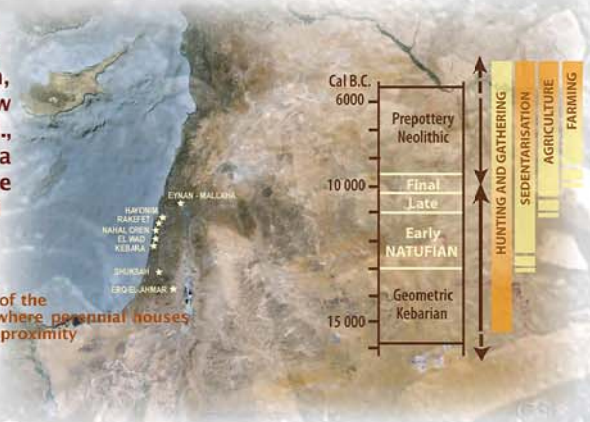
Discrete traits, inbreeding and family burials during the Natufian: an overview.

Fanny Bocquentin, Pascal Murail

DISCRETE TRAITS, INBREEDING AND FAMILY BURIALS DURING THE NATUFIAN: AN OVERVIEW

Fanny Bocquentin (CNRS UMR 7041) and **Pascal Murail** (Université de Bordeaux 1, UMR 5199)

The presence of family funerary space during the Natufian, as well as inbreeding, was suggested long ago based on the high prevalence of third molar agenesis found amongst the dead buried at Hayonim Cave (Smith, 1973). However, this hypothesis has recently been rejected after new discoveries reduced the rate of recurrence of this trait (Belfer-Cohen et al., 1991). If discrete traits (nonmetric anatomical variations with a multi-dependent transmission) have interested anthropologists since the discovery of the first Natufian skeletons (e.g. Keith, 1932), only dental traits were systematically studied (e.g. Smith, 1970) until recently.



Natufians were hunter-gatherers occupying the Levant area from 13,000 to 9,500 cal BC. Part of the population was living in permanent settlements where perennial houses and burials have been found in a relatively close proximity

Characterisation of the Natufian population

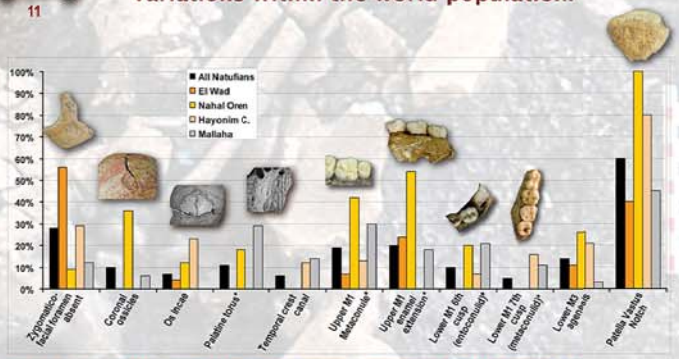
	Variation	N	%	Linked to PHASES (from Early to Late/Final)	frequency versus mondial referencies	presumed heritability
1	Sutura Mendosa*	64	30 %		high	high
2	Os Incae	90	7 %		very high	
3	Sutura temporo-frontalis*	20	20 %		very high	high
4	Palatine torus*	63	11 %	increase (p=0,003)	high	high
5	Accessory mental foramen	123	4 %		very low	
6	Mylohyoid bridging*	93	32 %	increase (p=0,033)	very high	high
7	Upper M1 carabelli*	93	41 %		high	high
8	Upper I2 interruption groove	64	36 %	increase (p=0,013)	average	
9	Costo-clavicular ligament fossa	53	28 %	reduce (p=0,026)	high	
10	Septal aperture Humerus	88	51 %		high	
11	Talus trigonum	62	10 %	increase (p=0,019)	average	

Discrete traits showing unusual frequencies and/or time variation characterizing the Natufian population.

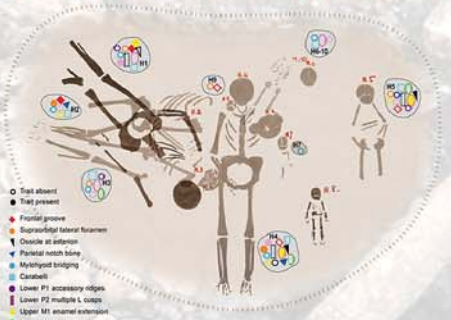
Our study is based upon 147 skeletal and dental epigenetic variations recorded on a corpus of ca 360 individuals from the major Natufian sites (see map; data from Bocquentin, 2003). Among them, we observed frequencies that were particularly high or low when compared to what has been described in other historical and modern populations. These atypical frequencies may suggest a certain isolation of the Natufian population but could also reflect a temporal evolution of the nonmetric anatomical variations within the world population.

Local specificities

When comparing the main Natufian groups, a majority of the discrete traits are present in similar frequencies thus reinforcing the idea of a homogeneous population. However, a few traits did not appear to be randomly distributed. Some dental traits considered as highly heritable show prevalence from 0 to >50 % suggesting that the intermingling of the population does not concern the totality of the genetic inheritance. Through these atypical frequencies, no special relations have been noted between groups.



Discrete traits showing statistically significant differences between major Natufian groups (Fisher exact < 0.05). Stars highlight traits presumed to be highly heritable.



Presence/absence of discrete traits amongst the dead buried successively in the sepulchral unit 1-10 in El Wad Cave (Early Natufian). H1, H4 and H5 share several traits which are rare amongst the dead buried on the terrace. Drawing after DAE Garrod (Courtesy of the Musée d'Archéologie Nationale, Saint-Germain-en-Laye)

Family Burials

We have projected on maps the presence/absence of discrete traits on skeletons buried in clusters in order to point out their biological relation. Only infrequent traits in the site were considered. During the Early Natufian, clear concentrations of epigenetic variations appear in some of the plural graves. A strong genetic link is likely in some cases when the dead share several rare traits. This specific recruitment is associated with sepulchral units where the dead were accumulated over time on the same spot.

Double burial of males within the sepulchral unit GVIII-IX (Early Natufian) of Hayonim Cave. They share 3 traits with genetic predominance (posterior bridge of the atlas; Sutura Mendosa, coronal ossicles). Courtesy of O. Bar-Yosef

From this data it appears that the Natufian population is quite homogeneous and that its non-metric characteristics were significantly stable over time. However, the prevalence of a few of the traits indicates major differences from settlement to settlement, which may signify a socio-cultural or even genetic isolation of the different Natufian groups during a short period of time, and/or a marked degree of inbreeding within part of the community. Furthermore, during the Early Natufian, what appears to be family burials linked with specific funerary treatments have been found in different settlements.

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ALT K. W. & TÜRP J. C., 1998. Hereditary Dental Anomalies. In : K. W. Alt, F. W. Rösing & M. Teshler-Nicola (eds.) : Dental Anthropology. Fundamentals, Limits and Prospects, p. 97-128. Gustav-Fischer : Stuttgart. **BELFER-COHEN A., SCHEPARTZ L. & ARENSBURG B.**, 1991. New biological data for the Natufian Populations in Israel. In : O. Bar-Yosef & F. R. Valla (eds.) : The Natufian Culture in the Levant, p. 411-424. International Monographs in Prehistory, Archaeological Seres 1 : Ann Arbor, Michigan. **BOCQUENTIN F.**, 2003. Pratiques funéraires, paramètres biologiques et identités culturelles au Natoufien : une analyse archéo-anthropologique. Thèse de Doctorat en Anthropologie Biologique (unpublished). Université Bordeaux 1, Talence, 629 p. http://ori-oai.u-bordeaux1.fr/ori-oai-search/notice.html?id=u-bordeaux1-ori-163&format=dc-id **BOCQUENTIN F., ARENSBURG B., MURAIL P., SELLIER P.**, 2009. Affinités et diversité des premiers groupes sédentaires du Proche Orient. In : E. Crubézy (Dir.). Le peuplement de la Méditerranée. Synthèse et question d'avenir : 213-224. Bibliotheca Alexandrina : Alexandrie. **CRUBEZY E., TELMON N., SEVIN A., PICARD J., ROUGE D., LARROUY G., BRAGA J., LUDES B. & MURAIL P.**, 1999. Microévolution d'une population historique. Numéro spécial des Bulletins et Mémoires de la Société d'Anthropologie de Paris, 11 (1-2). **HANIHARA T. & ISHIDA H.**, 2001. Frequency variations of discrete cranial traits in major human populations. Journal of Anatomy, 198, p. 137-152, p. 689-725 ; 199, p. 251-287. **HAUSER G. & DE STEFANO G. F.**, 1989. Epigenetic Variants of the Human Skull. Schweizerbart : Stuttgart. **KEITH A.**, SIR, 1932. The late Paleolithic Inhabitants of Palestine. Proceeding of the first International Congress of Prehistoric and Protohistoric Sciences, p. 46-47. Londres. **SAUNDERS S. R.**, 1978. The development and distribution of discontinuous morphological variation of the human infracranial skeleton. National Museum of Man, Archaeological Survey of Canada, 81 : Ottawa. **SMITH P.**, 1970. Dental morphology and pathology in the Natufians : the dental evidence for dietary specializations. Ph. D. Thesis : University of Chicago : Chicago (unpublished). **SMITH P.**, 1973. Family Burials at Hayonim. Paléorient, 1, p. 69-71.

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