DOUGLAS J. BREWER

A model for resource exploitation in the prehistoric Fayum

This paper discusses the zooarchaeological research program that has been initiated in the Fayum Depression. It presents a model for Fayum resource exploitation based on a preliminary analysis of the Fayum faunal remains.

Background to the study

Caton-Thompson and Gardner (1934) were the first to extensively investigate the prehistory of the Fayum depression, Egypt (Fig. 1). They concluded that two distinct cultures had occupied the area during the Early to Middle Holocene. They placed these two cultures in a chronological sequence based on their own construction

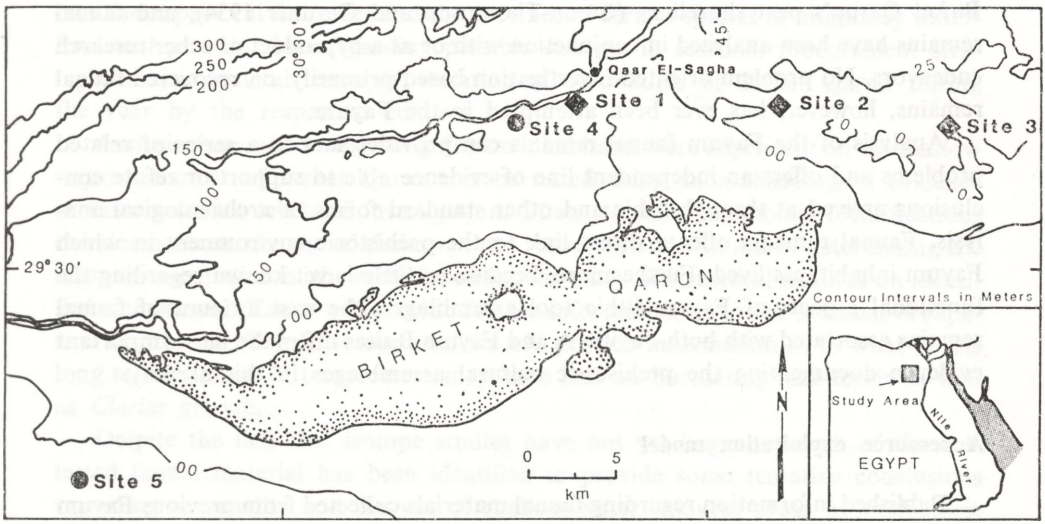

FIG. 1. Map of the Fayum showing location of sites used in this analysis

of the prehistoric levels of the Holocene lake predating the present Birket (Lake) Qarun. Fayum A sites, which represented the earliest industry, are characterized by a bifacial lithic tool assemblage, pottery, and the remains of domestic plants and animals. The presence of a Neolithic assemblage suggested to Caton-Thompson and Gardner (1934 : 1) that Fayum A sites represented village life supported by a fully developed Neolithic economy based on domesticates. Fayum B, the second cultural complex, was believed to represent a younger immigrant population into the Fayum area. Fayum B lithic materials are composed of backed blades and bladelets; bifacial tools are conspicuously absent. Additionally, Fayum B sites lacked pottery and any evidence suggesting that this population might have utilized domestic plants or animals. Caton-Thompson and Gardner (1934) referred to Fayum B as a lingering Mesolithic group.

Caton-Thompson and Gardner (1934) were correct in identifying two distinct cultural complexes, but later studies (Wendorf and Schild 1976; Wenke *et al.* 1983) have shown that Caton-Thompson and Gardner (1934) incorrectly interpreted the sequence of the Holocene lake levels. As a result of this misinterpretation, they placed the Fayum cultures in the wrong chronological order. Recent work in the Fayum (Wendorf and Schild 1976; Wenke *et al.* 1983) has shown that Fayum B sites consistently date earlier than Fayum A sites and are associated with an earlier period of lake transgression.

Archaeological research in the Fayum, while it has served to substantiate that two cultural groups used Fayum resources, has compiled little evidence pertaining to what resources were used and how changes in resource availability might have affected Fayum inhabitants. Molluscan remains have been used as indicators of Birket Qarun's past shorelines (Caton-Thompson and Gardner 1934), and faunal remains have been analyzed in conjunction with or as a byproduct of other research endeavors. No problem oriented investigation based primarily on recovered faunal remains, however, has ever been attempted in the Fayum.

Analysis of the Fayum faunal remains can provide clues to a series of related problems and offers an independent line of evidence able to support or refute conclusions arrived at through lithic and other standard forms of archaeological analysis. Faunal remains offer a direct link to the prehistoric environment in which Fayum inhabitants lived. Furthermore, because so little is yet known regarding the functional aspects of Fayum lithic tool assemblages, the vast amount of faunal remains associated with both Fayum A and Fayum B sites offers the most important evidence documenting the prehistoric cultural assemblages in this area.

A resource exploitation model

Published information regarding faunal materials collected from previous Fayum expeditions has presented evidence that procurement strategies regarding mammalian fauna differed between Fayum A and B cultural assemblages. The younger

Fayum A sites are dominated by the remains of domestic animals; the Terminal Paleolithic Fayum B sites possess only the remains of wild game animals (Caton-Thompson and Gardner 1934; Gautier 1976). However, Wenke *et al.* (1983 : 35) in a preliminary report described fish remains, predominantly catfish remains, as the most common animal identified from both Fayum A and B sites. When I examined this faunal assemblage I found catfish of the genus *Clarias* to be the most common animal recovered. In fact, *Clarias* accounts for approximately 66% of the identifiable fauna recovered from the Neolithic site that Wenke *et al.* (1983) investigated.

Clarias, the Nile catfish, prefers deoxygenated, shallow, swampy environments (Boulenger 1907; Greenwood 1966; 1968; Roberts 1975). This type of habitat would have been present across a relatively large area around the prehistoric Fayum lakes when they were at a high level. The large quantity of *Clarias* remains identified suggests that Fayum inhabitants heavily utilized the shallow water resource areas surrounding prehistoric Lake Qarun.

The gentle sloping nature of the Fayum Depression suggests that changes in lake depth would greatly influence the extent of land inundated by water. The shallow water habitats providing cover and breeding areas for waterfowl and certain fish species would be destroyed if lake levels were to decrease significantly. Human populations dependent upon these resources would then be faced with a crisis necessitating a change in procurement strategies.

The identification and analysis of faunal remains found in association with cultural assemblages identified as Fayum A or Fayum B can demonstrate the exploitation of shallow water habitats. Moreover, the investigation of annual growth on *Clarias* pectoral fin spines and the presence of certain species of migratory waterfowl will provide clues regarding possible changes in seasonal procurement strategies and in general terms the duration of occupation of Birket Qarun during the year by the respective cultures.

A subsistence model suggesting Fayum inhabitants were dependent on the shallow water resources of Birket Qarun can be tested using zooarchaeological evidence at three separate levels of investigation. First, standard taxonomic identifications can demonstrate the use of shallow water resources and will aid in determining the seasonal occupation of the area. Secondly, the study of structural features on identified elements of *Clarias* will provide further information as to the seasonal occupation of the area. Third, isotope analysis will provide information as to what effects long term changes in temperature may have had on fluctuating lake levels as well as *Clarias* growth.

Despite the fact that isotope studies have not yet begun, enough of the collected faunal material has been identified to provide some tentative conclusions regarding seasonality and the use of shallow water resource areas by prehistoric Fayum groups.

Faunal remains were collected using systematic transect surveys running per-

pendicular to the former beach ridges of the ancient Fayum lakes (Wenke *et al.* 1983; Brewer 1984). A total of five sites were incorporated in this analysis. Sites 1, 3, 4, and 5 were identified as Fayum A; site 2, Fayum B (Fig. 1). Two of the sites (sites 1 and 2) produced a very large faunal sample. They served as the main data base. Sites 3, which produced a very small sample, and sites 4 and 5 because they were collected by other research teams, were used in a supportive role.

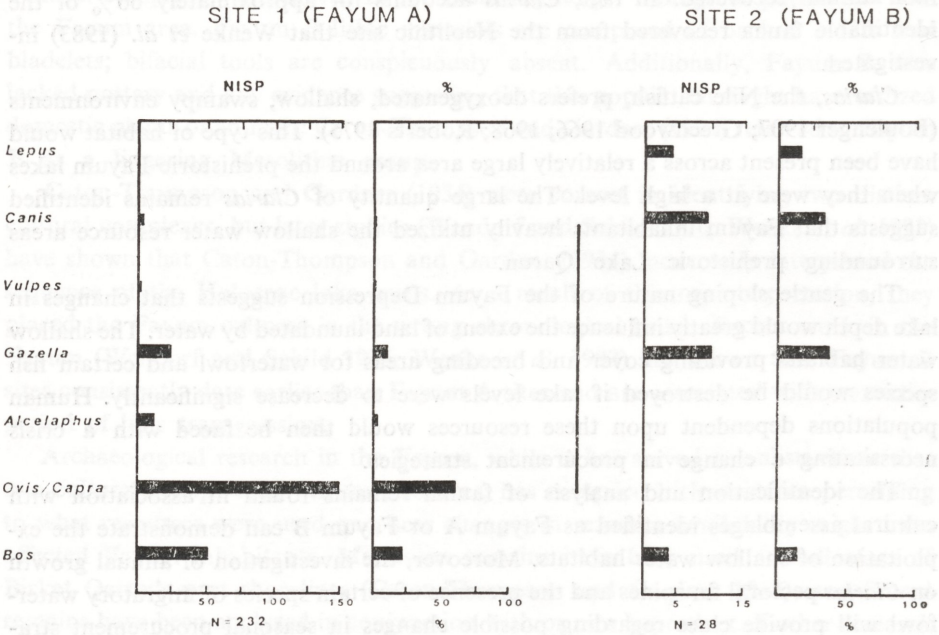

FIG. 2. Relative frequencies and NISP for Site 1 (Fayum A) and Site 2 (Fayum B) mammalian fauna

Figure 2 presents both the number of identified specimens (NISP) and the relative frequencies of the identified mammalian material from sites 1 and 2. The site 2 material is from a Fayum B cultural area; the site 1 material is from a Fayum A locality. The comparisons of mammalian fauna show a rather predictable pattern. The Fayum A site shows a predominance of domesticates supplemented by wild game animals. The Fayum B cultural assemblage lacks domesticates, but the presence of wild ungulates in the assemblage suggests that Fayum B folks practiced large game hunting. Evidence gathered from other Fayum A sites also shows use of domesticates, but in greatly reduced frequencies (Fig. 3). It seems safe to assume that domesticates were not the sole source of animal protein for Fayum A people. Other sources were, indeed, utilized. Minimally, based upon the faunal identifications, we can say that both Fayum A and B cultural groups took advantage of the area's wild terrestrial fauna.

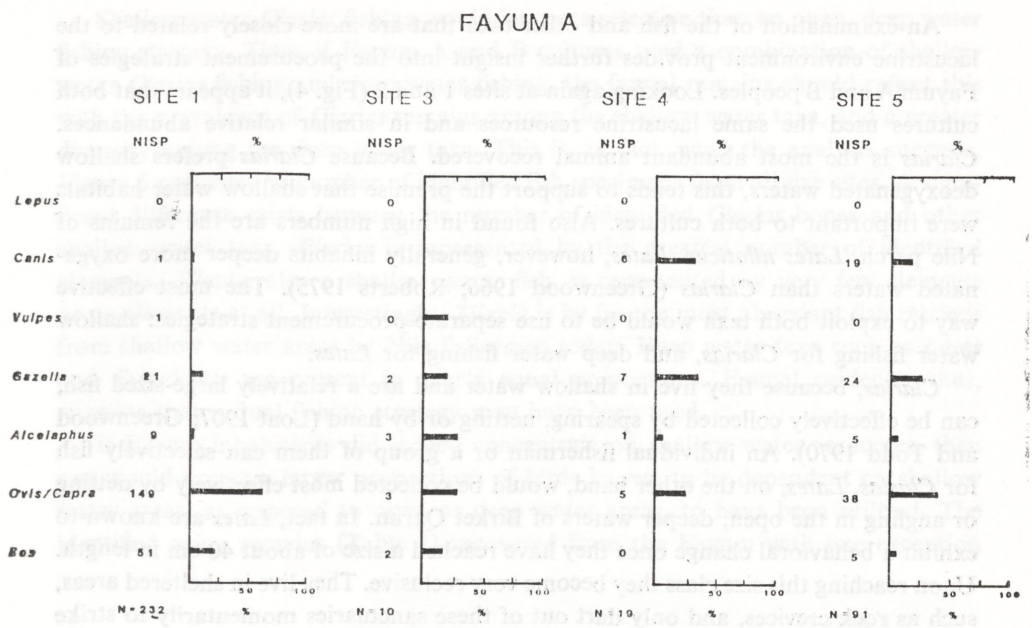

FIG. 3. NISP and relative frequencies for identified mammals from Fayum A sites

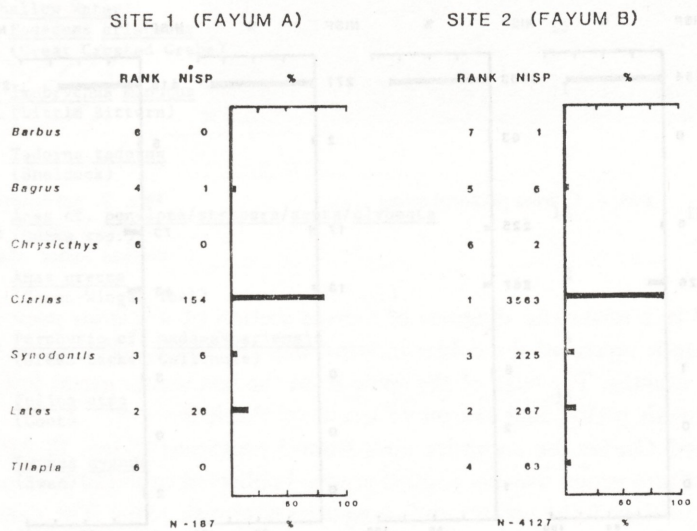

FIG. 4. NISP, relative frequencies, and rank order of Site 1 (Fayum A) and Site 2 (Fayum B) ichthyofauna

An examination of the fish and other taxa that are more closely related to the lacustrine environment provides further insight into the procurement strategies of Fayum A and B peoples. Looking again at sites 1 and 2 (Fig. 4), it appears that both cultures used the same lacustrine resources and in similar relative abundances. *Clarias* is the most abundant animal recovered. Because *Clarias* prefers shallow deoxygenated waters, this tends to support the premise that shallow water habitats were important to both cultures. Also found in high numbers are the remains of Nile perch, *Lates niloticus*. *Lates*, however, generally inhabits deeper more oxygenated waters than *Clarias* (Greenwood 1966; Roberts 1975). The most effective way to exploit both taxa would be to use separate procurement strategies: shallow water fishing for *Clarias*, and deep water fishing for *Lates*.

Clarias, because they live in shallow water and are a relatively large-sized fish, can be effectively collected by spearing, netting or by hand (Loat 1907; Greenwood and Todd 1970). An individual fisherman or a group of them can selectively fish for *Clarias*. *Lates*, on the other hand, would be collected most effectively by netting or angling in the open, deeper waters of Birket Qarun. In fact, *Lates* are known to exhibit a behavioral change once they have reached a size of about 40 cm in length. Upon reaching this size class they become very reclusive. They live in sheltered areas, such as rock crevices, and only dart out of these sanctuaries momentarily to strike at food (Hopson 1972).

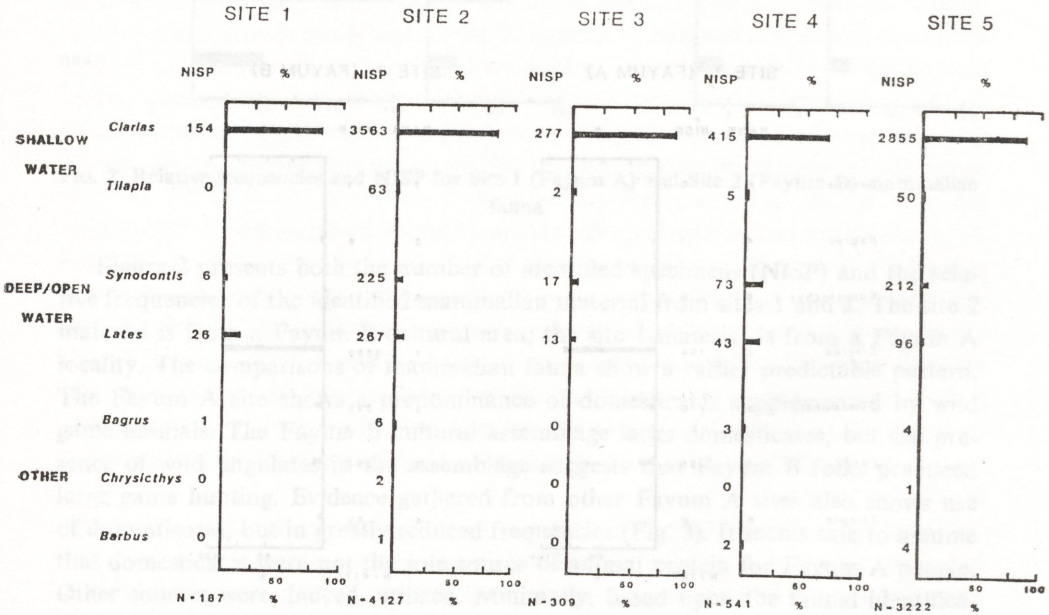

FIG. 5. Comparison of deep and shallow water taxa based on NISP and relative frequencies

Shallow water *Clarias* fishing would be more selective than an open, deep water fishing strategy. Thus, if Fayum A and B cultures used a combination of shallow water *Clarias* fishing and deep water fishing, the faunal remains should reflect this with the prevalence of *Clarias* remains among the shallow water taxa, and a greater diversity among the deep water taxa. This is, in fact, what the analysis suggests. Figure 5 presents the number of identified fish specimens from all five sites. A significant difference exists between the number of identified *Clarias* bones and other shallow water taxa. *Clarias* is represented by the greatest number of identified elements. *Tilapia*, also a shallow water fish, is represented by very few elements or no elements at all. Interestingly, *Tilapia* is by far the most abundant fish retrieve from shallow water areas by Nile fishermen today. Deep water taxa such as *Lates* and *Synodontis* are present in nearly equal proportions. Faunal evidence, thus, suggests that a dual fishing strategy may have been used.

It Fayum inhabitants did indeed concentrate on shallow water resources, then one would expect a larger proportions of birds known to be dependent on shallow water areas, as opposed to open or deep water areas, to have been utilized. The identified avian remains (Table 1) recovered from the Fayum with one exception

Table 1

Fayum avian remains

	Fayum B	Fayum A
Shallow Water		
Podeceps cristatus (Great Crested Grebe)	15	
Ixobrychus minutus (Little Bittern)	1	
Tadorna tadorna (Shelduck)	1	
Anas cf. penelope/strepera/acuta/clypeata (Ducks spp.)	16	10
Anas crecca (Green-Winged Teal)	2	
Porphyrio cf. madagascariensis (Green-backed Gallinule)	1	
Fulica atra (Coot)	11	1
Cygnus cygnus (Swan)		1
Open Water		
Gallinula chloropus (Moorhen)	1	

were all shallow water birds. If we include open water birds that require fringes of shallow water vegetation, such as the moorhen, all birds recovered from the Fayum A and B sites are at least partially dependent on shallow water habitats.

Fayum seasonality

Because *Clarias* remains dominate the shallow water fauna and because *Clarias* can be gathered year round, an intensive study of the growth cycles of this genus provide us with information as to the time of year it was collected. *Clarias* is an ectothermic animal (cold blooded). It depends on outside temperatures to maintain its metabolic activity. When conditions are warm, as in summer, the fish is active, feeds heavily, and growth is registered on its skeletal elements. Conversely, during the cold months of the year, the fish is relatively inactive, does not feed heavily and growth decreases dramatically. The seasonal variations in growth can be measured on any of several skeletal elements. I chose to study the pectoral fin spine because it preserves well and can be securely identified (Fig. 6).

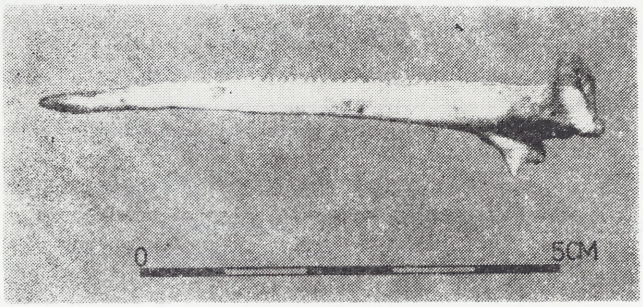

FIG. 6. *Clarias* pectoral spine

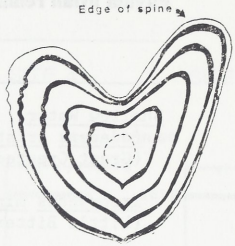

FIG. 7. Schematic view of *Clarias* pectoral spine thin section (after Morey 1983)

Figure 7 is a schematic diagram of a cross section of a *Clarias* pectoral spine. The dark bands represent the colder months, and the wider, light bands represent the warmer months. The edge of the spine from the last winter arrest line registers the final growth period and season of death of the fish.

I collected *Clarias* for an entire year from 3 localities: Cairo, El Minya, and Luxor. The Cairo group was my control group. I collected over 100 fish from Cairo alone, thin sectioned the spines, and computed a growth ratio. The denominator was the last full season of growth recorded on the spine, and the numerator was the final growth period truncated by the animal's death. This ratio was then associated with the date of the fish's capture.

Because temperature is one of the main contributors to fish growth, I divided the year into four temperature regimes corresponding to Egypt's yearly temperature cycles: Group I (December – February) represents the cool season or winter, Group II (March – May), a warming period, Group III (June – August), the hot months of the year, and Group IV (September – November), a cooling period.

Statistical tests (ANOVA and Bonferroni) showed that fish growth from the control group could be separated by factors other than chance for groups I - III. Groups III and IV were shown to be not significantly different from each other. A comparative chart was constructed with the mean growth for each group plotted ± 1 standard deviation (Fig. 8). The *Clarias* spines recovered from Fayum A and B sites were then compared to the chart.

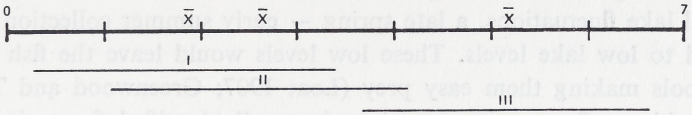

FIG. 8. Seasonality comparative chart

Group I: $\bar{X} = 1.865$ (Dec.-Feb.); Group II: $\bar{X} = 2.645$ (Mar.-May); Group III: $\bar{X} = 5.107$ (Jun.-Nov.)

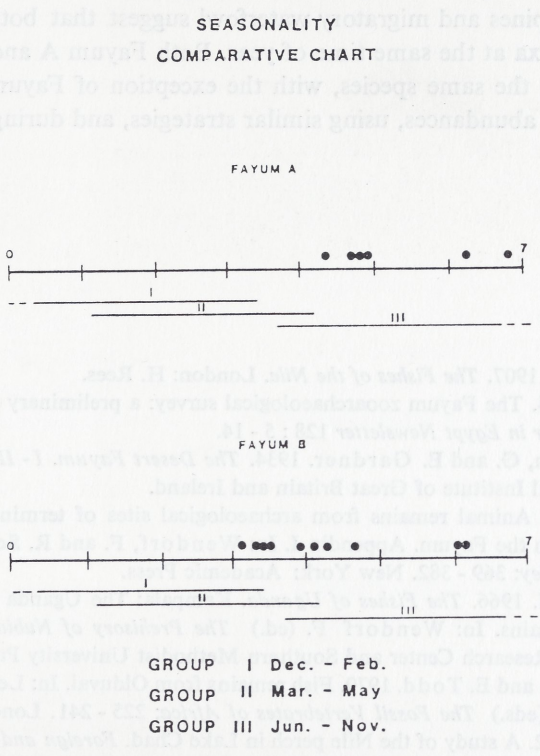

FIG. 9. Seasonal assessment of Fayum A and B spines

The results show that Fayum B *Clarias* were collected in late spring-early summer and again in the summer/fall. Fayum A spines show the same pattern (Fig. 9). The seasonality study suggests that both Fayum A and B groups collected *Clarias* at two different periods in the year. Because of the clustering around spring-early summer, I believe *Clarias* was captured by both groups in the late-spring early summer, and again in the summer-fall. It appears that Fayum A fish collecting may have taken place a little later in the summer than Fayum B, but it cannot be determined at this time if this is a cultural factor or one based on environmental circumstances.

Late summer-early fall would if Birket Qarun were connected to the Nile, coincide with a seasonally high Nile and also with the *Clarias* spawning season. During the spawning season, *Clarias* would be highly aggregated, which would facilitate their capture. If Birket Qarun were connected to the Nile, and, thus, subject to seasonal lake fluctuations, a late spring – early summer collection date would correspond to low lake levels. These low levels would leave the fish stranded in shallow pools making them easy prey (Loat 1907; Greenwood and Todd 1970). Seasonal evidence from avian remains places all identified forms in the Fayum during the winter months, roughly October – March.

In conclusion, standard taxonomic identifications point to a heavy use of shallow water resources by both Fayum A and B peoples. Seasonal inferences from *Clarias* pectoral spines and migratory waterfowl suggest that both cultural groups exploited these taxa at the same time of year. Both Fayum A and B groups appear to have exploited the same species, with the exception of Fayum A domesticates, in similar relative abundances, using similar strategies, and during the same time of year.

References

Boulenger, G. A. 1907. *The Fishes of the Nile.* London: H. Rees.

Brewer, D. J. 1984. The Fayum zooarchaeological survey: a preliminary report. *The American Research Center in Egypt Newsletter* 128 : 5 - 14.

Caton-Thompson, G. and E. Gardner. 1934. *The Desert Fayum. I - II.* London: The Royal Anthropological Institute of Great Britain and Ireland.

Gautier, A. 1976. Animal remains from archaeological sites of terminal Paleolithic to Old Kingdom age in the Fayum. Appendix I. In: Wendorf, F. and R. Schild (eds) *Prehistory of the Nile Valley*: 369 - 382. New York: Academic Press.

Greenwood, P. H. 1966. *The Fishes of Uganda.* Kampala: The Uganda Society.

– 1968. Fish remains. In: Wendorf F. (ed.) *The Prehisory of Nubia* I: 100 - 109. Dallas: Fort Burgwin Research Center and Southern Methodist University Press.

Greenwood, P. H. and E. Todd. 1970. Fish remains from Olduvai. In: Leakey, L. S. B. and R. J. G. Savage (eds.) *The Fossil Vertebrates of Africa*: 225 - 241. London: Academic Press.

Hopson, A. J. 1972. A study of the Nile perch in Lake Chad. *Foreign and Commonwealth Office Overseas Development Research Publication* 9.

Loat, L. 1907. Mr. Loat's report on the Nile fish survey. In: G. Boulenger, *The Fishes of the Nile*: XX-LI. London: H. Rees.

Morey, D. 1983. Archaeological assessment of seasonality from freshwater fish remains: a quantitative procedure. *Journal of Ethnobiology* 3 : 75 - 95.

Roberts, T. R. 1975. Geographical distribution of African freshwater fishes. *Zoological Journal of the Linnean Society* 57 : 249 - 319.

Wendorf, F. and R. Schild (eds) 1976. *Prehistory of the Nile Valley*. New York: Academic Press.

Wenke, R. J., P. Buck, J. Hanley, M. Lane, J. Long and R. Redding. 1983. The Fayum Archaeological Project: Preliminary Report of the 1981 Season. *American Research Center in Egypt Newsletter* 122 : 25 - 40.