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Aaron J. Brody

*Pacific School of Religion*, [abrody@psr.edu](mailto:abrody@psr.edu)

Roy J. King

*Stanford University*, [royking@stanford.edu](mailto:royking@stanford.edu)

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Genetics and the Archaeology of Ancient Israel

By Aaron J. Brody

Robert and Katherine Riddell Associate Professor of Bible and Archaeology

Director of the Badè Museum of Biblical Archaeology

Pacific School of Religion

Berkeley, CA 94709

e-mail: [abrody@psr.edu](mailto:abrody@psr.edu)

and Roy J. King

Associate Professor of Psychiatry and Behavioral Science, Emeritus

Department of Psychiatry and Behavioral Sciences

Stanford University

Stanford, CA 94305

e-mail: [royking@stanford.edu](mailto:royking@stanford.edu)

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Abstract: This paper is a call for DNA testing on ancient skeletal materials from the southern Levant to begin to database genetic information of the inhabitants of this crossroads region. Archaeologists and biblical historians view the earliest presence in the region of a group that called itself Israel in the Iron I period, traditionally dated to ca. 1200-1000 BCE. These were in villages in the varied hill countries of the region, contemporary with urban settlements in the coastal plains, inland valleys, and central Hill Country attributed to varied indigenous groups collectively called Canaanite. The remnants of Egyptian imperial presence in the region lasted until around 1150 BCE, postdating the arrival of an immigrant group from the Aegean called the Philistines ca. 1175 BCE. The period that follows the Iron I in the southern Levant is marked by the development of territorial states throughout the region, ca. 1000-800 BCE. These patrimonial kingdoms, including the United Kingdom of Israel and the divided kingdoms of northern Israel and Judah, coalesced varied peoples under central leadership and newly founded administrative and religious bureaucracies. Ancient DNA testing will give us a further refined understanding of the individuals who peopled the region of the southern Levant throughout its varied archaeological and historic periods, and put forward scientific data that will support, refute, or nuance our socio-historic reconstruction of ancient group identities. These social identities may or may not map onto genetic data, and without sampling of ancient DNA we may never know. A database of ancient DNA will also allow for comparisons with modern DNA samples collected throughout the greater region and the Mediterranean littoral, giving a more robust understanding of the long historical trajectories of regional human genetics and the genetics of varied ancestral

groups of today's Jewish populations and other cultural groups in the modern Middle East and Mediterranean.

To date there has been almost no genetic testing done on bioarchaeological remains from the region of the southern Levant (for the exception see Salamon et al. 2010). This paper will serve as a call for the need for DNA sampling on human skeletal materials from the region, to add vital data to our reconstructions of the social history of the ancient peoples and polities of a geographical region central to global human and cultural developments. Along with the need to begin to database ancient human DNA samples comes the caveat that this information will need to be interpreted with great sensitivity to ancient human identity construction, and to fractious modern political and social situations throughout the regions comprising modern Israel, Jordan, the Palestinian Authority, and parts of neighboring Syria, Lebanon, and Egypt.

We wish to stress that our reconstruction of ancient ethnicities through archaeology gives no legitimacy to modern political assertions of historic claims over land in the Middle East. It must also be foregrounded that ethnicity is viewed by the authors as a social construct of group identity (Malesevic 2004; Jenkins 2008). Ethnic identity is not essential or primordial; as a component of social identity it is flexible, situational, and may change and develop over time. Ethnicity is not genetic, although groups may identify by kinship ties that are both real and fictitious. Elements of ethnicity, that is, the variety of identifiers that help to define individuals as in-group or out-group, and how these aspects are defined both by the group itself and by outside groups, varies between social groups and may differ between different geographic regions and over different historic periods. Ethnicity may be more pronounced in the boundaries between groups, where self-awareness of ethnic identifiers may become emphasized.

Our hope is that ancient DNA testing will give us a further refined understanding of the individuals who peopled the region of the southern Levant, and put forward scientific data that will support, refute, or nuance our socio-historic reconstruction of ancient group identities and group identifications based on bioarchaeological studies of the morphometrics of human remains (Smith 1995, 1997). These social identities may or may not map onto patterns in the genetic data, which may be especially useful for understanding the category of group identity based on kinship, and testing whether or not this kinship is biological or fictitious. Without sampling of ancient DNA, we may never know. A database of ancient DNA will also allow for comparisons with modern DNA samples collected throughout the greater region and the Mediterranean littoral, giving a more robust understanding of the long historical trajectories of regional human genetics.

There are legal and political impediments to gathering DNA samples from ancient skeletal materials uncovered in the modern state of Israel (Einhorn 1997, pp. 64-74; Hallote and Joffe 2002). In general, the excavation or even disturbance of Jewish graves is considered illegal and immoral by ultra-Orthodox groups in Israel, who put considerable political pressure to insure that construction projects, which are funded by the state or permitted by state agencies; such as, roadways or foundation work for buildings, do not impact Jewish burials. Graves that cannot be avoided are typically excavated in a rushed manner, and skeletal materials are re-buried as quickly as possible with no time for analysis or sampling.

This may go a long way in explaining why, to our knowledge, there is only a single study done on the DNA of human bones in the southern Levant to date (Salamon et al. 2010). This DNA study is focused on human remains from the Chalcolithic period,

5<sup>th</sup>-4<sup>th</sup> millennium BCE, which predates any ancestral Jewish presence in the region by millennia. These obstructions within the modern state of Israel do not negate the possibility of sampling of bioarchaeological remains from the southern Levant that are housed in collections located outside of the region. It also does not preclude working with the Departments of Antiquities of the Palestinian Authority and the Kingdom of Jordan to obtain samples for human DNA testing within the parameters of the laws and political climate of each of these modern political entities.

Since the overarching theme of this volume is Jewish genetics, we have chosen to focus this overview on questions of ethnicity and ethnogenesis in the Iron I period, ca. 1200-1000 BCE (Stager 1998; Bloch-Smith 2003; Brett 2003; Dever 2003; Pitkänen 2004; Killebrew 2005; Faust 2006, 2010; Miller 2008; Fritz 2011). This is traditionally the period when some scholars view newly founded villages throughout the hill countries of the southern Levant as the habitations of early, premonarchic, or tribal Israel (for contrary views see Anfinset 2003; Pfoh 2009; Nestor 2010). Continuity in settlement in the Central Hill country into the Iron II, ca. 1000-586 BCE, the subsequent archaeological period associated with the biblical kingdoms of the United Monarchy and Divided Monarchies of northern Israel and Judah, suggests that the inhabitants of Iron I villages were, at least in part, the ancestors of the Kingdom of Judah (Faust 2006). In turn, the Judeans of the late Iron Age were the ancestors of groups exiled to Babylonia, Egypt, and those that remained in the land in the 6<sup>th</sup> c. BCE, and therefore may be viewed as the progenitors of at least some of the Jewish populations in the Near East and Mediterranean from the Hellenistic period forward. Thus, the deep culture history presented here may suggest at least some of the extended roots of the social memory of

modern Jewish groups, based on texts in the Hebrew Bible, and perhaps early roots of some Jewish genetics.

#### The geography of the southern Levant; regionalism and crossroads:

As a geographical territory, the southern Levant is remarkably diverse for a small land mass. Biodiversity is especially acute, and has had a major impact on settlement, and on agricultural and pastoral economies in the region throughout human history (Danin 1995). Most of the area relies on seasonal rainfall as a vital source of fresh water, which varies cyclically and has impacted settlement strategies.

Since prehistoric times, the region has been a crossroad providing important overland connections between the major centers of Egypt and Mesopotamia. A terrestrial corridor through the Negev linked the southern regions of the Arabian Peninsula to the wider world of the Mediterranean. Overseas connections were vital to the region, as the coastal areas provided important maritime links with the Egyptian Delta, the Lebanese and Syrian coasts, Cyprus, the Aegean, and further west in the Mediterranean. Thus it is not surprising to find varied sub-regions inhabited by human groups that identified themselves as different; since the hub of overland and maritime networks brought peoples, armies, goods, and ideas to, and through, the southern Levant throughout its long history (Brody 2002).

#### Cultural groups in the Iron I southern Levant:

Four main cultural groups are identified as inhabiting varied geographical sub-regions west of the Jordan River and rift valley in the Iron I period: Canaanites,



Egyptians, Philistines, and Israelites (Stager 1998; Killebrew 2005). To the east peoples settled in regions of modern Jordan which would later develop into the kingdoms of Ammon, Moab, and Edom (See figure 1 for a map of the southern Levant during the Iron I period).

Canaanites: In the Iron I period, Canaanites were located primarily in urban centers concentrated in the coastal plains, interior valleys, and Shephelah region of the southern Levant (Killebrew 2005, pp. 93-148; Bunimovitz and Lederman 2011). The major cities of the central Hill Country, Shechem, Jerusalem, and Hebron, were also centers of Canaanite culture. These settlements were holdovers from the city-states of the earlier period of the Late Bronze Age, although archaeological remains demonstrate that the material culture of their Iron I phases was impoverished, which may be interpreted as an impoverishment of the inhabitants of these Canaanite cities as well. For the Iron I period, ca. 1200-1000 BCE, we may consider this culture group or groups to be indigenous to the region.

Different data sources, however, suggest that the progenitors of the Canaanites migrated to the region of the southern Levant at the beginning of the Middle Bronze Age, ca. 2000-1850 BCE, from inland and coastal Syria (Ilan 2003). Over subsequent phases of the Middle Bronze Age it is likely that this immigrant population coexisted, interacted, and intermarried with local peoples whose ancestry may be traced back to the first settled villages in the southern Levant in the Neolithic period (Smith 1995, 1997). Thus the groups we label as indigenous to the region in the Iron I period, and put together under the ethnic term Canaanite, have their own varied cultural and genetic backgrounds.

Egyptians: During the first phase of the Iron I period, which most archaeologists would date to the initial fifty years of the era or 1200-1150 BCE, remnants of an Egyptian imperial presence was still in the southern Levant (Killebrew 2005, pp. 51-92). Egyptian political control over Canaan, and the physical presence of Egyptians in the southern Levant developed and changed over several centuries prior to the Iron I. Egyptian settlement during this final imperial phase is concentrated in very specific sites in the southern coastal plains and the Jezreel Valley, with an assemblage of material culture that contrasts with the local Canaanite archaeological remains. While the relationships and interactions between Canaanite and Egyptians was multi-faceted, complex, and multi-directional, unique Egyptian features such as burials in anthropoid coffins, inscriptions in the Egyptian language, Egyptian style monumental buildings, Egyptian style ceramics and statuary mark their physical, administrative, and political presence in the southern Levant. Egyptian technologies are also replicated in Canaan in building techniques, such as mudbrick foundations laid on sand, and in potting methods not indigenous to the southern Levant (Killebrew 2005, pp. 51-92).

Philistines: New to the region is a different cultural group, the Philistines, whose assemblage of material culture demonstrates their origins in the Aegean (Stager 1998; Killebrew 2005, pp. 197-245; Yasur-Landau 2010; Maeir et al. 2013). Philistine settlement in a core region of the southern coastal plain is part of a wider phenomenon of the maritime movement of varied groups from mainland Greece, the Aegean islands, and western coastal Turkey, to new homelands in Cyprus, Cilicia, and the Levantine littoral. The best known of these groups, identified through contemporary textual sources, the Hebrew Bible, and archaeological excavations, is the Philistines. Their material culture

is distinct from contemporary Canaanite and Egyptian archaeological remains, especially in the initial phases of settlement in the Levant. Varied aspects of the assemblage of Philistine material culture reveal their Aegean roots; such as, house forms, pottery shapes and decoration, ceramic technology, weaving technology, and diet. Unfortunately we lack a good corpus of burials from the region of Philistia, thus we are uncertain of Philistine mortuary practices, rituals, or the treatment of their dead. Recent discoveries of Cypro-Minoan inscriptions in early Iron Age levels at Ashkelon demonstrate that the Philistine inhabitants were speaking a language with parallels on Cyprus and relations to Crete, not a local Northwest Semitic dialect (Cross and Stager 2006).

We are well informed about Philistine diet, a sensitive marker of ethnicity. Certain legumes, a preference for pork, and the consumption of dog, are subtle indicators that Philistines brought different foodways with them from the Aegean that helped construct and maintain their distinct identity against neighboring groups in the southern Levant (Yasur-Landau 2010; Mahler-Slasky and Kislev 2010; Faust and Lev-Tov 2011; Maeir et al. 2013).

Over time, these Aegean immigrants acculturated aspects of local Levantine societies while retaining their own distinct culture until the Babylonian empire devastated the Philistine region in 604/3 BCE. While the overarching image from most texts preserved in the Hebrew Bible is one of animosity between Philistines and their neighbors, it must be pointed out that archaeological remains of certain indigenous pottery forms among the Aegeanized repertoire of Iron I ceramics hint at peaceful contact and cohabitation with Canaanites (Yasur-Landau 2010). Cultural interchange is symbolized by Samson's two marriages to Philistine wives, while literary elements in the

Samson saga hint at Aegean borrowings; such as, the riddle episode in which Samson wagers with the Philistines over the solution of a riddle he creates (Judges 14: 8-20; Weitzman 2002).

Premonarchic Israel: In the Iron I period, newly settled agricultural villages are founded in the central Hill Country, Galilee hills, and elsewhere that have been identified with the ethnogenesis, or beginnings of ethnic self-awareness, of premonarchic Israel (Stager 1998; Bloch-Smith 2003; Dever 2003; Killebrew 2005, pp. 149-96; Faust 2006, 2010). Survey data, gathered throughout the greater region, shows an unprecedented establishment of numerous small settlements in hilly regions that were underpopulated in the previous historic period. The excavation of several of these village sites has revealed a ceramic assemblage whose ancestry is found in the local Late Bronze Age pottery repertoire (Killebrew 2005, p. 177). A new architectural design is found in the pillared houses of these villages, usually made-up of four-room and three-room types, for which some scholars maintain the ethnic label “Israelite house” (Holladay 1992; Bunimovitz and Faust 2003; Faust 2006). Others, however, prefer to interpret this new house design functionally, viewing its design as reflecting socioeconomic factors rather than ethnic features, pointing out the house style’s distribution beyond the regions typically attributed to premonarchic Israel as well as the presence of non-pillared houses at sites usually deemed Israelite (Stager 1998, p. 137; Bloch-Smith 2003, pp. 407-408).

Burials in the central Hill Country from the end of the Late Bronze Age or the beginning of the Iron Age are very difficult to differentiate. This is because of the direct relationship of the style of their artifacts, use of the same cave tombs over both periods, and continuity of mortuary practices (Bloch-Smith 2004; contra Kletter 2002 and Faust

2004). The endurance in burial traditions may be read metaphorically as the blurring of the lines between the ethnic self-ascription of the peoples interring their dead ancestors in these tombs in the Late Bronze Age and early Iron Age.

If we equate these new highland settlements with tribal or premonarchic Israel, which in our opinion is valid, one can interpret indigenous group development in the founding of these villages and not an influx of refugee groups from Egypt or Transjordan as is outlined in Pentateuchal sources (Stager 1998; Bloch-Smith 2003; Dever 2003; Killebrew 2005; contra Faust 2006, pp. 184-85). It appears that the inhabitants of these villages did not distinguish themselves fully from their Canaanite neighbors, the root culture from which they eventually differentiated. The almost complete lack of pig bones from excavated highland village sites and the Canaanite site of Tel Beth-Shemesh in the northern Shephelah, however, suggests that dietary practices were in place that separated highland and Shephelah inhabitants from the Philistines settled in the southern coastal plain (Bunimovitz and Lederman 2011, pp. 44-45, fig. 8).

Encounters between Philistines, Canaanites, and premonarchic Israelites would have increased with the departure of Egyptians from the region around 1150 BCE. This vacuum of imperial Egyptian presence and power corresponded with a territorial expansion of the Philistines from their heartland to the north, east, and south (Stager 1998). With this expansion of Philistine territory, and lack of an Egyptian military buffer, it is likely that increased encounters took place, both peaceful and bellicose, between the Philistines and their neighbors that may have created greater ethnic self-awareness and differentiation.

So were early Israelite villagers simply rural Canaanites who also refrained from eating pork, adhered to an Exodus from Egypt ancestral tradition, and included Yahweh among a pantheon of deities worshipped (Brett 2003)? We may have put that too simply, but it gets at the gist of the argument. Canaanite itself is a term used by scholars as a kind of ethnic catch-all for the varied settled and pastoral nomadic groups that inhabited the city-states and different regions of the Late Bronze Age southern Levant. The inhabitants of the Iron I highland villages, or at least some of these villages, had a material culture whose roots were in the indigenous traditions of the region. Their language, or the best we can reconstruct it from fragments of early biblical poetry preserved imbedded in later Hebrew texts, is a Northwest Semitic dialect descended from the Canaanite language (Exodus 15, Judges 5, Deuteronomy 33, Genesis 49; Hackett 1998). They do differentiate in terms of locations of their settlements, a ruralization that must have been quite intentional given the difficulties of preparing and maintaining rocky, forested hill regions for agriculture (Stager 1998, pp. 141-42). Whether or not these Iron I villagers included Yahweh in their pantheon cannot be demonstrated archaeologically, although it is the tradition preserved in early Hebrew poetry. Yahweh, however, was not worshipped alone as is made clear in this same poetry, in varied theophoric names of biblical characters, and in the diverse religious traditions and ritual practices captured in the Book of Judges and 1 Samuel (Hackett 1998).

Thus we may view the relationship between early or tribal Israel and Iron I urban Canaanite groups as one of “proximate others” (Southwood 2012) and the period from around 1200-1000 BCE as one of ethnogenesis for Israel as it moved to define and differentiate itself over and against its neighboring urban cousins. The two other groups

discussed, the Egyptians and the Philistines were “distant others” from both the Canaanites and early Israel, exhibiting much wider gaps in some of the elements of social identities. These include language, diet, religion, ritual, art, treatment of the dead, and house forms, to name a few, which are “proximate” between Iron I Canaanites and premonarchic Israelites, but “distant” between those two groups and Egyptians and Philistines.

Modern DNA studies:

Although many modern DNA studies using Y chromosome and autosomal genome wide association markers have been published for Levantine, Arabian, Turkish and Jewish populations, DNA haplogroup frequencies of extant populations may not necessarily reflect the population structure of these regions circa 1000 BCE. Multiple migrations and population movements, such as the Assyrian and Babylonian exiles, Phoenician and Greek colonization, Persian, Hellenistic, and Roman hegemony, immigration of Arabian populations during the initial stages of Islamic conquests, and the Crusades may have had a profound effect on the distribution of both Y chromosome and autosomal markers.

In this review, we will take a slightly different approach to contemporary interpreting genetic data: rather than identifying our hermeneutic framework to be that of historic nations, regions, and populations, we will divide the broader geographic space into three domains: Mediterranean, Arabian Peninsula and the Southern Anatolian, Northern Mesopotamian and Northwest Iranian Fertile Crescent.

The Mediterranean Sea is a vast expanse of water that borders on three continental areas: North Africa, West Asia and South Europe. The climate and geology of the insular and littoral areas bordering on the Mediterranean share a common pattern—a Mediterranean climate, frequent seismic events and a karst limestone studded landscape. Moreover, the Mediterranean has been readily traversed both locally and across long distances by maritime transport for millennia. The historian Fernand Braudel considered the Mediterranean as a geographic/cultural unit whose commonalities surpass the conventional subdivision of geography into continents such as Europe vs. Asia (Braudel 1972). Braudel also viewed Mediterranean history through a broadly focused temporal and spatial lens, which he termed “la longue durée”, rather than on specific social-historical events such as conflict between states or empires. Braudel’s geographic and historical model of Mediterranean culture could pose an alternative way of analyzing human population genetic data of the region. Most genetic studies, both autosomal and haploid (Y chromosome and mtDNA), have tended to divide populations according to continental, national, ethnic, and linguistic barriers rather than considering the Mediterranean as a unit.

In a similar fashion, the Arabian Peninsula constitutes a geographic unit with its low annual rainfall and its initial low range human mobility shifting to long-range mobility near the beginning of the Iron Age with camel transport and trade. The Anatolian, North Mesopotamian, and NW Iranian region, circling the hilly flanks of the Taurus and Zagros mountains has sufficient annual rainfall to permit the development of Neolithic rain-fed agriculture.



Interestingly, the southern Levant lies at the confluence of these three domains. An eastern Mediterranean face into which the so-called “Sea Peoples” may have migrated at the end of the Late Bronze Age and from which the Canaanites and later the Phoenicians engaged in cosmopolitan sea-faring trade, an Arabian semi-desert sector into which nomadic and semi-nomadic groups have moved for millennia, and the coastal mountains of Lebanon and Syro-Palestine that saw the rapid development of the Neolithic economy—wheat, barley, caprids, cattle and pig domestication—circa 8000 to 7000 BCE. In light of this conceptual framework, we will present first autosomal findings and then, in turn, Y chromosome results that may shed light on the origin of the Israelite people.

#### Autosomal Studies:

Most published autosomal studies that include Levantine populations utilize hundreds of thousands of SNPs through arrays that genotype samples across the autosomes. A study by Behar et al. (2010) on multiple Jewish populations found the Ashkenazi and Sephardic Jews clustered with Cypriots and were situated between Druze from Carmel, Israel, and Armenians on a two dimensional principle component plot reducing the frequency variation of the 500K SNPs to the two underlying dimensions. Other Levantine populations, such as Lebanese and Syrians were slightly more distant from the centroid of these Jewish populations, while populations further south in the Arabian Peninsula, Palestinians, Jordanians, Bedouins from Israel, and Saudis were even more distant in the plot. Turks from Cappadocia and Iranians aligned closely with populations from the Caucasus.

A recent study (Haber et al. 2013) analyzed three Lebanese populations: Christian, Muslim, and Druze including data from many previously published samples from other autosomal studies. They found that Ashkenazi and Sephardic Jews clustered best with Lebanese Christians and Druze. Lebanese Muslims fell close to Syrians in both the principal component and multidimensional scaling plots. An ADMIXTURE analysis of world populations at the 10 component level revealed what was termed a Levantine component dominant in Anatolian, Iranian, Armenian, Cypriot, Ashkenazi and Sephardic Jews, and Lebanese Christians and Druze versus a Middle Eastern component, dominant in Bedouins, Saudis, Ethiopians, and Moroccans. The dichotomy between these two components overlaps between a clustering of the Mediterranean coastal region and the Northern Fertile Crescent in contrast to the Arabian and North African regions.

Both these studies support the hypothesis that Ashkenazi and Sephardic populations, to the extent that they may form a palimpsest of the Iron Age Israelites, may reflect indigenous Late Bronze Age Canaanites. Geographically, Canaanite archaeological material culture, and the rare textual and linguistic evidence point to the hub of Canaanite culture along the coast of Lebanon and Northern Israel, as well as inland to the Galilee area up to the Beka'a valley. The genetic affinities of the Jewish populations with Druze and Lebanese may reflect a common Canaanite substrate.

#### Y Chromosome Studies:

The Y chromosome, on account of its haploid state, often enables specific lineages to be traced through migrations and temporal demographic events in a manner that eludes the analysis of autosomal frequencies. In the three regions under consideration, Y haplogroup J-M304 is the major haplogroup in population frequency.

Haplogroup J itself splits into J1-M267 and J2-M172, which in turn fractionate into the numerically dominant J1e-P58 and J2a-M410 clades (Chiaroni et al. 2008; Chiaroni et al. 2010). It has been shown that J2a and J1e track the annual rainfall patterns of the Mid-East in frequency, with J2a at higher frequencies in the higher rainfall areas of Anatolia and the coastal Levant as well as the insular Eastern Mediterranean: Crete, Cyprus, and Sicily (Semino et al. 2004; Chiaroni et al. 2008; King et al. 2008; Zalloua et al. 2008). J1e on the other hand statistically covaries with a low rainfall pattern of the Mid-East Arabian Desert. The divergence in frequency patterns between J2a and J1e mirrors the two autosomal components in Haber (2013) with J1e spatially associated with the Mid-East component and J2a with the Levantine component. On a more micro-level, J2a frequency tends to surpass J1 frequencies in the insular Mediterranean, Anatolia, and Iran. J2a and J1 frequencies among Ashkenazi/Sephardic Jews and Christian and Druze Lebanese are approximately equal, while the reverse is seen among Arab speaking populations of the non-coastal Arabian Peninsula where J1 frequencies surpass J2a frequencies (Semino et al. 2004; Zalloua et al. 2008).

This geographic distribution of J2a versus J1 mirrors the two autosomal components from Haber et al. (2013). However, several demographic and migrational events may contribute to the observed Y frequency patterns in the southern Levant. Major J2a lineages whose origin is likely from East Anatolia, Armenia, Georgia, and NW Iran could have migrated to the southern Levant during the Early Bronze Age through the movement of the Kura-Araxes horizon to Lebanon, Syria, and ultimately the Galilee area marked by the Khirbet Kerak culture (Akkermans and Schwartz 2003). Later immigration from a similar East Anatolian source may have brought Hurrian onomastics

to the southern Levant during the Middle Bronze Age (King 2009). These events may have added J2a to an underlying J1 substratum. Analogously, J1 chromosomes may have amplified in frequency during the many episodes of sedentarization of nomadic and semi-nomadic populations in the southern Levant from the Arabian Desert. Finally, other Y lineages may have moved into the coastal southern Levant from the Aegean during the collapse of the Late Bronze Age cosmopolitan states.

Aegean Immigration to the southern Levant:

The Y chromosome patterns of contemporary populations offers a lens through which to explore the possible demographic effects of the Iron Age I Philistines in the far southern coastal Levant. Apart from the J2a patterns listed above, previous studies show an Aegean focus for two non-J Y lineages: E-V13 and G-M527/L13. E-V13 has been shown to have originated most probably in the Balkans circa 9000 BCE as a Mesolithic marker, while G-M527/L13 arose somewhat later during the Late Neolithic Era in coastal Western Anatolia (Battaglia et al. 2008; Rootsi et al. 2012). Both lineages track Greek colonization events from present day Marseilles/Provence (Greek colony of Massalia) to Greek colonies in Ukraine and Crimea (King et al. 2011; Rootsi et al. 2012). We also find E-V13 and G-M527 among contemporary Palestinians and Druze from Israel (table 1). This result suggests that E-V13 and G-M527 may track the immigration of Aegean colonists to the southern Levant.

Thus, DNA markers of contemporary populations offer us hints with which we may posit hypotheses about ancient Levantine DNA. Immigration from the Arabian Peninsula during the Late Bronze Age and/or Early Iron Age might be expected to contribute J1e markers to Israelite populations; settlements of Aegean derived “Sea

Peoples” may amplify the frequency of Aegean specific markers E-V13 and G-M527 among Philistine skeletal material, while the persistence of J2a in coastal Levantine/Canaanite populations should be discoverable in ancient DNA samples from the southern Levant. With full Y sequences, the dating of E-V13 and G-M527, both from Aegean source populations and Levantine target populations, will be more reliably estimable than conventional dating from YSTRs.

The single ancient DNA study of the southern Levant (Salamon et al, 2010) explored mtDNA haplogroups in a Chalcolithic context from a cave in the Judean Desert. Here mtDNA haplogroups, U3a, H and H6 were found from the skeletal remains in the samples tested. U3 is quite frequent in contemporary mtDNA from Near Eastern and Levantine samples suggesting some temporal continuity in mtDNA haplogroups from as far back as the Chalcolithic Era (circa 4500-4000 BCE). In addition, the authors found that the U3a and H6 haplotypes from the ancient DNA samples were present in a broad range of contemporary Jewish populations.

#### Conclusions:

The period that follows the Iron I in the southern Levant is one marked by the development of territorial states throughout the greater region. These patrimonial kingdoms coalesced varied peoples under central leadership and newly founded administrative and religious bureaucracies. New ideologies of the state required greater allegiance to the patrimonial kingdom and a tempering or a redirecting of Israelite family, clan, and tribal affiliations. Different territories and culture groups were brought under

the hegemony of the Israelite patrimonial kingdom, likely increasing interconnections between varied peoples.

Modern DNA studies throughout the region of the southern Levant, Middle East, and Mediterranean may currently be connected to ancient social history in a highly imprecise fashion. This is due largely to issues of dating, for which the standard of deviation is so large that it is challenging to link distinct modern DNA features to known archaeological data or historic events. By sampling skeletal materials from the southern Levant from secure archaeological contexts, we can begin to build an ancient DNA database. This database would provide ancient genetic information that we could then compare with our archaeological reconstruction of varied ethnic groups in the southern Levant in the Iron I and other periods. Ancient DNA may also be compared with modern DNA in order to better refine our understanding of the long-term histories of human groups and their interactions in the southern Levant.

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Table 1

Frequencies of Y Chromosome Haplogroups E-V13 and G-M527 in Various Populations,  
Expressed as Percentages (Syria, Jordan and Turkey and Lebanon have no G-M527)

<b>Region</b>	<b>V13*</b>	<b>M527**</b>
Lerna/Franchthi	36	1.8
Nea Nikomedeia	14	1.8
Phocaea	19	3.2
Rhodes	18	5
Crete	7	0.6
Provence	4	0.5
Ukraine	8	0.7
Palestinians	4	1.1
Druze	11	1.0
Bulgaria	17	0.1
Bosnia	20	0.0

\*--V13 Frequency data on Lerna/Franchthi, Nea Nikomedeia, Phocaea, Crete and Provence are extracted from King et al (2011). Rhodes from King, unpublished data. Bosnia and Ukraine are from Battaglia et al (2008), Palestinians and Druze are from Cruciani et al (2007), Bulgaria is from Karachanak et al (2013).

\*\*--M527 Frequency data are from Rootsi et al (2012), Karachanak et al (2013) for Bulgaria and King, unpublished for Rhodes.

Figure Legends:

Figure1: The southern Levant in the Iron I period