

REPORT PRESENTED TO THE SUPREME COUNCIL OF ANTIQUITIES, EGYPT, ON THE  
2000 SEASON OF THE DAKHLEH OASIS PROJECT.

## **INTRODUCTION.**

The 1999-2000 field season of the Dakhleh Oasis Project began on 16 November, 1999, when the field camp was opened at Ezbet Bashendi in our usual quarters. A total of 58 project members joined the camp from time to time, with less than 30 at any one time. Three SCA representatives, one for Coptic and Islamic and two for Pharaonic and Roman antiquities, accompanied the project this season.

Our field work encompassed most of our interests and included the linguistic study of the dialect at Bashendi, physical anthropological studies of the remains from Ismant el-Kharab, excavations at Holocene Neolithic campsites, at the Old Kingdom sites at Ein el-Gezareen, and the eastern Look-out posts, at the Roman village of Ismant el-Kharab (Kellis). There was also surveying by the Pleistocene archaeologist, by the geologists and the archaeozoologist, both in Dakhleh Oasis and in Kharga Oasis. The epigraphic survey of Deir el-Hagar temple continued until the end of the season in mid-March, 2000. The various team members have reported to me and I hereby pass on their accounts.

## **ENVIRONMENTAL STUDIES.**

### **1. Geological Studies**

The Geological Division of the Dakhleh Oasis Project sponsored two geologists in the field this season: Prof. Robert Giegengack, Department of Earth and Environmental Science, University of Pennsylvania, and Jennifer R. Smith, Ph.D. candidate in the same department.

The team was in the field from February 29 until March 14 and brought a Differential Global Positioning Satellite System (DGPS) to enable them to acquire better topographic control of mapped points than had been possible in years past. Our first objective was to establish elevations for the Pleistocene sediments mapped in the basin of Lake Balat by Jacqueline Frizano in 1995 and 1996. We need to establish whether sedimentary units Frizano defined in the western basin of Lake Balat are at the same elevations as the presumed equivalent sediments she mapped in the eastern basin, which extends to beyond Tineida, and whether Quaternary carbonate sediments we mapped along the crest of the Balat anticline are higher than the units mapped as CSS in the two basins. We occupied a number of outcrops in both basins, and along the crest of the anticline, while our base station, established on the roof of the new DOP laboratory in Mut, recorded small variations in the position calculated for that base station. When data are reduced we should be able to tell, with more confidence than we have had heretofore, whether or not the two basins of Lake Balat were ever joined, and whether the carbonate sediments along the crest of the Balat anticline simply represent another extension of the CSS or record an earlier breakout of ground water as the Mut aquiclude was thinned by erosion along the crest of the anticline. If the latter, then the anticline-crest carbonate sediments may represent the basal sediments of a lake that pre-dated Lake Balat, and of which those sediments are the only record.

Preliminary reduction of DGPS data indicate that all CSS remnants are at the same elevation, within 1 meter, but that the anticline-crest carbonate deposits are of the order of 10 meters higher.

We returned to Bulaq, in Kharga Oasis, on March 3, to revisit the travertine deposits at Wadi Midauwara and to map the deposit we identified in 1999 at Naqb Rizeikat (eventually we also remapped the travertine deposits at Naqb Mata'ana; both Rizeikat and Mata'ana had been visited briefly by Caton-Thompson and Gardner in the 1930's). On March 3 we took prehistorians Kleindienst and MacDonald to Midauwara to examine several of the sites we identified last year. On March 4 we began searching for

routes whereby we could reach Rizeikat and Mata'ana by car, and from the 5th through the 11th of March we mapped those travertine deposits. Neither is as complex stratigraphically as Midauwara, and neither yielded as many potential prehistoric sites. Rizeikat is a massive outlier of plateau tufa, cut off from the edge of the escarpment by headward growth of two major wadis, and preserved as a consequence from erosional removal by streams draining the edge of the escarpment. Rizeikat preserves evidence of massive slumping as support of the plateau tufa was removed by undercutting of the base of the plateau remnant. Several of the slump features appear to be earthflow lobes developed at the base of tufa blocks, a mass-wasting phenomenon typical of watered soils.

We established reconnaissance Quaternary stratigraphic sections for Rizeikat and Mata'ana, and sampled the major stratigraphic units for U-series age determination.

On March 12 we returned to Umm El Dabadib to try another method for acquiring cores from several of the giant acacia trees that survive there, but we succeeded only in burning out the heavy-duty battery-powered drill we had brought there at considerable expense. We will use the same drill bit next year, but will undertake to power it with a standard electric drill driven off an AC generator.

Jennifer Smith has acquired enough field information to complete her Ph.D. thesis, which we hope will be supported by U-series ages she will measure in the laboratory of Henry Schwarcz next summer.

## 2. Archaeozoology & Palaeontology.

### Introduction.

Prof. C.S. Churcher spent from 26 January until 23 February in the Oasis, occupied in field and laboratory work. The field work involved Late Cretaceous, Mid-Pleistocene and Holocene stratigraphy and the collecting of vertebrate materials from strata or deposits of these ages. The stratigraphic geology of the Libyan Escarpment, comprising the Taref, Mut, Duwi, Dakhla and Tarawan Formations, and of an anomalous structure east of Teneida in the first four formations, was assessed. Occurrences of Dakhleh Glass on the CSS plateau east of Camel Thorn Basin, were visited. CSS deposits southeast of Dakhleh's 'Eastern Gates' were further investigated and consequently Palaeolake Teneida was extended to the southeast, perhaps as far as the far hills. Laboratory work involved identifying animal materials from the Romano-Byzantine town of Kellis (Ismant el-Kharab), the Old Kingdom habitation site of Ein el-Gezareen, and the conservation and identification of Holocene specimens, mainly from the Neolithic Sheikh Muftah Cultural Unit. A hyæna den was partially excavated. Prof. Churcher, from time to time, was accompanied and assisted by B. Churcher, N. Churcher, Prof. M. R. Kleindienst and H. Thurston.

### Archeozoology.

#### I. Ein el-Gezareen (32/390-K2-2); An Old Kingdom Site: Archaeofaunal Samples.

The 1999 and 2000 samples derived from many squares but mainly from 'Surface' collections or shallow levels (<25 cm). Thus contamination with modern items was always a possibility (eg., ass, pig or chicken). The vertebrate materials recovered by A. J. Mills' team at Ein el-Gezareen during field seasons in the years 1998, 1999 and 2000 yielded the expected major complex of animals: cattle (cow, *Bos taurus*), goat (*Capra hircus*), and Dorcas gazelle (*Gazella dorcas*), with occasional representatives of other taxa.

Taxon	cattle ( <i>Bos</i> )	goat ( <i>capra</i> )	Gazelle ( <i>Gazella</i> )	Waste	Total

Taxon	cattle ( <i>Bos</i> )		goat ( <i>capra</i> )		Gazelle ( <i>Gazella</i> )		Waste	Total
	MNI	Wt	MNI	Wt	MNI	Wt	Wt	Wt
1998	82	13,120 37.95%	197	14,190 41.04%	24	560 1.62%	6,705 19.4%	33,815 100%
1999	38	4,495 31.72%	124	8,230 58.08%	18	255 1.79%	1,190 8.3%	14,170 100%
2000	13	695 21.79%	35	1,990 62.38%	9	60 1.88%	445 13.95%	3,190 100%

**Table 1.** The years' identifications are summarized by Minimum Numbers of individuals (MNI) and weights (Wt in grams to nearest 5 g), with percentages (%) by weight of bone assigned to each taxon given under the paired figures for each taxon. The 1998 figures are revised to include overlooked samples (Churcher, 1998, for earlier estimates).

MNI's were "guesstimated" as no reliable method exists for identifying each individual animal at sites in which many tens, if not hundreds, of animals were slaughtered and are represented to the recovering archaeologist as isolated and not necessarily intact skeletal units. MNI's give the numbers of individuals in each sample bag and these estimates, when combined, are therefore only rough indicators of the numbers of animals present. At best, they give approximations of the ratios of one animal to another in the site or section of site.

The weights given for each taxon by year also provides a false sense of exactitude as it is only the weight of bone recovered and identified by the assessor that is recorded. There comes a time when identification to taxon of every piece becomes labour intensive and reaches diminishing returns. Consequently, these figures are approximates and minima but do reflect the residuals from the process of taphonomic reduction, with the realization that larger bones and harder teeth are more likely to survive destruction by scavengers, etc., and thus bias the ratios.

The 1998 samples were the most extensive and possibly give reliable estimates of the incidence of cattle, goat and gazelle at the site. Neither the 1999 nor 2000 seasons' excavations were as extensive as that in 1998 and, because the sampling was less extensive, the ratios are less reliable. It is interesting to observe that 82 cattle provide essentially the same amount of bone as do 197 goats, for 211 and 72 g per animal, respectively (see previous paragraph). If the same ratios of cattle to goats is applied to the 1999 and 2000 samples, the (1999) 38 cattle should correspond to 91 goats and the (2000) 13 cattle should correspond to 31 goats. The latter figure is near enough to 35 to be insignificantly different. However, the 1999 sample appears to be overrepresented by goats by some 30 individuals, or approximately 25%. These figures should not be relied upon but do suggest that the 1998 and 2000 samples may represent the normal ratio of cattle to goat at this Old Kingdom site. It will be interesting to see whether future years' or enlarged samples in any wise agree with these preliminary results.

Twelve horncores (7 juvenile) of goat and 1 young male and 1 adult female of Dorcas gazelle were recovered in the 1999 sample and 4 juvenile horncores of goat and 2 female horncores of Dorcas gazelle recovered in the 2000 sample. It is noted that 24 goat horncores were recovered in the larger 1998 sample.

Additional animals for 1999 and not summarized in Table 1 are ass (*Asinus asinus*, 2), rabbit (*Oryctolagus cuniculus*, 2), goose (*Anser anser*, 1?), duck (*Anas platyrhynchos*, 2), pigeon (*Columba livia*,

5): wild animals, in addition to Dorcas gazelle, are desert fox (*Fennecus zerda*, 1), ostrich (*Struthio camelus*, 1?, & 10 occurrences of egg shell), turreted snail (*Melanoides tuberculatus*, 2), Nile oyster (*Etheria elliptica*, 3 fragments), and Nile catfish (*Clarias* sp., spine and 7 vertebrae). Small birds and mice were sparsely present.

Additional animals from the 2000 sample are ass (4), rabbit (1), duck (1?), ostrich (3 occurrences of egg shell), turreted snail (6), apple snail (*Pila ovata*, 4), Nile oyster (1). Small birds, possibly including pigeon, and mice were also present.

Six awls were recovered from within the 1999 bone sample and 10 awls and a bone knife in the 2000 sample. (Cf. >50 awls in the 1998 sample). Many fine pointed awls were recovered in all three annual samples but no robust bone awls or fids mounted in gazelle or goat longbone halves were found in the 1999 and 2000 samples. Perhaps this reflects the lack of deep excavations in these seasons.

Butchering techniques showed occasional uses of saws to detach horns or horncores, or to remove the finer cancellous bone from the ends of dense longbone shafts. Axes were used to divide vertebral columns axially, and mauls to reduce skeletons or expose marrow cavities, presumably after the meat had been stripped from the bones. Some dense longbone pieces appear to have been prepared as 'blanks' for further working. The catfish vertebrae in the 1999 sample were from the fish's body cavity and still retain their lateral processes. This shows that the fishes were whole and unfileted, but probably gutted, when processed for trade to the oasis.

II. Kellis (Ismant el-Kharab)(31/420-D6-1); A Romano-Byzantine Site: Analyses of the Archaeofaunal Samples.

Bone materials recovered from Kellis during the 1997 and 2000 field seasons were analyzed by feature and level, with small samples from 1993. The major samples from 1997 and 1998 were reported in 1998 (Churcher 1998). In each of the four years' 1997-2000 samples the combined frequencies of pig, cow, goat and chicken exceeded those of all other faunal components, perhaps by as much as 4:1 (Churcher, MS).

Taxon	pig ( <i>Sus</i> ) Nos.	Cattle ( <i>Bos</i> ) Nos.	Goat ( <i>Capra</i> ) Nos.	Chicken ( <i>Gallus</i> ) Nos.	Ass ( <i>Asinus</i> ) Nos.
1997		3	2		
2000	12	42	29	17 + egg	25

**Table 2.** Incidence of major taxa recovered from Kellis in 2000. The 1997 records are supplemental to those reported elsewhere (Churcher, MS; 1998). 'Nos.' give only the total frequency of a taxon present in an annual sample and may bear little relationship to its incidence at the site. It may indicate relative frequency subject to taphonomic biases imposed by scavengers.

No remains attributable to sheep (*Ovis aries*) were identified from Kellis, as in the 1998 analysis. Other taxa present in Kellis include camel (2 + dung), rabbit (1), duck (3), goose (1), Dorcas gazelle (2), apple snail (5), Nile oyster (3). Also present were small avian bones (probably including pigeon), bones of mouse (2) and gerbil (4), grasshopper and probable canid dung. Beetles were found associated with a mummy. Human remains occurred 11 times and represented infant, child, adolescent, adult and senile

individuals.

The first four animals (pig, cow, goat and chicken) represent 63% (100/158) of the incidences compared to 80% in sites excavated in 1995-1998 (Churcher MS). This 17% difference may reflect in part the increased incidence of ass (16% [25/158] from 5% [36/685]).

Six additional identifications of Nile oyster were made on materials collected in 1993 from Rooms 3,4, 6,24 & 27a, and Zone XVIII, Chamber C.

The identified specimens from Ein el-Gezareen and Kellis, unless retained for future reference or because of modification as tools, were returned to their respective sites.

### III. Holocene (Neolithic) Sites: Analyses of Archaeofaunal Samples.

The Holocene faunal specimens comprise those collected by McDonald from her excavations during the field seasons of 1998, 1999 and 2000. They derive from Locs. 105, 108A, 270B, 300, 385B, 387, and 388. They mainly consisted of elements of Dorcas gazelle (*Gazella dorcas*), hartebeeste (*Alcelaphus buselaphus*), and a large cattlebeast (either cow *Bos*, or Cape buffalo, *Syncerus?*).

The Holocene bone specimens were frequently more fragile and fragmentary, and required considerable conservation attention before identification was practicable and storage safe. The interesting and less common identifications included hyaena, probably striped hyaena (*Hyaena hyaena/H. striata*, Loc.387); an artiodactyl larger than Dorcas gazelle and smaller than hartebeeste (Loc.270B); this may be a large gazelle, e.g., the rhim or Loder's gazelle (*Gazella leptoceros*), or possibly an early domestic goat (*Capra hircus*; early for Northeast Africa). However, all possible goat specimens derive from surface deposits or nearly so (Levels 1 or 1A) and McDonald and I are waiting the recovery of a certain goat element from a deeper horizon before confirming its presence in the Sheikh Muftah Cultural horizons

### IV. Bee's Lookout (30/450-C4-1)

A small sample from Bee's Lookout, collected by Dr. Olaf Kaper, contained elements from Dorcas gazelle (*G. Dorcas*, 8 pieces), cattle tooth enamel (*Bos ?taurus*), a hare calcaneum (*Lepus capensis*), mouse

Taxon	Dorcas gazelle <i>G. Dorcas</i>	hartebeeste <i>A. Buselaphus</i>	bovid <i>Bos</i> or <i>Syncerus?</i>	Comments
loc. No.				
105	1		1	
108A	7	1		
270B	large gazelle?		1	gazelle may be goat
300				ass (discarded)
385A	1			Nile oyster; lymnaeid snail; marine shell - ? <i>Pinctada</i> sp.
387	6	1	1 (large, ? <i>Pelorovis</i> )	hyaena (? <i>H. Hyæna</i> ) jaw frag., and lizard.

Taxon	Dorcas gazelle <i>G. Dorcas</i>	hartebeeste <i>A. Buselaphus</i>	bovid <i>Bos</i> or <i>Syncerus?</i>	Comments
388	1	1		

**Table 3.** Animals identified from 7 Sheikh Muftah Cultural sites excavated in 1999 by Dr. M.M.A. McDonald.

and gerbil bones, bird longbone shaft, snake bones (3 vertebrae with ris), a small scat containing a cricket exoskeleton, possibly from a fennic fox (*Fennicus zerda*), and a leather strap, sized to encircle a wrist, possibly made from goat hide, and possibly a wrist guard for a bowman. This site is dated to the Old Kingdom on pottery and other artefacts, and the animals identified were extant in the region during this period (and still are).

#### Vertebrate Palaeontology.

##### V. Holocene Palaeontology.

Additional vertebrate specimens were collected from pan sediments on the eastern margin of Camelthorn Basin (Loc. 358), dated at 8000-6000 BP on their contiguity and stratigraphic equivalence with Sheikh Muftah Cultural Unit clusters. These specimens derive from sediments below an unevenly deflating duricrust that at present forms the main upper element of the pan deposits. Some specimens are incorporated in the duricrust, which is calcareous and may be dissolved in dilute acetic acid to free the bones or teeth. New specimens become exposed every 2 or 3 years as aeolian erosion thins or makes windows through the crust into the underlying pan sediments. Specimens recovered this year include associated bovid metacarpal, carpal and two proximal phalanges, on first examination indistinguishable from *Bos*, both distal end of condyles and basioccipital of a skull, also similar to those of *Bos*, and an elbow (distal end of humerus and proximal ends of radius and ulna, in articulation) of *Gazella dorcas*. The latter appears as though severed by a hyæna's bite (see *H. hyæna* reported from Loc.387, above).

These materials are coeval with the zebra jaw (*Equus capensis*) and hartebeeste (*Alcelaphus buselaphus*) specimens recovered in 1998. Materials of similar age and geological provenance were recovered by McDonald from Locs. 105, 108, and 108A this season. No visit to similar deposits of the same age near Sheikh Muftah was possible this season.

##### VI. Mid-Pleistocene Palaeontology and Stratigraphy.

The mid-Pleistocene near-shore CSS exposures of Palaeolake Teneida, now topographically elevated on crests of Taref Fm. sandstone yardang gebels on the eastern-southern margin of the oasis from southeast of Ezbet Ein Hajir (Loc.348) to Iron Balls Spring (Loc.211) were scouted for further specimens of the Iron Balls fauna. Loc.348 yielded materials assignable to a large bovid, ?extinct giant African buffalo *Pelorovis*, and include a damaged astragalus, an unfused proximal epiphysis of phalanx I of camel (?*Camelus thomasi*), postcranial materials of a gazelle similar to *Gazella dorcas* in size and morphology, but larger, a scrap of an equid upper molar, and vertebral fragments, including zygapophyses from vertebrae large enough to derive from *Pelorovis* and others from an animal apparently larger than the giant buffalo but of unknown affinity (?hippo, rhino or elephant). The shaft of a bird bone was also recovered; at present unidentified except to the size of a thrush. Loc.357 yielded further scraps and a MSA/ESA flake

on a short visit.

I visited the CSS capped bedrock highs to the south of the Kharga road, near the old road camp, before the gebels at the 'Gates of the Oasis'. We observed that CSS extends to the crest and the east-west trending Taref Fm. ridge that is the local topographical high and forms the limit of the oasis basin in the area. From this crest it is possible to see the 'Three Bashendi Ladies', the 'Cat and Two Kittens' and the 'Long Mountain' gebels, some 10-20 km on the southeast horizon and to realize that there is nothing to preclude Palaeolake Teneida from having extended well to the south of the present oasis and to have flooded much of the area containing McDonald's Holocene Neolithic sites. It will be necessary to visit some of these distant gebels or those forming the eastern margin of this basin to search for ancient beach cobbles or wave-cut benches.

#### VII. Cretaceous Palaeontology.

A. An additional sample of the layer that yielded microfossils at Bee's Friday Site (25°37.07'N; 29°17.44'E) and a grab sample from Gerry's Site east of Two Red Hills' High Bluff (25°32.98'N; 29°18.87'E), from the layer that contained turtle and dyrosaur vertebrae, were obtained for collapsing in water and sorting under magnification to expand the earlier sample and test that Gerry's Site contained a fauna similar to that at Bee's Friday Site. The animals recognized at Gerry's Site are all present in Bee's Friday Site although the depositional environment and size of fossil specimens reflect a higher energy environment.

B. Dr. Peter Sheldrick located and collected parts of a mosasaur from the Dakhla Fm. east of the Two Red Hills piedmont spur. These comprise six pectoral girdle and/or limb pieces and 10-15 vertebrae. The former are in fair condition but the latter are badly wind eroded with the centra of the vertebrae almost removed. An unsuccessful attempt was made to find this site. Subsequently, through correspondence with Sheldrick, I believe that I have determined the locus and will visit it in the 2001 field season.

The bones appear to represent a left scapula (2 pieces), radius, ulna, partial metapodial or phalanx, and an unidentified element of a smaller mosasaur, probably *Cliastes* sp. This is the first associated vertebral column and girdle with limb elements so far found in the Dakhla Fm. shales. All previous fragments have been isolated units or collections of vertebrae.

C. During an excursion to the piedmont of the escarpment, north of Bashendi and near where Sheldrick found mosasaur materials, for the purpose of checking the P-II and P-III crests of the piedmont spurs for ESA/MSA tools, Kleindienst and I, and accompanied by others, located a shale horizon in the Mut Fm. that contains dinosaur vertebrae and other bones. It also included a tooth of the shark *Scapanorhynchus rapax*, chelonian vertebrae and two types of turtle carapaces. Seven vertebrae in various states of preservation were collected and are stored for examination and conservation in 2001. Other fragments, possibly of skulls or girdles, were also collected. The vertebrae are as yet unidentified but provisionally represent a carnosaur, possibly *Spinosaurus* or *Carcharodontosaurus*, and other forms (not crocodilian, and not the longostrine crocodilian *Dyrosaurus*). Further investigation of this stratum in 2001 should prove most fruitful!

#### Stratigraphy.

#### IX. Cretaceous Stratigraphy (25°27.5'N, 29°23.20'E): Bow Wave Structure.

The anomalous 'ring' structure, dubbed the 'Bow Wave Structure', involving Taref Fm. sandstone, Mut Fm. variegated shale and phosphorite sills, and Dakhla Fm. black shale (from outside to centre), that lies northwest of Iron Balls Spring across the fault that separates the Taref Fm. sandstone gebels of Camel Thorn Basin area from the chalk covered pediments to the north, was roughly mapped at a scale of 1:2000

based on the aerial photos of the area. The formations exposed were verified and keyed onto the sketch map. Kleindienst measured dips, with recorded maxima of about  $80^{\circ}$  on an approximately E-W strike on the Duwi Fm. phosphorites at the south-centre of the 'ring'. Dips are less elsewhere around the 'ring' becoming markedly less to the east. The disarrangement of the strata to the northwest is further confused. It is likely that the disarranged strata continue under the chalk mantled by P-III pediment that forms the northern boundary of the exposed structure. The whole appears as though something ploughed into the strata from the east at a relatively shallow angle, forcing strata downwards and creating a wave or berm of up-ended strata on both sides and to the west or front, where the effect is most marked. Hence, like a bow wave of something moving westwards. This conformation can be duplicated in sand with a fist!

Key fossils have been recovered from the Mut, Duwi and Dakhla that confirm that the 'ring' contains depressed portions of the strata that form the Libyan Escarpment. The Mut Fm. within the structure yielded a dinosaur (?carnosaur) vertebral centrum, a lungfish tooth plate (*Ceratodus humei*) and a tooth of a shark (*Scapanorhynchus rapax*), all typical of Mut deposits. A block of displaced Mut and Duwi Fms to the southeast of the structure yielded a tooth crown of *Sc. rapax* from the Mut Fm. and parts of two elasmosaur vertebrae from the Duwi Fm., the latter typical of the Duwi fauna. The exposures of these strata units within the Bow Wave Structure should be carefully combed for further fossils to confirm their identity and show that the units are typical and that the ring formation has been imposed upon the units subsequent to their deposition.

There appears to be no sign of any penetration of the centre of the 'basin' formed by these up tilted strata and thus, if the structure is indeed the result of an impact, the overlying rock that was displaced or distorted to form shallower levels of the 'ring' has been eroded away. As no ring faults have yet been discerned, the possibility that the structure represents a graben seems unlikely.

#### Miscellaneous

##### IX. Hyæna Den (Lat. $25^{\circ} 28.06'N$ ; Long $29^{\circ} 11.65'E$ ).

An abandoned hyæna den was discovered in 1998 by Kleindienst and myself beneath the CSS cap of a flat-topped gebel SE within the basin of Palaeolake Balat (Churcher, 1998, Field Report). Part of a day was spent excavating one entrance (of two). The den had been vandalized by tomb robbers who mistook it for a Roman Period tomb. In 1998 bones were seen scattered about the entrance and down the talus slope below, and represented ass, cow, goat, camel and hare, as well as red fox or jackal and fennec, the latter three probably representing denizens after the extirpation of the hyænas. Bone from an undisturbed layer towards the side of the entrance represented cow and ass, but also included a fragment of a dentary with part of the last lower molar of a hartebeeste. If possible, a radiocarbon date on this fragment would give a date for coexistence of hyæna and hartebeeste. Such a date might be as recent as 1960, and Osborne and Helmy (1980, 428) give a recent record for *H. Hyæna* at 'Dakhla Oasis.' Bones collected in 1998 and examined by A. J. Sutcliffe of the Natural History Museum, London, in March 1998, were confirmed as broken by hyæna.

##### X. Summary.

The accomplishments of this season are: 1. Identification of the archaeofaunal elements from Kellis, Ein el-Gezaren and the specimens recovered by McDonald. 2. The collection of further competent *in situ* Sheikh Muftah age Holocene specimens. 3. Realization that Palaeolake Teneida probably extended southeast to a shoreline against the hills to the east of the extensive basin southeast of Teneida and to the hills visible on the south-southeast horizon. 4. The discovery of a new dinosaurian deposit in the Mut Fm. and 5. The start of formulating how the Bow Wave Structures anomaly east of Teneida may have formed

and its geological composition.

Scheduled for further investigation in 2001 is the bow wave Structure (checking the strata or formations, and measuring the dips, strikes, etc, with GPS locations), the Mut Fm. new dinosaur locality, the Mid-Pleistocene Iron Balls Faunal horizon, and the southeastern shoreline of Palaeolake Teneida. Stratigraphic, geomorphologic and palaeontological inquiries will be pursued as opportunities become available.

#### XI. References.

Churcher, C. S. , MS., Faunal remains from Kellis: animals identified from deposits within temples, churches and domestic areas. [26 p., 1 table].

Churcher, C. S. 1998. Dakhleh Oasis Project. Report for the 1998 Field Season. [10 p]

Osborne, D. J. And I. Helmy. 1980. The Contemporary Mammals of Egypt (including Sinai). Fieldiana (Zoology), N.S. No.5 (1309), 428p.

### 3. Archaeobotany.

This year's field season of the archaeobotanists Ursula Thanheiser and Johannes Walter lasted four weeks.

During this period plant remains from two Holocene sites, two Old Kingdom sites, and the Romano-Byzantine village of Kellis were extracted.

#### A. Holocene Sites.

This year's work concentrated on excavating two Sheikh Muftah Neolithic sites, but only one of these yielded archaeobotanical materials (Loc. #105 = **30/420-P1-1**). A total of 9 soil samples were taken, the charcoal and charred plant macro-remains extracted with the aid of an electrostatic device and analysed. All samples yielded some charcoal; albeit from one genus only: *Tamarix* sp. (Tamarisk). No macro-remains were present on the sites. Whether this is due to differential preservation of the two classes of material, or whether this reflects a specific use of the sites, is yet unclear.

#### B. Old Kingdom Sites.

##### 1. Ein el-Gezareen (**32/390-K2-2**)

From a total of 15 soil samples which were left over from last year's excavation, the charred plant remains were extracted and analyzed. In contrast to the previous season, the amount of charred material present in the soil samples was rather low. All samples yielded emmer wheat (*Triticum dicoccum*) and barley remains (*Hordeum vulgare*) but hardly any other fruits or seeds. In addition to the macro-remains, wood charcoal from tamarisk (*Tamarix* sp.) and Nile acacia (*Acacia nilotica*) was found.

##### 2. Watch Post **30/450-C4-1**

Seven soil samples were taken and the plant remains extracted in the usual way. All samples yielded charcoal of both tamarisk (*Tamarix* sp.) and acacia (*Acaacia* sp.), but no other plant remains. This leads to the tentative conclusion that the soldiers stationed on the post were supplied with food and did not prepare their meals there.

##### 3. The Romano-Byzantine settlement of Kellis (**31/420-D6-1**)

Work concentrated on the analysis of plant remains which were left over from previous seasons

and on samples from the newly excavated areas A/9, A/10, and C/2/2 - C/2/6. Currently we have a total of c.850 samples from domestic areas, the temple complex and Large Eastern Church. The results of this year's work fit well into the pattern already emerging during previous seasons. Staple crops are bread wheat (*Triticum aestivum*) and hulled barley (*Hordeum vulgare*), followed by hard wheat (*T. durum*) and occasionally emmer wheat (*T. diccocom*) and pearl millet (*Pennisetum americanum*). Amongst the pulses, fava bean (*Vicia faba*) is dominant. Other species (lentil - *Lens esculenta* and pea - *Pisum sativum*) are very rare. This stands in strong contrast to other Roman sites (like Mons Claudianus) where pulses occur in abundance. The spectrum of other plants (condiments and spices, fruits and nuts, fiber plants, weeds and ruderals) was extended by a new plant, castor bean (*Rhizinus communis*).

## ARCHAEOLOGICAL STUDIES.

### 4. Pleistocene Archaeology & Geoarchaeology.

The Pleistocene archaeologist, Prof. M. R. Kleindienst, began her work on February 9th, departed on 8th March, and was based at Ezbet Bashendi. From time to time, Prof. Kleindienst was accompanied and assisted by Prof. C.S. Churcher, N. Churcher, B. Churcher, Prof. R.F. Giegengack, J.R. Smith and H. Thurston. She reports as follows.

Limited field time meant limited objectives:

- 1) to verify, photograph & further explore the two "Dakhleh Glass" localities (Loc. 211, Loc.390),
- 2) to finally walk up the old Darb el-Tawil trail, known since 1986 from air photos and palaeontological work below the escarpment,
- 3) to visit the area not yet surveyed in the Piedmont NE of Bashendi, east of locs. 318/319,
- 4) to obtain samples for Schwarcz for a new dating method, now under trial,
- 5) to liaise with the geologists re their work at Kharga, mapping tufas at Wadi el-Medawarra in 1998 & 1999,
- 6) to finish a small area of survey for MSA related to the CSS, SE of the Loc.211 terrace. (This was not completed in 1998),
- 7) to process some old collections, from various localities.

Re: 1) I established the southward spread of Dakhleh Glass at loc.211, extending from the CSS-capped jebels overlooking the eastern Camel Thorn Basin, to the southern detached CSS terrace remnant of Loc. 211. The northern extent has not yet been fully established; the eastern and western limits have probably been eroded away. Dakhleh Glass resting on the Holocene pan sediments at loc.358, is clearly redeposited as it is on the surface of el-Akoulah Pan. (At Loc.358, in Camel Thorn Basin, I found a 'sinter', formed by the melting of the upper pan sediments, associated with a Holocene locality [?Sheikh Muftah Unit], a material which is quite different from Dakhleh Glass.

a) With Churcher and others, and later with Giegengack and Smith, I investigated the 'Bow Wave Structure' (BWS) north of el-Akoulah Basin, which was discovered in 1996. Its origin remains a mystery that requires future geological investigations. It is clear that all the existing geological maps of this entire area south of el-Battikh Promontory are incorrect regarding the geological formations present, and the degree of faulting and cross-faulting. One possible origin for the BWS is that of an impact crater, although Giegengack considers this unlikely. We also investigated the three areas of displaced sediments (duwi and Dakhla Formations) noted in 1996, which are resting on the eroded

Tarif sandstone surface below the rim of el-Akoulah (? approximately = rim of Palaeolake Teneida). We do not yet understand how small blobs of sediment came to be out of stratigraphic order well south of the stratified bedrock exposures.

b) I briefly visited Loc. 390 southwest of Balat. While photographing the CSS and Dakhleh Glass deposits, I noted pieces of a curious iron-rich rock which appears to have a melted surface, some as large as 60 cm in length. This may be a chondrite, and related to the Dakhleh Glass at Loc. 390, occurrence 2, which had been found in 1998. *This needs confirmation by experts.* I will map and test Loc. 390 in 2001, where ESA appears to derive from the 'old reg' (aeolized veneer) underlying the CSS.

Re: 2) With several others, I climbed the Darb el-Tawil trail that follows a C1 colluvial ramp up the escarpment face, south of the Wadi el-Tawil. This shows clearly on air photographs, and is easily followed although it is washed-out in places and probably has little modern usage. I collected 'trail garbage' which C. Hope identified as ranging from Old Kingdom through modern; actually, the 2 sherds identified as 'modern' were the only ones seen. Mainly, the indicated usage of the trail in antiquity goes back to pre-Old Kingdom times (Holocene lithic debris) up to Medieval Islamic times; for the latter there is a staging area to the north of the trail head on the Plateau with abundant broken water jugs with their plugs, faience plate fragments, etc. A local informant says that the trail is still known as "The Walking Trail". However, bones identified by Churcher indicate that both donkeys and camels ascended/descended in Antiquity. Just below the trail head is a protected area behind large fallen limestone blocks, with slab structures. This may be the 'outlook site' or 'checkpoint' for the trail, although no petroglyphs were noted in our rather hasty passage. Some sherds are associated (not collected). The French Mission may have previously collected some sherds, as this trail is marked on some of their published maps of Dakhleh - e.g. in BIFAO '99 (Marchand and Tallet 1999:316)

a) C. S. and N. Churcher found a 'staging area' site of Sheikh Muftah Unit/Pharaonic times southeast of the trail head, in a long deflation basin lying to the east of a limestone yardang. Its age and importance were later confirmed by a visit with McDonald and Taubner (Loc.402).

b) The basal remnants of tufa terraces were noted in place along the trail, about 1/3rd of the way up. These were later confirmed in a visit with Giegengack and Smith. This is the first find of tufa terraces in place on the Dakhleh Escarpment face, although we have previously predicted that they should exist.

c) The two later visits to the area allowed me to explore the P-II and P-III terraced surfaces below the colluvial ramp, as well as for tufa outcrops and large displaced blocks in the colluvium and the terrace gravels. It is noteworthy that while lithics of Holocene archaeological units form a continuous scatter on the colluvial face, extending with lesser frequency onto the two terraced remnants, there are practically NO Pleistocene lithics at all (only 3 Levallois flakes found). This area was little frequented during the Pleistocene, which agrees with observations previously made in the Wadi el-Tawil and in Wadi el-Ueb to the north. The northeast corner is clearly a 'Transit zone' for the Pleistocene inhabitants of Dakhleh.

Re: 3) Two visits with Churcher established that the area east of Loc.318/319 deserves a detailed survey in 2001. The area number assigned is Loc. 394. In the course of one visit, I noted a relatively rich palaeontological site in the Mut Formation (the "Monday Site"), lying below a P-III terrace remnant.

Re: 4) Samples from Loc.318 do not appear to be suitable for Schwarcz's new 'skinflint' dating technique. If samples can be dated they would help to anchor the late Pleistocene sequence, because, based upon

condition, morphology and technology, Loc. 318 is younger than the Dakhleh Unit (Aterian), and older than the Sheikh Mabruk Unit.

Re:5) A one-day survey with McDonald, Giegengack and Smith was made to Wadi el-Medauwarra, Kharga Oasis, on March 3rd:

- a) One locality (MD-2), fortunately sampled by Kleindienst and Wiseman in 1998, is now destroyed by roadwork along the new Luxor tarmac road. The entire area of wadi fan gravels observed by Churcher and Kleindienst in 1996 is now destroyed, both north and south of the new road. Any archaeological information there is now lost. Small tufa terraces to the northwest, which also bore archaeological material in 1996, have been severely damaged. (See report by McDonald, below, for Holocene localities visited: MD-4, -5, -6).
- b) Due to time constraints, it proved only possible to visit one Pleistocene locality, and MSA workshop (MD-10), for about 10 minutes; this requires further survey in 2001, as it appears either to be a pre-Aterian MSA unit which is already employing some 'Aterian' traits, or possibly it is an older Aterian unit. The workshop area lies on an easy access route to the Plateau top, adjacent to tufa terraces, with large chert nodules of excellent quality, some incorporated in large fallen limestone blocks lying on a series of benches below the Plateau rim. Time did not permit relocation of the Earlier Stone Age locality which the geologists had found during their mapping in 1999 (Smith et al, 1999).
- c) The Pleistocene localities discovered by Giegengack and Smith are more difficult of access, and are probably safe from tourist looting at present. However, the Holocene sites near the new road embankment are endangered. These should be mapped and collected in 2001, or the evidence will disappear.
- d) A field register book for Kharga Oasis was initiated.

Re: 6) Survey of the southeastern edge of Loc.211 CSS terrace was completed. Sparse finds suggest that the main MSA presence was further north, beginning with Loc. 391 and extending to Loc. 374, at the Iron Balls Spring, and then further north to Loc. 361 nearer the northern shore of Palaeolake Teneida. Only one small fragment of bone was found. (Only a few MSA finds have been collected south of the Loc. 211 terrace in previous years. No artefacts were found associated with the CSS of the detached terrace remnant [Loc. 211S], which would have been even further out into the palaeolake.)

- a) Churcher and I also revisited Loc.349 (located in 1996), in order to obtain a GPS reading on the southernmost CSS yardangs preserved on the sandstone ridge south of the Kharga road, and south of Locs. 350-351-352. Elevations here are apparently over 155 m about sea level, and these small remnants suggest that the palaeolake may have had a much larger southern extent than we previously believed. A search will be made for ancient beach 1 levels to the east and south in 2000. Basal layers of the yardanged southeastern-most CSS remnant appear to incorporate diatomite, which can give valuable palaeoenvironmental information.
- b) Giegengack suggests that the three palaeolake basins conservatively identified by Kleindienst and Churcher in 1998 (Churcher et al, 1999) were once interconnected, at times forming one large lake (ca. 30 x 30 km?). However, the larger one makes the lake, the more water one must put into the palaeobasin, and the greater the changes one must envisage for the mid-Pleistocene palaeoenvironments of Dakhleh. This remains a problem for the continuing geoarchaeological and zooarchaeological investigations of the CSS.

Re: 7) Processing of various collections marked 'TBP' was completed. Others still remain undone, alas!

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## 5. Holocene Prehistory.

The Holocene prehistorian, Dr. M. M. McDonald spent nearly 9 weeks in the field, starting January 7. During most of that time she was assisted by Ines Teubner, a student from Alexander Humboldt University in Berlin. While a few days were spent on survey in the eastern part of the oasis, atop the eastern Plateau, and in Kharga Oasis, most field time was devoted to the excavation of several sites.

We did work on all 3 Late Prehistoric cultural units in Dakhleh, but concentrated on the Sheikh Muftah. Sheikh Muftah is the latest of the units, overlapping the Old Kingdom occupation of the oasis, but remains the most poorly understood. Sh. Muftah sites tend to occur near (or under) modern cultivation, and while nearly 100 have been recorded in El-Dakhleh, few are known to retain *in situ* deposits, and before January 2000, none had been excavated.

Loc.105 (**30/420-P1-1**) seemed an unusually promising site. It lies SW of the Balat cultivation, on the edge of an extensive area of land crusted with salt and gypsum, in a spot that may have been a swamp in the mid-Holocene. Here, worked stone, pottery, and considerable animal bone are eroding out of the crust. We therefore established a grid 42 x 26 m over the richest part of the site, mapped at all at 1:100, and then excavated a total of 65m<sup>2</sup>.

Deposits are differentially preserved, but in much of the excavated area, we detected 3 buried layers bearing cultural material : one right under the crust; below it a dark grey level with much charred matter, up to 10 cm thick, and below that a thin light grey buff sandy silt, with artefacts and bone occurring in the top 6 - 8 cm of the layer.

The goals in excavating are to recover organics - plant and animal remains - to shed light on prehistoric diets and for dating purposes, as well as *in situ* artefacts, and information about the settlement

itself. At 105, we met some of these goals, and not others.

Concerning settlement information, we found no evidence of shelters at the site, but did encounter 3 hearths. Relatively little charcoal was recovered, despite the dark grey Layer 2 deposits, and none of it has been analysed yet. A considerable amount of animal bone was collected, and so far gazelle and hartebeeste have been identified. Both ground stone (slabs and handstones) and chipped stone are common at Loc.105, and an estimated 2400 flakes were excavated. The collection of 105 tools includes 40 (mostly stubby) points, as well as notches, denticulated and retouched pieces in nodular chert, and scrapers fashioned in tabular chert. The pottery at 105 can be identified as 'Late Sh. Muftah' material.

Site 108 (**30/435-B3-2**) is another Sh. Muftah site associated with the crusted land, but much smaller than 105. Here too, animal bone was eroding out within a larger scatter of pottery and chipped stone. The pottery and lithics were collected within a 28 x 10 m grid, while 8 m<sup>2</sup> were excavated to recover animal bone from several species. A carnelian bead was recorded as well.

Aside from the Sh. Muftah, some work was done on the Bashendi cultural unit as well. Two new Bashendi B sites, Loc 388 (**31/420-N10-2**) and Loc.389 (**31/420-N10-3**) were recorded in the vicinity of Loc.105, and a collection of lithics and sherds was made at 388. Further southeast in the oasis, within the large Bashendi site of 228, the 'Mound Site', or Loc.387, tested last year, had yielded an extraordinarily rich fauna, including a very large bovid and hyæna. To add to that collection I went back for a couple of days and dug another 5 m<sup>2</sup> in an ashy pit, adjacent to the 5 m<sup>2</sup> excavated last year.

Work on the Masara unit in Dakhleh Oasis this year was confined to site 265 (**29/450-G3-2**), a Masara C hut circle site originally tested in 1997. That year, Hut 8, one of the 19 structures on the site, was excavated. This year we tested 2 other structures and some of the deposit between the circles. Hut 1 is a well-defined circle of standing slabs, about 3 m in diameter, within a cluster of 3 structures. In and around Hut 1, 42 m<sup>2</sup> were planned at 1:20. Within the hut 5 m<sup>2</sup>, its western half, was excavated. The deposit was quite similar to that in Hut 8. The floor of the hut, 25 cm below the present surface, and 10 - 15 cm above bedrock, had been only slightly hollowed out when the hut was built. Two small hearths consisting of ashy patches with charcoal, over fire-reddened soil, were found. One, near the hut centre, measured 65 cm across, the other, against the west wall, 30 cm across. Elsewhere the hut floor was relatively clean yielding scattered ostrich eggshell and charcoal, a couple of flakes, a large sandstone block against the N wall and a few slabs that had fallen from the wall slabs, probably after the hut was abandoned.

Outside of Hut 1, we excavated 5 m<sup>2</sup> of the surface lying between Hut 1 and 2 of its neighbours. This area proved clean, yielding no features, and only a few chipped stones including a core and a couple of stubby points. Elsewhere on the site, we excavated an isolated bin consisting of a circle of standing slabs 1 m across, which proved empty.

While considerable work must have gone into the construction of the hut circles of 265, the relative lack of chipped stone and other debris suggests the site could not have been occupied for very long.

Aside from the work on the oasis floor, we investigated a playa atop the plateau to the east of Dakhleh, at the head of the Darb el-Tawil, where we found campsites of Bashendi B, Sheikh Muftah and Pharaonic age. In Kharga Oasis, DOP geologists R. Giegengack and J. Smith had reported Epipalaeolithic sites in the Wadi el-Medawarra near the plateau top on the road to Luxor. I went with the geologists and M.R. Kleindienst to investigate, and found material very similar to that of Masara A and Masara C in eastern Dakhleh Oasis.

## **6. Geophysical Surveying.**

Dr. Tatyana Smekalova spent several weeks in January and February, 2000, surveying on two sites: 32/390-K2-2, Ein el-Gezareen, and 33/390-L9-1, Amheida. Both are towards the western end of the oasis, both have buried architectural remains. In both cases, she used an Overhauser gradiometer GSM-19WG and the results in each case were excellent. These will be presented in the context of each of these sites.

## **7. Ein el-Gezareen: 32/390-K2-2**

This was the fourth season of field work at this Old Kingdom settlement site in western Dakhleh Oasis. The first two seasons were occupied with the excavation of a 10m x 15m test area, which resulted in the exposure of a bakery area. Last season began with a magnetometer survey of about 1/2 of the site area with the spectacular results of the identification of a 55m x 105m enclosure with heavy outer walls. This geophysical surveying was then confirmed in outline by excavating the outer wall of the enclosure and into several of the adjacent rooms along the eastern side.

The 1999/2000 season has seen the extension of the sub-surface surveying by Dr. Smekalova over almost all the site area, an extra 1.2 ha. Her results indicate many features and anomalies throughout the whole area of the site. The magnetometer survey is being so successful at this site because a big contrast exists between the mudbrick walls and the fill and because structures are situated only a very little distance below the surface. As last season, the discoveries of this underground survey must be verified by excavation. This will occur in future seasons.

Excavation during the weeks of this season's field work concentrated upon the "eastern enclosure", that area bounded by heavy mud brick walls measuring about 55m x 25m which is situated to the east of the large enclosure. Last season we had delineated the outer walls of this enclosure together with a series of rooms lying along the inside of the eastern wall. This season we decided to undertake a clearance of the surface features of the remainder of this eastern enclosure, only excavating a maximum of about 10 centimetres. The results were rewarding.

There are over forty identifiable rooms within this space. Some of these are so large that they must have been open-air and unroofed spaces. These generally show greater amounts of ash and burning areas than the closed rooms. Several of the rooms have small patches of burning, often round and in the middle of the floor, which seem to have been intended for room warmth rather than any industrial or even cooking purpose. Several rooms had larger deposits of ash, which seem to have been baking fire accumulations. The ceramics from the surface of the eastern enclosure have been treated as surface material, have been collected, but have not yet been analysed. All do, however, date to the late sixth dynasty. Earlier material may be recovered from lower levels after excavation begins.

Unlike the enclosure walls, some of which are 1.45 m wide and others nearly 3 metres, the walls of the various rooms within are generally poorly constructed and either a single brick or 1 1/2 bricks thick. It is probable that the surface remains represent only the final occupation at the site. Stratified remains of architecture have been evidenced in a few places and we expect that the plan of Fig. 1 will be altered through excavation in the future.

The eastern and the western enclosures outer walls are not connected and the two are from two distinct building phases. That wall which we are treating as the west wall of the eastern enclosure is in fact the east wall of the western enclosure. It appears to have existed prior to the construction of the eastern enclosure and at the southern end it can be seen to turn westwards while the south wall of the eastern enclosure runs parallel to it but outside it. The magnetometer survey shows this wall as complete while excavation reveals an interruption of nearly 4 metres at its northern end. Again, evidence of stratified

architecture. There is a most interesting building at the northern side, partly within the eastern enclosure and partly within the western enclosure. The walls are well constructed, 1½ bricks wide and with a ~5 cm

Figure 1.

layer of grey plaster on the faces. Compared with all the rooms so far seen on the site, this is a large structure, some 4.0 x 4.50 metres. It has a symmetry which is not seen elsewhere and at the northern end are columns and/or pilasters which make a sort of open area or porch. The possibility that this is a religious structure occurs to us, although it may have quite another function. It is part of the latest phase on the site and overlies the heavy enclosure wall.

At the northern end of Ein el-Gezareen is an area which appears to have a large component of Sheikh Muftah Neolithic cultural remains. The magnetometer survey shows there to have been several areas of ash or burning, which may be the indicators of separate rooms. As the Sheikh Muftah is the indigenous culture that survives as late as the Pharaonic Egyptian this occurrence will provide some



Dakhleh Oasis Project: Ein El Gezareen (32/390-K2-2)

excellent evidence for the relationship between the two different cultures. It will be excavated next season.

### **8. Old Kingdom Watch Posts: 30/450-C4-1**

O. E. Kaper, H. Willems, and L. Kuijper were the Project members to undertake this study in 1999/2000. They were in the field from 13 to 22 December, 1999.

Excavations were carried out at a new site, **30/450-C4-1**, which lies at the eastern edge of 'Camel Thorn Basin', some 8 km east of Teneida. The site consists of a hill with three stone shelters on the top. A dense surface scatter of potsherds and flint dates the occupation to the Old Kingdom. A limited amount of carvings in the rock helps to confirm this date.

The season started with a systematic collection of the surface material according to a 10m x 10m grid. A trainee of the DOTACP was employed at this stage.

On 19 December work was started inside the three huts. Plans were drawn up of the site as a whole and of each of the huts separately. The interiors of the three huts were excavated. The two smaller huts on top of the hill proved to contain only little material. Only random potsherds and flint were found and no botanical remains or remains of fire. The larger hut was associated with the most intense surface scatter and its interior showed a more complex stratigraphy, demonstrating a longer period of use. Finds include a grinding stone, some bone, mainly of gazelle, a piece of worked leather, limited amounts of charcoal and again Old Kingdom potsherds and flint.

Excavation at this site will be finished in a future season.

Analysis of specific find categories was undertaken for ceramics (Hope), botanical remains (Thanheiser) and zoological remains (Churcher).

### **9. Ismant el-Kharab (ancient *Kellis*): (31/420-D6-1)**

Provided elsewhere in these pages.

### **10. Amheida: 33/390-L9-1**

This year marked the start of new work at Amheida under the auspices of Columbia University, and jointly directed by Professor Roger Bagnall and Professor Lynn Meskell. In this preliminary season several visits to the site were made for general reconnaissance, photography, and planning. Three areas of the site were identified for minimal surface clearance and recording.

\* Area 1 to the north of the site is an industrial area, showing evidence of kilns and vitrified material adjacent to a major street. This area also extends westwards adjoining an area of elite structures with a series of vaults and and painted plaster. We need to ascertain the extent of these buildings in order to plan for conservation in subsequent seasons.

\* Area 2 is approximately located in the middle of the site sloping upwards towards the west. It consists of a set of interrelated rectilinear structures. Surface evidence reveals that almost all of these rooms were plastered and/or painted. Towards the base of the slope are a series of rooms which have vaulted roofs and possibly one that is domed: all appear to have wall decoration.

\* Area 3 lies at the south-eastern edge of the site and is a highly enigmatic brick structure resembling the core of a pyramid. This large monumental structure is demonstrating signs of severe instability and we may require consultation with a structural engineer before proceeding further. Our purpose at present is to map this feature and the surrounding set of structures which have additional vaults. Some have suggested the structure is funerary in purpose, however without systematic recording this issue will remain unresolved.

In January these three areas were planned and drawn by J.E. Knudstad in preparation for further planning of superstructures in 2001 and excavation in 2002. In conjunction with the architectural survey we also initiated a geophysical survey under the direction of Tatyana Smekalova. With the results of the subsurface survey in place we can establish potential areas for excavation in future years and also tracts of land which will be suitable for the construction of buildings including a guard house and conservation and pottery sheds.

### 11. Epigraphy.

A third season of recording at the temple of Deir el-Hagar was conducted in February and March, 2000. The work was directed by Dr. O.E. Kaper, who led a team of seven egyptologists from the Humboldt University, Berlin.

During the 15 working days spent in the temple, seventeen previously unrecorded scenes were copied onto plastic film. In addition, nine scenes could be finished in ink and several more drawings were checked for accuracy against the original reliefs.

With the assistance of a local trainee, the Arabic graffiti in the temple were copied. Most of these date between the years 1911 and 1921.

### 12. Physical Anthropology.

As this was planned as a study season, no excavation was undertaken by Professor J.E. Molto and his group. Research and analysis was conducted on materials previously collected from **31/420-C5-2**, (= "Kellis 2") the eastern of the two cemeteries associated with Ismant el-Kharab.

Objectives of the 1999/2000 Season:

1. to analyze infant remains excavated in the previous field season ( n = 68),
2. to assess sacra for potential sexing methods,
- 3 to develop standards for aging fetal remains,
- 4 to collect dental morphology from burials excavated in previous field seasons,
- 5 to collect modern buccal and hair samples from Ezbet Bashendi children for DNA and dietary analysis.

The primary objective of the 1999 bioarchaeology component of the Dakhleh Oasis Project was the analysis of subadult burials excavated but not analyzed in the previous season. This sub-sample consists of 68 burials with the following demographic breakdown:

2nd trimester fetuses	3 (4.4%)
3rd trimester fetuses/neonates	13 (19.2%)
B - 1 year	17 (25.0%)
1 - 2 year	12 (17.6%)
2 - 3 year	3 (4.4%)
3 - 10 years	17 (25.0%)
12 - 17 years	3 (4.4%)

The total Kellis 2 sample of 378 burials is now sufficiently large for a detailed demographic analysis (life tables, etc.), although the adult cohorts are still small for conducting detailed palaeoepidemiological research. Fig. 3 provides a diagrammatic representation of the burials excavated

and analyzed to date. Fig 2 illustrates the size of this sample relative to the complete Kellis 2 cemetery.

The subadult sample analyzed this year has larger representation of fetal remains than the rest of the cemetery. This may, in fact, represent a methodological bias as osteometric standards developed for fetuses in other populations were tested on the Kellis 2 sample. The large number of late fetuses may be a concomitant of the fact that the Kellis 2 people are small and their birth sizes may reflect this anthropometric (osteometric) characteristic. To date very few studies of population based on fetal aging research have been attempted as most often few fetal remains are recovered in archaeological samples.

None of the subadult burials analyzed this year had any noteworthy osteopathologies, although they do increase the overall sampling of these cohorts. In particular, there were a large number of subadult dentitions with dental caries and other dental pathologies which improves our statistical analysis for the study of palaeodietary aspects of this population.

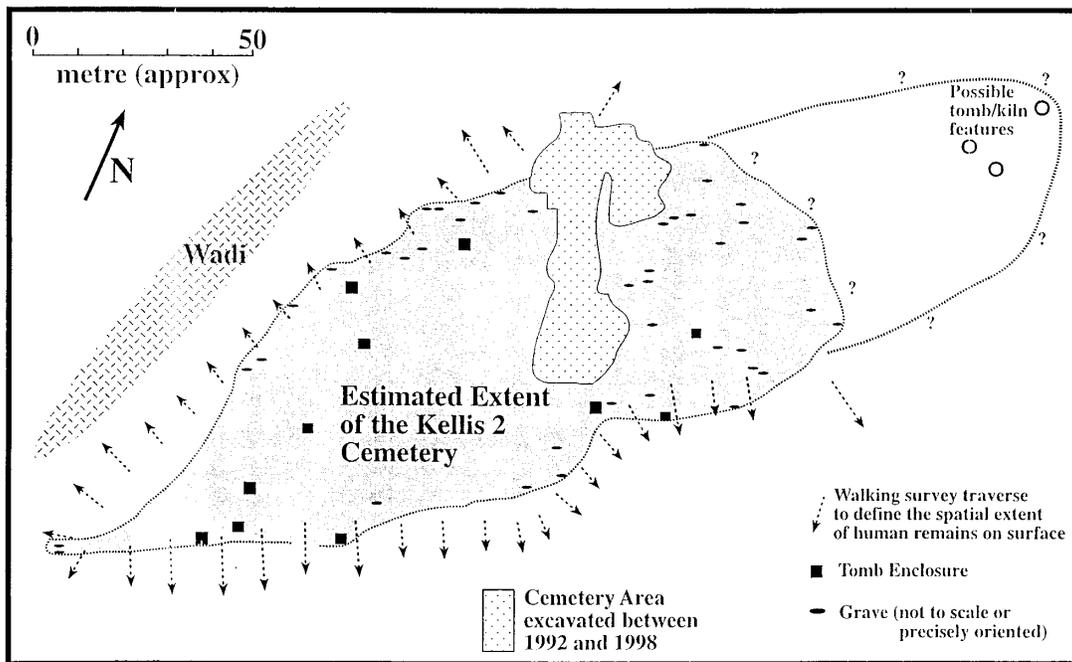
Although most of the adult burials from the Kellis 2 population can be accurately sexed using hip criteria, there are several burials for which sex is indeterminant. Most of these skeletons have intact sacra and this with the fact that the samples from 31/420-C5-1 are all mixed (= each skeletal element has to be studied separately) led to the decision to test various extant methods for sexing and aging the sacrum. The sacra were collected at our storage area at the cemetery, were labelled, sorted by number and then analyzed for several metric and non-metric variants in the laboratory at Ez. Bashendi. This study was done blind as the sex and age of the burials (though previously recorded) was unknown to the researchers. The data will be analyzed this year. The results could have implications for both the study of the Kellis population samples and, of course, the field of bioarchaeology. In addition, the sacra were used for studies for the presence of spina bifida occulta and other sacral variants (sacral hiatus level, sacralization of L5, etc.) This research was primarily designed as an inter-observer reliability test for future publication of the sacral data.

In terms of the biochemical research, 100 children from Bashendi provided buccal samples and hair (boys only). Clearance for the research was provided by the ethics committee at Lakehead University and from local officials. The buccal samples will be used for DNA research. This will provide a modern comparative sample by which to gauge and interpret the palaeo-DNA evidence. Several of these samples have already been analyzed and the yield of DNA is sufficient for the study. The hair samples will be analyzed for their isotopic signatures ( $^{13}\text{C}$  and  $^{15}\text{N}$ ) and will provide a comparative measure for interpreting the palaeo-dietary evidence for Kellis 2 and Ein Tirghi subadults.

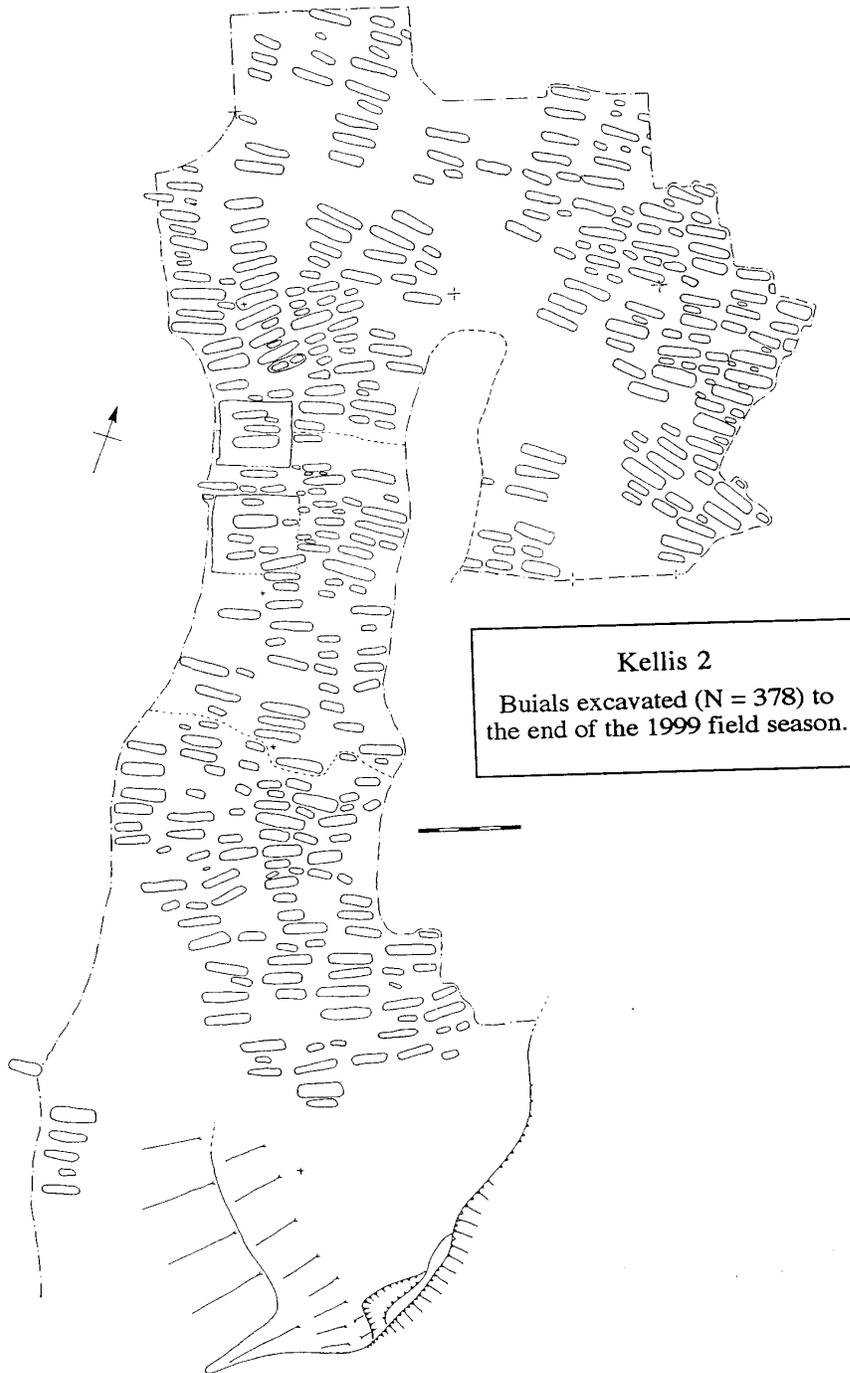
In sum, this study season provided the opportunity to complete the analysis of the Kellis 2 sample and to test and develop methods that will assist in the future interpretation of the bioarchaeology of this unique population.

Figure 2.

Figure 3.



Prehistoric Human Remains.



Dr. J. Thompson joined the field camp from 5th to 15th January, 2000, and spent this season undertaking a complete dental analysis of 5 Neolithic skeletons excavated in previous years. One of the more complete skulls was partially reconstructed providing valuable cranio-facial dimensions for comparative analysis. G. Madden assisted in the analysis of these individuals - cleaning the bones, providing a detailed inventory, and undertaking metric, non-metric, and palaeopathological analysis of the skeletal material.

Dr. Thompson and G. Madden accompanied Dr. M. McDonald to Loc. 100 (31/420-P5-1), west of Balat. Here a Neolithic skeleton had been discovered and partially collected in 1982. The remainder of this individual was discovered by G. Madden. A second individual was discovered but left *in situ* for recovery next season.

The total number of excavated Neolithic specimens now amounts to 6 individuals: three from 365, two from 375, and the newly excavated partial skeleton from Loc. 100.

### **13. Conclusion.**

The 1999-2000 season of the Dakhleh Oasis Project has been one of excellent results from many different fields of scholarship, from environmental studies to physical anthropology and historical archaeology. The regional study of the interaction of environmental change and human activity has so many components that it progresses slowly but surely, with new information every season. Future plans include working at new sites, Mut el-Kharab and el-Muzzawaka, and returning to all the Old Kingdom sites - Ein el-Gezaren and the Watch Post sites - and continuing at Ismant el-Kharab and its cemeteries. Our prehistorians intend to continue with their individual studies in eastern Dakhleh Oasis and in Kharga Oasis. Environmentalists are each in the midst of studies and intend to continue these. This work would not be possible without the full cooperation and participation of various of our Egyptian colleagues. In particular, Mr. Ashraf el-Sayed Mahmoud of Sohag, continues to be an invaluable co-worker and SCA representative.

Anthony J. Mills  
Director.