

History of Zoological Expeditions and Studies on Jordan*

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In the present review, the history of zoological expeditions that were undertaken on the Jordanian fauna are presented. The published zoological studies regarding mammals, birds, reptiles, freshwater fishes, freshwater Mollusca, Siphonaptera and Ixodidae are reviewed. Some remarks are made on recent trends in zoological studies carried out by Jordanian zoologists.

KEY WORDS: Jordanian fauna

The locations of Jordan offers a great diversity of animal life, since Jordan forms a cross road for the animals of Africa, Asia and Europe. A mixture of these faunal elements exists in addition to the occurrence of local fauna in our area. Also, Jordan underwent many geological changes in the past which resulted in the formation of very different habitats and ecological regions.

The religious importance of this area, in addition to the other two reasons above, may stand as another factor in attracting the European naturalists and scholars in the past two centuries to visit our area in order to explore its exotic fauna and flora.

Particular attention was given to Palestine at that time; and resulted in a number of books on its natural history, which to a certain degree talked about the fauna of Transjordan or East Palestine. During the period of the First World War, the British came to our area, and mandated Jordan and Palestine. Many members of the British Army collected and published on the fauna of Palestine and Transjordan. A large number of specimens were shipped to the British Museum of Natural History, which furnished the British zoologists with materials to perform many comparative studies on the fauna of the Near East.

The present work is an attempt to collect all the

information and records, sum them up together in order to determine what has been done so far on the following animal groups: birds, mammals, reptiles, freshwater fishes, freshwater Mollusca, Siphonaptera, and ticks. Also, to present a brief account on the recent activities that were undertaken by Jordanian zoologists.

In 1963, the first official zoological expedition was organized by Mountfort and in the following years more interest was initiated to conduct broader studies on the Jordanian fauna. Azraq oasis received more attention than any other part of the country. This is due to its diversified fauna that includes many vertebrates and other invertebrates. Boyd conducted a second expedition in 1965 to that oasis accompanied by several zoologists. Another short term expedition was when Hamsley and George (1966) visited Azraq again to evaluate its future as a national park.

The establishment of the Royal Society for Conservation of Nature was a very crucial step to preserve the Jordanian fauna, which was threatened by extinction. This society took responsibility for protecting the endangered species and for organizing the hunting seasons. In addition, the Royal Society for Conservation of Nature formed the Shaumari Wildlife Reserve near Azraq to protect and attract the species that had almost disappeared from the country. Soon after the establishment of the Jordan University in 1963, a small museum was founded to bring together the scattered collections that were made by the students and the staff of the

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Biology Department. Now this museum is more organized and containing representatives of the Jordanian fauna. In 1980, the newly born University of Yarmouk seriously proposed the formation of "the Jordanian Natural History Museum". This idea was brought to life and the museum was established. Many collections were made and organized for both display and zoological studies.

At the present, the Jordan and Yarmouk Universities have a marine station at the Aqaba Gulf. This station will produce many studies relevant to our marine life fauna. A French team led by Dr. J. Jaubert spent more than two years in studies using this station. Also, Dr. M. Wahbeh (University of Jordan) published more than a dozen articles on the local ecology of the Aqaba Gulf.

Mammals

The mammals of Jordan received more attention than any other animal group. Interest in the mammals of the Near East, especially those of Palestine, goes back to the 18th century when Hasselquist traveled in Southern Palestine and collected mammals, in addition to other animals. Tristram visited Palestine on a number of occasions during the 19th century under the auspices of the Palestine Exploration Fund. He mentioned some mammals from Transjordan. His results were published in 1866 and 1884. After the First World War, the British mandated Jordan. Many collections were made by some members of the British Army staff, who sent all their collections to the British Museum (Natural History). Some of these specimens were used as comparative materials for other studies. Ellerman (1948) used some of these Jordanian specimens to establish a key for the rodents of Southeast Asia. Hardy (1947) conducted an expedition to Wadi Araba and the mountains of Edom in 1946, but I could not trace what happened to that collection.

In 1914, an expedition was led by I. Phillips, who traveled through Jordan, Sinai and parts of Lebanon. His collection was kept at the Museum of Comparative Zoology. Allen (1915) made use of this collection and published their results.

Bodenheimer (1935) collected all the data concerning the mammals of Palestine and some parts

of Jordan, which have been mentioned in the old reports. Also, he reviewed all the mammals of the area based on the previously published reports and on his own observations and collections. He tried to settle the synonymy and the taxonomic errors that were made in the past. Harrison (1959) travelled in Jordan while serving in the British Army. He collected bats from the Jarash area and around Amman.

Up until 1963, there was no major work on the Jordanian mammals. At that time, Sana Atallah, a Jordanian naturalist started his activities. Since 1963-1968, Atallah had worked closely with mammals. He made several collections from Jordan, Syria, Lebanon and the West Bank of Jordan. A number of articles that dealt with the Jordanian mammals were published (Atallah, 1966, 1967a, 1967b, 1967c; Atallah and Harrison, 1967). I saw the collection that he left at El-Jafer Agricultural Station when he studied the mammals of that area. Atallah also joined the International Jordan Expedition (1966) to which he contributed to the study of the mammals of Azraq. He deposited parts of his collection at the American University of Beirut Museum, several museums in Germany, his private museum at his native town of Bait Sahor (West Bank) Jordan, and the Natural History Museum at Pahlavi University in Shiraz, Iran. His manuscript "Mammals of the Eastern Mediterranean 1977 and 1978" contained the base line data of the Jordanian mammals and is one of our main references in this regard. For more details about Atallah, see Kumerloev (1973).

After the tragic death of Atallah, a gap was formed in mammalogical studies in Jordan. There was no systematic work until Mazin Qumsiyeh, a relative of Atallah, who was determined to follow the steps that Atallah drew. He started collecting mammals from Jordan, and published a report of the bats of Jordan in 1980. This young naturalist collected a large number of rodents and chiroptera from Jordan and North Africa while pursuing his degree. He kept these specimens in some American museums. He also contributed in building up the Jordan University Museum mammals collection. In 1986, Qumsiyeh *et al.*, studied for the first time the karyotypes for Jordanian small mammals. They also contributed in additional records of mammals for Jordan. Other studies on Jordanian

mammals were published by Kock (1969), De blase (1972), Hemmer (1978), Kock and Nader (1983), Amr and Saliba (1986), and Amr and Woodbury (in press).

Clarke (1977) prepared a list of the Jordanian mammals that was based on Harrison (1964, 1968, 1972), Atallah's reports, Nelson's book and his own observations and collections while he was serving as the director of the Wildlife Protection Programme in Jordan. The same is true for Nelson (1973) regarding his study of the mammals of Azraq, in which he made his list based on these previous reports and his own personal collections and observations.

Ann Searight, a British archeologist visited Jordan several times and made a collection of live rodents from the Eastern Desert. She donated some of her collection to the Jordan University Museum and wrote an account on the collection she made from Jawa area (In preparation). The present author collected several mammalian specimens from different parts of the country. He reported on the mammals of North Jordan and observed the ecology of the desert rodents.

The Jordanian Natural History Museum (Yarmouk University) staff collected a large number of mammals, especially from the northern part of the country. There is a fair collection of mammals from different parts of the country at that museum waiting to be studied and published.

Birds

The first bird collection from Jordan was probably made by Hart (1891), when he traveled in Southern Jordan during 1883. He listed a number of species of birds that he saw and collected from Wadi Araba and Ghore Es Safi. Dawydoff (1898) published a list of birds collected from Transjordan. Meineirzhagen, a member of the British Army, made several observations on our avifauna. In 1922, he traveled over the Eastern Desert from Amman to Iraq, passing by Azraq. He listed a number of birds that he saw and collected along his trip (Meineirzhagen, 1924).

In his book, Bodenheimer (1935) included some observations and remarks on the birds of Transjordan. Hollom (1959), through a grant from the

Leverhulme trust, visited Jordan in 1955 to gain more information on the distribution and field characters of the birds in our area. He traveled in the Northern Jordan Hills, Dead Sea depression, Southern Jordan Highlands, Eastern Desert and Azraq. His list contained 130 species from different parts of the country. Cameron and Cornwallis (1966) visited Azraq in 1963 as part of the Oxford University Expedition. They listed 108 species of birds from that area.

In 1963, Mountfort led the first British Expedition to Jordan. He himself as an ornithologist in addition to four others made comprehensive observations on Jordanian birds. In this book (1965), Mountfort listed 216 species of birds from several regions of the country. Also, he directed the attention of the Jordanian authorities to some endangered species of birds which needed to be protected (Mountfort, 1963a, 1963b).

A team of five ornithologists joined the second international Jordan Expedition that was led by Boyd in 1966. They reported nearly 250 species of birds from Azraq (Boyd, 1966). Vera-Benson (1970) reported a number of birds from Jordan, mostly from Azraq area. In 1984, an Arabic translation for Vera-Benson's book appeared under a different title (Vera-Benson, 1984).

A major reference that covers the avifauna of Azraq was published by Nelson (1973). He devoted most of his time that he spent in Azraq studying birds. A list that contained over 300 species of birds from Azraq was presented. It was based on the result of the two previous expeditions and his own personal observations.

Clarke (1980) published a report on the avifauna of Shaumari Wildlife Reserve, located near Azraq. He listed 134 species of birds over a period of two years. Also, he speculated on the local ecology of that reserve and how it may attract other local birds from the surrounding areas. Clarke (1981, 1982) reported on other local birds breeding at Azraq and the Jordanian desert. Wallace (1981, 1982, 1983a, 1983b) published on some important findings regarding the ecology of Azraq oasis birds, that he observed during the International Jordan Expedition in 1965.

Conder (1981a, 1981b) made observations on the avifauna of Azraq during 1979. In 1982, Flaxman (1982) reported on some migrant birds occur-

ing in Jordan.

Other collections were made by the staff of the Jordan University Museum and the Jordanian Natural History Museum (Yarmouk University). Some of these materials were classified, and their results were presented in the "Symposium on the Fauna and Zoogeography of the Middle East" (Suleiman and Shafei, 1985).

Reptiles

The diversity of the Near Eastern reptiles attracted the attention of several zoologists. Tristram collected a number of reptiles species during the several trips that he made to Palestine and some parts of Jordan. Hart (1891) reported on some reptiles that he encountered during his journey from Aqaba to Ghore Es Safi. Another report was published by Peracca (1894) which contained materials that Dr. Festa collected when he traveled in the area. Barbour (1914) published on the reptilian collection that was made by I. Phillips expedition in 1914, in which he described a new species from the Petra area. Schmidt (1930) published the results from the M. Field Expedition to Northern Arabia, and he described a new species of snakes from the Bayer area. All the material of that collection is kept at the Field Museum in Chicago. Parker (1935) described a new subspecies of lizards from the Eastern desert, and he speculated about the melanism of this new form. Haas (1943) published the results of his journey from Amman to Aqaba in 1936, and kept that collection at the Hebrew University Museum. In 1951, Haas reviewed all the reptiles of Palestine, Jordan and Syria. He revised the taxonomic status of each species and listed the reptilian fauna of the region known at that time.

Since the trip Haas made to Jordan, scarce work has been conducted on the Jordanian reptiles. Wettestien (1951) mentioned some materials that were collected from Jordan. During the first British Expedition to Jordan in 1963, Mountfort (1965) reported on a number of reptiles that he saw during his trips around the country, and he also presented illustrated plates of some of the Jordanian reptiles. Atalah (1966) collected a large number of reptiles and amphibians from Azraq and its sur-

roundings when he joined the second International Jordan Expedition. He listed 17 species from that collection. Hoofien (1965, 1969) and Werner (1968) contributed in adding new records to the Jordanian reptiles.

Werner (1971) made use of the collections that were made by Bisserot and Western in 1963 and 1965, which were kept at the British Museum of Natural History. He examined that collection, which was composed of 45 specimens, and he published an updated list of the herpetofauna of Jordan. In addition, he described a new subspecies of lizards, but, he could not discuss the ecology and the zoogeography of the Jordanian reptiles. Nelson (1973) listed Azraq's reptiles based on the collections that were made by the Helmsly and George expedition in 1966, Atallah's list and on his personal observations made during his stay in Azraq.

An interest developed in the Department of Biological Sciences (University of Jordan) by Dr. A. Disi to study the Jordanian reptiles. He started collecting reptile specimens from all over the country. This survey resulted in a large collection of reptiles and amphibians and an article on the venomous snakes (Disi, 1983). Also, Disi (1985) published a systematic list of the Jordanian snakes, including new records to our area. Other reports will be published later to cover the rest of the reptiles.

In 1980, a Belgian team visited Jordan in order to explore in greater detail the Jordanian reptiles. They traveled in many parts of the country and published their report, which contained new information about the Jordanian reptiles.

Among the active collectors, Ann Searight recently visited Jordan and stayed for more than two years. She collected several specimens of snakes from the Eastern desert and donated all of her collection to the Jordan University Museum.

The present author contributed in collecting some reptilian materials from different parts of the country; he deposited all of his collection in the Jordan University Museum and published on the incidence of snakebites in Jordan which included some remarks on the distribution of the Jordanian venomous snakes (Amr and Amr, 1983).

The staff of the Jordanian Natural History Museum (Yarmouk University) collected a large number of reptiles and amphibians from Northern Jordan and also from Upper Jordan Valley.

Freshwater Fishes

Little is known about the taxonomy and distribution of the freshwater fishes in Jordan. Annandale (1915) listed the freshwater fishes of Lake Tiberias. Other previous reports that contained Jordanian materials were published by Gunther (1864), and Tristram (1884).

Nelson (1973) reported on five species of freshwater fishes in Azraq. During the visit of the German team, Krupp and Schneider (1980) collected many aquatic fauna from different water bodies in Jordan. This collection resulted in describing a new subspecies by Krupp (1982) from Ghore Es Safi. Also, the senior author sent a collection of freshwater fishes to Krupp, which in turn was deposited at Senckenberg Museum. Krupp (1983) examined some freshwater fishes from Azraq that were kept at the British Museum which was collected originally by Rzoska in 1965 during the British Expedition collection. Villwock *et al.* (1983) described *Aphanius sirhani* from the Eastern desert. Villwock (1981) also added new records of fishes to Azraq. Recently, Al-Absy and Mir (1986a, 1986b) published two papers on the local freshwater fishes of Jordan.

Siphonaptera

As stated by Hubbard (1962), there was no information on the Siphonaptera of Jordan until 1962. The first published work on Jordanian Siphonaptera was that of Lewis (1964) in which he reported on two flea species from one species of rodent that Atallah collected. Later, Lewis joined the international Jordan Expedition in 1966, and he reported ten flea species from Azraq area, but without referring to their mammalian hosts.

The most comprehensive study ever made on the Jordanian fleas was that of Burt (1970). She worked under Dr. Lewis at Iowa State University. Her master thesis was entitled "Fleas (Siphonaptera) of Israel and Jordan". A new species was described in addition to listing all the mammalian hosts for the fleas in Jordan. Most of the examined

materials were Atallah's collection, and Dr. Lewis collection from Jordan.

Two species of fleas were reported by Morsy *et al.* (1980) and Ismail *et al.*, (1982) when they studied the ectoparasites of stray cats from the Amman and Irbid areas respectively.

Recently, Lewis (1982) reported on a number of fleas that were obtained from Azraq, (probably they were the same as those that he mentioned earlier in 1966). Saliba and Amr (1985) reported six species of fleas that were collected from six mammalian hosts. Also, the present author sent a collection of fleas to Mr. Hutson (British Museum of Natural History) to confirm their initial identification. These specimens were kept at the British Museum of Natural History.

Our major references regarding the Near Eastern Siphonaptera are those of Theodore and Costa (1967) and Lewis (1967, 1982), the former having listed 37 flea species that were collected from the Palestinian mammals.

Ixodidae

The ticks of Jordan are less intensively studied than fleas in terms of collection and published work. Hoogstraal and Kaiser (1960) described a new species of ticks from Jordan which were collected from sheep and goats. Some of that collection was deposited in the United States National Museum, The British Museum of Natural History, Chicago Natural History Museum and other organizations. In 1979, Hoogstraal *et al.* reviewed *Omithodoros capensis* based on a collection from several countries including Jordan. Dr. Hoogstraal has a collection of Jordanian ticks which were sent to him through the Jordanian Ministry of Agriculture and from Sana Atallah (Hoogstraal, per. com.). Hoogstraal and Kaiser (1959), published the materials that were sent to him by Prof. Baduieri (WHO consultant), two visited and conducted epidemiological investigations on relapsing fever Jordan during 1954-55, while he was studying the epidemiology of the relapsing fever in Jordan. The present author, in collaboration with Dr. Saliba (University of Jordan), sent a collection of ticks obtained from mammals, birds and reptiles to Dr.

Hoogstraal to confirm their identification. The list that resulted from this limited collection will be published later. These materials are kept at the Jordan University Museum. Recently, Petney and Al-Yaman (1985) studied the ticks associated with *Testudo graeca*.

Mollusca

From the literature search it appears that the oldest report on the Jordanian freshwater snail was that of Hart (1891), in which he documented some snails he had collected from Wadi Araba and Ghore Es Safi. Annandale (1915) listed the molluscan fauna of Lake Tiberias when he studied the hydrobiology of that lake. Germain (1921, 1922) wrote two comprehensive volumes on the mollusca of Syria of which Jordan was part of at that time. His materials were kept at the Natural History Museum in Paris. More interests were developed regarding the freshwater snails of the Middle East, due to the medical importance of some pulmonate snails, especially those that act as intermediate hosts for human schistosomiasis. This reason motivated a survey in Southwest Asia in 1950-1951 by Abdel Azim, who visited and surveyed a limited number of freshwater bodies in Jordan. His results were published after his death and appeared as Abdel Azim and Gismann (1956). Later, Chu (1969) conducted a second survey on a few freshwater bodies in Jordan. He sent the collected materials to the Danish bilharzia Laboratory, Denmark, for identification. Another survey was undertaken by the Jordanian health officials in 1975. The collected materials were sent to the British Museum of Natural History for identification. Scates (1968) studied the hydrobiology of Azraq. Her work resulted in reporting nine species of freshwater snails from that oasis. Nelson (1973) listed these species again, in addition to collecting some molluscan materials from Azraq.

After Saliba *et al.* (1976) and Saliba and Salameh (1980) reported the presence of the snail intermediate host of *Schistosoma heamatobium* in Jordan, an extensive survey was conducted to cover all the freshwater habitats of the country. A large collection was made and sent to the Museum of

Zoology, University of Michigan in Ann Arbor, for identification. The results of this survey were published (Burch, 1985).

During the visit of the German team, Krupp and Schneider (1980) collected aquatic fauna from several water bodies in Jordan, including freshwater mollusca. Bandel and Salameh (1981) studied the hydrobiology of the Zarka River and mentioned some of the molluscs that they obtained along the Zarka River. Schutt (1983) in his comprehensive article on the freshwater molluscs of Syria, mentioned many species of freshwater snails collected from Jordan.

Scattered collections were cited by Brown and Wright (1980) and Brown (1980), which denoted specimens that were collected from Azraq. Representatives of the freshwater snails of Jordan were deposited in the Jordan University museum.

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