Khorassan,** Duruch.

STREET EXPEDITION SPECIMENS: **Fars:** vicinity of Shiraz, 3 (skins only).

ADDITIONAL SPECIMENS: **Khuzistan:** labeled "Farahan, Persia. Bakhtiari Mountains, 36° N, 49° E." (BM 45.174–175). The Bakhtiari Tribal region centers in the Zagros Mountains at 32° N, 50° E. (Within this region there is a Faridan District located at 32°50′N, 50°00′E. The co-ordinates provided on the specimen label locate this place far to the north of Bakhtiari territory. It seems likely that the locality Farahan is a corruption of Faridan, which lies in Bakhtiari country.)

RANGE: Blanford's fox is known only from the three localities given above.

Remarks.—This very pretty little fox is known locally as the king (shah) or black (siah) fox (rubah). Its skins bring a price of $7 to $15. About 8 km. north of Persepolis I observed *V. cana* at rather close range on rocky mountainside and found partial remains of a dead one near Ahmad Mahmoudi, both localities in Fars Province. The skins, bought fresh from fur dealers, were rather common at fur shops, particularly at Tehran. *V. cana* will probably be found to inhabit mountains throughout Iran. This fox is so rare in scientific collections that it has been recorded from but six localities outside Iran. All these are limited to the Persian plateau, and it seems desirable to summarize them here: Uzbek SSR: Bokhara (Zhitkov, 1907, p. 444). Turkmen SSR: Saramsakly, ca. 40 km. [sic.] Germab, (Ognev, 1931, p. 358). Afghanistan: Kandahar (Blanford, 1888–91,

p. 151). W. Pakistan: Gwadar (Blanford, 1877, p. 321); Turbat; Bajaur (Siddiqi, 1961, p. 140.)

Vulpes rüppelli Schinz Sand Fox

Canis rüppellii [sic.] Schinz, 1825, Cuvier's Thierreich, 4, p. 508.

Type locality.—Sudan: Dongola.

Distribution.—

PREVIOUS: Birula (1912, p. 270), **Kerman:** Mekran (=Saragad) District: Kala-i-bid.

STREET EXPEDITION SPECIMENS: **Tehran:** 130 km. southeast of Tehran, 1 (skeleton).

ADDITIONAL SPECIMENS: **Tehran:** "salt desert" south of Tehran 1 (FMNH 42720 + skeleton). **Kerman:** Iranshahr (SMNS 4125). **Mazanderan:** Firuzkuh (SMNS no number).

RANGE: The five widely scattered localities provided above suggest that *V. rüppelli* occupies a wide range in the eastern half of Iran.

Remarks.—Our specimen was taken at night in low hills at the edge of the great central desert. Its stomach contained remains of one jerboa, seemingly *Jaculus blanfordi* (several of which were noted in this area), a lizard and a centipede.

Blanford's (1876, p. 41) *Vulpes famelicus* (=*rüppelli*) from Bushehr, unidentifiable from his account, is identifiable by Schlater's (1878, p. 392) description of the same specimens. The black backs of the ears positively confirm these animals as *Vulpes vulpes* because backs of the ears of *V. rüppelli* are light tan or sandy brown.

Ursus arctos Linnaeus Brown Bear

Ursus arctos Linnaeus, 1758, Syst. Nat., 10th ed., 1, p. 47.

Type locality.—Sweden.

Distribution.—

PREVIOUS: De Filippi (1865, p. 343), Elburz Mountains. Blanford (1876, p. 47), **Fars:** Shiraz; Imanzadeh Ismail, 50 miles north of Shiraz, "throughout the mountains of western and northern Persia," Lönnberg (1925, p. 28), **Mazanderan**. Goodwin (1940, p. 3), **Mazanderan:** Chalus Kalandost. Misonne (1959, p. 30), "à proximite de la route de Chalous, dans le Elburz."

STREET EXPEDITION SPECIMENS: **Mazanderan:** 6 kilometers south of Sama, 1 (skeleton.)

ADDITIONAL SPECIMENS: **Khorassan:** Mt. Almeh, 1 (skull only IGC). **Lurestan:** 1 (skull only IGC).

RANGE: Brown bears range throughout the Elburz Mountains and through the Zagros Mountains from Rezaiyeh south to Shiraz.

Remarks.—Among bears we observed in the forests around Sama in late August were two females, each with a pair of half-grown cubs. The contents of fresh droppings suggested that bears were feeding principally on wild fruit. Mr. Jahangiri, chief of the Iran Game Council in Rezaiyeh, stated that bears were common in the Zagros Mountains west and south of that city. Mrs. O. C. Burris of the Famaman Orphanage treated the single survivor of two hunters mauled in 1959 by a bear in the Zagros Mountains south of Faraman, Lurestan.

Mustela nivalis Linnaeus Weasel

Mustela nivalis Linnaeus, 1766, Syst. Nat., 12th ed., **1**, p. 69.

Type locality.—Sweden:Vesterbotten Province.

Distribution.—

PREVIOUS: Cabrera (1901, p. 118), **Khuzistan:** Upper Karun River. Misonne (1959, p. 31), **Kurdistan:** Sameleh; Marivan; Sakkez; Akinlou. **Zanjan:** Soltanieh.

STREET EXPEDITION SPECIMENS: **Kurdistan:** Hezar Darreh, 2 (1 skull only); Cheykhan, 1 (all three specimens presented to the expedition by the Institut Pasteur of Iran).

RANGE: The weasel's range as presently known includes the Zagros Mountains between lines drawn from the upper Karun River north to Soltanieh and from Soltanieh to Saqqez. The localities mapped by Vereshchagin (1959, p. 659) in Transcaucasia and Thomas' (1905, p. 522) of Baibort, Turkey, suggest that this species possibly will also be found to occur over all of northwest Iran.

Remarks.—We did not observe this species in the field.

Vormela peregusna Guldenstaedt Marbled Polecat

Mustela peregusna Guldenstaedt, 1770, Nov. Comm. Acad. Sci. Imp. Petrop., **14** (1), p. 441.

Type locality.—Southern USSR: Banks of the river Don.

Distribution.—

PREVIOUS: Satunin (1905b, p. 126), **Azarbaijan:** Namin. Birula (1912, p. 274) states that he possessed no specimen but that N. K. Zarudny's notes contain a description of it from Seistan. Vereshchagin (1959, p. 657) maps three Iranian localities that seem to me to represent **Azarbaijan:** Arbadil; Sarab. **Qazvin:** Qazvin. Misonne (1959, p. 31), **Kurdistan:** Sameleh; Khiace Kandi. **Zanjan:** Soltanieh.

STREET EXPEDITION SPECIMENS: **Khorassan:** Shahrabad Kaur, 1 (skin only). **Kurdistan:** exact locality unknown, 2 (in alcohol, gift from Institut Pasteur of Iran).

ADDITIONAL SPECIMENS: **Khorassan:** Serakhs (BM 94.8.7.1). **Gorgan:** Gorgan (BM 82.11.3.2). **Kerman:** Seistan (BM 8.4.10.1).

RANGE: The range of the Marbled-polecat is not well elucidated but seems to include most of Persia north of Seistan.

Remarks.—We did not observe this species in natural habitat. The man from whom the stuffed skin was purchased at Shahrabad Kaur stated that this species was uncommon in the area.

Martes foina Erxleben Rock Martin

Mustela foina Erxleben, 1777, Syst. Regn. Anim., 1, 458.

Type locality.—Germany.

Distribution.—

PREVIOUS: Cheesman (1920, p. 334), **Khuzistan:** Pusht-i-Kuh mountains. Ognev (1931 p. 633), Northern Persia. Misonne (1959, p. 31), **Gorgan:** Bandar Shah.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** Maku, 1 (skin only). **Kerman:** vicinity of Zahedan, 7 (skins only).

RANGE: This animal is known from the above widely scattered localities. On the basis of the wide variety of habitat represented by these several localities, it seems that the rock marten may possibly range throughout Iran.

Remarks.—We did not encounter this species in the field. A trapper at Ahram described an animal of which he catches several each year and his description seemed almost unmistakably to be that of a marten. Fresh tracks of an animal in the mountains near Ahmad

Mahmoudi were possibly made by a marten. Blanford (1876, p. 44) quotes O. St. John as having seen a weasel "half as big again as a polecat" near Shahpur and ". . . that martens' skins are commonly sold at Isfahan, said to have come from the westward." All of these notes may possibly refer to *M. foina*. Prime pelts in Tehran bring more than twice the highest price paid in the provinces.

Vereshchagin (1959, p. 656) maps numerous localities in Armenian SSR and Azarbaijan SSR along their border with Iran. On this basis it might be supposed that rock marten may be found to range very extensively in northwestern Iran. Ognev's (1931, p. 633) summary of the range in the Turkmen SSR lists several localities along the Iranian border which suggest occurrence of this marten in adjacent Khorassan Province. Hatt (1959, p. 41) lists several localities in Iraqi Kurdistan which connotes existence of the species at least in the ecologically similar portions of adjacent Lurestan Province.

Martes martes Linnaeus Pine Marten

Mustela martes Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 46.

Type locality.—Sweden: Upsala.

Distribution.—

PREVIOUS: Ellerman and Morrison-Scott (1951, p. 245), **Gorgan:** Astrabad. Misonne (1959, p. 31), **Gorgan:** Bandar Shah.

STREET EXPEDITION SPECIMEN: **Gorgan,** Gorgan, 1 (skin only).

RANGE: The pine marten is recorded only from the above localities centering around Gorgan. Game council inspectors at Dasht told us of the existence of marten in the nearby forested slopes of the Elburz Mountains. These observations indicate a possibility that this species ranges throughout the forested northern slopes of the Elburz.

Remarks.—On October 20 a fresh skin was bought from a Gorgan fur merchant who stated that it was collected around October 1 in a forested area 18 km. east of Gorgan.

Meles meles Linnaeus Badger

Ursus meles Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 48.

Type locality.—Sweden: Upsala.

Distribution.—

PREVIOUS: Blanford (1875, p. 310), **Isfahan:** Isfahan. Blanford (1876, p. 44, 46), **Fars:** Abadeh; Dehbid. Goodwin (1940,

p. 4), **Khorassan:** Gouladah. Misonne (1959, p. 32), **Gorgan:** Gumshun. **Azarbaijan:** Moghan steppe. **Kurdistan:** Akinlou.

STREET EXPEDITION SPECIMENS: **Gorgan:** 3.2 km. north of Pahlavi Dezh, 2 (1 skin only, 1 skull only), 16 km. southeast of Gorgan, 1 (skull only). **Azarbaijan:** vicinity of Zanjan, 1 (skin only). **Kurdistan:** Akinlou, 1 (skeleton).

ADDITIONAL SPECIMENS: **Lurestan:** Faraman, 1 (FMNH 92900).

RANGE: The localities provided above indicate that the badger ranges through the Zagros Mountains from northern Fars at least to Rezaiyeh. The Moghan steppe and Gorgan records are presently widely separated from the Zagros population localities.

Remarks.—We observed active badger burrows in the hills 10 km. southwest of Rezaiyeh, Azarbaijan; near Qarnabad village, in Gorgan; and on low hills in the Turkmen plains west of Pahlavi Dezh. Each of these were systems provided with several large entrances. Skeletal remains of a badger were found within the forest above Gorgan.

Lutra lutra Linnaeus Otter

Mustela lutra Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 45.

Type locality.—Sweden: Upsala.

Distribution.—

PREVIOUS: Blanford (1876, p. 43), Ghilan, Mazanderan and Khuzistan Provinces. **Isfahan:** Isfahan. **Fars:** Bandamir. Birula (1912, p. 274), **Kerman:** (Seistan) Helmand River; Neisar. Ognev (1931, p. 527), **Tehran:** Tehran. Misonne (1959, p. 32), **Gorgan:** Bandar Shah. **Ghilan:** Fumen. **Tehran:** Karadj.

STREET EXPEDITION SPECIMENS: **Mazanderan:** Tabiabad Rud, 13.7 km. northeast of Gorgan, 1 (skin only). **Ghilan:** vicinity of Astara, 1 (skin only). **Azarbaijan:** 19 km. southwest of Rezaiyeh, 1 (skeleton). **Lurestan:** Faraman, 1 (skin only). **Fars:** vicinity of Shiraz, 3 (2 skins only, 1 skeleton).

ADDITIONAL SPECIMENS: **Ghilan:** Bandar Pahlavi (SMNS 5017–18). ? Province: Doruk River (BM 93.10.17.2).

RANGE: Otters seem to occur in most of the perennial streams in Iran.

Remarks.—Otters were common in the streams and their adjoining irrigation networks southwest of Rezaiyeh and at Faraman. Tracks along sand and mud bars frequently revealed where otter had paused to eat freshwater crabs or clams. Carp, too, were numerous in these streams and likely afforded portions of the diet. Abundant tracks and slides existed along the banks of the Karkheh River 12 miles south of Shush.

Herpestes edwardsi Geoffroy Gray Indian Mongoose

Ichneumon edwardsii E. Geoffroy, 1818, Descr. Egypte, **2**, p. 139.

Type locality.—"East Indies". Pocock's (1937, pp. 214, 222) statement (not "1933" as stated by Ellerman and Morrison-Scott, 1951, p. 296) implies restriction of the type locality to either India: Madras, Madras or India: Mysore, Dharwar.

Distribution.—

PREVIOUS: Birula (1912, p. 233), **Kerman:** Basman; Jalk; Rask. Wroughton (1920, p. 317), **Kerman:** Quarquarsdan; Geh. Cheesman (1921, p. 577), **Fars:** Shiraz. **Kerman:** Qasrqard.

STREET EXPEDITION SPECIMENS: **Fars:** Ahram, 5; 24 km. north of Kazerun, 1. **Kerman:** 18 km. west of Iranshahr, 4; Geh, 2.
ADDITIONAL SPECIMENS: ? Province: Manzoun Mirtum P. Gulf (BM 47.1125).

RANGE: H. edwardsi seems to occur in the portion of Iran south of a line drawn from northern Khuzistan (ca. Dizful) to the city of Kerman then to the city of Zahedan.

Remarks.—We did not observe the grey mongoose outside of date groves and gardens. They seem to be completely diurnal and exit from their burrows, usually located along the bases of adobe walls, well after sunrise. At Geh they lay about in the sun in the morning before feeding. The contents of eight stomachs examined were as follows: blood only, 3; insects only, 1; 2 *Rana cyanophlyctis* (frog, Ranidae), lizard, insects (mostly orthopterous and hemipterous), 1; 4 or 5 lizards and several orthopterous insects, 1; empty, 2. Mongooses living in date groves showed little fear of man and were easily approached. Local inhabitants brought several wild ones to us alive.

Collection of *H. edwardsi* at Kazerun and Ahram extends the range of this species 85 km. west to the former town and 160 km. southwest to the latter village from Shiraz. Ahram becomes the westernmost locality in the known range of the species. Ahram's

location on the coastal plain and Cheesman's (1920, p. 332) statement "I chased but failed to secure a large mongoose near Maidan-i-Naptun [Khuzistan]", which quite possibly represented this species provide a basis for supposition that *H. edwardsi* will be found to range over much of the Khuzistan plain.

Herpestes auropunctatus Hodgson Small Indian Mongoose

Mangusta auropunctata Hodgson, J. Proc. Asiatic Soc. Bengal, **5**, p. 235.

Type locality.—Nepal.

Distribution.—

PREVIOUS: Gray (1864, p. 554), **Khuzistan:** Mohammerah, (1869, p. 151), **Khuzistan.** Birula (1912, p. 229), **Kerman:** Dshelellabad (Seistan).

STREET EXPEDITION SPECIMENS: **Kerman:** 24 kilometers southwest of Zabol, 2.

ADDITIONAL SPECIMENS: **Kerman:** Seistan (BM 8.1.13.3).

RANGE: In Iran this mongoose is known only from the two provinces given above which are located on the east and west boundaries of southern Persia. No positive records exist from the wide intervening area.

Remarks.—Both our specimens were abroad during the day when taken. One entered a henhouse about 9:00 A.M. and was subdued before killing any chickens. Its stomach was empty. The other crossed in front of our car and tried to take refuge in a *Tatera indica* burrow. Its stomach contained remains of a frog and a lizard.

Blanford (1876, pp. 42–43) cites St. John's notes of having obtained "ichneumon," though apparently no specimens were preserved, in the neighborhood of Shiraz and Persepolis and arbitrarily allocates these to *H. persicus* (=*H. auropunctatus*). Misonne (1959, p. 39) asserts that St. John's specimens definitely represent *H. auropunctatus* but cites no evidence in support of this. Specimens of *H. edwardsi* from Shiraz (BM 36.7.20.35) and Kazerun (FMNH 97853) suggest that St. John's "ichneumon" possibly represented *edwardsi*. Khorramshahr, the nearest of the localities from which *H. auropunctatus*, is recorded, lies about 430 km. west northwest of Shiraz.

Hyaena hyaena Linnaeus Striped Hyaena

Canis hyaena Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 40.

Type locality.—Southern Persia: **Laristan,** Benna mountains. mountains.

Distribution.—

PREVIOUS: Linnaeus (1758, p. 40) **Fars** (Laristan): Benna mountains. Blanford (1876, p. 42) **Kerman:** "common in Baluchistan." **Fars:** Shiraz; Kazerun; Dehbid, 7500 ft. "[common] on the Persian plateau, and it extends throughout the whole country to the Caucasus." Satunin (1905, p. 7), **Khuzistan:** Lower Karun River. Birula (1912, p. 237) **Khuzistan:** Seba on the Karun River four versts below Rakhmanie. This refers to the specimen referred to by Satunin (*loc. cit.*). Misonne (1959, p. 32) states that this species inhabits all of Iran.

STREET EXPEDITION SPECIMENS: **Kerman:** 45 km. SW Iranshahr, 1 (skeleton). **Khuzistan:** 19 km. W. Shush, 1 (skeleton).

ADDITIONAL SPECIMENS: **Mazanderan:** no exact locality (SMNS uncataloged skull of a young ♂).

RANGE: On the basis of known distribution records the striped hyaena seems to occur across the southern half of Iran. The information provided by Ellerman and Morrison-Scott (1951), Bobrinsky, *et al.* (1944), Sidiqi (1961), Vereschagin (1959), concerning areas adjacent to Iran suggests that this species will be found to range over most of Iran.

Remarks.—Both of our specimens had been killed by local men. The one from 45 km. SW Iranshahr was killed with a rock as it fed on a dead camel. Footprints, the size of which suggested that a hyaena made them, were observed by our party at Chah Shur, Damghan Province on January 28, 1963.

Felis catus Linnaeus Wild Cat

Felis catus Linnaeus, 1758, Syst. Nat., 10th ed., **1,** p. 41.

Felis sylvestris Schreber, 1777, Saugeth., **3,** p. 397.

Felis libica [sic] Forester, 1780, *in* Buffon's Nat. Vief. Thiere, **6,** p. 313.

Type locality.—Sweden.

Distribution.—

PREVIOUS: Blanford (1876, p. 35), **Fars:** near Shiraz; Kamaraj. Birula (1912, pp. 224, 228), **Kerman:** vicinity of Basman; Bampur River (Zarudny observed but did not collect specimen). Zukowsky (1914, p. 130), **Khorassan:** 110 versts south of

Geok Tepe, Turkmen SSR (=24 km. south-southeast of Shirvan). Goodwin (1940, p. 5), **Gorgan:** Turkmen Desert near Astrabad. Haltenorth (1953, p. 49), **Gorgan:** Astrabad. Pocock (1951, pp. 124, 126), **Fars:** Persepolis. **Khorassan:** Meched. Misonne (1959, p. 33), **Gorgan:** vicinity of Bandar Shah. **Azarbaijan:** Ardebil [I have been unable to locate the original source of this record although Vereschagin (1959, p. 663) shows a locality presumably Ardabil]. **Kerman:** Kerman.

STREET EXPEDITION SPECIMENS: **Gorgan:** 1.6 to 6.4 km. south of Pahlavi Dezh, 3 (2 skeletons). **Azarbaijan:** 10 km. southwest of Rezaiyeh, 1 (skeleton). **Lurestan:** Faraman, 1 (skeleton). **Fars:** vicinity of Ahram, 1 (skin only).

RANGE: The only parts of Iran from which this cat is unreported are the forested northern slopes of the Elburz Mountains and the Caspian coastal plain.

Remarks.—We noted these cats most commonly in the Turkmen Plains. The stomach of one female contained three shrews, two *Crocidura leucodon* and one *Suncus etruscus*. The two specimens from the Zagros Mountains [south of Rezaiyeh and Faraman] were collected in riverine thickets not distant from villages. These had fed on one unidentified mouse, one *Arvicola terrestris*, one small fringillid bird, tomato, and large chunks of flesh. The skin purchased at Ahram was said to have been collected on the coastal plain, a situation similar ecologically to the Turkmen Plains.

Taxonomic Remarks.—Most recent students of the taxonomy of the Felidae admit or accede to the probability that *F. catus*, *F. sylvestris*, and *F. libyca* are one and the same species (Schwarz, 1930, p. 224; Pocock, 1951, pp. 6–8; Haltenorth, 1957, p. 91). As early as 1869 Gray (p. 33) indicated that wild and domestic cats interbreed freely and since no characters have been demonstrated constant in distinguishing these it seems appropriate if not necessary to use the oldest available name, *Felis catus* Linnaeus, 1758 as originally suggested by Schwarz (1930, p. 223).

Pelage.—Great variation in the shade of base color and shape and dispersal of color patterns exists in the six skins of our specimens.

Felis chaus Guldenstaedt Jungle Cat

Felis chaus Guldenstaedt, 1776, Nov. Com. Acad. Petrop., **20**, p. 483.

Type locality.—USSR: Terek River north of the Caucasus.

Distribution.—

PREVIOUS: Blanford (1876, p. 36), **Fars:** Khist, northeast of Bushire; Shahpur; near Borasjan; Karagatch (River). "Common in Western Persia and on the Caspian . . ." Pocock (1951, p. 152), **Fars:** Pir-i-Bam, 14.5 km. south of Shiraz. **Kerman:** Gursala, [in] Jiruft [Dist.]; Seistan; 100 miles east of Bampur, south of Jebel Bariz Range. [Because the Jebal Berez Range lies approximately 250 km. northwest of Bampur, it would seem that 100 miles east is a mistake and should read 100 miles west].

STREET EXPEDITION SPECIMENS: **Gorgan:** 4.8 km. east of Aliabad, 1; 8 km. east-northeast, 1.2 km. south of Gorgan, 1 (skeleton). **Mazanderan:** 12 km. west, 1 km. south of Chalus, 1 (skeleton). **Fars:** northeastern bank of Lake Famur, 1 (skeleton).

ADDITIONAL SPECIMENS: **Khuzistan:** 6.4 km. west, 8 km. south of Haft Tappeh (553 C. A. Reed, YPM material).

RANGE: The jungle cat is presently known in Iran from the forested northern slopes of the Elburz Mountains and from south of the 32nd parallel of latitude.

Remarks.—*Felis chaus* seems to confine its range in Iran to forested or well vegetated situations. The stomach of one of these cats contained only a single whole dormouse, *Glis glis*, that of another held four *Mus musculus* and five *Apodemus sylvaticus*. We found numerous catches of bird carcasses (largely *Fulica atra* [coot]) around Lake Famur and trapped a large jungle cat there. These birds and a variety of other species were in the habit of roosting on the banks of the lake at night. Three jungle cats were observed walking along the main road about 16 km. south of Gonbad-i-Kavus in mid-afternoon. Though seemingly abundant in the forests, *Felis chaus*, according to our observations, did not occur in the nearby Turkmen Plains, an area inhabited by *F. catus libycus*.

A specimen collected October 25 was in the process of shedding its deciduous canines. The mammary tissue of a female taken September 8 had degenerated into narrow interrupted bands. From this it appears that parturition may take place in the spring (April-May) or early summer.

Specimens from southern Iran are slightly lighter than ones from the northern forests.

Felis pardus Linnaeus Leopard

Felis pardus Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 41.

Type locality.—Egypt.

Distribution.—

PREVIOUS: Griffith, Smith, and Pidgeon (1827, p. 469) mention specimens "brought from the Gulf of Persia." De Filippi (1865, p. 343), Ghilan and Mazanderan Provinces. Blanford (1876, p. 34–35), throughout Persia and Baluchistan. Kennion (1911, appendix I. p. 278), **Kerman:** Palang Kuh. Pocock (1927, p. 213–214), **Gorgan:** Gorgan. **Kerman:** Seistan; Perso-Baluch border. Pocock (1930, p. 79), **Fars:** Mishun; Chak-i-Buzza Pa. **Khuzistan:** Marsh Ao Gorge in the Pusht-i-Kuh range; northeast of Dizful. Zukowsky (1964, p. 152), **Fars:** Miriz. **Khorassan:** Mastchid range north of Meched.

STREET EXPEDITION SPECIMENS: **Khorassan:** about 8 km. southeast of Shahrabad Kaur, 1 (skin only). **Kerman:** Damin, 2 (skins only). **Fars:** Ahram, 1 (skin only).

RANGE: Leopards occur throughout Iran.

Remarks.—Although we did not observe leopards in the field, we noted fresh tracks on several occasions. Two of our hunters at Iranshahr reported seeing two of these animals in the mountains south of that town. At virtually every expedition camp, local hunters reported leopards present in the vicinity and fresh skins were for sale at Gorgan, Shiraz, and Kermanshah as well as the localities cited for Street expedition specimens.

His Highness Prince Abdul Reza shot a female with two cubs in the fall of 1962 on the National Almeh Hunting Preserve, Khorassan Province. A cub skin purchased November 8 at Damin was said, and appeared, to have been collected within the preceeding two months.

Leopards probably prey on wild sheep, goat, and pig, but at times are said to feed on domestic animals. A shepherd brought us the fresh skin of a large leopard he killed by poisoning the carcass of a leopard-killed sheep of his flock.

Felis uncia Schreber Snow Leopard

Felis uncia Schreber, 1776, Saugethier, **3**, pl. 100 (1776) and text pp. 386, 586 (1777).

Type locality.—Fixed by Pocock (1930, p. 332) as the Altai Mountains [Mongolian Peoples Republic and Sinkiang and Kansu Provinces, China].

Distribution.—

PREVIOUS: Zarudny (1890 original not seen; see Ognev, 1935, p. 267. Ognev possibly refers to Zarudny's field notes.) **Khorassan:** Serakhs.

STREET EXPEDITION SPECIMENS: **?Khorassan:** Kopet Dagh Mountains, 1 (skin only).

RANGE: Unknown.

Remarks.—Our snow leopard skin was purchased from a Tehran fur dealer who stated that he did not remember its exact source but that he thought it had originated from the mountains east of Mashhad (Kopet Dagh Range). Ognev (1935, p. 267) reports on two specimens from two localities in the Kopet Dagh mountains south and west of Ashkhabad, Turkmen SSR, both of which lie in close proximity to the Iranian border. Ognev (1935, p. 263) attempts to make a case for rejection of Pocock's restriction of the type locality and for replacing it with the southern slopes of the Kopet Dagh Mountains adjacent to Iran. Much of the basis for his argument stems from the remarks of Buffon (1761, pp. 151–152, 164). This last author provided the description (pp. 151–152, pl. 13) to which Schreber (*supra cit.*) assigned the name *Felis uncia.* Buffon remarks (p. 164) that the ounce lives in Persia where it is called Youzze and is trained for hunting gazelle, and he describes such a hunt in Hircania. But these remarks of Buffon's clearly refer to the cheetah, *Acinonyx jubata,* which is even today called Youzze-Palang in Iran ("palang" means leopard in Farsi). Because the ranges given by Schreber (1777, p. 387) and F. R. Gmelin (1788, p. 77) were obviously taken from Buffon's account and because Buffon's remarks about the Persian and Hircanian ounce refer to the cheetah, it seems that Pocock (*loc. cit.*) was completely justified in his restriction of the type locality to the Altai Mountains, which he considered the first locality based on an actual specimen.

Since Hamilton Smith figured an ounce in Griffith's *The Class Mammalia* (1827, **2**, p. 469) said to have been "brought from the shores of the Persian Gulf" [Pocock (1930, p. 332) erroneously states "alleged to have been captured on the shores of the Persian Gulf"], rumors have persisted that this cat exists in southern Iran. Blanford (1876, p. 35) states that he has seen ounce skins in London said to have been brought from Persia, and he quotes O. St. John's note of his receipt of an ounce skin at Shiraz, Fars which supposedly was native to the nearby countryside. Misonne (1959, p. 35) states that

in one scene of a motion picture of the migration of the Qashgai tribe in Fars Province an ounce skin is clearly visible among the tribal baggage. Nevertheless, no *bona fide* specimen has ever been reported from any part of Iran. The nearest known localities on record are those from the Turkmen SSR cited above. The possibility that *F. uncia* occurs in the Iranian Kopet Dagh seems much more likely than does finding it in southern Iran.

Felis manul Pallas Manul Cat

Felis manul Pallas, 1776, Reise Russ. Reichs, **3**, p. 692.

Type locality.—Buryat Mongol ASSR: Uda River, south of Lake Baikal.

Distribution.—

PREVIOUS: Pocock (1951, p. 185), **Khorassan:** Meched.

STREET EXPEDITION SPECIMENS: Exact locality unknown, 1 (skin only).

RANGE: This cat is recorded from Mashhad only.

Remarks.—The skin we have was purchased from a Tehran fur dealer who did not recall its exact origin. Mr. Dowlat Shahi, owner and manager of the Tehran zoo, told me that he has had two manul cats in the recent past but did not remember from which part of Iran he had received them.

Acinonyx jubatus Schreber Cheetah

Felis jubata Schreber, 1776, Saugeth. **3**, pl. 105 (1776), text, pp. 392, 586 (1777).

Type locality.—South Africa; Cape of Good Hope.

Distribution.—

PREVIOUS: De Filippi (1865, p. 343), **Mazanderan**. Birula (1912, p. 223), **Kerman:** Rud-i-Kaskin near Bampur; Sargad [Sargad is the district of Persian Baluchistan centering around Zahedan]. Misonne (1959, p. 35) incorrectly says that Birula's Shurab=Bampur. Birula clearly denotes his supposition that Shur-ab was a synonym of Sargad when he placed the former name in parentheses.

STREET EXPEDITION SPECIMENS: **Kerman:** Damin, 1 (skin only).

RANGE: The range of the cheetah seems to be largely determined by the range of gazelle. Prior to 1940 this species probably

existed over all the basin country of Iran; presently it seems to be confined to the more secluded of these areas.

Remarks.—The advent of the jeep after World War II marked the beginning of a decrease of these animals largely through slaughter of their essential prey, the gazelle. We occasionally heard reports of cheetah and saw a few skins for sale. Cheetah may still hold their own in the more remote desert areas and perhaps the present curtailment of gazelle hunting by the Iran Game Council will prove effective and cheetahs will stage a comeback.

Lynx lynx Linnaeus Lynx

Felis lynx Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 43.

Type locality.—Sweden: near Upsala.

Distribution.—

PREVIOUS: I can find no verification for the citation of Persia by Bobrinsky *et al.* (1944, p. 159) and Ellerman and Morrison-Scott (1951, p. 308) for the range of this species.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** vicinity of Tabriz, 1 (skin only).

RANGE: The lynx is presently known in Iran only from the single locality provided above. Vereshchagin (1959, p. 662) shows numerous localities in Transcaucasia. Bobrinsky *et al.* (1944, p. 159 and map 31) show its occurrence in the Kopet Dagh Mountains of the Turkmen SSR, adjacent to Khorassan Province northeastern Iran. Hatt (1959, pp. 47–48) reports it from Kurdistan, Iraq. These places suggest that the lynx may possibly be found to range across the Elburz Mountains of northern Iran linking the Transcaucasian and Kopet Dagh populations and to occur south through the Zagros Mountains to approximately Kermanshah.

Remarks.—Earlier reports of the lynx from Iran are not satisfactorily documented by specimens. The specimen reported above was bought from a Tehran fur dealer who stated with certainty that it came from the vicinity of Tabriz. Lynx skins were abundant on the Tehran fur market.

Lynx caracal Schreber Caracal

Felis caracal Schreber, 1776, Saugeth., pl. 110, text **3**, pp. 413, 587 (1777).

Type locality.—South Africa: Capetown: Table Mountain.

Distribution.—

PREVIOUS: Blanford (1876, p. 37), **Khuzistan:** Dizful. Birula (1912, p. 223), **Kerman:** "Zarudny saw a cat in the mountains along the Rud-i-Kaskin between Basman and Bampur that resembled this species." Siddiqi (1961, p. 159), **Kerman:** Bampur.

STREET EXPEDITION SPECIMENS: **Tehran:** Siah Kuh, 1 (skin only).

RANGE: The caracal lynx is known only from the above localities. The wide range that Ellerman and Morrison- Scott (1951, p. 310) provide for this species suggests that it will be found to occur more widely in Iran.

Remarks.—This specimen was shot by Mr. Khosrow Sariri in the summer of 1959 when he observed two caracals together, one of which escaped. Mr. Dowlatshahi, owner of the Tehran Zoological Garden, stated that the caracal in the zoo in February 1963 had been in captivity about three years, but that he no longer remembered its exact origin in Iran.

Siah Kuh lies about half way between Dizful and the Turkmen SSR localities shown by Bobrinsky *et al.* (1944: map 30). The gap that formerly separated northern from southern records can seemingly be bridged by this locality. This locality and the one from Bampur negate Misonne's (1959, p. 34) conjecture, "Le caracal n'habite probablement pas le plateau persan." This skin is the third reported from Iran.

Equus hemionus Pallas Half Ass; Persian Wild Ass

Equus hemionus Pallas, 1775, Nov. Comm. Acad. Sci. Petrop., **19**, p. 394, pl. 7.

Type locality.—USSR: Transbaikailia (Dauria) Tarei-Nor (in close proximity to the Mongolian border).

Distribution.—

PREVIOUS: Pallas (1780, pp. 259–273), **Tehran:** mountains about Qazvin. Smith (1841, p. 351), **Fars:** between Yazdikhast and Shulgastan (see also Harper, 1940, pp. 199–200). Blanford (1876, p. 86), the 240 km. stretch between Khan-i-Khora, **Fars** and Kulah Kazi, **Isfahan.** Lydekker (1916, pp. 14–15), Yazd. Goodwin (1940, p. 17), **Tehran:** Siah Parde.

STREET EXPEDITION SPECIMENS: **Damghan:** environs of Semnan, 1 (skeleton). This specimen was a captive in the Tehran zoo.

RANGE: The range of the half ass presently seems to conform to the limits of the eastern basin region of Iran.

Remarks.—The large herds of half ass that existed over much of the eastern basin two to three decades ago have disappeared from all but its remotest regions. [Personal communication from Mr. Khosrow Sariri, Chief Adjutant Iran Game Council. Mr. Sariri makes frequent surveys around the great eastern desert and has been in touch with the situation for many years.]

We observed half ass twice near Chah Ali Khan, Damghan Province, a lone animal once, and a group of six. On each occasion these animals fled to the rough gulley-dissected hills around the bases of the mountains rising from the plain. The animal is well known in Baluchistan, and according to local account migrates seasonally.

Harper (1940, pp. 189–199) reviews the taxonomy of *Equus onager*, the northeastern Persian race of the onager, concluding this name should date from Boddaert, 1785, because ". . . Zimmerman (1780, p. 80) merely cites a polynomial from Brisson." Hershkovitz (1949, p. 277) shows Zimmerman 1780 to be a binomial work. Zimmerman (1780, p. 80) cites Brisson (1762, p. 62) which is not binomial but modifies Brisson's word order to fit his own consistently binomial scheme. Thus the correct name for the north Persian wild ass stands as *Equus hemionus onager* Zimmerman, and the type locality must be fixed. Harper (1940, p. 199) fixed the type locality of *E. h. onager* Boddaert as "mountains about Kazvin" from Hablizl (1783, p. 93). Groves (1964, p. 334) remarks "the mountains about Kazvin—supposedly type locality of *onager*—contain no suitable wild ass country!" I have visited Qazvin three times. This city lies in flat basin, which is a northwestern extension of the Dasht-i-Kavir Basin, about 13 km. south of the Elburz Mountain escarpment. The surrounding area is densely inhabited by man, and wild ass no longer occur in the vicinity, however, according to Pallas (1780, pp. 259–273) these animals doubtlessly did in the past. Their habits of taking refuge in the rougher, higher country, bordering basins, is probably the basis of Hablizl's observations of herds in the Qazvin mountain valleys. The physical structure of the Elburz system is such that "valleys"—water courses would be a more appropriate description—open directly onto the plain north of Qazvin. It is these erosions that wild ass likely inhabited, though it is doubtful that they ever will again. Thus Groves (1964, p. 334) is clearly in error, and Harper's (1940, p. 199) restriction of type locality to Qazvin is in a general way adequate. Because *Equus hemionus* normally inhabit open desert basin

it seems necessary only to drop the emphasis from the "mountains" and to restrict the type locality ot *E. h. onager* Zimmerman to the plain between Qazvin and the Elburz Mountains.

Sus scrofa Linnaeus Wild Hog

Sus scrofa Linnaeus, 1758, Syst. Nat., 10th ed., 1, p. 49.

Type locality.—Germany.

Distribution.—

PREVIOUS: De Filippi (1865, p. 344), Forests of Ghilan and Mazanderan Provinces. Blanford (1876, pp. 86–87), Caspian Provinces. Oak forests of Fars Province. Reedy swamps of Khuzistan Province. Goodwin (1940, p. 15), **Gorgan:** Dar Kaleh. Misonne (1959, p. 36), **Kurdistan. Tehran:** Tehran-Qazvin region.

STREET EXPEDITION SPECIMENS: **Azarbaijan:** 4.8 km. northeast of Maku, 1 (skeleton). **Mazanderan:** 5 km. east of Sama, 1 (skeleton). **Gorgan:** 16 km. southeast of Gorgan, 4 (3 skeletons, 1 skull only). **Kerman:** 24–32 km. southwest of Zabol, 5 (5 skeletons).

ADDITIONAL SPECIMENS: **Khuzistan:** Shahur Rud on the Ahvaz-Andimeshk Road (FMNH 92907–8); 30 km. northwest of Ahvaz (FMNH 92906). **Lurestan:** east of Kermanshah (FMNH 92909–10); Naft-e-Shah (92905).

RANGE: Wild hogs seem to occur throughout most of Iran, being absent only from the most barren deserts.

Remarks.—These animals show a wide habitat tolerance in Iran, that ranges from forest to semi-desert. We observed large populations in the Caspian forests, where they fed in the forests and in cultivated fields. The damage done to the fields brings great wrath upon them, usually ineffectual, from the local farmers. We also noted large populations in Seistan, where the animals retired to the reed beds of the dry Hamum-i-Hirmand lake bed during the day, and along the Karkheh River south of Shush where they inhabited the riverine thickets. We observed wild pigs on dry open plain near Kazerun and near the Iraq border west of Shush.

Several young pigs were trapped in "wells", literally pits with vertical walls dug down eight to twelve feet to the subsurface water level, in the Hamum lake bed of Seistan.

Cervus elaphus Linnaeus Red Deer; Stag

Cervus elaphus Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 67.

Type locality.—Southern Sweden.

Distribution.—

PREVIOUS: Brooke (1874, p. 43), **Ghilan:** Talysh District. Blanford (1876, p. 95), Caspian Provinces. Thomas (1907, p. 202), **Mazanderan:** Elburz Mountains near Demavend. Goodwin (1940, p. 15), **Khorassan:** Dasht; Gouladah. **Gorgan:** Dar Kaleh. Misonne (1959, p. 37), **Gorgan:** mountains south of Bandar-i-Gaz.

STREET EXPEDITION SPECIMENS: **Mazanderan:** 9 km. south-southwest of Sama, 2 (2 skeletons).

RANGE: The present Iranian range of *C. elaphas* is confined to the forested northern slopes of the Elburz Mountains.

Remarks.—The red deer is a common inhabitant of the Caspian forest. Our specimens collected August 19 are an adult female and her halfgrown spotted calf. Several males were observed below 900 m. Breeding is said to occur from mid-September to about mid-October and during this period the stags are hunted, for they are said to be lured to imitations of stag bellowing.

Capreolus capreolus Linnaeus Roe Deer

Cervus capreolus Linnaeus, 1758, Syst. Nat. 10th ed., **1**, p. 68.

Type locality.—Sweden.

Distribution.—

PREVIOUS: Blanford (1876, p. 96) cites Pallas, S. G. Gmelin, Menetries and Eichwald as authorities for including Ghilan and Mazanderan Provinces in the range. Cheesman and Hinton (1923, pp. 608–9), **Lurestan:** Jowan Rud, 64 km. north of Kermanshah; Kermanshah market. Misonne (1959, p. 37), **Gorgan:** region south of Bandar-i-Gaz.

STREET EXPEDITION SPECIMENS: **Mazanderan:** 6 km. southeast of Sama, 1 (skeleton).

RANGE: Roe deer occur throughout the forested northern slopes of the Elburz Mountains and are known from the Zagros mountains of northern Lurestan Province. This certainly suggests that the roe deer exists in the Zagros Mountains of western Iran.

Remarks—Roe deer are abundant in the forest of the provinces bordering the Caspian Sea. Officials of the Iran Game Council informed us that they had received recent reports of the occurrence of these deer from the mountains west of Kermanshah.

Gazella subgutturosa Guldenstaedt Goitered Gazelle

Antilope subgutturosa Guldenstaedt, 1780, Acta. Acad. Sci. Petrop. 1778, 1, p. 251.

Type locality.—Northwestern Persia.

Distribution.—

PREVIOUS: De Filippi (1865, p. 344), **Qazvin:** near Qazvin. Blanford (1876, p. 61), **Isfahan:** near Isfahan ". . . the common gazelle of Persia and is found everywhere away from the forests of the Caspian and shores of the Gulf." Lydekker (1910, p. 202) **Kerman:** Seistan. Lydekker and Blain (1914, p. 44), **Tehran:** near Tehran. Cheesman (1921, p. 579), **Fars:** between Khan-i-Zinian and Shiraz. Goodwin (1940, p. 16), **Khorassan:** Gouladah, Turkman Desert. **Tehran:** Siah Parde. Misonne (1959, p. 38), **Azarbaijan:** Moghan Steppes.

STREET EXPEDITION SPECIMENS: **Khorassan:** Dasht, 2 (2 skeletons). **Isfahan:** 5 kilometers west of Sarvestan, 1 (skeleton). **Fars:** vicinity of Ahram, 2 (skeletons).

ADDITIONAL SPECIMENS: **Tehran:** salt desert south of Tehran (FMNH 42717–19). **Khuzistan:** near Gutvand village (FMNH 92913–16); plain north of Ahvaz (FMNH 92919). **Lurestan:** region of Saripol (FMNH 92917–18).

RANGE: The range of the goitered gazelle includes all of Iran except the forested north slope of the Elburz and adjacent Caspian coast. By habit this gazelle does not occur in the mountains proper but does (or did) range through most of valleys between ranges.

Remarks.—This is the most common gazelle in Iran. Today, however, the great herds of two and three decades ago have been wantonly decimated by jeep hunting—a practice in which the animals are unsportingly run down and slaughtered. The foresighted judgment of the Iran Game Council in restricting hunting of this animal is a step in the proper direction toward preserving this species; however, enforcement of this ruling is extremely difficult.

We found these animals from sea level to well over 1500 m. Gazelle inhabiting the coastal plain around Ahram took refuge by day in

gullies cutting across coastal plain or among the low dissected foothills along the base of the Zagros escarpment. These animals fed on the plain in the late afternoon and early evening hours and probably in the early morning. None of three females taken November 10 and January 10 contained embryos.

Ellerman and Morrison-Scott (1951) erect a subgenus, Trachelocelle, for *G. subgutterosa*, one of the characters of which is "normally hornless females, or at most have mere rudiments of horns, whereas females of other species have distinct horns." Two females from Gutvand, Khuzistan FMNH 92913 and 92915 possess small horns. Those of the first measure 5 mm. but those of the latter are 24 mm. long and 7.1 mm wide at the base and fit the Ellerman and Morrison-Scott (1951) description as "mere rudiments of horns."

Gazella gazella Pallas — Chinkara

Antilope gazella Pallas, 1776, Misc. Zool. p. 7.

Type locality.—Syria.

Distribution.—

PREVIOUS: Blanford (1876:91), **Kerman,** Bampur; Jalk. Lydekker (1908, p. 499), **Khorassan,** Kain. Misonne (1959, p. 38) saw one of these gazelles at Tehran which was said to have been caught near Semnan.

STREET EXPEDITION SPECIMENS: **Kerman,** ca. 15–25 km. southwest of Bampur, 2 (1 skeleton). **Damghan,** 6 km. south of Chah Ali Khan 1 (skeleton).

RANGE: The specimen from Chah Ali Khan represents the northwesternmost record of this species in Iran and confirms Misonne's (1959, p. 38) information that it occurs in this part of Iran.

Habits and habitat.—We observed a pair of these animals in sand dunes along the southwest edge of the Jaz Murian Basin and a group of five on rocky incipient peneplain near Chah Ali Khan. The female collected January 30 at the latter locality contained a 160 mm. embryo (total length).

Capra hircus Linnaeus — Persian Wild Goat

Capra hircus Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 68. (Domestic goat of Sweden)

Capra hircus aegagrus Erxleben, 1777, Syst. Tegn. Anim., p. 260. (Persian wild goat)

Type locality.—Dagestan ASSR: Caucasus Mountains in southern region.

Distribution.—

PREVIOUS: DeFilippi (1865, p.344), Elburz Mountains. Blanford (1876, pp. 89 90), **Tehran,** Shemiran, north of Tehran, 13,000 ft. **Isfahan,** Isfahan. **Fars,** Shiraz; Kuh-i-Barf near Shiraz; hills near Bushire. **Kerman,** hills between Magas and Aptar, east of Bampur. Kennion (1911, pp. 48, 58, 268), **Khorassan,** Kopet Dagh Mountains near Turkestan border; Chehel Doktoran mountain, Palang Kuh. Cheesman (1920, p. 346), **Khuzistan,** in Pusht-i-Kuh Mountains near Shushtar. Cheesman (1921, pp. 578, 580), **Fars,** Siakh Range 10 miles south Shiraz; Kalat, 30 miles northwest Shiraz; Kavar valley southeast Shiraz. Goodwin (1940, p. 16), **Khorassan,** Hairleigh; Dergermatie. Misonne (1959, p. 38), **Kurdistan,** 60 km. southeast Bidjar (saw horns).

STREET EXPEDITION SPECIMENS: **Azarbaijan,** 4.8 km. northeast of Maku, 2 (2 skeketons). **Mazanderan,** Herzar Laa (6 km. east of Varangrud), 5 (5 skeletons); Doab, 1 (skull only). **Damghan,** mountains north of Damghan, 1 (skeleton); Chah Ali Khan, 2 (2 skeletons); 160 km. southeast Chah Ali Khan, 1 (skull only). **Khorassan,** vicinity of Shahrabad Kaur, 1 (skull only). **Isfahan,** 6 and 9 km. northeast of Galatappeh, 5 (5 skeletons). **Fars,** vicinity of Shiraz, 1 (skin only); Juyom, 1 (skeleton); mountain escarpment 6.5 km. northeast of Ahram, 6 (6 skeletons).

ADDITIONAL SPECIMENS: **Lurestan,** Mt. Hadji Abad, 1 (FMNH 92921); Mangalat, 2 (FMNH 92922-3); 26 km. north Tang-i-Knist valley, 1 (FMNH 92924); mountains above Takhi-i-Bustan, 1 (FMNH 92925).

RANGE: Wild goats seem to inhabit every mountain range in Persia.

Remarks.—Wild goats exist to what we would estimate as near range carrying capacity throughout the highlands of Iran. These animals prefer, where available, steep, rugged cliff facings, but range widely over the adjacent mountains to feed. Females with nearly half-grown kids were taken August 11 in the high Elburz. Two females and two yearling males were collected from a small group near Galatappeh on December 21. Females and yearlings (sex?) comcomprised a group of eleven seen near Juyum January 1. Large groups with adults of both sexes present were viewed at Chah Ali Khan on January 28 and 29. Here we noted that the very old "white"

males were usually alone, remaining aloof from the herds which contained several four to six year old males. During the breeding season males acquire a pungent musky smell that lasts from about November through January. A female collected January 29 at Chah Ali Khan contained a single 125 mm. embryo (total length, except head and neck remained arched).

Goats collected at Ahram were very thin, apparently due to fodder shortage resulting from prolonged drought. A group of professional hunters, who sold the flesh of wild game locally, constantly hunted these animals in the mountains east of Ahram. There was a greater demand for sheep flesh than that of goat. Both, in the opinion of our whole party, are superb food.

Taxonomic Remarks.—Two subspecies, *C. h. aegagrus* and *C. h. blythi*, are recognized by Ellerman and Morrison-Scott (1951) and Heptner, Nasimovich, and Bannikov (1961), the latest revisors of these groups. Erxleben (1777, p. 260) applied the name *aegagrus* with a description to these goats in the Caucasus Mountains. Hume (1874, p. 240) gave the name *blythi* to the Sind wild goat, without description, merely to distinguish it from *C. severtzowi* [=*C. ibex severtzowi*] (see Lydekker, 1913, pp. 159–160). Lydekker (1913, p. 160) distinguished *blythi* from *aegagrus* as follows "it differs from . . . *C. h. aegagrus*, by its smaller size, the slight development, or even absence, of the knobs on the front edge of the horns, which are more closely approximated at the tips, and apparently by the paler ground color of the coat." Lydekker, however, provides no measurements for this size distinction.

Summer pelage differs from that of winter in its lack of woolly underfur and its bright fulvous brown coloration with a sharp black middorsal stripe about 20 mm. wide and blackish facial markings. The winter pelage of *C. hircus* is much grayer with the dark markings reduced in intensity. Males of five years and older are said to become increasingly whiter each winter until they become almost solid white, but for dark markings on the face and below the knees on all four legs, dark middorsal stripe, and dark shoulder stripe. This was pointed out to us in the field.

Ovis ammon Linnaeus Wild Sheep

Capra ammon Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 70.

Type locality.—Kazakhstan SSR: Semipalatinsk Oblast; near Ust' Kamenogorsk on the Irtish River.

Distribution.—

PREVIOUS: Gmelin, S. G. (1774, p. 433), Elburz Mountains [probably south of Rasht]. De Filippi (1865, p. 344), Elburz Mountains. Blanford (1876, pp. 87–88), **Tehran,** Elburz Mountains near Tehran. **Fars,** Shiraz. **Kerman,** Jalk; Dizak. Guenther (1899, p. 374), **Azarbaijan,** Koyun Daghi Island. Nasanov (1909:1080), **Fars,** Laristan. Nasanov (1910, p. 708), **Isfahan,** environs of about 50 versts [sic] from Isfahan. **Mazanderan,** environs of Demavend. Nasanov (1913, p. 25), **Gorgan,** several places in mountains near [probably south or southeast of] Gorgan. **Khorassan,** Nardin. Kennion (1911, pp. 28, 136, 168, 281), **Khorassan,** Bujnurd Hills, hills northeast of Meched; Karadagh [near Kala-i-Nadiri, see p. 172]; Kain. **Kerman,** hills near Lowari-Ab Well and Baluch Ab Well in the Palang Kuh range [Kuh-i-Malek-Siah]. Lydekker (1913, pp. 83, 92), south flank of the Elburz. "Bujnurd, Ala Dagh, Seistan, Persia" (p. 92) refers to a single specimen and is obviously a combination of two widely separated localities. Cheesman (1920, p. 345), **Khuzistan,** Baktyari [Mountains]. Cheesman (1921, pp. 578, 581), **Fars,** Dehnau, Baiza, Kuh-i-Bamu. Sushkin (1925, p. 148), **Azarbaijan,** Kara Dagh Mountains [near Baba-Bagy; see Tsalkin, 1951, p. 246]; north of Travriz [? misspelling of Tabriz]. Goodwin (1940, p. 16), **Khorassan,** Hairleigh; Dergermatie. Tsalkin (1951, pp. 248, 304, 308, 309, 311), **Khorassan,** (?) Shakunizhree, N. Persia [not located]. **Damghan,** near Shahrud. **Khuzistan,** Pusht-i-Kuh. **Kerman,** Kaskin. Misonne (1959, p. 39), **Kurdistan,** region of Akinlou.

STREET EXPEDITION SPECIMENS: **Mazanderan,** vicinity of Doab, 11 (11 skeletons). **Gorgan,** Elburz Mountains 50 km east of Gorgan, 1 (skull only). **Damghan,** Elburz Mountains north of Damghan, 4 (3 skeletons, 1 skull only), Shahrud, 1 (skull only), 79 km. northwest of Anarak, 3 (skulls only). **Khorassan,** vicinity of Shahrabad Kaur, 6 (6 skeletons), vicinity of Bojnurd, 6 (6 skulls only). **Isfahan,** 16 km. northeast of Galatappeh, 4 (4 skeletons). **Fars,** 66 km. southeast of Shiraz, 1 (skull + scalp); 10 km. east of Ahram, 6 (2 skulls only, 1 skin only, 1 skeleton). **Kerman,** 45 km. southwest of Iranshahr, 4 (4 skeletons).

ADDITIONAL SPECIMENS: **Lurestan,** near Faraman village, 2 (skeletons only, specimens of C. A. Reed collection, YPM).

RANGE: Wild sheep range throughout the mountains of Iran.

Remarks.—Wild sheep exist abundantly throughout Iran. Every mountain chain seems to support a population. The high mountains about our Doab camp were mantled with grazing areas where we observed sheep at 3,000–4,200 m. elevation; however, this area is inhabited by sheep only during the summer months because it is buried beneath deep snow from mid-October until mid-March. Our observations seemed to indicate that adult rams roam in herds separate from the females in early August. Later, in November, flocks of adult males, adult females, and yearlings were observed together. In the lower mountain ranges of interior Iran grazing is not as lush as in the High Elburz and varies with geographic locality, altitude, and also time, because rain does not necessarily fall annually in many areas.

An adult female taken August 2 was lactating and the total length of lambs acquired August 6 measured 81 cm (♀) and 87 cm (♂), roughly 70 per cent of adult total length. Other lambs or yearlings taken in early November and early and late December virtually bridge the size gap between lambs and adults.

APPENDIX OF OTHER SPECIES REPORTED FROM IRAN

This appendix provides a list of the 28 species previously recorded from Iran that were not represented among the 99 species collected by the Street Expedition. These are included so that this paper may provide complete coverage of the known mammalian fauna of Iran to date. For each species the following information is recorded: scientific name; primary citation; type locality; distribution in Iran (the majority of the species treated here have been recorded from a single locality and no attempt will be made to provide the areal range of these); remarks (this category is self-explanatory where employed).

Paraechinus aethiopicus Ehrenberg — Ethiopian Hedgehog

Paraechinus aethiopicus Ehrenberg, 1833 in Hemprich and Ehrenberg, Symb. Phys. Mamm. **2**, sig K, recto.

Type locality.—Sudan: Dongola Desert.

Distribution.—

PREVIOUS: Thomas (1922, p. 144), Tanb Island, Persian Gulf.

NEW SPECIMENS: 8893 NMV, **Kerman,** Kuh-i-Hezar.

Remarks.—This specimen from Kuh-i-Hezar is allotted to this species on the basis of its single-rooted $P^{\underline{3}}$ which is greatly reduced in size (cf. Ellerman and Morrison-Scott, 1951, p. 27). This locality marks the range of this species for the first time on the Persian mainland and extends the range about 1250 km. east-southeast of Hatt's (1959, p. 27) easternmost Iraq record of Baghdad and approximately 500 km. northwest of Tanb Island in the Persian Gulf.

Sorex minutus Linnaeus — Lesser Shrew

Sorex minutus Linnaeus, 1766, Syst. Nat., 12th ed., **1**, p. 73.

Type locality.—USSR: Western Siberia; Barnaul.

Distribution.—

PREVIOUS: Goodwin (1940, p. 3), **Khorassan,** Dasht.

Tadarida teniotis Rafinesque — European Free-tailed Bat

Cephalotes teniotis Rafinesque, 1814, Precis. Som. 12.

Type locality.—Sicily.

Distribution.—

PREVIOUS: Trouessart (1897, p. 104), Persia. Lewis and Harrison (1962, p. 477), Persia. These authors mention two alcoholic specimens in the British Museum (N.H.). I examined two alcoholic specimens at that institution from **Fars,** Bushire (97.11.10.2) and "Foot of the Elburz mountains" (10.8.12.5).

Remarks.—We frequently heard and occasionally glimpsed bats that behaved much like *Tadarida taeniotis* at Ahram and Lake Famur, both localities in Fars. I have observed and collected this species in southern Europe (Granada, Spain and Naples, Italy).

Myotis nattereri Kuhl Natterer's Bat

Vespertilio nattereri Kuhl, 1818, Ann. Wetterau Ges. Naturk. **4,** no. 1, p. 33.

Type locality.—Germany: Hanau; Hessen.

Distribution.—

PREVIOUS: Harrison (1963, p. 302), **Azarbaijan,** Guter Su.

Myotis emarginatus Geoffroy Geoffroy's Bat

Vespertilio emarginatus Geoffroy, 1806, Ann. Mus. Hist. Nat. Paris **8,** p. 198.

Type locality.—France: Ardennes; Givet, Charlemont.

Distribution.—

PREVIOUS: Blanford (1876, p. 20), **Kerman,** Jalk. Thomas (1920a, p. 933), **Kerman,** Shastun near Dizak. Kuzyakin (1950, p. 267) maps a locality in **Khorassan,** seemingly near Mashhad.

NEW SPECIMENS: 27.10.26.2–4 BM from **Mazanderan,** Barfurush.

RANGE: This bat is known from four widely scattered localities in Iran, the scattered nature of which suggests that it may occur through a large part of the eastern half of Iran.

Pipistrellus nathusii Keyserling and Blasius

Vespertilio nathusii Keyserling and Blasius, 1839, Arch. Naturgesch. **5,** no. 1 p. 320.

Type locality.—Germany: Berlin.

Distribution.—None in Iran.

Remarks.—Ellerman and Morrison-Scott (1951, p. 184) list "?Persia" in the range of this bat. This species has not yet been colected in Iran.

Pipistrellus mimus Wroughton Indian Pygmy Pipistrelle
Pipistrellus mimus Wroughton, 1899, J. Bombay N. H. Soc., **12**, p. 722.

Type locality.—West India: Surat Dist.: Mheskatri, Dangs.

Distribution.—

PREVIOUS: Cheesman (1920, p. 576), **Fars,** Shiraz.

Range.—Cheesman did not mention whether comparisons between *P. mimus* and the very similar species *P. pipistrellus* were made. Because this record represents a considerable range extension for either *P. mimus* or *P. pipistrellus* than those provided by Ellerman and Morrison-Scott (1951, pp. 163, 166) it would seem desirable that this Shiraz series be re-examined.

Pipistrellus coromandra Gray Indian Pipistrelle
Scotophilus coromandra Gray, 1838, Mag. Zool. Bot., **2**, p. 498.

Type locality.—India: Coromandel Coast; Pondicherry.

Distribution.—

PREVIOUS: Dobson (1871), p. 461), **Fars,** Shiraz.

Remarks.—Dobson (loc. cit.) states of these examples only "Several spirit specimens of immature individuals referable to this species [*Pipistrellus coromandra*]." The possibility that these immature specimens represent some species other than *P. coromandra,* e.g. *kuhli, mimus, pipistrellus,* cannot be overlooked. No writer since Dobson has mentioned further study of these specimens.

Eptesicus bobrinskoi Kuzyakin Bobrinsky's Bat
Eptesicus bobrinskoi Kuzyakin, 1935, Bull. Soc. Nat. Moscow, **44**, pp. 435-437.

Type locality.—Turkmen SSR: Tjulek wells in Aral Kara-Kum Desert 65 km. east of Aralskoje More (city).

Distribution.—Harrison (1963, p. 303), **Azarbaijan,** Guter Su.

Eptesicus nasutus Dobson Sind Bat
Vesperugo (*Vesperus*) *nasutus* Dobson, 1877, J. Asiat. Soc. Bengal, **46**, no. 2, p. 311.

Type locality.—India: Sind; Shikarpu.

Distribution.—

PREVIOUS: Thomas (1905, p. 520), **Khuzistan,** Ahwaz.

Eptesicus bottae Peters Bott's Serotine
Vesperus bottae Peters, 1869, Mber. Preuss. Akad. Wiss. p. 406.

Type locality.—Arabia: Yemen.

Distribution.—

PREVIOUS: Thomas (1905, p. 520) **Khuzistan,** Mala-i-Mir; Telespid. Cheesman (1921, p. 574), **Fars**: Basht, 4000 ft.

Otonycteris hemprichi Peters Hemprich's Long-eared Bat

Otonycteris hemprichi Peters, 1859, Mber. Preuss. Akad. Wiss., p. 223.

Type locality.—None.

Distribution.—

PREVIOUS: Satunin (1909b, p. 281), **Kerman**, Nukendzhaga.

Plecotus austriacus Fischer Long-eared Bat

Plecotus auritus austriacus Fischer, 1829, Synops. Mamm. p. 117.

Type locality.—Austria, Vienna.

Distribution.—

PREVIOUS: Peters (1866, p. 18), Persia. Harrison (1963, pp. 305–6), **Azarbaijan,** Guter Su. Aberdeen University (1965, p. 6) **Isfahan,** Kuh Rang area.

Vulpes corsac Linnaeus Corsac Fox

Canis corsac Linnaeus, 1768, Syst. Nat., 12th ed., appendix to vol. 1, p. 223.

Type locality.—USSR: Steppes between the Ural and Irtish Rivers.

Distribution.—

PREVIOUS: Misonne (1959, p. 30), **Gorgan,** Gumshun.

Selenarctos thibetanus G. Cuvier Asiatic Black Bear

Ursus thibetanus G. Cuvier, Ossements Foss. 4, p. 325.

Type locality.—Assam: Sylhet.

Distribution.—

PREVIOUS: Blanford (1876, p. 47) mentions the occurrence of a black bear in Iranian Baluchistan. Birula (1912, p. 279) records the following information from N. Zarudny's notes: Kerman Province: examined dead *S. thibetanus* in date grove at Rashid-Khnom; saw bears at Tagab; frightened bear out of Tamarisk thicket along the Rud-i-Zakhan; noted bear tracks, presumably this species, along the Rud Khane-i-Kyagur between Basman and Bampur.

RANGE: The Asiatic Black Bear is reported from the southeastern part of Kerman Province.

Remarks.—Although this bear undoubtedly ranges in southern Kerman Province no specimen, it seems, has ever been preserved from Iran. Nearly all the men we talked with from Damin, Iranshahr, Bampur, and Geh were familiar with this black bear and were in complete accord on the point that these bears frequent the date groves in the vicinities of these towns annually when the dates ripen.

Melivora capensis Schreber Honey Badger

Vivera capensis Schreber, 1776, Saugethiere pl. 125, also 1777, **3**, p. 450.

Type locality.—South Africa: Cape of Good Hope.

Distribution.—

PREVIOUS: Thomas (1905:523), **Khuzistan,** Ram Hormuz. Cheesman (1920:335), **Lurestan,** Baksai on the Iran-Iraq frontier. Ognev (1931:503) cites "S. I. Bilkevich (1918)" as recording the ratel from Atrek and Astrabad Provinces in Iran, but I have been unable to locate Bilkevich's original paper.

NEW SPECIMENS: 5201 SMNS, **Khuzistan,** on the road between Shush and Ahvaz.

RANGE: The ratel or honey-badger is presently known from the Khuzistan plains and the parts of Lurestan abutting the Tigris river valley and seemingly, the Turkmen plains of the present day Gorgan and Khorassan Provinces.

Felis leo Linnaeus Lion

Felis leo Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 41.

Type locality.—Algeria: Constantine.

Distribution.—

PREVIOUS: Blanford (1876, pp. 30–31), states that lions occurred abundantly from Khuzistan Province east into Fars Province to 53° E. An encounter with a lioness in oak forest south of Dasht-i Arjan in **Fars** is related. Sykes (1902, p. 319), **Fars,** hills about Kazerun. Sykes (1910, 265), **Khuzistan,** along the banks of the rivers. Kinnear (1920, pp. 33–37), **Khuzistan,** jungles of the Kurun River; Bakhtiyari Mountains; Ram Hormuz plain; near Mt. Asemari; Suza; Dizful. Champion Jones (1945, p. 230), **Khuzistan,** Karkheh River gorge about 40 miles north of Dizful (sight record December 1941). Heany (1944, p. 44), **Khuzistan,** 40 miles northwest of Dizful (sight record May 22, 1942).

Remarks.—No lion has been reported from Iran since May 1942 and it seems likely this species is now extinct there, however the possibility that a few may still exist in the "jungles" of the Dez, Karkheh and Karun river valleys should not be overlooked.

Felis tigris Linnaeus Tiger

Felis tigris Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 41.

Type locality.—India: Bengal.

Distribution.—

PREVIOUS: De Filippi (1865, p. 343), Ghilan and Mazanderan Provinces. Kennion (1911, pp. 243, 247), **Gorgan,** Elburz mountains east of Gorgan. **Khorassan,** mountains along the southern bank of the Gorgan River. Misonne (1959, p. 34), **Khorassan,** near Dasht.

RANGE: The above records and Satunin's (1905b, p. 146) from the Talysh mountains of Azarbaijan SSR suggest that the tiger occurs throughout the forest zone along the northern slope of the Elburz mountains.

Phoca caspica Gmelin Caspian Seal

Phoca vitulina var. *caspica* Gmelin, 1788, Syst. Nat., 13th ed., **1,** p. 64.

Type locality.—Caspian Sea.

Distribution.—

PREVIOUS: Confined to Caspian Sea (Ellerman and Morrison. Scott, 1951, p. 330). These seals reportedly visit the Iranian coast frequently but we failed to observe them. We did see a specimen in the Tehran Zoo that was captured during the fall of 1962 near Ramsar.

Dama mesopotamica Brooke Mesopotamian Fallow Deer

Cervus mesopotamicus Brooke, 1875, P.Z.S. p. 264.

Type locality.—Iran: "Khuzistan, Luristan".

Distribution.—

PREVIOUS: Brooke (1875, p. 264), **Khuzistan,** Karun, Diz, and Karkheh Rivers. Ellerman and Morrison-Scott (1951, p. 359), **Lurestan,** Juanrud District north of Kermanshah. Haltenorth (1961, pp. 22-23), **Khuzistan,** Harmala on the Dez River; Ahmad Mollah on the Karkheh River.

RANGE: This species seems to be confined to the ever shrinking *Tamarisk-Populus euphraticus* riverine thickets along the Dez, Karkheh and Karun rivers in the vicinity of Shush. The status of the population, if such presently exists, in the Jowan Rud valley of Lurestan is unknown.

Remarks.—Mr. Khosrow Sariri, Chief adjutant of the Iran Game Council informed me (letter of May 27, 1963) that he with a party sponsored by the Iran Game Council had captured two males and two two females alive in the Karkheh and Dez River valleys near Shush and that these animals have been transported to a Game Preserve

near Sari in Mazanderan Province. Mr. Eskander Firouz, treasurer of the Iran Game Council writes regarding *D. mesopotamica* in a letter dated August 14, 1965: "we caught three more animals since last winter [1964 65]—first a four-year old stag, which was consigned to von Opel in Frankfort, then two (one of either sex), which were sent to the Dasht-e-Naz Park near Sari. The mature female in the park [captured in 1964] meanwhile gave birth to a fawn this year—and we thus have a total of seven fallow deer in this enclosure."

Gazella leptoceros Cuvier Rhim

Antilope leptoceros Cuvier, 1842, in Geoffroy and Cuvier, Hist. Nat. Mamm., 4, p. 72. Antilope a longues cornes, 2, and pls. 373, 374.

Type locality.—"Semmaar" (probably the desert between Giza and Wadi Natron, Lower Egypt, Flower 1932).

Distribution.—

PREVIOUS: Cheesman (1920, p. 344), **Khuzistan,** Shushtar and Ahwaz.

Ochotona daurica Pallas Daurian Pika

Lepus dauuricus Pallas, 1776, Reise Russ. Reichs., 3, p. 692.

Type locality.—USSR: Eastern Siberia: Kalusutai, Onon River.

Lagomys dauricus Buchner, 1890, Wiss. Res. Przewalski Cent. Asien Reisen, Zool. Th., 1, Saugeth. 172. Emendation.

Distribution.—

PREVIOUS: Thomas (1922a, p. 189), **Kerman,** Seistan.

Remarks.—Thomas (1922a, p. 189) described *Ochotona curzoniae seiana* from a single alcoholic specimen received in an exchange with the Indian Museum at Calcutta and subsequently prepared into a skin and skull. Ellerman and Morrison-Scott (1951, p. 452) allocate it to *Ochotona daurica*. After study of the type specimen in London I agree that morphologically the specimen is more similar to *daurica* than to any other Asian conie. However, *Ochotona daurica* is a steppe dweller whose range encompasses the southeastern Altai and Southern Transbaikallia, USSR; Mongolia; and Chzhili, Shensi, Shansi, and the western part of Kansu Provinces, China (Gromov *et al.* 1963, p. 242), and the closest part of the range of this species, Koko Nor, Mongolia, lies beyond the Himalayan Mountain escarpment east northeast of Seistan approximately 2575 km. Furthermore, habitat of *daurica* as described by Allen (1938, p. 552–553) does not exist in Seistan.

Sciurus anomalus Guldenstaedt Persian Squirrel

Sciurus anomalus Guldenstaedt, 1785, Schreber, Saugethiere 4, p. 781.

Type locality.—Georgian SSR: Sabeka, 25 km. southwest of Kutais.

Distribution.—

PREVIOUS: Blanford (1876, p. 49), **Fars,** oak forest near Shiraz. Cheesman (1920, p. 575), **Fars,** Kaluni 4200 ft.; Sisakht 6500 ft.; Chinar 6600 ft.

RANGE: This squirrel has been reported only from the above cited places in Fars Province. Hatt's (1959, pp. 79–80) records from numerous places in the forested and semi-forested Zagros Mountains of Iraqi Kurdistan provide a basis for suggesting that this species will be found to occur elsewhere in the forested elevations of the Zagros range in Iran.

Spermophilopsis leptodactylus Long-clawed Ground Squirrel

Arctomys leptodactylus Lichtenstein, 1823, Eversmann. Reise, p. 119.

Type locality.—Uzbekistan SSR: Karata, 140 versts northwest of Bokhara.

Distribution.—

PREVIOUS: Petter, *et al.* (1957, p. 120), **Khorassan,** Serakhs.

Allactaga hotsoni Thomas Hotson's Jerboa

Allactaga hotsoni Thomas, 1920, J. Bombay Nat. Hist. Soc. **26** no. 4, p. 936.

Type locality.—Iran: **Kerman;** Kant [=Kont], 20 miles southwest of Sib.

Distribution.—This species is known from a single specimen from the type locality.

Remarks.—See account of *Allactaga williamsi.* Siddiqi (1961, p. 189) incorrectly locates Kont in W. Pakistan. Kont lies well within Iranian territory.

Rattus rattoides Hodgson Turkestan Rat

Mus rattoides Hodgson, 1845, Ann. Mag. Nat. Hist., (ser. 1) **15,** p. 267.

Type locality.—Nepal.

Distribution.—

PREVIOUS: Etemad (1964, p. 652) recorded this species from Iran. The captions of Figures 1 and 2 state that the specimen is from Moghan. The label on the specimen in Etemad's Figures 1 and 2 is unclear but seems to read "Moghan, 30 kilometers S of Mashhad N.E. Iran." This would be in Khorassan Province.

Remarks.—The bodies of FMNH specimens, nos. 97518–19, of *Rattus norvegicus* from Tehran, Tehran, are white ventrally, as are the ventral halves of the bicolored tails. Numerous FMNH specimens of *R. norvegicus* from Ngluko, Yunnan Province, China, possess white-colored undersurfaces of the body and tail. Etemad compared his specimen with only *R. rattus*. The pelage difference between *R. rattoides* and *R. norvegicus* is that in the former the hairs covering the ventral surfaces of the body are white from base to tip, whereas these are gray basally in the latter. On the basis of the distribution of *R. rattoides* in Uzbek SSR and Afghanistan it seems possible that the species may occur in Iran, but, if *R. rattoides* is to be unequivocally recognized as a component of the Iranian fauna, the exact nature of the coloration of the ventral hairs of the specimen from Moghan must be ascertained with certainty. This cannot be accomplished from Etemad's account.

Meriones hurrianae Jerdon Indian Desert Jird

Gerbillus hurrianae Jerdon, 1867, Mamm. India, p. 186.

Type locality.—India: Punjab; Hissar.

Distribution.—

PREVIOUS: Blanford (1876, p. 68), **Kerman,** Bahukelat. Wroughton (1920, p. 31), **Kerman,** Chabahar. Heptner (1940, p. 20), **Kerman,** near Bahu Kelat. Petter *et al.* (1957, p. 116), **Fars,** 60 kilometers north of Bandar Abbas on the route to Kerman.

RANGE: This jird ranges west across southern Kerman Province to the southeast corner of Fars Province.

Remarks.—Misonne states (1959, p. 51) in error that Petter *et al.* (1957, p. 116) found this species 200 km. west of Bandar Abbas on the route to Lar.

Meriones meridianus Pallas Midday Jird

Mus meridianus Pallas, 1773, Reise Russ. Reiches, **2**, p. 702.

Type locality.—Kazakstan SSR: Uralsk Region; near Novo-Bogatinsk.

Distribution.—

PREVIOUS: Heptner (1940, p. 32), **Khorassan,** Mandakhi; Rum. Petter *et al.* (1957, p. 117) **Khorassan,** Sarakhs.

RANGE: The Iranian range of this species is so far limited to the most northeastern Province.

Remarks.—The first two above localities lie on the Persian plateau and the last is located off it on the edge of the Kara Kum Desert.

Pitymys subterraneus de Silys Longchamps Pine Vole

Arvicola subterraneus de Silys Longchamps, 1836, Essai Monogr. sur les Campagnols des environs de Liege, p. 10.

Type locality.—Belgium: Liege; Waremme.

Distribution.—

PREVIOUS: Ellerman (1948, p. 784) records specimens from **Ghilan,** Kuramabad.

Sotalia plumbea Cuvier Plumbeous Dolphin

Delphinus plumbeus Cuvier, 1829, Règne Anim., 1, p. 288.

Type locality.—India: Malabar.

Distribution.—

PREVIOUS: Murray (1884, p. 98) records two skulls from the Persian Gulf coast in **Fars,** Bandar Lengeh.

SUMMARY

A narrative account cursorily describes the physiography and general ecology observed along the routes taken in Iran by the W. S. and J. K. Street Expedition. Separate from the narrative and arranged alphabetically by the name of the collecting locality, ecological description of each of the places where the expedition paused to study and collect tells what mammals were found in what sort of biotic communities. A gazetteer is provided with the coordinates of, or appropriate remarks on, every Iranian locality cited in the text.

The distribution data for Iran published before 1963, for each of the 99 species represented by the 1719 mammal specimens obtained by the expedition, and the 26 other species known from Iran is summarized for the first time since 1876.

The following advances in taxonomic knowledge of mammal species of southwest Asia beyond that presented by Ellerman and Morrison-Scott (1951) and Misonne (1959) result from this study of collections of the Street Expedition in relation to previously existing materials:

Crocidura leucodon lasia Thomas, 1906, is in fact *C. leucodon* Hermann, 1780, and not *C. lasiura* Dobson, 1890.

Crocidura russula caspica Thomas, 1907, is in fact *C. russula* Hermann, 1780, and not *C. lasiura* Dodson, 1890.

Rhinopoma hardwickei pusillum Thomas, 1920, is shown to be synonomous with *R. h. seianum* Thomas, 1913.

Pipistrellus aladdin Thomas, 1905, is a synonym of *P. kuhli kuhli* Kuhl, 1819.

Miniopterus schreibersi pallidus Thomas, 1907, and *M. s. pulcher* Harrison, 1956, are shown to be junior synonyms of *M. s. schreibersi* Kuhl, 1819.

Microtus guentheri Danford and Alston, 1880, and *Microtus irani* Thomas, 1921, are synonymous with *Microtus socialis* Pallas, 1773.

Ellobius lutescens is a subspecies of *E. fuscocapillus.*

The subspecies *buxtoni* Thomas, 1919, and *insularis* Goodwin, 1939, are shown to be synonymous with *Nesokia indica indica* Gray and Hardwicke, 1832.

Glis glis persicus Erxleben, 1777, is shown to be the oldest available name for the south Caspian fat dormouse, and *G. g. caspicus* Satunin, 1905, is a junior synonym.

Collecting efforts of the expedition are shown to have resulted in discoveries in Iran of nine species not previously known to occur there:

Erinaceous europaeus
Neomys anomalus
Talpa streetorum
Rhinolophus euryale
Rhinolopus blasii
Eptesicus nilssoni
Vespertilio murinus
Barbastella leucomelas
Microtus nivalis

One species entirely new to science, a mole of the family Talpidae, has been described from Hezar Darreh, Kurdistan, Iran and named *Talpa streetorum.*

GAZETTEER

The compilation of the Iranian place names listed here was a relatively easy task, whereas that of determining the correct location of many of these proved more formidable. Some of this difficulty stemmed from the varied transliterations of Persian names into English, French, Russian, Italian, and/or Spanish. By grace of my personal experience in Iran and acquisition of a cursory familiarity with Farsi, as the Persian language is known, words often employed as pre- or suffixes (e.g. deh, rud, chah, which mean respectively village, river, well) in transliterations have frequently provided clues that facilitated location of obscure localities.

Most of the places from which mammal specimens have been preserved, even those visited by the earliest collectors (e.g., S. G. Gmelin, 1770–1772, De Filippi, 1863; St. John, 1869–71; Blanford, 1872; etc.), have been accurately located. This accomplishment seems to be due to (1) the stability of the names and locations of cities, towns, villages and names of geographic features, at least during the relatively brief recent period of Persia's more than 2,500 years of recorded history; (2) the detailed itineraries or accounts provided by most collectors of vertebrates in Iran, and (3) the excellent maps which are presently available.

The maps and gazetteers provided in "The Times Survey Atlas and Gazetteer of the Worlds," (J. G. Bartholomew ed.) London 1922; its successor, "The Times Atlas of the World, Mid-Century Edition," (John Bartholomew ed.) London 1959; and "National Geographic Atlas of the World," (M. B. Grosvenor ed.) Washington 1963 are satisfactory for locating the larger and more prominent towns, cities, and geographic features but those found most useful were: "The Army Map Service Iran-Iraq K501 Series, 1:253,440 (1941) and K502 Series, 1:250,000 (compiled 1951) published by Corps of Engineers, U. S. Army, Washington, D. C. and the World Aeronautical Chart, 1:1,000,000 4th revised edition (1958) published by Aeronautical Chart Service, U.S. Army Air Forces, Washington, D.C.

For the purpose of standardization, the names provided in this gazetteer follow where possible those listed in the U.S. Board on

Geographic Names Gazetteer 19, Iran (1956) published by the U.S. Government Printing Office, Washington, D.C. Place names not listed in Gazetteer 19 were cited from the K501 or 502 map series, the World Aeronautical Chart, or the original literature in that order of preference.

Many Persian place names enjoy wide usage throughout Iran (e.g. over 120 different listings are given for Aliabad in the Gazetteer 19). With the knowledge from the specimen label of who collected the specimen and when, and with available knowledge of the collector's itinerary, we have generally been able to locate the correct place when specimens have been recorded from a locality the name of which is used for more than one place.

In alphabetizing, place names of more than one word are treated as if but a single word (e.g. Dehdez, Deh-i-Diz, Dehnan would come properly in this order).

Because of the confusion involved in the various transliterations of Persian place names, particularly to the unpracticed reader, I attempt to provide the most common synonyms for the polynomial localities encountered in this study. Synonyms will be readily recognized by a cross reference in the co-ordinate column. In the Accounts of Species section in the subheading PREVIOUS under *Distribution*, I have attempted to list locality records spelled as they appeared in the original literature. Additionally, these places have been listed with the appropriate Province. A large number of these localities as originally spelled are synonyms to the name accepted by the U.S. Board on Geographic Names, Gazetteer 19.

The -e-, -i-, -ye- of names such as Band-e-amir, Band-i-Qir, Rudkhaneh-ye-Jask are synonomous in meaning. The Gazetteer 19, however, does not indicate this nor does it standardize usage of any single one of these.

The abbreviation *ca.* before co-ordinates indicates that the exact locality of the place was not provided in Gazetteer 19 or found on any of the maps used, but according to information provided in the primary literature should lie at or near the point given.

On occasions (e.g. Varang River) the English word "river" has been substituted for the Persian equivalent, "rud." Though the Gazetteer 19 lists the stream as Varund Rud, it is felt that replacement of Rud with river will result in less confusion particularly for those readers unfamiliar with Persian.

The province names accompanying the localities in the text provide, principally, a means whereby the reader may readily locate the

approximate part of Iran in which the locality cited exists by referral to map no. 1 on pp. 14–15. This map consists of a modification by me of a map published by A. H. Hamzavi, Iranian Information Center, New York, ca. 1960 (exact date not provided).

GAZETTEER

ABADAN, Khuzistan: 30°20′N 48°16′E
ABADEH, Fars: 31°10′N 52°38′E
ABHAR RIVER, Damghan: 36°02′N 49°45′E
ABOUSALT, Khorassan—village on the 64 km. route from Mashhad SW to Fariman
ABTAR, Kerman: 27°14′N 60°53′E
AGHBOLAGH MORCHED, Kurdistan: 35°37′N 48°07′E
AGHDACH, Kurdistan: (*see* Agh Dagh)
AGH DAGH, Kurdistan: 37°23′N 48°33′E
AHMAD MAHMOUDI, Fars: 28°20′N 53°42′E
AHMAD MOLLAH, Khuzistan—*ca.* 5 km. south of Shush, precise locality not found
AHRAM, Fars: 28°52′N 51°16′E
AHVAZ, Khuzistan: 31°19′N 48°42′E
AHWAZ, Khuzistan: (*see* Ahvaz)
AKBARABAD (near Shiraz), Fars: 29°41′N 52°33′E
AKHLAMAD, Khorassan: 36°37′N 58°55′E
AKINLOU, Kurdistan: 35°35′N 48°07′E
ALA DAGH MOUNTAINS, Azarbaijan—exact locality not determined, presumably *ca.* 38°30′N 46°15′E
ALA DAGH, Khorassan: (*see* Aleh Dagh)
ALAKHURSHID, Khuzistan: (*see* Ala Khvorshid)
ALA KHURSHID, Khuzistan: (*see* Ala Khvorshid)
ALA KHVORSHID, Khuzistan: 31°32′N 49°52′E
ALEH DAGH MTNS., Khorassan: 37°07′–17′N 57°30′–50′E
ALIABAD, Gorgan: 36°54′N 54°52′E
ALKHORSHIR, Khuzistan: (*see* Ala Khvorshid)
ALLAH YARLOU, Azarbaijan: 38°50′N 47°45′E
ANARAK, Damghan: 33°20′N 53°42′E
ANBARABAD, Kerman: 28°25′N 57°50′E
ANDEMESHK, Khuzistan: (*see* Andimeshk)
ANDIMESHG, Khuzistan: (*see* Andimeshk)
ANDIMESHK, Khuzistan: 32°27′N 48°21′E
APTAR, Kerman: (*see* Abtar)
ARAS RIVER: 39°56′N 48°20′E
ARAXE RIVER: (*see* Aras River)
ARDABIL, Azarbaijan: 38°15′N 48°18′E
ARDEBIL, Azarbaijan: (*see* Ardabil)
ARDESTAN, Damghan: 33°45′N 52°30′E
ASHRAF, Gorgan: (*see* Behshahr)
ASHURADE, Gorgan: (*see* Ashuradeh-ye-Bozorg)
ASHURADEH-YE-BOZORG, Gorgan: 36°50′N 53°56′E
ASKANIEH, Khorassan—village on the 64 km. route from Mashhad SW to Fariman
ASPAS, Fars: 30°40′N 52°24′E

ASTARA, Ghilan: 38°26′N 48°52′E
ASTRABAD, Gorgan: (*see* Gorgan)
ASTRABAD PROVINCE—former province now included in Gorgan Province, see map pp. 14–15
ASUPAS, Fars: (*see* Aspas)
ATRAK PROVINCE—former province, probably located in the northern parts of the present Gorgan and Khorassan Provinces.
ATRAK RIVER, Khorassan—flows west from Kopet Dagh north of Bojnurd to the Caspian Sea
AVIZ, Khorassan: 33°43′N 69°57′E

BABA BAGY, Azarbaijan—in Kara Dagh mountains, exact locality not found
BABOL, Mazanderan: 36°34′N 52°42′E
BABOL SAR, Mazanderan: 36°43′N 52°39′E
BACH GOUTARAN, Kurdistan—not located, but presumably in vicinity of Aghbolagh Morched
BACKTYARI MTNS., Khuzistan: (*see* Bakhtiari Mtns.)
BADZHISTAN, KHORASSAN: (*see* Bejestan)
BAGHERABAD, Khorassan: (*see* Bakhirabad)
BAGH-I-SHAHI, Khuzistan: (*see* Baksai)
BAHU KALAT, Kerman: 25°43′N 61°25′E
BAHUKELAT, Kerman: (*see* Bahu Kalat)
BAHU KELAT, Kerman: (*see* Bahu Kalat)
BAIZA, Fars: 30°03′N 52°50′E
BAKHIRABAD, Khorassan: 35°58′N 59°45′E
BAKHTIARI MTNS., Khuzistan: 32°13′N 49°48′E
BAKSAI, Khuzistan: 32°53′N 46°21′E
BAKTYARI MTNS., Khuzistan: (*see* Bakhtiari Mtns.)
BALUCH AB WELL, Kerman, in Palang Kuh Mtn. range: 30°08′N 60°44′E
BALUCHISTAN—eastern part of Kerman Province
BAM, Kerman: 29°06′N 58°21′E
BAMGOUR, Kerman: (*see* Bampur)
BAMPHUR, Kerman: (*see* Bampur)
BAMPUR, Kerman: 27°12′N 60°27′E
BAMPUR RIVER (Rud), Kerman: 27°18′N 59°06′E
BAND, Azarbaijan—village 10 km. SW Rezaiyeh
BANDAMIR, Fars: 29°47′N 52°51′E
BANDAN, Kerman: 31°23′N 60°44′E
BANDAR ABBAS, Fars: 27°11′N 56°17′E
BANDAR ABBAS, Fars: 60 km. north of, along road to Kerman: 27°30′N 56°10′E
BANDAR-E-GAZ, Gorgan: 36°47′N 53°59′E
BANDAR-E-LENGEH, Fars: 26°33′N 54°53′E
BANDAR-E-PAHLAVI, Ghilan: 37°28′N 49°27′E
BANDAR-E-SHAH, Gorgan: 36°56′N 54°06′E
BANDAR-I-GAZ, Gorgan: (*see* Bandar-e-Gaz)
BANDAR LENGEH, Fars: (*see* Bandar-e-Lengeh)
BANDAR PAHLAVI, Ghilan: (*see* Bandar-e-Pahlavi)
BANDAR SHAH, Gorgan: (*see* Bandar-e-Shah)
BAND-E-AMIR, Fars: (*see* Bandamir)
BAND-I-QIR, Khuzistan: (*see* Band Qir)

BAND QIR, Khuzistan: 31°39′N 48°53′E
BARDEH SUR RIVER, Azarbaijan: (*see* Rud-e-Bardeh Sur)
BARENG, Kerman: 31°08′N 61°12′E
BAR FARUSH, Mazanderan: (*see* Babol)
BARFURUSH, Mazanderan: (*see* Babol)
BASHT, Fars: 30°21′N 51°09′E
BASKET MTN., Azarbaijan: 37°45′N 45°12′E
BASMAN, Kerman: 27°49′N 60°12′E
BEHBEHAN, Fars: 30°35′N 50°14′E
BEHSHAHR, Gorgan: 36°43′N 53°34′E
BEJESTAN, Khorassan: 34°31′N 58°10′E
BENDAN, Kerman: (*see* Bandan)
BENDER BOUCHIRE, Fars: (*see* Bushehr)
BENDUN, Kerman: (*see* Bandan)
BENNA MOUNTAINS, Fars: not located
BERDESUR CHAY, Azarbaijan: (*see* Rud-i-Bardeh Sur)
BESHA DARAZ, Khuzistan: (*see* Bisheh Deraz)
BID, Kerman: (*see* Kala-i-Bid)
BIDJAR, Kurdistan: (*see* Bijar)
BIJANEH, Lurestan—7 km. E of Kermanshah
BIJAR, Kurdistan: 35°52′N 47°36′E
BIJISTAN, Khorassan: (*see* Bejestan)
BILASSOAR, Azarbaijan: 39°21′N 48°20′E
BIRDJAND, Khorassan: (*see* Birjand)
BIRJANAH, Lurestan: (*see* Parchineh)
BIRJAND, KHORASSAN: 32°53′N 59°13′E
BIRJANEH, Lurestan: (*see* Parchineh)
BISHEH DERAZ, Khuzistan: 32°48′N 46°58′E
BISITAN, Lurestan: (*see* Bisitun)
BISITUN, Lurestan: 34°23′N 47°26′E
BISOTUN, Lurestan: (*see* Bisitun)
BIZINE, Kurdistan: 35°40′N 48°37′E
BOJNURD, Khorassan: 37°28′N 57°19′E
BOLIABAD, Kerman—24 km. east of Kerman
BORASJAN, Fars: (*see* Borazjan)
BORAZJAN, Fars: 29°16′N 51°12′E
BOSTANABAD, Azarbaijan: 37°50′N 46°50′E
BOUKAN, Azarbaijan: (*see* Bowkan)
BOWKAN, Azarbaijan: 36°31′N 46°12′E
BUJNURD, Khorassan: (*see* Bojnurd)
BUKAN, Azarbaijan: (*see* Bowkan)
BUNDE-KIL, Khuzistan: (*see* Band Qir)
BUSHEHR, Fars: 28°59′N 50°50′E
BUSHIRE, Fars: (*see* Bushehr)
CAMP KOHAK, Kerman (in Seistan)—not located
CHAGAJOR, Khuzistan: (*see* Chagha Khur)
CHAGHA KHUR, Khuzistan: 31°55′N 50°53′E
CHAHABAR, Kerman: (*see* Chah Bahar)
CHAH ALI KHAN, Damghan: 33°44′N 52°59′E
CHAHBAHAR, Kerman: (*see* Chah Bahar)

CHAH BAHAR, Kerman: 25°18′N 60°37′E
CHAHBAR, Kerman: (*see* Chah Bahar)
CHAH BASU, Kerman: 25°48′N 60°14′E
CHAH-I-DURA, Kerman: *ca.* 27°40′N 60°15′E
CHAHIL DUKTORAN RANGE, Kerman: (*see* Chehil Duktaran Range)
CHAH-I-NAVAR, Kerman: 30°15′N 61°04′E
CHAH-I-NODOU, Khorassan: (*see* Nodou)
CHAH-I-NOVAR, Kerman: (*see* Chah-i-Navar)
CHAH SHUR, Damghan: 34°10′N 52°20′E
CHAK-I-BUZZA PA, Fars: (*see* Mishan)
CHALUS, Mazanderan: 36°38′N 51°26′E
CHALUS KALANDOST, Mazanderan—not located, but presumably in the general area of Chalus
CHALUS RIVER, Mazanderan: 36°40′N 51°25′E
CHAMAN BID, Khorassan: 37°25′N 56°38′E
CHAMAR, Azarbaijan: 38°55′N 45°30′E
CHAMP, Kerman: (*see* Chanf)
CHANF, Kerman: 26°38′N 60°29′E
CHARMAN-I-BID, Khorassan: (*see* Chaman Bid)
CHEHEL DOKTORAN RANGE, Kerman: (*see* Chehil Duktaran Range)
CHEHELGERD, Isfahan: 32°26′N 50°61′E
CHEHIL DUKTARAN RANGE, Kerman: 30°39′N 60°39′E
CHESMEFLI, Ghilan—in Elburz Mtns. of Ghilan Province, exact locality not determined
CHEYKHAN, Kurdistan—not located
CHINAR, Fars: 30°49′N 51°13′E
CHIRAZ, Fars: (*see* Shiraz)
CHODSHA-I-DU-TSHAGI, Khorassan: (*see* Khvajeh Dow Chahi)
CHOSCHT-ADAN MTNS., Khorassan: 34°34′N 60°33′E

DACH BOUROUN, Gorgan: 37°35′N 54°49′E
DACHT, Khorassan: (*see* Dasht)
DAGJA, Isfahan—not located, according to Ellerman (1948, p. 799) it lies 23 miles east of Isfahan
DAK-I-DO WELL, Kerman: *ca.* 28°59′N 60°29′E
DALAKI RIVER, Fars: 29°19′N 51°06′E
DAMGHAN, Damghan: 36°09′N 54°22′E
DAMIN, Kerman: 27°25′N 60°55′E
DARBAND, Isfahan: *ca.* 32°44′N 51°13′E
DAR KALEH, Gorgan—not precisely located, but according to Goodwin's description it should lie near our locality of Aliabad, Gorgan
DARYACHEH-I-FAMUR, Fars: (*see* Famur, Daryacheh-i-)
DARYACHEH-I-URMIAH, Azarbaijan: (*see* Urmiah, Daryacheh-i-)
DARYACHEH-YE-SEISTAN, Kerman: 31°00′N 61°15′E
DASHT, Khorassan: 37°19′N 56°01′E
DASHT-E-ARZHAN, Fars: 29°39′N 51°58′E
DASHT-I-ARJAN, Fars: (*see* Dasht-e-Arzhan)
DASHT-I-KAVIR, north part of Great Central Desert 34°N 56°E
DASHT-I-LUT, south part of Great Central Desert 31°N 58°30′E
DASHT-I-MOGHAN, Azarbaijan: (*see* Moghan Steppe)

Davar Panah, Kerman: 27°21′N 62°21′E
Degermatie, Khorassan: (*see* Dergermatie)
Deh Bid, Fars: 30°38′N 53°11′E
Dehbid, Fars: (*see* Deh Bid)
Dehdez, Khuzistan: 31°43′N 50°17′E
Deh-i-Diz, Khuzistan: (*see* Dehdez)
Dehnau, Fars: 29°27′N 52°38′E
Demavend Mtn., Mazanderan: 35°56′N 52°08′E
Derbent, Isfahan: (*see* Darband)
Dergermatie, Khorassan: *ca.* 37°26′N 56°23′E
Dez River (Rud), Khuzistan: 31°39′N 48°52′E
Dezful, Khuzistan: 32°23′N 48°24′E
Divandarreh, Kurdistan: 35°55′N 47°02′E
Divandere, Kurdistan: (*see* Divandarreh)
Divandire, Kurdistan: (*see* Divandarreh)
Diwan Darreh, Kurdistan: (*see* Divandarreh)
Diz River, Khuzistan: (*see* Dez River)
Dizak, Kerman: (*see* Davar Panah)
Dizful, Khuzistan: (*see* Dezful)
Djoulfa, Azarbaijan: (*see* Jolfa, Azarbaijan)
Djulfa, Azarbaijan: (*see* Jolfa, Azarbaijan)
Djulfa, Isfahan: (*see* Jolfa, Isfahan)
Doab, Mazanderan: 36°07′N 51°32′E
Dopulan, Khuzistan: (*see* Dow Polan)
Doruh, Khorassan: (*see* Duruh)
Doruk River—not located
Dow Polan, Khuzistan: 31°55′N 50°35′E
Dshalk, Kerman: (*see* Jalq)
Dshelellabad (Seistan), Kerman: vic. of 31°00′N 61°50′E
Dumbeneh, Isfahan—not located, Thomas (1905, p. 526) lists it as 50 mi. north of Isfahan
Du Pulan, Khuzistan: (*see* Dow Polan)
Duruch, Khorassan: (*see* Duruh)
Duruh, Khorassan: 32°16′N 60°30′E
Duz Ab, Kerman: (*see* Zahedan)
Duz Ab Well, Kerman: (*see* Zahedan)
Duzoab, Kerman: (*see* Zahedan)

Enzeli, Ghilan: (*see* Bandar-e-Pahlavi)
Esfahan, Isfahan: (*see* Isfahan)
Esmailabad, Kerman: 32°03′N 59°49′E

Fahraj, Kerman: 28°58′N 58°52′E
Fahraj Rud, Kerman: 28°58′N 58°52′E
Famur, Daryacheh-i-, Fars: 29°30′N 51°50′E
Farad, Damghan: (*see* Forat)
Farahan, Bakhtiari Mtns., Khuzistan: (*see* Faridan District)
Faraj, Kerman: (*see* Fahraj)
Faraman, Lurestan: 34°13′N 47°18′E
Faridan District, Khuzistan: 32°50′N 50°00′E

FARIMAN, Khorassan: 35°43′N 59°53′E
FARIMUN, Khorassan: (*see* Fariman)
FIROUZ KUH, Mazanderan: (*see* Firuzkuh)
FIRUZKUH, Mazanderan: 35°46′N 54°47′E
FORAT, Damghan: 35°57′N 54°21′E
FRAT, Damghan: (*see* Forat)
FUMEN, Ghilan: (*see* Rasht)

GACH QASA GULI, Fars: 29°47′N 50°32′E
GACH SAR, Mazanderan: 36°07′N 51°19′E
GALANDER TALECH, Mazanderan: 36°48′N 54°16′E
GALATAPPEH, Isfahan: 33°13′N 51°45′E
GANJAH KUH MTN., Khorassan: 37°20′N 56°55′E
GARPOSHT, Kerman: 27°07′N 60°30′E
GAZAN KARREH, Kurdistan—10 km. northwest of Akinlou
GEH, Kerman: 26°13′N 60°12′E
GEZARDARREH, Kurdistan: (*see* Hezar Darreh)
GHAZVIN, Qazvin: (*see* Qazvin)
GIRSAFA, Kerman: (*see* Gursafa)
GIURGEN RIVER, Khorassan: (*see* Gorgan River)
GIZAR DARREH, Kurdistan: (*see* Hezar Darreh)
GOARPUSHT, Kerman: (*see* Garposht)
GOLANDAR, Khorassan—67 km. southeast of Birjand, not 75 km. southwest of Birjand as stated by Heptner (1940, p. 28); 32°24′N 59°40′E
GOLMIRAN, Kerman: 33°12′N 60°08′E
GOMBAD-I-KABOUS, Khorassan: (*see* Gonbad-i-Kavus)
GONBAD-I-KAVUS, Khorassan: 37°17′N 55°17′E
GORG, Kerman: 29°30′N 59°43′E
GORGAN, Gorgan: 36°50′N 54°29′E
GORGAN RIVER: 36°58′N 54°02′E
GORVEH, Kurdistan: 35°10′N 47°48′E
GOULADAGH, Khorassan: *ca.* 37°37′N 55°53′E
GOULADAH, Khorassan: (*see* Gouladagh)
GOURG, Kerman: (*see* Gorg)
GULANDER, Khorassan: (*see* Golandar)
GULEGA, Ghilan—not located but presumably in vicinity of Kopur Chal
GULJANDER, Khorassan: (*see* Golandar)
GULMIRUN, Kerman: (*see* Golmiran)
GULU DAGH, Khorassan: (*see* Gouladagh)
GULYANDER, Khorassan: (*see* Golandar)
GUMSHAN, Gorgan: 37°04′N 54°06′E
GUMSHUN, Gorgan: (*see* Gumshan)
GURG, Kerman: (*see* Gorg)
GURGAN, Gorgan: (*see* Gorgan)
GURSAFA, Kerman: (*see* Kubid)
GURSALA, Kerman—misspelling of Gursafa, *see* Kubid
GUTUR SU, Azarbaijan: (*see* Kutur Su)
GUTVAND, Khuzistan: 32°15′N 48°15′E
GUTWAND, Khuzistan: (*see* Gutvand)
GWARGUSHT, Kerman: (*see* Garposht)

HADJIABAD, Kerman: (*see* Sa'idabad)
HAFT TAPPEH, Khuzistan: *ca.* 32°04′N 48°20′E
HAIRLEIGH, Khorassan:—not located
HAMADAN, Hamadan: 34°48′N 48°30′E
HAMUM-I-HIRMAND (Seistan), Kerman: (*see* Daryacheh-ye-Seistan)
HARD-AL MAMLAH, Khuzistan: 31°53′N 48°31′E
HARMALA, Khuzistan: (*see* Hard-al Mamlah)
HASHTPAR, Ghilan: 37°48′N 48°55′E
HELMAND RIVER (Seistan), Kerman: (*see* Hirmand River)
HESSAREK, Qazvin: 35°50′N 50°54′E
HEZAR DARREH, Kurdistan: 35°25′N 47°07′E
HEZAR LAA, Mazanderan—12 km. west of Doab or 6 km. east Varangrud
HIRCANIA: (*see* Hyrcania)
HIRMAND BASIN, Kerman: (*see* Seistan)
HIRMAND RIVER, Kerman: 31°12′N 61°34′E
HORMOZ, Strait of: 26°34′N 56°15′E
HOTU CAVE, south of Beshahr, Mazanderan: 36°43′N 53°34′E
HUMUK, Kerman: 29°59′N 60°51′E
HURMAK, Kerman: (*see* Humuk)
HUSSEIN ABAD (Seistan), Kerman: 30°48′N 61°24′E
HUSSEIN ABAD, Khorassan: 35°52′N 59°49′E
HUSSEIN-ABAD, Khorassan: (*see* Hussein Abad)
HYRCANIA, a province of the ancient Persian Empire that corresponds essentially to Gorgan and eastern Mazanderan provinces of modern Iran.

IMANZADEH ISMAIL, Fars: 30°20′N 52°40′E
IRANSHAHR, Kerman: 27°13′N 60°41′E
ISFAHAN, Isfahan: 32°40′N 51°38′E
ISMAILABAD, Kerman: (*see* Esmailabad)
ISPAHAN, Isfahan: (*see* Isfahan)
ISPID LAMIN, Kerman:—not located
IZEH, Khuzistan: 31°50′N 49°50′E

JAHROM, Fars: 28°31′N 53°33′E
JALK, Kerman: (*see* Jalq)
JALQ, Kerman: 27°36′N 62°41′E
JARGHUN, Fars—There is no such place on the K501 map at the co-ordinates which are on the specimen label. This is possibly a misspelling of Zarghum: 29°28′N 52°44′E
JASK, Kerman: 25°38′N 57°46′E
JAVANRUD, Lurestan: 34°48′N 46°30′E
JAZ MURIAN BASIN, Kerman: 27°20′N 58°55′E
JEBAL BAREZ KUH, Kerman: 28°30′N 58°20′E
JEBAL BARIZ RANGE, Kerman: (*see* Jebal Barez Kuh)
JIROFT DIST., Kerman: 27°45′N 58°00′E
JOCHDI, Khorassan: 37°20′N 56°50′E
JOLFA, Azarbaijan: 38°57′N 45°38′E
JOLFA, Isfahan: 32°38′N 51°37′E
JOWAN RUD, Lurestan: (*see* Javanrud)
JUAN RUD, Lurestan: (*see* Javanrud)

JUIMAND, Khorassan: (*see* Juymand)
JULFA, Azarbaijan: (*see* Jolfa)
JUYMAND, Khorassan: 34°20′N 58°41′E
JUYOM, Fars: 28°10′N 53°52′E
JUYUM, Fars: (*see* Juyom)

KAFIR-KALEH HILLS, Khorassan: (*see* Kafir Qaleh Hills)
KAFIR QALEH HILLS, Khorassan: *ca.* 35°51′N 59°38′E
KAHA KAHA (Seistan), Kerman: 30°57′N 61°15′E
KAHOURAK, KERMAN: (*see* Kahurak)
KAHRIZ, KURDISTAN: 33°36′N 49°20′E
KAHUR, Kerman: (*see* Kyagur)
KAHURAK, Kerman: 29°26′N 59°40′E
KAIN, Khorassan: (*see* Qayen)
Kain Dist., Khorassan—former district centering around Qayen
KAIR RIVER, Kerman: (*see* Kalar River)
KALAGAN, Kerman: 26°48′N 58°49′E
KALA-I-BID, Kerman: 29°09′N 61°03′E
KALA-I-NADIRI, Kara Dagh Mtns., Khorassan: 37°00′N 59°46′E
KALAR RIVER (Rud), Kerman: 25°22′N 60°12′E
KALAT, Fars: 29°48′N 52°19′E
KALATE, Khorassan—village along the 64 km. route from Mashhad to Fariman
KALEH PENINSULA, Gorgan: 36°50′N 47°23′E
KALEH SEFID, Kurdistan: 34°50′N 47°23′E
KALE SEFID, Kurdistan: (*see* Kaleh Sefid)
KALUNI, Fars: 29°35′N 51°53′E
KAMALABAD, Qazvin—*ca.* 20 km. south of Karaj
KAMARAJ, Fars: 29°37′N 51°29′E
KAMARIJ, Fars: (*see* Kamaraj)
KAMARIJ DASHTISTAN, Fars: (*see* Kamaraj)
KAMARJ, Fars: (*see* Kamaraj)
KANT, Kerman: (*see* Kont)
KARA DAGH MTNS., Azarbaijan: (*see* Qareh Dagh)
KARA DAGH MTNS., Khorassan: 37°00′N 59°46′E
KARADJ, Qazvin: (*see* Karaj)
KARAGATCH RIVER, Fars: (*see* Rud-i-Mand)
KARAJ, Qazvin: 35°48′N 50°59′E
KARA TEPE, Khuzistan: *ca.* 32°36′N 47°36′E
KARAVANDAR RIVER, Fars: 27°35′N 60°48′E
KARIZ, Kurdistan: (*see* Kahriz)
KARKHEH RIVER, Lurestan and Khuzistan Provinces: 31°31′N 47°55′E
KAROUM RIVER, Khuzistan: (*see* Karun River)
KARUN RIVER, Khuzistan: 27°08′N 56°48′E
KARWANDAR RIVER, Fars: (*see* Karavandar River)
KASHAN, Kerman: (*see* Jalq)
KASHGAN RIVER, Lurestan: 33°06′N 47°32′E
KASHKAN RIVER, Lurestan: (*see* Kashgan River)
KASKIN, Kerman: 27°30′N 60°22′E
KASR-I-CHIRINE, Lurestan: (*see* Qasr-e-Shirin)
KASRKEND, Kerman: (*see* Qasr-e-Qand)

KASVIN, Qazvin: (*see* Qazvin)
KATRU, Fars: (*see* Qatruyeh)
KAVAR VALLEY (southeastern Shiraz), Fars: 29°11′N 52°44′E
KAYR RIVER, Kerman: (*see* Kalar River)
KAZARUN, Fars: (*see* Kazerun)
KAZBIN, Qazvin: (*see* Qazvin)
KAZERUN, Fars: 29°37′N 51°38′E
KAZVIN, Qazvin: (*see* Qazvin)
KERAT, Khorassan: 34°34′N 60°33′E
KERMAN, Kerman: 30°17′N 57°05′E
KERMANSHAH, Lurestan: 34°19′N 47°04′E
KHADJE ABOUSALT, Khorassan: (*see* Abousalt)
KHADJE DJARRAH, Khorassan—village on 64 km. route from Mashhad southwest to Fairman
KHAICE KANDI, Kurdistan:—not located
KHANEH-YE-ZENYAN, Fars: 29°40′N 52°09′E
KHAN-I-KHORA, Fars: (*see* Khan-i-Khurreh)
KHAN-I-KHURREH, Fars: 30°51′N 53°08′E
KHAN-I-ZINIAN, Fars: (*see* Khaneh-ye-Zenyan)
KHARG ISLAND, Persian Gulf: (*see* Khark Island)
KHARK ISLAND, Persian Gulf: 29°15′N 50°20′E
KHARZ ISLAND, Persian Gulf: (*see* Khark Island)
KHASH, Kerman: 28°14′N 60°14′E
KHEST, Fars: 29°34′N 51°20′E
KHIDRI, Khorassan: 34°01′N 58°48′E
KHISM ISLAND: (*see* Qeshm)
KHIST, Fars: (*see* Khest)
KHOI, Azarbaijan: (*see* Khvoy)
KHOMAM, Ghilan: 37°22′N 49°40′E
KHOMAN, Ghilan: (*see* Khomam)
KHOOY, Azarbaijan: (*see* Khvoy)
KHORASSAN—occasionally used to refer to Mashhad
KHORRAMABAD, Ghilan: 36°52′N 49°01′E
KHORRAMABAD, Lurestan: (*see* Khurramabad, Lurestan)
KHORRAMSHAHR, Khuzistan: 30°25′N 48°11′E
KHOY, Azarbaijan: (*see* Khvoy)
KHUDIAN DISTRICT OF EASTERN KERMAN PROVINCE—not located
KHURRAMABAD, Lurestan: 33°30′N 48°20′E
KHUZISTAN (region): 30°30′N 50°00′E
KHVAJEH DOW CHAHI, Khorassan: 31°53′N 62°31′E
KHVOY, Azarbaijan: 38°33′N 44°58′E
KHWAJA-DUCHA NI, Khorassan: (*see* Khwaja Dow Chahi)
KIRMAN, Kerman: (*see* Kerman)
KOHNEHEZAR, Kurdistan—12 km. west of Akinlou
KOHNEH HEZZAR, Kurdistan: (*see* Kohnehezar)
KOHRUD, Isfahan: (*see* Qohrud)
KONEH HESSAR, Kurdistan: (*see* Kohnehezar)
KONT, Kerman: 27°01′N 61°38′E
KOPET DAGH MTNS., Khorassan: 37°50′N 58°00′E
KOPUR CHAL, Ghilan: 37°32′N 49°14′E

KOPURTSCHAD, Ghilan: (*see* Kopur Chal)
KORD KUY, Gorgan: 36°48′N 54°07′E
KOUHAK (Seistan), Kerman: 31°00′N 61°45′E
KOUR-AB, Kerman—this co-ordinate lies ca. 35 km. east northeast from where Heptner (1940, p. 12) places it: 25°39′N 60°26′E
KOYUN DAGHI ISLAND (in Lake Urmiah), Azarbaijan: (*see* Quyun, Jazireh-ye-)
KUBID, Kerman: 28°26′N 55°42′E
KUHHA-YE-SABALAN, Azarbaijan: (*see* Sabalan, Kuhha-ye-)
KUH-I-ALMEH, Khorassan: 37°21′N 56°06′E
KUH-I-ASMARI, Khuzistan: 31°43′N 49°35′E
KUH-I-BAMU, Fars: 29°43′N 52°34′E
KUH-I-BARF, Fars: 29°47′N 52°19′E
KUH-I-BINALUD MTNS., Khorassan: 36°15′N 59°00′E
KUH-I-HAZARAN, Kerman: (*see* Kuh-i-Hezaran)
KUH-I-HEZAR, Kerman: (*see* Kuh-i-Hezaran)
KUH-I-HEZARAN, Kerman: 29°30′N 57°18′E
KUH-I-HEZAR MASJID, Khorassan: (*see* Masjid Range)
KUH-I-KHARGIZ, Isfahan: 33°27′N 51°48′E
KUH-I-KHOJA, Kerman: (*see* Kuh-i-Khwaja)
KUH-I-KHWAJA, Kerman: 30°57′N 61°15′E
KUH-I-MALAK SIAH MTNS., Kerman: 29°45′N 60°37′E
KUH-I-MISHAB, Azarbaijan: 38°21′N 45°30′E
KUH-I-SHAH JEHAN MTNS., Khorassan: 37°00′N 58°00′E
KUH-I-TAFTAN, Kerman: 28°36′N 61°06′E
KUH RANG AREA, Isfahan: (*see* Kuh Rang, Rud-e)
KUH RANG, Rud-e, Isfahan: 32°18′N 50°13′E
KUHRUD, Isfahan: (see Qohrud)
KUKHISTER, KHORASSAN: 37°07′N 59°30′E
KULAH KAZI, Isfahan: 32°23′N 51°49′E
KULA QAZI, Isfahan: (*see* Kulah Kazi)
KUM, Tehran: (*see* Qom)
KURAMABAD, Ghilan: (*see* Khorramabad, Ghilan)
KUTSCHAN, Khorassan: (*see* Quchan)
KUTUR SU, Azarbaijan: 38°18′N 47°43′E
KYAGUR, KERMAN: 27°45′N 60°14′E

LAKE FAMUR, Fars: (*see* Famur, Daryacheh-i-)
LAKE URMIAH, Azarbaijan: (*see* Urmiah, Daryacheh-i-)
LALAZAR RANGE, Kerman: (*see* Laleh Zar Kuh)
LALEH ZAR KUH, Kerman: 29°24′N 56°46′E
LANGARAK, Khorassan: 36°11′N 60°02′E
LANGARUD, Ghilan: 36°11′N 50°10′E
LAR RIVER, Tehran: 35°51′N 51°53′E
LARISTAN (former province) now in Fars: 26°30′N 54°00′E
LOWARI AB, Kerman (well): 60°48′N 30°05′E
LUKRA RIVER, Fars (60 miles north of Bushehr)—not located

MAGAS, Kerman: (*see* Zaboli)
MAHALLAT, Isfahan: 33°53′N 50°30′E
MAHAN, Kerman: 30°05′N 57°18′E

MAHIDASHT, Lurestan: (*see* Robat)
MAHNEH, Khorassan: 34°59′N 58°51′E
MAHUM, Kerman: (*see* Mahan)
MAHUN, Kerman: (*see* Mahan)
MAIDAN-I-NAPTUN, Khuzistan: (*see* Meydan-e-Naftuh)
MAIN, Khorassan: (*see* Mahneh)
MAINA, Khorassan: (*see* Mahneh)
MAINE, Khorassan: (*see* Mahneh)
MAIN (Miyan) KALEH PENINSULA, Gorgan: (*see* Kaleh Peninsula)
MAJDI GOLI, Khorassan—village along the 64 km. route from Mashhad southwest to Fariman
MAKU, Azarbaijan: 39°17′N 44°31′E
MALA-I-MIR, Khuzistan: (*see* Izeh)
MALLA KALA, Azarbaijan—not located
MANDAKHI, Khorassan: (*see* Miandehi)
MANDEHI, Khorassan: (*see* Miandehi)
MANDOWAB, Azarbaijan· (*see* Miandow Ab)
MANGALAT, Lurestan—village 17 km. northeast of Kermanshah
MANJIL, Ghilan: 36°45′N 49°24′E
MANZOUN MIRTUM, Persian Gulf—not located
MARAGEH, Azarbaijan: (*see* Maragheh)
MARAGHEH, Azarbaijan: 35°14′N 49°43′E
MARAND, Azarbaijan: 38°26′N 45°46′E
MARAVEH, Khorassan: (*see* Maravih Tappeh)
MARAVIH, Khorassan: (*see* Maravih Tappeh)
MARAVIH TAPPEH, Khorassan: 37°55′N 55°57′E
MARIVAN, Kurdistan: 35°31′N 46°10′E
MARSH AO GORGE, Khuzistan—not located, but it lies somewhere in the Pusht-i-Kuh range
MASHAD, Khorassan: (*see* Mashhad)
MASHED-I-SAR, Mazanderan: (*see* Babol Sar)
MASHHAD, Khorassan: 36°18′N 59°36′E
MASHISH, Kerman: (*see* Mashiz)
MASHIZ, Kerman: 29°56′N 56°37′E
MASJID RANGE, Khorassan: 36°55′N 59°22′E
MASTCHID RANGE, Khorassan: (*see* Masjid Range)
MECHED, Khorassan: (*see* Mashhad)
MEIGAN, Kerman: (*see* Meigun)
MEIGUN, Kerman: 31°49′N 59°28′E
MEKRAN COAST—coast along Gulf of Oman, roughly: 57°E – 62°E
MELUZIL, Isfahan: 32°15′N 51°45′E
MENZIL, Ghilan: (*see* Manjil)
MEYANDOAB, Azarbaijan: (*see* Miandow Ab)
MEYANEH, Azarbaijan: (*see* Mianeh)
MEYDAN-E-NAFTUN, Khuzistan: 31°56′N 49°18′E
MEYMEH, RUD KHANEH-YE-, Khuzistan: 32°05′N 47°16′E
MIANDEHI, Khorassan: 34°53′N 58°38′E
MIANDOW AB, Azarbaijan: 36°58′N 46°06′E
MIANDUAB, Azarbaijan: (*see* Miandow Ab)
MIANEH, Azarbaijan: 37°26 N 47°42′E

MIJNABAD, Khorassan: (*see* Mozhnabad)
MISHAN, Fars: 30°23′N 49°51′E
MISHUN, Fars: (*see* Mishan)
MIYANDEH, Khorassan· (*see* Miandehi)
MIYAN KALEH PENINSULA, Gorgan: (*see* Kaleh Peninsula)
MOGHAN STEPPE, Azarbaijan: 39°35′N 48°00′E
MOGHAN, Khorassan—30 km. south of Mashhad—not located
MOHAMMERAH, Khuzistan: (*see* Khorramshahr)
MOHAMRAH, Khuzistan: (*see* Khorramshahr)
MORCHA KHURT, Isfahan: 33°06′N 51°30′E
MORCHEH KHVORT, Isfahan: (*see* Morcha Khurt)
MOZHNABAD, Khorassan: 34°07′N 60°06′E
MT. ALMEH, Khorassan: (*see* Kuh-i-Almeh)
MT. ASEMARI, Khuzistan: (*see* Kuh-i-Asmari)
MT. DEMAVEND, Tehran: 35°56′N 52°08′E
MT. HADJI ABAD, Lurestan—about 25 km. north of Kermanshah
MT. SABALAN, Azarbaijan: (*see* Sabalan, Kuhha-ye-)
MT. SAHAND, Azarbaijan: 37°13′N 46°16′E
MT. SAKHEND, Azarbaijan: (*see* Mt. Sahand)
MT. SAVALAN, Azarbaijan: (*see* Sabalan, Kuhha-ye-)
MUDZHNABAD, Khorassan: (*see* Mozhnabad)
MUGHAN STEPPE, Azarbaijan: (*see* Moghan Steppe)
MUSHABAD, Azarbaijan: 37°44′N 45°12′E

NAFT-E-SHAH, Lurestan: 33°59′N 45°30′E
NAGADEH, Kurdistan: 36°56′N 45°22′E
NAIN, Damghan: 32°52′N 53°05′E
NAMIN, Azarbaijan: 38°25′N 48°30′E
NAMAKDUN, Island of Khism, Persian Gulf: 26°36′N 55°28′E
NARDIN, Khorassan: 37°03′N 55°59′E
NASRIEH, Khuzistan: (*see* Ahvaz)
NAUK-I-JAHAN, Kerman: 26°03′N 60°10′E
NAUZDAR, Kerman: (*see* Neisar)
NAWAR, Kerman: (*see* Chah-i-Navar)
NEISAR, Kerman: 30°33′N 61°15′E
NEYRIZ, Fars: 29°12′N 54°19′E
NIKSHAHR, Kerman: (*see* Geh)
NIRIZ, Fars: (*see* Neyriz)
NODOU, Kerman: 28°28′N 62°09′E
NOKADZH VILLAGE, Kerman: 26°27′N 60°34′E
NOSRATABAD, Kerman: 29°54′N 59°59′E
NUKENDZHAGA, Kerman: (*see* Nauk-i-Jahan)
NURABAD, Kurdistan: (*see* Bizine)
NUSI, Khorassan: 35°48′N 58°26′E

OUZUNDARREH, Kurdistan: (*see* Uzondarreh)

PAHLAVI DEZH, Gorgan 37°01′N 54°30′E
PALANG KUH, Kerman: (*see* Kuh-i-Malak Siah)
PARCHINEH, Lurestan: 36°43′N 48°56′E

Pasht Kuh, Ghilan: (*see* Pish Kuh)
Persepolis, Fars: 29°57′N 52°52′E
Pir Badam, Kurdistan: 35°34′N 48°09′E
Pir-i-Bam, Fars: 29°31′N 52°28′E
Pishin, Kerman: 26°06′N 61°47′E
Pish Kuh, Ghilan: 36°55′N 49°08′E
Pol-i-Abgineh, Fars: 29°33′N 51°46′E
Posht Kuh, Khuzistan: (*see* Pusht-i-Kuh Mtns.)
Pulvar River, Fars: 29°51′N 52°46′E
Pusht-i-Kuh Mtns., Khuzistan: 32°48′N 47°12′E

Qain, Khorassan: (*see* Qayen)
Qara Agach River, Fars: (*see* Rud-i-Mand)
Qareh Dagh Mtns., Azarbaijan: 36°51′N 48°27′E
Qareh Su (River), Gorgan: 36°56′N 54°25′E
Qareh Su River, Lurestan: 34°10′N 47°21′E
Qarnabad, Gorgan: 36°47′N 54°35′E
Qasr-e-Qand, Kerman: 26°12′N 60°45′E
Qasr-i-Chirine, Lurestan: (*see* Qasr-i-Shirin)
Qasr-i-Shirin, Lurestan: 34°31′N 45°35′E
Qasrqard, Kerman: (*see* Qasr-e-Qand)
Qatruyeh, Fars: 29°09′N 54°43′E
Qayen, Khorassan: 33°44′N 59°11′E
Qazr-i-Chirine, Lurestan: (*see* Qasr-i-Shirin)
Qazvin, Qazvin: 36°16′N 50°00′E
Qeshm Island, Persian Gulf and Strait of Hormoz: 26°45′N 55°45′E
Qohrud, Isfahan: 33°40′N 51°25′E
Qom, Tehran: 34°39′N 50°54′E
Qom River, Tehran: 34°48′N 51°02′E
Quarnabad, Gorgan: (*see* Qarnabad)
Quarquarsdan, Kerman—probably a misprint of Qasrqand
Quchan, Khorassan: 37°06′N 58°30′E
Quyun, Jazireh-ye-(island in Lake Urmiah), Azarbaijan 37°28′N 45°38′E

Rabat-i-Qarebil, Khorassan: (*see* Robat-i-Qarabil)
Rabat Tah, Fars: (*see* Rabatak)
Rabatak, Fars: 29°23′N 51°51′E
Rachtagan, Tehran: 36°20′N 50°09′E
Ram Hormuz, Khuzistan: 31°16′N 49°36′E
Ramsar, Ghilan: 36°53′N 50°41′E
Rashid Khnom, Kerman—not located
Rasht, Ghilan: 37°16′N 49°36′E
Rask, Kerman: 26°13′N 61°25′E
Reg-i-Malik, Kerman· 28°44′N 61°39′E
Resht, Ghilan: (*see* Rasht)
Rezaiyeh, Azarbaijan: 37°33′N 45°04′E
Rezvandeh, Ghilan: 37°33′N 49°01′E
Rik-i-Malik, Kerman: (*see* Reg-i-Malik)
Robat, Lurestan: 34°16′N 46°48′E
Robat-i-Khakister, Khorassan: (*see* Kukhister)

ROBAT-I-QARABIL, Khorassan: 37°19′N 56°26′E
ROBAT-I-QAREH BIL, Khorassan: (*see* Robat-i-Qarabil)
ROBAT KARJM, Tehran: 35°28′N 51°05′E
ROUDBAR, GHILAN: (*see* Rudbar)
RUDBAR, Ghilan: 36°48′N 49°24′E
RUD-E-BARDEH SUR, Azarbaijan: 37°30′N 45°00′E
RUD-I-KASKIN, Kerman— 1.5 km. south of Kaskin
RUD-I-KASRKEND, Kerman: (*see* Qasr-e-Qand)
RUD-I-MAND, Fars: 28°11′N 51°17′E
RUD-I-MEHRAN, Fars: 26°52′N 55°24′E
RUD-I-MIHRAN, Fars: (*see* Rud-i-Mehran)
RUD-I-ZAKHAN, Kerman—not located
RUD KHANEH-YE-ZANGMAR, Azarbaijan: (*see* Zangmar River)
RUD KHANE-I-KYAGUR, Kerman: (*see* Kyagur)
RUM, Khorassan: 33°26′N 59°11′E

SABALAN, Kuhha-ye-, Azarbaijan: 38°15′N 47°49′E
SABZAWAR, Khorassan: (*see* Sabzevar)
SABZEVAR, Khorassan: 36°13′N 57°42′E
SABZWAR, Khorassan: (*see* Sabzevar)
SAFID RUD, Ghilan: 37°00′N 59°49′E
SAGHEZ, Kurdistan: (*see* Saqqez)
SAHNEH, KURDISTAN: (*see* Saneh)
SA'IDABAD, Fars: 29°28′N 55°42′E
SAKIZ, Kurdistan: (*see* Saqqez)
SAKKEZ, Kurdistan: (*see* Saqqez)
SAMA, Mazanderan: 36°25′N 51°25′E
SAMELEH, Kurdistan: 34°50′N 47°15′E
SAMNAN, Damghan: (*see* Semnan)
SANANDAJ, Kurdistan: 35°19′N 47°00′E
SANEH, Kurdistan: 34°29′N 47°41′E
SANG-E-SAR, Damghan: 35°43′N 53°19′E
SAQQEZ, Kurdistan: 36°14′N 46°16′E
SARAB, Azarbaijan: 38°00′N 46°34′E
SARAKHS, Khorassan: 36°32′N 61°11′E
SARBAS, Kerman: (*see* Sarbaz)
SARBAZ, Kerman: 26°39′N 61°15′E
SAR CHAM, Damghan: 37°07′N 47°54′E
SAR-E-POL-E-ZAHAB, Lurestan: 34°28′N 45°52′E
SARGAD, Kerman—Sargad is a district centering around Zahedan
SARI, MAZANDERAN: 36°34′N 53°04′E
SARIPOL, Lurestan: (*see* Sar-e-pol-e-Zahab)
SARIPUL, Lurestan: (*see* Sar-e-pol-e-Zahab)
SARJAN, Fars: (*see* Sa'idabad)
SARVESTAN, Isfahan: 33°08′N 51°47′E
SAVEH, Qazvin: 35°01′N 50°20′E
SEBA, Khuzistan—vicinity of 26 km. south-southwest of Ahvaz
SEFID RUD, Ghilan: (*see* Safid Rud)
SEISTAN (Region), Kerman: 30°30′N 62°00′E
SEMNAN, Damghan: 35°33′N 53°24′E

SERAB, Azarbaijan: (*see* Sarab)
SERAKHS, Khorassan: (*see* Sarakhs)
SEYAH DAHAN, Qazvin: 36°04′N 49°43′E
SHAH ABBAS (caravansarai), Tehran: 34°44′N 52°11′E
SHAH ABDUL AZIM, Tehran—exact locality not found but probably in vicinity of 35°30′N 51°25′E
SHAH GODAR, Kurdistan: 35°41′N 48°08′E
SHAH GUDAR, Kurdistan: (*see* Shah Godar)
SHAHI, Mazanderan: 36°28′N 52°53′E
SHAH PASAND, Khorassan: 37°05′N 55°10′E
SHAHPUR CAVE, Fars: 29°48′N 51°37′E
SHAHPUR RIVER, Fars: 29°39′N 51°03′E
SHAHPUR RUIN, Fars: 29°46′N 51°35′E
SHAHRABAD KAUR, Khorassan: 37°29′N 56°46′E
SHAHRIAR, Tehran: (*see* Robat Karim)
SHAHRUD, Damghan: 36°25′N 55°01′E
SHAHUR RUD, Khuzistan: (*see* Shahvar Rud)
SHAHVAR RUD, Khuzistan: 32°00′N 48°19′E
SHAKU-NIZHREE, N. Persia: (not located)
SHARAFKHANEH, Azarbaijan: 38°11′N 45°29′E
SHAREF KHANEH, Azarbaijan: (*see* Sharafkhaneh)
SHARTOUS, Khorassan—village along the 64 km. route from Mashhad southwest to Fariman
SHARUD, Damghan: (*see* Shahrud)
SHATT-AL-ARAB (River), Khuzistan: 30°20′N 48°16′E
SHAUR RUD, Khuzistan: (*see* Shahvar Rud)
SHAUSTUN, Kerman: 27°23′N 62°20′E
SHEIK ALI ZAMUL, Khuzistan: 32°01′N 48°16′E
SHEKASTAN RIVER, Fars: 29°49′N 51°27′E
SHEMIRAN, TEHRAN: 35°48′N 51°26′E
SHEOUL, Fars: (*see* Shul)
SHIKASTAN RIVER, Fars: (*see* Shekastan)
SHIRAZ, Fars: 29°36′N 52°32′E
SHIRVAN, Khorassan: 37°24′N 57°55′E
SHIRWAN, Kerman: 27°22′N 61°52′E
SHUL, Fars: 30°01′N 52°52′E
SHULGASTAN, Fars: (*see* Shurjestan)
SHULGISTAN, Fars: (*see* Shurjestan)
SHURJESTAN, Fars: 31°23′N 52°25′E
SHUSH, Khuzistan: 32°11′N 48°15′E
SHUSHTAR, Khuzistan: 32°03′N 48°51′E
SHUSP, Kerman: 31°48′N 60°01′E
SHUSTAR, Khuzistan: (*see* Shushtar)
SHUSTER, Khuzistan: (*see* Shushtar)
SIAH KUH, Tehran: 34°38′N 52°16′E
SIAH PARDE, Tehran—south of Tehran, exact locality not found
SIAKH RANGE, Fars—10 miles south of Shiraz, exact locality not found
SIB, Kerman: 27°15′N 62°05′E
SIRJAN, Fars: (*see* Sa'idabad)
SISAKHT, Fars: 30°47′N 51°33′E

SISTAN (Region), Kerman: (*see* Seistan)
SOH, Isfahan: 33°26′N 51°27′E
SOLTANIEH, Damghan: 36°26′N 48°48′E
SONDIAN, Ghilan—not located but presumably in vicinity of Kopur Chal
SONGHOR, Kurdistan: 34°47′N 47°36′E
SONGOR, Kurdistan: (*see* Songhor)
SONQOR, Kurdistan: (*see* Songhor)
ST. KOUNDOUS, Khorassan: (*see* Gonbad-i-Kavus)
SULTANIA, Azarbaijan: (*see* Soltanieh)
SULTANIEH, Azarbaijan: (*see* Soltanieh)
SULTANIYEH, Azarbaijan: (*see* Soltanieh)
SURAB, Kerman: 33°32′N 59°08′E
SURUN (well), Khorassan: *ca.* 36°26′N 59°38′E
SUSA (mound of), Khuzistan: (*see* Shush)
SUZA, Khuzistan: (*see* Shush)

TABIABAD RUD, Mazanderan—13.7 km. east of Gorgan
TABRIZ, Azarbaijan: 38°05′N 46°18′E
TAGAB, Kerman—not located, very probably a misspelling of Talab
TAGHISTAN, Fars—not 31°57′N 53°19′E as listed by Misonne, 1959, p. 96; *see* Tangistan
TAGI-ABAD, Province?—not located
TAG-I-DOROKH Plain, Kerman: 32°10′N 60°27′E
TAG-I-DURUH PLAIN, Kerman: (*see* Tag-i-dorokh)
TAKHI-I-BUSTAN, Lurestan: 34°23′N 47°08′E
TAKHT-I-JAMSHID, Fars: (*see* Persepolis)
TALAB (well), Kerman: 28°30′N 61°59′E
TELECH MAHALLEH, Ghilan: (*see* Mahallat)
TALISH MTNS., Ghilan and Azarbaijan: 38°42′N 48°18′E
TALYSH DIST., Ghilan: vicinity of Talish Mtns.
TALYSH MTNS.: (*see* Talish Mtns.)
TANB-E-BOZORG (island), Persian Gulf: 26°14′N 55°19′E
TANB ISLAND, Persian Gulf: (*see* Tanb-e-Bozorg)
TANG-I-KNIST, Lurestan: 34°29′N 47°07′E
TANGISTAN (District), Fars: 28°43′N 51°11′E
TANGKANIDAN, Kerman: 29°03′N 61°07′E
TANJAK, Fars—not located, but the village is stated by Murray, 1884, p. 98 to be in Tangistan
TASUKI, Kerman: 30°22′N 61°09′E
TAVRIZ, Azarbaijan: (*see* Tabriz)
TAZEABAD, Gorgan: (*see* Tazehabad)
TAZEHABAD, Gorgan: 37°17′N 53°19′E
TEHERAN, Tehran: (*see* Tehran)
TEHRAN, Tehran: 35°40′N 51°26′E
TELESPID, Khuzistan: 30°21′N 50°19′E
TIB RIVER, Khuzistan: (*see* Meymeh, Rud Khaneh-ye-)
TIR TASH, Mazanderan: 36°44′N 53°46′E
TIRTASH, Mazanderan: (*see* Tir Tash)
TORBAT-E-HEYDARIYEH, Khorassan: 36°15′N 59°13′E
TUISARKAN, Kurdistan: (*see* Tuysarkan)

TUISERKHAN, Kurdistan: (*see* Tuysarkan)
TULA RUD, Ghilan: 37°48′N 48°59′E
TUMB Island, Persian Gulf: (*see* Tanb-e-Bozorg)
TUNB ISLAND, Persian Gulf: (*see* Tanb-e-Bozorg)
TURBAT-I-HAIDARI, Khorassan: (*see* Torbat-e-Heydariyeh)
TURKMEN PLAIN, Gorgan and Khorassan: 37°15′N 56°30′E
TURKMEN DESERT, Gorgan: (*see* Turkmen Plain)
TUYSARKAN, Kurdistan: 34°33′N 48°27′E

URMIAH, Daryacheh-i-, Azarbaijan: 37°40′N 45°30′E
UZONDARREH, Kurdistan: 35°32′N 48°21′E
UZUN DARREH, Kurdistan: (*see* Uzondarreh)

VARAMIN, Tehran: 35°20′N 51°39′E
VARANG RIVER (Rud), Mazanderan: 36°07′N 51°22′E
VARANGRUD, Mazanderan: 36°07′N 51°22′E

YAZD, Yazd: 31°53′N 54°25′E
YAZD-E-KHVAST, 31°31′N 52°07′E
YAZDIKHAST, Fars: (*see* Yazd-e-Khvast)
YUNSI, Khorassan: (*see* Nusi)

ZABOL (Seistan), Kerman: 31°02′N 61°30′E
ZABOLI, Kerman: 27°07′N 61°40′E
ZAHEDAN, Kerman: 29°30′N 60°52′E
ZAHIDAN, Kerman: (*see* Zahedan)
ZANGMAR RIVER, Azarbaijan: 39°17′N 44°50′E
ZANJAN, Damghan: 36°40′N 48°29′E
ZANJAN RIVER, Damghan: 37°08′N 47°47′E
ZARD KUH, Isfahan: 32°22′N 50°04′E
ZARDEH KUH, Isfahan: (*see* Zard Kuh)
ZARGHUM, Fars: 29°48′N 52°44′E
ZENDJAN, Damghan: (*see* Zanjan)
ZIARAT SEID HASSAN, Khuzistan: *ca.* 32°30′N 47°05′E
ZINJAN, Damghan: (*see* Zanjan)
ZONUZ CHAY, Azarbaijan: 38°29′N 45°31′E
ZURGHUM, Fars: (*see* Zarghum)

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