

EXPEDITION # 15¹, 1977: JORDAN (May 14 - June 27, 1977: 1 month & 13 days)

May 14, 1977

Up about 6:00 to watch birds in back yard w/Jean. Packed ca 8-9; mowed lawn & bird- watched. Had to go to office for some forgotten traveler's checks. Didn't allow much time and just walked on the plane with no waiting. 11:40; long dull wait at O'Hare. Wrote later to Martha Surface Barnes. Bought book about Lin Piceo and read it. Caught plane ca 4:40 on time. Nice 747, but only to Boston. There changed to crummy 707 with every seat filled & temperature near boiling. Bad service, poor food, the usual TWA. Landed Paris Charles de Baule airport. The first time I had not stopped at Le Bourget or Orly, but didn't get off to see it; looked as gruesome as Kennedy or O'Hare, but the worst was over. Cooler was crowded flight to Rome. Then checked bag even arrived & the usual change money, buy bus ticket & on in to Termini & Terminal Hotel. Same room as always except on 1st. floor. Bushed, but not dead. Walked a lot to kill time & finally ate at the unnatural time of 6:00 pm. To bet before 8:00.

5/16 Fretful night but unexpectedly slept to 9:00 am. Went to FAO and saw Erna, Trevor Williams, T. Sykes, R. Pichal and Ebbe Kjelqwis. "News from East Africa not good at all; from West Africa possibly better w/ Bilquez doing the politics. The millets collected by the French may be routed through a French station (Bondi?) where they will be grown in greenhouses under quarantine, then sent to a lab in Denmark for treatment and then to India. If there are any genes left by then. The whole picture one of confusion, lack of direction, naivete' and frustration. Erna thinks the Mediterranean program is moving and they are making collections at least. Yavash Yavash, heshalloh." [Yavash yavash" means doing something slowly or quietly or doing something or order someone to do an action without any attention from others or a procedure that happens slowly but having a strong effect about something. <https://www.italki.com/question/45624>. The last word may be a personal name, otherwise its meaning is unknown. HVH2]

5/17 Back to FAO & pick up tickets [is FAO his sponsor? Looks like it.] Went to Airport and Met Tom Staub & had easy ride [flight to Amman, see below.] Walt Rast met them at the airport. [Next page has at the top of page:] "American Center for Oriental Research" [and below that:] "Jim & Sue Sauer – local Director of the Center." [The Internet says that the ACOR is in Amman Jordan. Then he lists about 8 additional people, with a word about where they were from.]

5/18 Up late, rented car and drove with Dave & Linda to Salt (35 km) and to villages north of thereof, then back to Salt, then up to Jarash (35 km) and back to Amman. No wild wheat, some wild barley and oats. People arriving all the time.

5/19 Up by 7:00 a land cruiser from the Dept. of Antiquities took them (Jack, Dave & Arab driver who spoke no English) "up north: Jarash, Irbid, Um Queie, south along Jordan Hwy back to Irbid, lunch, then Ajlun and Amman. The country side is crowded. Several refugee camps, lots of

¹ There are numerous names in this journal which were unknown to me, most of which I did not attempt to decipher. Some seemed more important and those I did investigate to obtain the correct spelling and meaning.

military, much land recently put in cultivation. The right ecological zones for wild wheat are overgrazed. We saw none and I don't think we missed it. Driver knew no more English than we knew Arabic and, I suspect cannot read either. He asked directions even when road clearly marked."

5/20 "Huge party came in eve. before & slept in bed rolls all over. Too many for showers since water rationed. In mid-morning Dave & Linda McCraey, Jack Lee, Bryant Prill & I got in a 'service' & took off for Karak. Car made 85 mph some of the time but a Mercedes & all under control. Arrived at rest house early P.M. Nothing doing on Friday. Moved some iron bedsteads in castle for arrivals expected tomorrow. Shower & tour of dead town. Later in eve. more excitement in rest house (locals celebrating Friday), but I went to bed.

5/21 Dave ill, so Harlan just went off by himself hiking to the top of a hill overlooking the Dead Sea "Beautiful place, wheat fields lush green, some barley turning & some lentils being harvested." Go back & more people arriving. "feet tired, blistered."

5/22 Set out for morning walk with Bryant Prill, but turned the right ankle & it ached and swelled during the day. He tried to sleep it off, but it was still bad. More people arrive, now to about 50 people. They set up tents and reps from the Dept. of Antiquities arrived.

5/23 Rented car and drove south, with Bryant Prill & Teas (?) Riley, "to Mazar the driver's village and had tea at his house and collected a few market samples: lentil, chickpea & wheat. Then on to El Tafila." There they had lunch at the driver's brother's house and got a couple of samples. "then on a bit farther to Basira – the Biblical Bozra – or - Basiera means little Bozra, the real Bozra being elsewhere. Anyway, the Guide Book lays some heavy stuff on the town:

Gen. 36:33 – Bosra, Bozra is capital of Edom

Is 63:1 "Who is this that commeth from Edom with dyed garments from Bozra, this beautiful one in his robe, walking in the greatness of his strength?"

Is 34:6 "for there is a sacrifice to Yahweh in Bozra and a great slaughter in the land of Edom."

Jer. 49:13; see also 48:24 & 49:22 "For I have sworn by myself, saith the Lord, that Bosra shall become a desolation and a reproach and a desert and a curse; and all her cities shall be everlasting wastes."

Amos 1:12 "I will send a fire into Theman: and it shall devour the houses of Bosra"

"We got a few more samples & came on back." Then he has a nice description of the outing.

5/24 Breakfast at 6:00, meeting set for 7:00 but not until 7:30. Arrangements finally made & off by 8:40 – a little less than an hour to the site. Mad confusion because anything serious had to await the surveyor. The landscape laid out in big fields and smaller squares. People assigned

different areas & responsibilities depending on experience & etc. Not my department so set out to scout the place. The ruined town seems to have been built on a high blob of unconsolidated detritus washed down the Wadi Karak, which the Karak then cut through so that the town is high above the wadi bottom. There is a substantial spring on town side of the wadi which has been tapped for irrigation at various times and still is in a poor sort of way. Fields all around had been irrigated not long ago, but not now. Someone has been measuring discharge & we should get a figure if possible. The site is hot and desolate alright but not without some charm, beauty & mystique. The purpose of the town remains to be determined, but sizeable town remained in the area at least through Byzantine times. Got a few samples for botanical identification, but doubt that the plants are very significant. It's desert & farming must have been irrigated. It was a hot, but not bad morning & by 12:30 we were on our way back. According to an archaeological map, Karak is the Biblical Kire Moab, a capital of Moab and the great crusader castle represented the capital of Oultre Jourdain (Oultrejourdain) ruled by Renaud de Châtillon.

- 5/25 The national holiday, but we worked getting into the schedule gradually. Up at 4:30. Breakfast at 5:00 & off by 6:00 – actually 6:10 which is pretty good. Things getting underway now. More tents put up & surveyor busy getting fields & squares laid out. I went down to Numara. Site on top of hill with spectacular canyon in redbeds next to it. Hiked up ridge while the guys & some Bedouins put up tent. Another settlement farther up. Fantastic canyon. Then, while they went back to Bab edh-Dhra, I hiked up canyon. Incredible! In some places extremely narrow with water running essentially fr. wall to wall. Abiter water form rains on highlands. Must scour badly at times, & no place to be caught in flash flood. Plants few & of minor interest. Out in the open did see Cda & Dan together w. spiny shrubs & Salsola, etc. The town should be interesting. Just laid out a square or two. Walt & Tom came & I took them back to Bab edh-Dhra then back again for Jack Graham & Wayne - A very hot day & glad to reach the cool highlands of Karak. More people arrived – Jack Donohue a geologist & Mike Tinnegan made it down. The schedule now to get up at 2:45, breakfast at 3:15 off by 4:00.
- 5/26 Carl's alarm went off at 2:30 instead of 2:45 but no problem. Everyone dazed on way down the canyon." (so they go down the canyon to the site). Got Sami to go around & talk to the workmen. Almost none had land of their own. It is very expensive for them. The general interpretation is that the large areas that were formerly in cultivation are not now cultivated because of decline in water supply. Perhaps landlordism, usury & other problems are a factor. The crops today are all trunk crops for cash sale: tomatoes, peppers, eggplants, cucumbers, melons, etc.; but the land once cultivated & now abandoned is many times that now in use. **Must find out more.** No transportation so could not go in village. Pretty dull. People digging "squares" but finding little of interest, except one spot where the Sandis had broken into a channel house (without knowing it?) Masses of human bones, badly fragmented. Seems to be very thick, stocky & short people. The day became very hot with strong wind. The Mexican sombrero blowing off all the time. The most uncomfortable day so far, and even the Karak

highlands hot & windy. The grand dining room of the castle, however, a grand 72° F. Marvelous construction.

[Next page, at top:] Records

Irrigation Dept. Natural Resources Authority

Rainfall for Karak in mm. [Then he has a chart of rainfall records by month from October to May and for dates 1964-65, 65-66, 67-68, 68-69, 69-70,70-71 and so on through 76-77.]

5/27 "Scouting water supplies & vegetation. No great action."

5/28 Went down with the group & after hiking some time one Mohammad was pulled off the group and assigned to me as interpreter. We went up the hill to a station I had thought was an exp. Sta., but turned out to be only a forestry nursery. The chicken raising installation next door is private. We looked at the tree seedlings – mostly Pines, halepense, *P. piniaea*, some terebinth, Eucalyptus, etc. **Then tried to get rainfall records.** They had a few but had never added them up & accuracy doubtful. So, went to town & saw the Agricultural Department. Their data are shown previous page – old, musty sheets in Arabic, never summarized & never used. Accuracy?? That seemed like all I could get from here. Water – flow records, if any, are with the Natural Resources Authority in Amman. So, put in for a seat in a rented car for Petra. Carl & Christine Helms, Bryant Prill & John Opis plus me. Nice ride down the King's Highway. A little detour to Shawbak castle of crusader times although built by the Turks. Then on to Petra & rest house. The place having trouble expanding facilities for lack of water & other things. We walked to the entrance of the canyon in evening & back in the crepuscule². The shapes of tombs looking strange in the dusk. Long delay at dinner because Christine had latched on to an American working in Saudi Arabia with the "national Guard" i.e. conglomeration of desert tribes that traditionally fight each other. It was interesting and she was doing her homework because Saudi Arabia is her bag. Still I wanted to go to bed. Finally a hot shower & out like a light.

5/29 Carl was up first & found no water & no lights. Eventually broke the top of the toilet tank trying to get enough water to comb his hair! He isn't going to adjust & doesn't want to. I dressed & woke Christine & we were off about 5:00 a.m. This brought me to Petra at a good time. The walk through the canyon very satisfactory & surprise at the "treasury"³ an emerging fantastic! The whole thing very impressive. We had breakfast at Naggal's camp & then hiked to the "Monastery". Another fantastic building & a great view of the Araba but exhausting. Back down a hot, steep trail to a cold beer, small rest, then to "the high place". Another fantastic & exhausting climb to an altar of some sort. Worth every bit of it. The lungs stop heaving & the heart stops pounding long before the knees stop shaking. Carl wanted to rent horses to get back but it didn't pan out, so out through the canyon we hiked absolutely dead at the next

² twilight

³ Al-Khazneh

house. Still no water in ours but Christine had water so we all showered. I drank 1.7 liters of mineral water & never quenched the thirst. A beer on top of that did wonders. A light smoke & one gathered up & came back – part of the way by the desert Highway. It was a grand day but killing. Carl is 63 and I 60, but the youngsters found it just as tough. Very few hiked as much as we. Petra at last! In no way disappointing even with all the tourists. I've seen a good many of the large stone works efforts. None is better than another, all different. Monolithic churches of Lalibella, the statues of Bamian, the cliff dwellers of Urgup, the walls of Sacsahuayman, the Great Wall of China, pyramids of Egypt and Mexico, Machu Pichu, Cuzco walls & so on. Petra is Petra and unique. It was a fine day.

- 5/30 Understandably pooped. Got use of a car for most of the morning & **scouted water resources**. Wadi es Sal is the big one between W. Karak & W Numeira. A modest flow of good water in well-lined sluices. Two previous attempts at least wiped out by landslides & erosion. **No spring exactly but trickles come out of the ground & gather suggesting that at the time of year, at least, the water is close to the gravel – bolder surface. A fair amount of tomatoes raised on it. Farther north, I found that the water for both Al Mazra'a and Haditheh comes from Haditheh – nothing from the Karak where the water seems to dive below the gravels. In between are three salt springs – two small, the other a network of man some sulfurous & so salty the rocks are encrusted w/ crystals. This is in Wadi Madba'a according to map. When I got back to camp, found that Jack Donahue (geologist w/ Pitt) back - finally gotten them to take the aqueduct seriously. That eve he gave a very nice non-technical talk on the great rift & the local scene at Bab edh-Dhra'. I think together we can provide same service for the folks.**
- 5/31 With a military pass, Jack D, Mark McG & I plus Nabie and a driver took the Dept of Antiquities land cruiser down to Safi, Fifeh and another m. Wadi Nuhbbar Safi plain is impressive, of considerable size & **no evidence of a real water shortage; the whole thing seems to be irrigated**. The site a bust badly, messed up with modern gun emplacements etc. Surface scatter of Roman & Byzantine. Little positively bronze age & the place does not look level in. Fifeh on the other hand looks good; real rock walls, some blades, grinders, lots of shade – looks like a living site. Nabil found a tomb & pulled out EB pot. The last site a tell pile of rocks only with a small wall around it.
- 6/1 Bad night for wind & the dust v. heavy. Decided not to go back to Safi for that reason. Pictures would be hazy. **Hiked the [Wadi Karak](#) for source of the aqueduct**. It was a long one. The end destroyed but no water in sight. It must have been different at one time. One well-built pitch had cut stone right to the wadi bottom – no fill nor erosion since. The patch may be late, however. Sami's tomb about to be opened – a nice circular structure of mud brick slightly conical. Should yield its secrets tomorrow. One shaft tomb also close to the blocking stone which should be reached tomorrow. Things happening on the fortress & habitation areas as well. Much bustle & with all the digs going something has to turn up of interest. An easy day, but instructive.

- 6/2 Plans for the trip south ruined by Checkpoint Charlie who took all cameras & a roll of film of mine. Hoping it would be resolved in time. I took a hike up towards village of Dra' & finally found a tarmac road that goes to the wadi bottom. **There was water in the wadi there & it flowed down until it sank into the sand & ground about where the old aqueduct would have taken off. The reason for the effort seems explained.** Went on down & to the cemetery. Shaft tombs of both Jolm Macalia & Carl Helms down to the doors & to be opened tomorrow. A new personality arrived. Bob Johnson of Rochester. Ceramic Engineer & Dean of something, 6'8" loud & full of fun.
- 6/3 Friday, Took Christine in car to get photos at [Numeira](#) – the canyon Acacia cortices Wadi Es-Sal – [Ziziphus spina – Christi](#)., Broken canals, Haditheh spring, trees etc. Army scared us out of taking photos of broken canal there which rises even higher than aqueduct at Wadi Karak. We had tea with them & came back. The whole camp excited because of tomb opening. Carl's was about perfect - no robbery, no disturbance in 4-5000 years in the bones just as they were left with only a little rainwater seeping in at some time. Three skulls and a bundle of long bones & ribs. Secondary burials, late of very handsome pots, thin ware, ground basalt, bowls, etc. John's tomb had some roof-fall & not so perfect but otherwise undisturbed & more pots. Sami's beehive now down to the bones, fill all the way. The "cemetery" all excited, but Al Cohaine over at the "city" has a wooden door post in the socket. Carl very excited & everyone glad for him. Booze on the terraces & to bed. The regimen telling.
- 6/4 Sat. So back to Safi, Feifeh and Khanazar with Nabil & driver. Jack Donahue & Mark MacGannchey (sp?). Camera this time but had to hide them as much as possible. Saw plants I had overlooked or not recognized before like Haucuylon. Lot a better deal for the "cities of the plain" which do not look like cities at all, more likely ceremonial centers with burial ground. Did they do secondary burials – because they were black tent nomads & gathered at the altar only once a year? Looks possible. [Bab edh-Dhra'](#) may be a real town but not much evidence for residential areas – so far. Well, it was a fairly good day. Johnston & the Helms took off for Amman as did many others. I'm staying & hope to collect tomorrow. The water turned off all afternoon – caught Carl in the middle of a shower – you can imagine what he said.
- 6/5 Sunday Supposed to see the highlands of the several wadis we have been studying. Mark, Jack D. & 2 others decided we should go to the bank first. Much, much delay & over 1 hour to get some money changed, then the driver could not be found for another ½ hour. Finally, off by back road through Ai-headwaters of Es-Sal & Iraq headwaters of Numeira. Sampled wheat & barley & a few lentils & one vetch. The day nice, the scenery magnificent, the sampling not bad – rocks, plants, sites. A short trip, but beautiful – back for lunch & loaf. A good Sunday; most people went to Amman.
- 6/6 Mon. This one something else. Very still most of the night & hot. Then a hot wind & the world was covered with dust. Walsa up ca 1:30 w/stomach cramps & nausea. A bad start. Kept things reasonably under control. Took the car, Mark & John Opie to Wadi Hadithah & traced the Old canal to a lovely canyon cut out of limestone w/ **waterfalls & all**. Enjoyed it. Saw where

children had been playing “irrigation” – neat! Back to second breakfast w/stomach still fighting. Then to Wadi Es-sol & Numeirah. The heat tremendous & stomach in bad shape. Just zonked out under shade of the big rock while Mark & John did the canyon. A real struggle to get through the day. It turned out to be only 114° F but no breeze & it felt like an oven. Finally, back to highlands, a shower & beer & skimpy lunch. Went to pharmacy for tetracycline. Nipped some [arak](#) & slept & by supper felt much better.

6/7 Tues. My 60th birthday. During the night a cool breeze had sprung up and by 2:30 am it was downright chilly. I wore a sweater to breakfast. Hard to believe the contrast. Down the Ghor to a cool day with a delightful breeze – a perfect day. Took tour with Jack Donahue leading – a very interesting & pleasant session. Discovered things about the site that surprised both archaeologists and the geologist: e.g. a ca. 20 ft rather consolidated deposit in a tributary wadi with pot sherds & mud-brick all the way through it. Looks more like a tell than anyone thought. Altogether the site is impressive and a large section on the north must have eroded out. Lots of mortars for grinding, lots of flint blades, no projectile points at all recognizable. Sheep-goat the main animal bones & barley the main crops w/grape seeds fairly common. Made round of cemetery. More tombs to be opened, but not much new. Back to the highlands & a cold beer bought by Carl for my birthday then to a real first I had arranged w/free beer for all at my expense. The cook outdid himself w/a full half chicken each, extra fine bread, pine nuts, salad, apricots & an enormous birthday cake. It was all great. In the evening the Helms’, Bob Johnson & I had been invited to the house of John & Mary Pedigo for drinks and dinner. He is chief engineer for the potash co. with a camp at Numeira. It was all very pleasant but strangely American & incongruous. American food, color TV with U. S. programs, etc. – homemade bread because “there isn’t anything else”. Still, they are very nice people & well-adjusted to Karak except they miss other Americans. Both are graduates of Texas A & M and Mary is the daughter of Frank Gould! Now based in Houston. It got late early & we went back to rest house where lights promptly went out. A grand birthday but too much food.

6/8 Wed. A last-minute change in plan since Mike Finnegan under the weather, his car was available. I took it alone & drove down past Busiera to the woodlands. The data are: start with main street mosque at Tafila, then Busiera turnoff is 17.6 km from Tafila. Dana is 4.5 km from Kings Highway. The road winds through the woodlands so one can get a good section without walking much. Turns out to be oak-juniper almost entirely. The oak has very small holly-shaped leaves with much variation on a single tree. Found one very large terebinth and one wild almond, but the woodland poor in species compared to the Zagros. Lower slopes on Wadi Hadas had a [zizyphus spinae](#) – [christae](#) woodland at one time plus some other shrubs. There are a few trees near Karak that look like relicts & I must check them out before I go. Got samples of “dokhan” in suq. May complicate the Ezekiel text (?). Carl Helms left by service about 5:00 p.m. Happy to go, but I’m sure had a good time.

[Note: this begins on next page, the page facing the 6/8 entry. At the top of the page was:]

Data 6/11,

Division of Water for Hadithe spring

12" for Hadithe

6" for Mazra

4,000 dumen [Not sure of this word. Here Harlan goes into a lot of names & numbers concerning wells and wadis. He ends up this section, about the water resources with this note: **"50 yrs ago > 20 yrs ago, better than 5 yrs ago & then better than now."** [This is what all his research on the hydraulics of these wadis have led him to conclude.]

- 6/9 Thurs To site: weather still cool & pleasant – hiked the Wadi Hadith with Mark & John Opir. Found a delightful canyon in limestone w/waterfalls, etc. just lovely. The broken canal led to the wadi bottom shortly before that. Huge section washed out. No great innovation but pleasant day. Local governor gone until Sat.
- 6/10 Fri. On the site mostly killing time. The field work done as far as I can see. More tombs, more bones, more pots, more walls, little plant material, some grape seeds, an olive pit, a couple of barley seeds. Mark now excavating instead of survey – an outer wall or tower. Found a javelin head & what looks like arrow shaft. Most went up to Karak & sorted the collections.
- 6/11 Sat Walt, Tom, Jack Donahue & I made still another trip south through Safi Fitch, Khanazer & on up the fault to the Araba. Still worthwhile. E. B. tombs & pottery at Safi, but no site visible. Fitch & Khanazia being ripped up by highway construction people looking for gravel. A sad story of "progress". On return got Mohammed Denivish & called on the local governor. Date shown on previous page. **Water shortage appears real & serious. 6,000 drums no longer irrigated at Mazra'. Need data.** Bought bottles of J & B for the evening cocktail party. It was a good bash & I shall leave with reluctance. A great bunch of people & a very attractive area.
- 6/12 Sun. Late up, like 6:00 am local time. Breakfast & service to Ammon. A beautiful day & regrets at leaving that lovely castle, the little town, the gang & all that. To the American Centre - no sweat. It being only about 10:00 a.m. Went to Natural resources Authority. Was routed to the Director, Yosef El Nimri in another building and then to Amin Wardam in a third building. He was very helpful and provided what data he had – see next pages.

[On the next two pages he gives data on several wadis. The numbers have no units, so it is hard for this author to tell what the measurements mean. They are probably water depth or flows, but without units the numbers are hopeless. The next page gives a more formal title to the data:]

The Hashemite Kingdom of Jordan

Natural Resources Authority

Hydrology Division

Technical Paper No 40

“Review of Spring Flow Data – prior to 1965”

Amman, December 1966.

[Then he gives numbers for Wadi Thraa’ and draws a line across the page and below the line:]

Central Water Authority

H. K. Jordan East Bank Jordan Water Resources

Vol 4 Pt 1 Hydrology & sediment

Pt 2 Floods

Rept. by Sir M. Mochodald & Pts. 1965

Longest rainfall records are at Amman Airport – since 1923 & this gives fig. of 268 mm. At Beirut, records go back to 1880 & the curves are similar as far as they go.

“It can be seen that during the period 1880-1920 the rainfall was almost always in excess of the average values, whereas since 1920 apart from a short period 1938-1945, the rainfall was almost always less than the long-term average” – suggests possibly a 40 yr. cycle.

Seasonal Dist. Rainfall at Amman Airport [he then lists the following numbers, which I will omit.

<u>Month</u>	<u>Ave. %</u>	<u>Max % of Aves</u>	<u>Min. % of Aves</u>
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Sept.

Oct.

Nov.

Dec.

Jan.

Feb.

March

Apr.

May

[Harlan continues, for two more pages of hydraulic data on a number of wadis in Jordan. All kinds of numbers copied from various publications. I will not try to copy all these numbers. At this point in time it is hard to see the value of these. But the daily log continues:]

6/13 Mon. To NRA for more data/ Lotfi Boulos chm Bot. Dept. U of Jordan Jamil Lahham MSc in charge herbarium going soon to Penn State to get PhD taxonomy.

6/17 Tue

Dr. Dwari Assist. Dean College Agric wheat (durum) bosby, tomato big crops now being studied – will start on lentils – chalogins etc. later. Cr, Zoo students in Agric. Aprgroms one crop – one animal. S MSc. Crop prod. crop protection – soils & irrigation – human. ???? agric. Forma & extraior. Cellege Orig. Univ. started 1973. [many of these words too hard to transcribe]

The plants collected tentatively identified on following pages. Jamil a real help on some, but a day in the herbarium very refreshing. A girl secretary picked me up in a. m. & I came back by bus U service in eve. Got ticket fixed at Alitalia instead of Alia & all should be ready for Sat. [Harlan must be leaving Sat. 6/18/1977.

[On the following page, and continuing for 4 pages more, are lists of plants. I will not try to transcribe them. HVH2]

[Note at top of last page of plant lists:]

6/15 Wed. Called at U. S. Embassy. A Ms. Heslop was Agr. Economist & took my seeds & permit.

[Then on page following the last list of data, he begins text, but he just says that he went to another department and got some more data on irrigation.]

6/16 At NRA Library

Hunting Technical Services Ltd. 6 Elotree Way, Boreham Wood, Herts, England. “Karak – Hosa Groundwater Irrigation Project” Oct. 1968. The Kerak area was largest east of the desert Highway and Hejaz railway – Summary says in part. “...The soils of the Hasa Basin are normal standards too saline and alkaline for development. However, the existence of copious supply of groundwater at relatively shallow depth suggests that the economics of development should be examined. (sodium could possibly be bleached down – what effect on the lower Hasa drainage?

[On the next page he lists two more drainage projects, then writes:]

Three pilot farms of 100 donums⁴ each (10 ha) were established one each at Ghor Hazra’a, G. Isal and G. Sofi. – sald problems serious & recommends abandonment of the Safi farm – drainage & leaching

⁴ According to Wikipedia the dönüm (aka donum, or dunum) is an old Ottoman unit of land area defined as “representing the amount of land that could be ploughed by a team of [oxen](#) in a day”. Of course, this varied from place to place. In 1928 “the metric dunam of 1,000 square metres (0.10 ha) was adopted, and this is still used”.

required – Nematodes a big problem, rotations needed – The study shoots for 166% cropping intensity “if the water availability will permit”.

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Refs to Mr. Shahidy, Project Manager, Pilot Project Southern Ghore

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--- “Irrigation is applied at intervals of 5-10 days. At Ghor Mazra’a the irrigation water comes from the concrete tank in which the depth of water is measured before and after application, in order to record the quantity of water applied. The average rate of application is 25 m³/donum which is equivalent to 25 mm or 1 inch of irrigation.”

Another report by same consultants dated March, 1977 “Mujib & southern Ghore Irrigation Project, Preliminary Review Report. Water resources Supplement” pp 34 plus map & tabs. They summarize previous reports & data to get the following averages: [Then he gives a table of data with 12 months of the year, beginning in October with yearly averages, for 6 different places. I will not try to duplicate these numbers. The averages are 80, 30, 30, 810, 150 & 150 l/s (liters per second). There is a note on the margin of the sheet, which says:] “The spring at Hadithe is rated at a reliable 300 l/s.” [We can conclude that the spring at Hadithe has an output greater than most of the other sources in the table.]

[On the next page (page 27) he gives a narrative about the flows in Wadi Kaarak and then Wadi Dhra’a including the effects of irrigation on wadi flows. The following is quoted from his notes on Wadi Dhra’a:]

The flows diverted from the Wadi Dhra’s used for irrigation in Ghor Dhra’a. The residual base flow is gradually lost and at the confluence with the W. Karak the wadi Dhra’a carries no base flow on the surface.

[He continues on with hydraulic data on ‘Ain Silskin, Wadi laal, Wadi Numeria, also called W. Hudiera, Wadi Faifa, Wadi Khanzira, Wadi Ibn Hammad (Hadithe). He continues with page after page of hydraulic data, listing references. Then on my page 32 he abruptly changes course:]

“Can’t describe it, but took some pictures. Got in too late for lunch at the villa so had a fine meal in town – the only customer. Managed to walk to the villa gate w/o knowing it & they took care of me & everyone else through a. m. of June 24 when Marcres Kajam, his son & I took the Amexio car to Milano. [Suddenly, he is in Italy. I must have missed a crucial note somewhere. Earlier he said that he was leaving on Saturday, June 18 and here it is. HVH2]

A meeting is a meeting but the villa and estate is something else.

On to Venice and a marvelous tour, hiking all over town, taking the boats – one brief gondola. The tourist crowds fantastic. At San Marco more tourists than pigeons – Away from there they disperse through the town and not so bad. Spent 25th – not long enough – on 26 took train to Roma & on 27 back

to Champaign where I arrived exhausted to find a note of Sue Ogelvee's (Jean's aunt) death & so on to Florida early next morning – a long story.

[Following this ending there are several more pages of data. These are more places and crops. The Title is "Jordan, 1977".]