Contribution to the knowledge of Iranian flora: a herborization in the Dasht-e-Lut area (Kerman Province)

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Abstract

A joined research project named "Meteorites and plants from Lut desert" was performed in 2017 by the Botanical and Mineralogical sections of Natural History Museum of Florence with other Italian and Iranian partners. It enabled the collection of 146 plant specimens in SE Iran. It's a small but rather rare and significant contribution to the knowledge of a very remote and poorly known region of central Asia, including both important endemics and characteristic species of steppic and desertic environments.

Keywords: Iranian flora, Dasht-e-Lut area, Kerman Province.

Riassunto

Contributo alla conoscenza floristica dell'Iran: un'erborizzazione nell'area del deserto di Lut (Provincia di Kerman)
Il progetto di ricerca congiunto "Meteorites and plants from Lut desert", condotto dalle sezioni di Botanica e Mineralogia del Museo di Storia Naturale di Firenze in collaborazione con rappresentanti di altre istituzioni sia italiane che iraniane, ha permesso la raccolta di 146 campioni vegetali nell'Iran sud-orientale. Si tratta di un modesto ma raro e significativo contributo alla conoscenza di una regione particolarmente remota e poco conosciuta dell'Asia centrale, che comprende importanti endemismi e specie caratteristiche di ambienti steppici e desertico.

Parole chiave: Flora iraniana, Area di Dasht-e-Lut, provincia di Kerman.

Introduction

The current territory of Iran (Islamic Republic of Iran), with 1.648.195 km², latitudes spanning from 39°42' to 25°03' N, altitudes from sea level to the Damavand peak (5609 m) and a very diversified pattern of orographic and climatic elements, hosts a very rich flora and fauna, whose knowledge is probably still far away from being deeply known. According to Ghahreman & Attar (2000), Iranian flora includes more than 6400 species of vascular plants; the richest biodiversity areas are those of the Zagros, Alborz and Kopet Dag mountain ranges, which, together with the Anatolian plateau, constitute one of the 36 world biodiversity hotspots (Myers *et al.*, 2000).
One of the first extensive floristic exploration of Persia was carried out by the French pharmacist and botanist Pierre Martin Remi Aucher-Éloy (1792-1838). He travelled a long time through several east-European and western-Asiatic countries and his herbarium duplicates were widely distributed in Europe, including the Florence Herbarium. When Pierre Edmond Boissier (1867) published the first volume of his famous *Flora Orientalis*, relatively few other collections were available, thanks to Engelbert Kaempfer (1651-1716), Johann Georg Gmelin (1709-1755), André Michaux (1746-1801), Jean Guillaume Bruguière (1750-1798), Guillaume-Antoine Olivier (1756-1814), Johann Nepomuk Szovits (1778-1837), Alexander Georg von Bunge (1803-1890), Karl Georg Theodor Kotschy (1813-1866) and Friedrich Alexander Buhse (1821-1898). Later, several other botanist would have travelled and collected plant specimens within the Persian/Iranian border, the first (until the half of XXth century) mainly coming from Europe – e.g. Heinrich Carl Haussknecht (1838-1903), Paul Ernst Emil Sintenis (1847-1907), Joseph Friedrich Nicolaus Bornmüller (1862-1948), John Frödin (1879-1960), Erwin Gauba (1891-1964) and Karl Heinz Rechinger (1906-1998) – then with an increased effort by local scientist – e.g. Hossein Gol-e-Golab (1995-1985) and Ahmad Parsa (1907-1997).
Nevertheless, few of the abovementioned botanists, for both logistic, climatic and socio-political reasons, had the opportunity to collect plants within the wide desert areas in the south-Eastern part of the country, located between the Kerman, Khorassan and Sistan and Baluchistan Provinces; consequently, every new specimen gathered here represents a potential, precious improvement for museum collections and research activities.
According to Takhtajan (1986), this phytochorion, mostly corresponding to the salt Kavir desert (to the north) and the sandy/muddy Lut desert (to the south), constitute the Central Iranian floristic subprovince (Irano-Turanian Region, Armeno-Iranian Province), at the border with the Paleotropical Kingdom (Sudano-Zambezian Region, South Iranian Province). With an overall area of 51.800 km2, the Lut ("empty") desert (Dasht-e-Lut) represent one of the largest endorheic basin in

the World. Indeed, most of the very few yearly rainfalls are concentrated in the winter and leads to ephemeral water flows, the main landscape shaping factors (especially in the western part) being the constant south-eastern winds. Large areas of this extremely arid plateau, including the famous Gandom Beyran (the hottest land surface on Earth; Mildrexler *et al.*, 2006), are completely devoid of vegetation and the local trophic equilibrium seems to be mainly ensured by exogenous organic matter either transported here by seasonal streams and winds or provided by the corps of dead migratory animals. Plants, even if sparse and erratic, can be only found along the streams beds or at the desert borders, near the slopes of the very close mountains.

The present report from such a remote area was enabled thanks to a positive collaboration between colleagues working in different research fields of Natural History. Based on a well established scientific collaboration between Florence and Kerman (Shahid Bahonar) Universities, in early spring 2017 a joint-expedition had been organized there by a composite italo-iranian research team aiming to collect and study the meteorites deposited along Lut desert steady, pale dry, wind-grooved mud deposits known as "the Kaluts" (Moggi Cecchi *et al.*, 2017). Since the very complex organization of the field trips, the opportunity was also taken to enhance its potential scientific outputs by including a biologist in the equipe, in charge to collect plants and zoological samples along the trip path for the improvement of the Florence Museum public heritage. In spite of the very poor plant-cover of some areas, two weeks of work spent in, and around, Lut with the "*Meteorites and plants from Lut desert*" project turned out in a significant number of gatherings. Even if without any conceit to provide a comprehensive vision of the floral diversity of the Lut area, we hope that the floristic list provided here represents a useful tool to plan further investigations and make the scientific community aware that a little part of this biodiversity is also available at Florence NHM.

Materials and methods

With the only exception of few plants collected in Tehran during the technical transfers, all the listed specimens were collected between March 12th and 24th 2017 in the central-western part of Lut desert, near the villages of Shahdad and Shafiabad and along the high valley between the Kuh-e Jupar and Kuh-e Palvar, between Kerman, Mahan and Bam (Fig. 1; Tab. 1). The complete list of collection localities is provided in Tab. 1, together with the codes used in the floristic list.

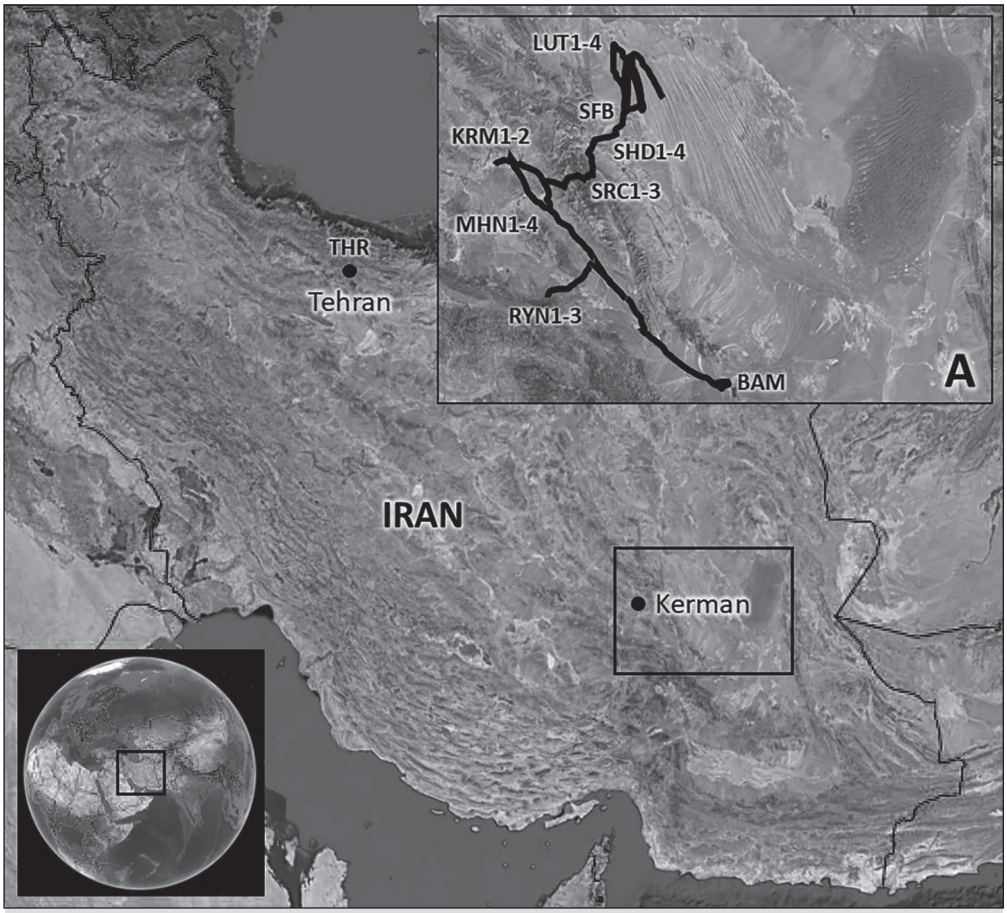

Fig. 1. Satellite map (from Google Earth) of Iran with details on the expedition itinerary and collection localities (codes as listed in Tab. 1).

Code	Locality
BAM	Bam ancient citadel (Arg-e-Bam), 1050 m, 29° 6'N, 58°22'E
KRM1	Kerman city, road margin, 1770 m, 30°16'N, 57° 4'E
KRM2	Kerman city, Holy Defence Museum park, 1760 m, 30°18'N, 57° 4'E
LUT1	Lut desert, along the Shahdad-Nehbandan road, 5 km N of Shafiabad, 320 m, 30°35'N, 57°45'E
LUT2	Lut desert, near a dried stream along the Shahdad-Nehbandan road, 15 km N of Shafiabad, 330 m, 30°40'N, 57°45'E
LUT3	Lut desert, near a dried stream close to the Shahdad-Nehbandan road, 29 km N of Shafiabad, 310 m, 30°48'N, 57°42'E
LUT4	Lut desert, 37 km N of Shafiabad, 290 m, 30°52'N, 57°40'E
MHN1	Mahan, near the Shah Nematollah Vali sanctuary, 1910 m, 30° 3'N, 57°17'E
MHN2	riverbed between Kerman and Bam, 50 km SE of Mahan, 2330 m, 29°42'N, 57°37'E
MHN3	dry grassland between Kerman e Bam, 52 km SE of Mahan, 2320 m, 29°42'N, 57°37'E
MHN4	Mahan, steppe near the "Garden of Prince" (Bāgh-e Shāzdeh) UNESCO site, 2020 m, 30° 1'N, 57°16'E
RYN1	Rayen waterfalls, 2840 m, 29°33'N, 57°17'E
RYN2	Dry slopes along the road between Zahrun-e Pa'in and Rayen waterfalls, 2660 m, 29°34'N, 57°18'E
RYN3	Zahrud-e Pa'in, cultivated fileds, 2480 m, 29°35'N, 57°20'E
SFB	Shafiabad village, steppe and cultivated fields margins, 330 m, 30°32'N, 57°46'E
SHD1	Shahdad village, 490 m, 30°24'N, 57°41'E
SHD2	between a *wadi* and a *quanat* 10 km W of Shahdad, 780 m, 30°23'N, 57°35'E
SHD3	along a *wadi*, near the crossroads to Bāq-e-houtk, 12 km to Shahdad, 830 m, 30°22'N, 57°34'E
SHD4	along a *wadi*, near the crossroads to Gashtoiye village, 19 km to Shahdad, 1100 m, 30°19'N, 57°32'E
RC1	Sirch village, 1690 m, 30°11'N, 57°33'E
SRC2	Sirch, along the road to Bolbolooiye, 1920 m, 30°11'N, 57°30'E
SRC3	between Bolbolooiye and Sirch, about 11 km to Sirch, 2130 m, 30°12'N, 57°28'E
THR	Teheran, city center, flower beds and road margins (spontaneous), 1190 m, 35°42'N, 51°23'E,

Tab. 1. Codes of plant collection localities (accuracy of ± 1 km), as indicated in the floristic list.

Our current knowledge on Iranian flora is mainly based on the monumental – and nearly complete – *Flora Iranica* edited by Rechinger (1963-2015). Unfortunately, for the identification of the specimens I couldn't rely on other important *Floras*, since they're still widely uncomplete and/or uncompletely translated from Farsi to English or French (Parsa, 1948-1960; Ghareman, 1979-1998; Mobayen, 1980-1996; Assadi *et al.*, 1988-2008). On the contrary, a very useful support to the most critical specimen identification was obtained by the examination of types images – when available – through the JSTOR platform (https://plants.jstor.org) and, to a lesser extent, by general distribution checks through GBIF (https://www.gbif.org).

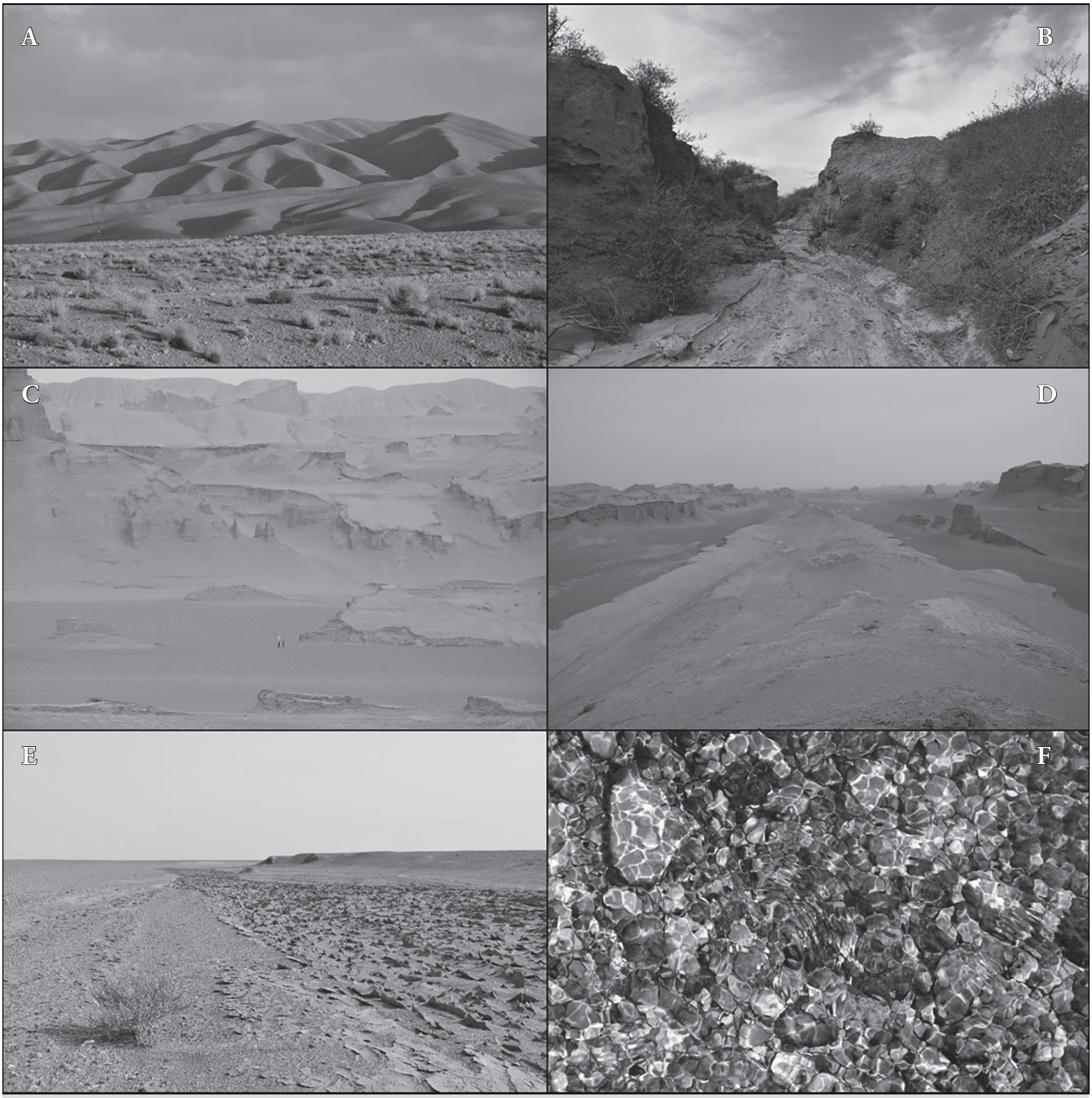

Fig. 2. Some characteristic environmental aspects of the explored area: A) Upland steppe near Mahan; B) dry *wādī* (seasonal creek) close to Shafiabad village; C-D) the Kaluts, in the westernmost part of the Lut desert; E) traces of a very ephemeral, seasonal stream at the borders of Lut desert, with an isolated *Cornulaca monacantha* shrub in the foreground; F) clear water in an open stretch of a *qanāt* (typical ancient underground aqueduct bringing water till the desert villages from neighbouring relieves) close to Shahdad, where a small population of an endemic mollusk (*Melanopsis doriae* Issel, 1865) was found.

Results

The "Meteorites and plants from Lut desert" expedition provided a very rare opportunity for the observation of unusual aspects of life adaptation to extreme environments (Fig. 2).
While plants (Fig. 3) are concentrated near the borders of the Kaluts, along the seasonal stream beds or within the human settlements, where a minimum water supply is warranted at least in some months, several animals and animal traces (Fig. 4) have been observed in the very central part of the Kalut area too. This fact witness that an exogenous provision of organic compounds is sufficient to support a quite rich biological community.
One of the unexpected outputs of the expedition has been the collection of many rests of dead animal (both invertebrates and vertebrates), together with a small entomological

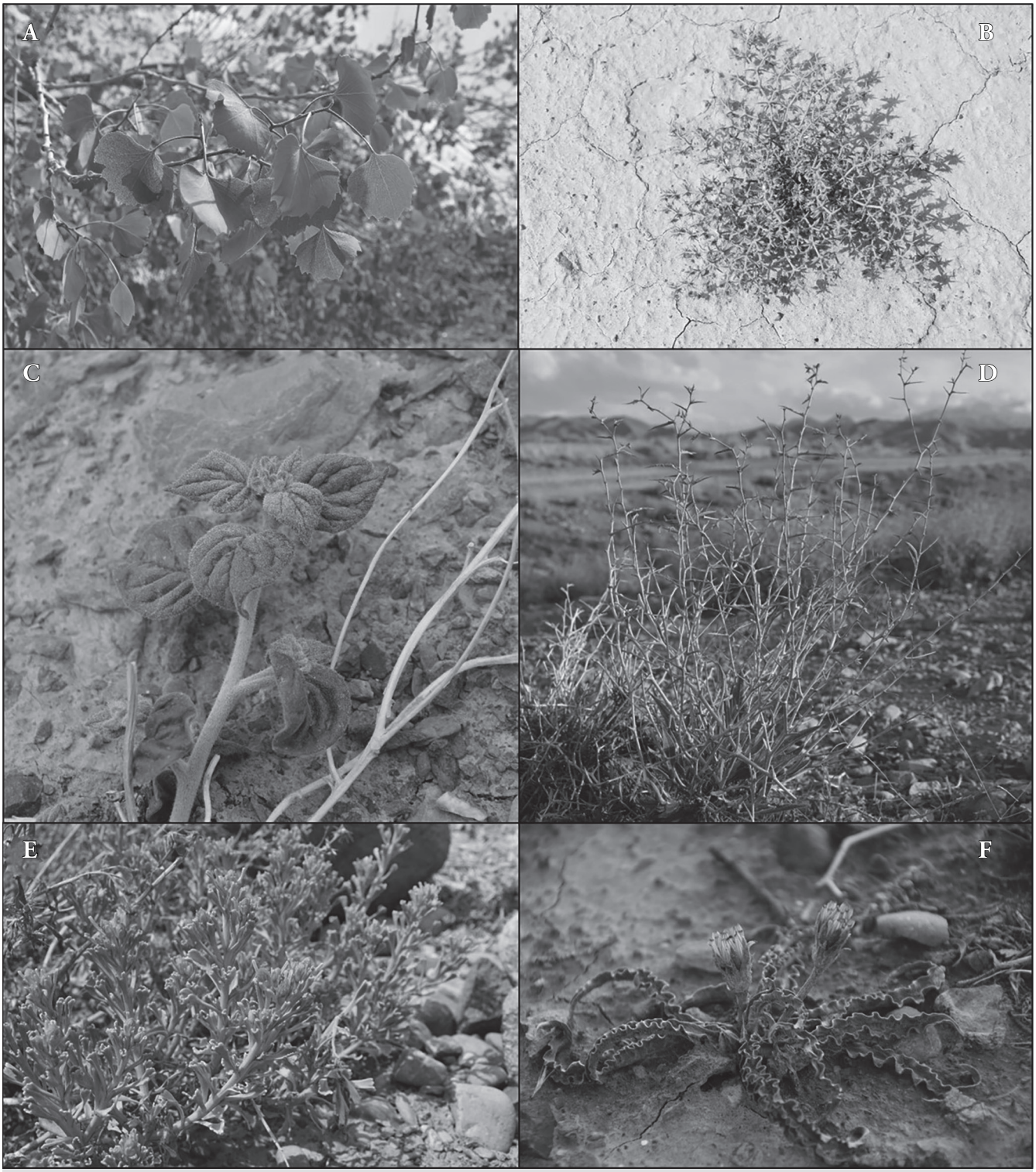

Fig. 3. Some of the most interesting plant species observed during the "Meteorites and plants from Lut desert" expedition: A) *Populus euphratica*; B) *Fagonia bruguieri*; C) *Heliotropium aucheri* subsp. *carmanicum*; D) *Cousinia piptocephala*; E) *Iphiona aucheri*; F) *Scorzonera pseudolanata*.

collection and tissue-samples from some interesting species of Lut herpetofauna (lizards) useful for DNA barcoding and other genetic studies (with no damage for the wild individual). However, since most of the zoological samples are still under study, the present contribution only focuses on plants. In the following list, orders and families are arranged according to the linear sequence proposed by Christenhusz *et al.* (2011) and Reveal & Chase (2011), while alphabetical order has been followed for genera and species.

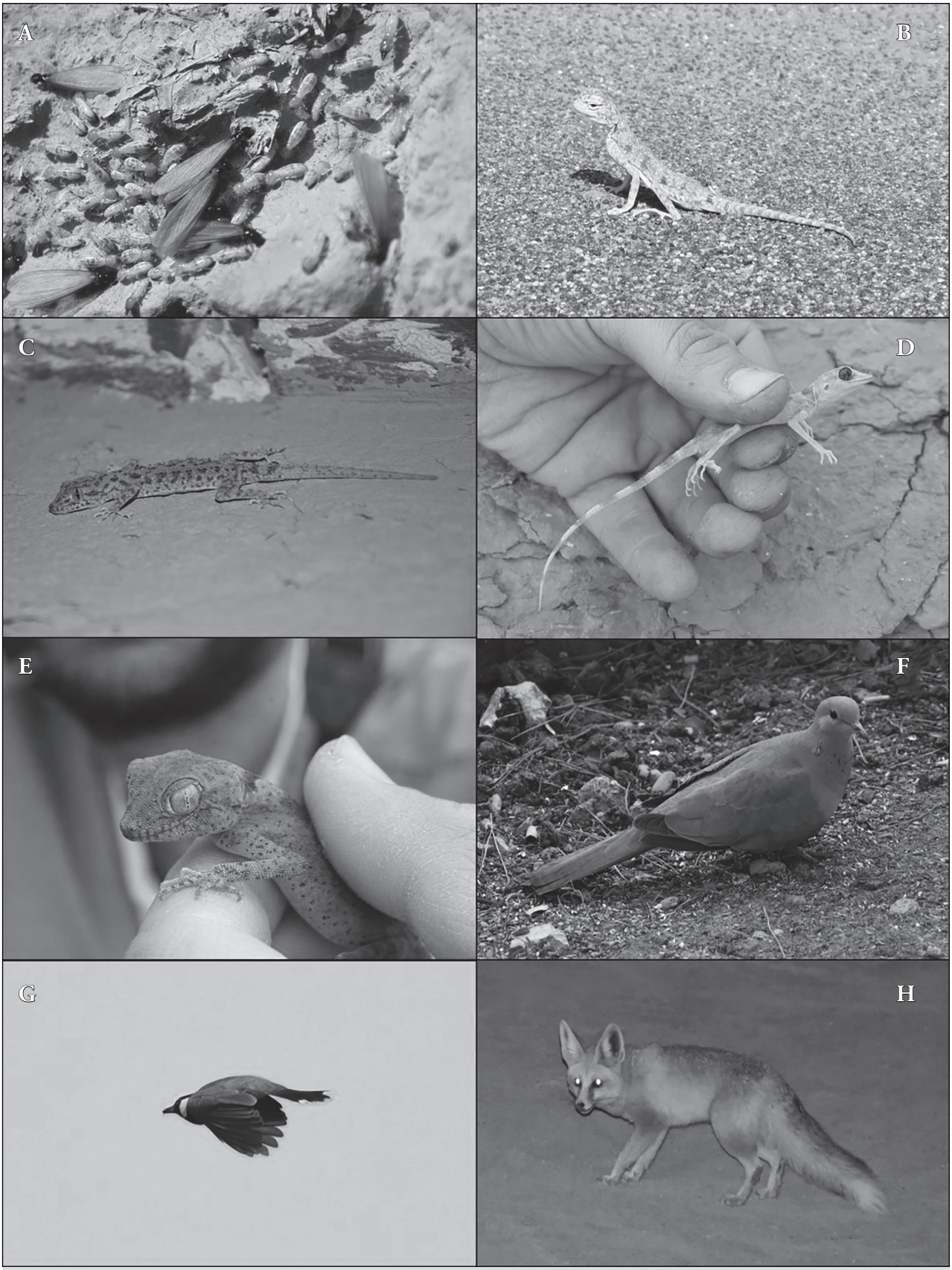

Fig. 4. Some of the most interesting animal species observed during the "Meteorites and plants from Lut desert" expedition: A) *Anacanthotermes sp.*; B) *Phrynocephalus maculatus* Anderson, 1872; C) *Cyrtopodion scabrum* (Heyden, 1827); D) *Rhinogekko misonnei* De Witte, 1973; E) *Agamura persica* (Duméril, 1856); F) *Streptopelia senegalensis* (Linnaeus, 1766); G) *Pycnonotus leucotis* (Gould, 1836); *Vulpes rueppellii* Schinz, 1825.

Ephedraceae
Ephedra strobilacea Bunge – RYN1 (FI052496, HC3512)

Cupressaceae
Cupressus sempervirens L. – SRC1 (FI052429, HC3445)

Arecaceae
Phoenix dactylifera L. – SFB (FI052483)

Poaceae
Arundo donax L. – SHD2 (FI052431, HC3447)
Bromus commutatus Schrad. – SFB (FI052530)
Bromus gracillimus Bunge (FI052546)
Hordeum murinum L. – MHN4 (FI052507, HC3523)
Imperata cylindrica (L.) P.Beauv. – SFB (FI052471, HC3487)
Lolium multiflorum Lam. – SHD1 (FI052446, HC3462)
Phalaris minor Retz. – MHN4 (FI052545)
Poa annua L. – THR (FI051062)
Polypogon monspeliensis (L.) Desf. – SHD1 (FI052444, HC3460)
Polypogon viridis (Gouan) Breistr. – SFB (FI052470, HC3486)
Schismus arabicus Nees – SHD3 (FI052484, HC3500)

Papaveraceae
Fumaria parviflora Lam. – KRM1 (FI051068)
Hypecoum pendulum L. – MHN4 (FI052513, HC3529)

Ranunculaceae
Ceratocephala falcata (L.) Pers. – MHN4 (FI052510, HC3526)

Zygophyllaceae
Fagonia bruguieri DC. var. **bruguieri** – SHD2 (FI052436, FI052537, HC3452), SHD4 (FI052536, FI052538)

Fabaceae
Acacia farnesiana (L.) Willd. – SHD1 (FI052447, HC3463)
Alhagi persarum Boiss. & Buhse – SFB (FI052452, HC3477)
Astracantha floccosa (Boiss.) Podlech – RYN2 (FI052499, HC3515)
Glycyrrhiza glabra L. – SFB (FI052461, HC3468)
Lathyrus sativus L. – KRM1 (FI051069)
Medicago lupulina L. – MHN4 (FI052539)
Melilotus indicus (L.) All. – SFB (FI052469, HC3485)
Prosopis cineraria (L.) Druce – SFB (FI052541, FI052468), SH2 (FI052438, HC3454)
Prosopis farcta (Banks & Sol.) J.F.Macbr. – SFB (FI052540, HC3484)
Prosopis juliflora (Sw.) DC. – SFB (FI052459, HC3475)

Rhamnaceae
Ziziphus spina-christi (L.) Willd. – SFB (FI052460, HC3476)

Euphorbiaceae
Euphorbia peplus L. – SRC1 (FI052430, HC3446)

Phyllanthaceae
Andrachne telephioides var. **rotundifolia** (Eichw. ex C.A. Mey.) Müll. Arg.* – MHN4 (FI052509, HC3525)

Salicaceae
Populus euphratica Oliv. – SHD1 (FI052445, HC3461), SHD2 (FI052433, HC3449)

Geraniaceae
Erodium cicutarium (L.) L'Hér. – MHN4 (FI052518)

Nitrariaceae
Peganum harmala L. – MHN2 (FI052556), SHD3 (FI052555)

Sapindaceae
Dodonaea viscosa (L.) Jacq. – SFB (FI052525)

Malvaceae
Gossypium herbaceum L.* – SFB (FI052457, HC3473)
Malva microcarpa Pers. – SFB (FI052529), SHD1 (FI052442, HC3458)

Capparaceae
Capparis spinosa L. s.l. – SFB (FI052547), SH2 (FI052440, HC3456)

Brassicaceae
Alyssum linifolium Willd. – MHN4 (FI052512, HC3528)
Alyssum szovitsianum Fisch. & C.A.Mey.* – MHN4 (FI052511, HC3527)
Chorispora persica Boiss. – MHN4 (FI052520, HC3536)
Chorispora tenella (Pall.) DC. – MHN4 (FI052516, HC3532)
Descurainia sophia (L.) Webb & Berthel. – MHN1 (FI052524, HC3540)
Eruca sativa Mill. – RYN1 (FI052495, HC3511), SFB (FI052463, HC3479)
Farsetia heliophila Bunge ex Coss. – SH2 (FI052437, HC3453)
Fortuynia bungei Boiss. – SHD3 (FI052482, HC3498)
Lepidium draba L. – MHN4 (FI052508, HC3524), RYN3 (FI052494, HC3510)
Malcolmia strigosa Boiss. – MHN4* (FI054504), KRM2 (FI051065)
Sisymbrium irio L. – MHN4 (FI052521, HC3537)

Frankeniaceae
Frankenia pulverulenta L. – SFB (FI052454, HC3470)

Tamaricaceae
Tamarix gallica L. – LUT1 (FI052448, HC3464), SFB (FI052472, HC3488), SH2* (FI052535)
Tamarix kermanensis B.R.Baum* – SFB (FI052462, HC3478)
Tamarix macrocarpa (Ehrenbg.) Bunge – LUT4 (FI052451, HC3467)

Polygonaceae
Calligonum comosum L'Hér.* – LUT2 (FI052449, HC3465), SHD3 (FI052479, HC3495)
Polygonum arenastrum Boreau – MHN4* (FI054534), THR (FI052425, HC3442)
Polygonum patulum M.Bieb.* – SFB (FI052467, HC3483)
Pteropyrum aucheri Jaub. & Spach – SHD3 (FI052478, HC3494)

Caryophyllaceae
Buffonia oliveriana Ser. – MHN4 (FI052553)
Gymnocarpos decandrus Forssk. – SHD2 (FI052558, FI052559)
Holosteum glutinosum (M.Bieb.) Fisch. & C.A.Mey. – MHN4 (FI052554)
Minuartia meyeri (Boiss.) Bornm. – MHN4 (FI052501, HC3517)
Stellaria media (L.) Vill. – THR (FI052424, HC3441)

Amaranthaceae s.l.
Anabasis setifera Moq. – SHD3 (FI052476, HC3492), SHD4 (FI052474, HC3490)
Atriplex leucoclada Boiss. – SHD4 (FI052557)
Bassia eriophora (Schrad.) Aschers. – BAM (FI052492, FI052493, HC3508, HC3509), MHN4 (FI052523, HC3539)
Chenopodium album L. subsp. **album*** – SHD3 (FI052477, HC3493)
Chenopodium murale L. – SFB (FI052453, HC3469)
Cornulaca monacantha Delile – LUT3 (FI052450, HC3466)
Halothamnus kermanensis Kothe-Heinr. – MNH2 (FI052489, HC3505)
Salsola imbricata Forssk. – SHD2 (FI052435, HC3451)
Seidlitzia florida (M.Bieb.) Boiss. – MNH2 (FI052487, HC3503), SH2 (FI052441, HC3457)
Spinacia oleracea L. – SFB (FI052456)

Boraginaceae s.l.
Asperugo procumbens L. – KRM1 (FI051070)
Heliotropium aucheri subsp. **carmanicum** (Bunge) Akhani & Förther – SHD4 (FI052473, HC3489)
Lappula sinaica (A.DC.) Asch. & Schweinf.* – MHN4 (FI052549)
Nonea caspica (Willd.) G.Don* – KRM2 (FI051066)
Nonea lutea (Desr.) Rchb.f. ex DC. – THR (FI051064)
Paracaryum rugulosum (DC.) Boiss. – MHN2 (FI052486, HC3502), MHN3 (FI052490, HC3506), MHN4 (FI052550)
Rochelia disperma (L.f.) K.Koch – MHN4 (FI052548)
Trichodesma africanum (L.) Sm. – SHD3 (FI052481, HC3497)

Convolvulaceae
Convolvulus arvensis L. – SFB (FI052464, HC3480)
Cressa cretica L. – SFB (FI052465, HC3481), SHD1 (FI052443, HC3459)

Oleaceae
Fraxinus angustifolia subsp. **persica** (Boiss.) Azadi – KRM1 (FI051071)

Plantaginaceae
Plantago lanceolata L. – SFB (FI052531, FI052552)
Veronica biloba L. – MHN4 (FI052517, HC3533)
Veronica persica Poir. – SRC3 (FI052428, HC3444)

Lamiaceae
Lallemantia royleana (Benth.) Benth. – MHN4 (FI052514, FI052515, HC3530, HC3531)
Marrubium crassidens Boiss. – MHN4 (FI052522, HC3538)

Asteraceae
Artemisia kermanensis Podl. – SHD3 (FI052480, HC3496)
Artemisia tecti-mundi Podl.* – SRC3 (FI052426, HC3443)
Carthamus oxyacantha M.Bieb. – SRC2 (FI052526)
Carthamus tinctorius L. – SFB (FI052455, HC3471)
Cousinia piptocephala Bunge – MHN4 (FI052505, HC3521)
Echinops acantholepis Jaub. & Spach – MHN4 (FI052504, HC3520)
Iphiona aucheri (Boiss.) A.Anderb. – SH2 (FI052439, HC3455), SHD2 (FI052434, HC3450), SHD3 (FI052475)
Jurinea carduiformis (Jaub. & Spach) Boiss. – MHN4 (FI052534)
Launaea procumbens (Roxb.) Ramayya & Rajagopal – SFB (FI052466, FI052527, HC3482)
Onopordum carmanicum (Bornm.) Bornm. – MHN4 (FI052506, HC3522)
Pulicaria gnaphalodes (Vent.) Boiss. – MNH2 (FI052488, HC3504)
Scorzonera intricata Boiss. – RYN2 (FI052497, HC3513)
Scorzonera pseudolanata Grossh. – MHN4 (FI052503, HC3519)
Scorzonera tortuosissima Boiss. – SHD3 (FI052485, HC3501), SHD4 (FI052533, HC3491)
Senecio coronopifolius Burm.f. – MHN3 (FI052491, HC3507), MHN4 (FI052519, HC3535), SFB (FI052528, HC3472), SHD3 (FI052532), SRC3 (FI052427)
Sonchus asper (L.) Hill – SFB (FI052458, HC3474)
Taraxacum baluchistanicum Soest* – MHN4 (FI052502, HC3518)
Tragopogon buphtalmoides (DC.) Boiss. – KRM2 (FI051067)

Apiaceae
Daucus carota L. s.l. – THR (FI051063)
Ducrosia anethifolia (DC.) Boiss.* – MHN4 (FI052544), MNH2 (FI052543)
Ducrosia assadii Alava – RYN2 (FI052498, HC3514)
Ferula orientalis L.* – RYN2 (FI052500, HC3516)

The botanical collection includes 146 specimens. All the collected specimens are stored in the Herbarium of Natural History Museum of Florence, Botanical Collections "Filippo Parlatore" (FI), 12 of them turning out the be the first ones representing their taxon in this large repository (*Artemisia kermanensis, Artemisia tecti-mundi, Ducrosia assadii, Halothamnus kermanensis, Fraxinus angustifolia subsp. persica, Malva microcarpa, Onopordum carmanicum, Prosopis farcta, Scorzonera pseudolanata, Scorzonera tortuosissima, Tamarix kermanensis, Taraxacum baluchistanicum*). A number of taxa is also represented by duplicates stored in the private herbarium of the author (HC). Since the gatherings were made in early spring, a significant phenological gap was observed between plants collected in desertic lowland (in full anthesis, or even fruiting) and those found at higher altitudes; the lack of fully developed diagnostic characters in the latter is the main reason why in few cases (marked with "*") the species-level identification is slightly doubtful.

With the only exception of nine cultivated plants, all the others come from natural stands, as authoctonous or naturalized. They represent 29 families and 114 different taxa. Among these, the most represented are the Asteraceae, with 18 taxa, followed by Brassicaceae and Poaceae (11), Amaranthaceae and Fabaceae (10) and Boraginaceae (8). None of them turned to be new for the investigated phytochorion, but all provide important confirmation and/or improvement of the very poor floristic knowledge of the Lut desert area. Five taxa (*Buffonia oliveriana, Chorispora persica, Cousinia piptocephala, Fortuynia bungei, Scorzonera intricata* and *Taraxacum baluchistanicum*) are endemic to the Armeno-Iranian Province, while additional six (*Artemisia kermanensis, Ducrosia assadii, Halothamnus kermanensis, Heliotropium aucheri* subsp. *carmanicum, Onopordum carmanicum* and *Scorzonera pseudolanata*) are strictly restricted to its Central Iranian subprovince and have been very rarely collected before.

Acknowledgments

Due to both technical and bureaucratic issues, the material collected during our expedition has been stored for a long period at the Kerman Shahid Bahonar University botanical laboratories and its transfer in Italy took near a year to be completed. This turned out to be quite harmful for most of insect specimens, which had been only prepared for a temporary conservation, while the valuable and careful attention of my colleague, Prof. Mansour Mirtadzadini, ensured that the botanical samples reached the Florence museum with no damage at all: my first acknowledgement goes to him. Many thanks to the former president of our Natural History Museum, Prof. Guido Chelazzi, who enthusiastically supported the idea of a multidisciplinary approach to the initiative, and to all the team members: Vanni Moggi Cecchi and Giovanni Pratesi (University of Florence), Mario Di Martino (Italian Astrophysics Institute and Turin Astronomic Observatory), Jeannine Casarini (Turin), Romano Serra (University of Bologna and San Giovanni in Persiceto "Museo del Cielo e della Terra"), Gabriele Giuli (University of Camerino), Majid Nemati (Sahid Bahonar University of Kerman), our drivers and guides during the expedition (Saeed, Amhed, Afshin and Moein) and my little, but valuable, technical assistant in the Shafiabad village, Hassan Pour Alibadi. Finally, I want to acknowledge the very precious support received by my colleagues at Florence NHM: those from the zoological section (Paolo Agnelli, Fausto Barbagli, Luca Bartolozzi, Simone Cianfanelli and Annamaria Nistri) for the identification of animals pictures and specimens; those from the herbarium (Anna Donatelli, Lorenzo Lastrucci and Chiara Nepi), for their help during both the preliminary organization phase and all the following steps leading the specimens to their ultimate destination; all the others for the excellent teamwork expressed while preparing the exhibition showing our preliminary results (held in Florence between December 2018 and January 2019).

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