Title
How America Was Colonized: Linguistic Evidence

ISBN
9783319151373

Author
Nichols, Johanna

Publication Date
2015

DOI
10.1007/978-3-319-15138-0_9

Peer reviewed

How America was colonized: Linguistic evidence

Johanna Nichols
University of California, Berkeley

Preprint for submission (not yet peer-reviewed, not yet edited)

Please refer to the published version:
Nichols, Johanna. 2015. How America was colonized: Linguistic evidence. In Michael David Frachetti and Robert N. III Spengler, eds., *Mobility and Ancient Society in Asia and the Americas,* 117-126. New York: Springer.

America was colonized by Asian migrants who moved from northeastern Siberia into North America, either coastally or by an interior route through now-submerged Beringia, and from there spread southward eventually to settle the entire hemisphere. That much is made clear by the geography, the human genetics, and the archaeological record. But much else remains unclear: when did immigration begin? how many genetic populations immigrated? how many linguistic populations? how fast did they move? Linguistic evidence can shed some light on these and other questions. It is not that we can reliably trace the languages of the Americas back to one or a few ancestral languages, reconstruct the vocabulary and grammar of the ancient ancestor(s), or show that the American languages are related to some Asian language family. Far from it; only rarely can a linguistic descent be traced back more than about 6000 years, not even halfway back to the well-dated spread of the Clovis Culture across North America at about 13,000 BP.[1] Rather, the time required to generate the historically attested number of languages and language families in the Americas can be estimated; frequencies of structural properties in areally-defined linguistic populations can discriminate between populations and point to geographic origins; and attested and straightforwardly reconstructable rates of language spread can be used to estimate rates of migration and demographic spread.

The beginning of Asia-America migrations

The archaeological evidence for the early colonization of the Americas is fairly straightforward. The earliest firm archaeological evidence includes a pre-Clovis mastodon hunting site at Manis, Washington, c. 13,800 BP (Waters et al. 2011); a human coprolite from Paisley Caves, Oregon c. 14,500-14,000 BP (Gilbert et al. 2008); human remains from Santa Rosa Island offshore from southern California, c. 13,000 BP (Erlandson et al. 2011, Erlandson, Moss, & Des Lauriers 2008:34); and an archaeological site including artifacts and human footprints and fingerprints in Monte Verde, Chile, c. 14,100 BP (Dillehay 1997, Dillehay et al. 2008, Erlandson et al. 2008); see also Gibbons 2014. In very recent work, Halligan 2014 describes an early find from Florida which Gibbons 2014 reports as dated to

[1] Here and below I express all dates in calendar years before present.

14,500 BP. Human settlement of the Siberian Arctic began over 40,000 years ago (Hamilton & Buchanan 2010), but no firmly dated American site is anywhere near that old.

Recent estimates of the age of the American human population based on genetics generally range between 15,000 and 20,000 years (Schurr 2004, Tamm et al. 2007, Perego et al. 2009, and many others). A current view sees the American population as diverging from the rest of Asia beginning perhaps 30,000 years ago, followed by some 15,000 years of hunkering down during the Last Glacial Maximum (LGM) in Beringia, which recent work shows to have been a fairly rich environment for megafauna and humans at the time, followed by a rapid spread into the Americas c. 15,000 BP (Tamm et al. 2007, Willerslev et al. 2014, Hoffecker 2014).

For a summary of the different kinds of evidence as of 2004 see Madsen ed. 2004 and especially Madsen's recapitulation (389-396).

Entries to North America could have been by either interior or coastal routes, and recent work tends to assume that both occurred. The archaeologically based entry dates cited above are for interior overland entries. Coastal colonization, by coastally adapted people using watercraft, could have begun early (Australia-New Guinea was settled before 50,000 BP, showing that seafaring technology existed very early), but any direct archaeological evidence has been obliterated by the postglacial sea-level rise. Colonization by coastally adapted people could certainly have begun by about 16,000 BP, by which time "the Pacific Rim was a plausible migration route, entirely at sea level, with rich and diverse resources from both marine and terrestrial ecosystems" (Erlandson & Braje 2011): a "Kelp highway" extended from Japan to Baja California (Erlandson et al. 2007), and southward to the Andean coast were rich estuaries created as the postglacial sea rise flooded coastal drainages (Erlandson & Braje 2011:29). The early North American sites listed above are coastal or near-coastal. Only in South America are there a number of inland sites with dates around 13,000 BP. For early coastal adaptation and coastal colonization in general see Bicho et al. eds. 2011.

Linguistic evidence

The linguistic evidence, as interpreted, expanded, and reanalyzed over the last 25 years, continues to point rather clearly to a much earlier colonization and a much greater age for the American linguistic population. One form of evidence is the sheer number of distinct language families in the Americas. Table 1 gives the totals: the Americas contain close to half of the world's language families.

Table 1. Total numbers of separate language families[2] by macrocontinent. Source: the Autotyp database (Bickel & Nichols 2002ff.), Nichols et al. 2013.

Africa & Eurasia	87	(25%)
Australasia	110	(32%)
Americas	144	(42%)

[2] These are *stocks* in the technical sense of the Autotyp project (Nichols et al. 2013): the oldest genealogical level that is both demonstrably a family and reconstructable. There are a few older groupings that are demonstrably families but too old to be reconstructable: the clearest case is Afroasiatic, comprising the stocks Semitic, Egyptian, Berber, Chadic, Cushitic, and Omotic.

This genealogical diversity has built up in two ways: immigration of distinct linguistic ancestors and diversification *in situ*. A language family generally takes about 6000 years to become fully distinct from its sisters to the point that linguists can no longer demonstrate the common descent. Some language families are younger, e.g. the Chumashan family of coastal and near-coastal southern California, which, judging from the degree of its internal diversity and what can be inferred from the archaeological evidence, is not much older than the Romance or Germanic families (i.e. about 2000-2500 years). Some of these younger families may have older connections that are detectable but have not been detected yet; however, given the rates of extinction known to have accompanied language spreads over the last few thousand years, and the intensity of comparative work done in recent decades, it is more parsimonious to assume that these younger families are sole survivors of what would have been older families had their sisters survived.

Note that totals of languages and families are *extant* ones only, i.e. they represent successful colonizations. Some early archaeological sites could well be failed colonizations (Anderson & Gillam 2001:531), but if so they have not contributed to the attested linguistic diversity.

Rates of immigration from Asia to America are unknown, but given the rates of language movement and migration observable and reconstructable in the North Pacific region over the last several thousand years, entries are unlikely to have occurred more often than one every two or three millennia. (For the prehistory and reconstruction of the two North Pacific families, Eskimo-Aleut and Chukchi-Kamchatkan, see Fortescue et al. 1994 and Fortescue 2005.) Overland immigration into North America was probably impossible during the LGM and infrequent until the deglaciated corridor between the cordilleran and continental ice sheets had been colonized by enough plants and animals to enable a pedestrian society to survive enroute from central Alaska to northern Oregon.[3] Also, importantly, the ecology and resources of the passage had to be sufficient to support a spread or motivate a migration in the first place.[4]

A language occasionally diversifies into a large number of surviving daughter branches, giving rise to an old family with many initial branches, but this is not common. When it does occur, it usually accompanies unusual and archaeologically detectable situations such as major economic or technical advances or recolonization of mostly empty lands after a major drought or a glaciation. Rates of diversification and/or change that would create large numbers of families in substantially less than 6000 years could conceivably have accompanied the initial spread of *Homo sapiens* into previously uninhabited lands and, therefore, might have accompanied the frontier of the human spread into and across the Americas, but it is difficult to believe that such processes would not also have been visible in the Austronesian colonization of the remote Pacific or the Pama-Nyungan expansion across interior Australia (Austronesian: Blust 2009, Ross et al. eds. 2008, Kirch 2010, Donohue & Denham 2010; Pama-Nyungan: McConvell 1996, Bowern & Koch 2004). Nichols (2000) assumed a frontier with rapid diversification and multiple colonizations at relatively rapid rates but was still unable to reach a postglacial initial colonization without violating

---

[3] This could have occurred as soon as the corridor supported enough insect and plant life to function as a flyway for migratory waterfowl.

[4] See note 4: migrations of birds would have signaled to hunters that the flyway led to life-supporting terrain.

uniformitarianism. To summarize, the genealogical diversity of the American linguistic population demands an earlier beginning of the colonization process than either the archaeological or the genetic evidence appears to provide.

Once in North America, how rapidly did human societies spread southward and eastward to populate the entire hemisphere? We have a few examples of archaeologically traceable expansions into new lands. The settlement of the Siberian north beginning ~46,000 BP moved at about 0.25 km/year, with a halt and stasis from ~32,000 BP to ~16,000 BP, then movement into the Americas at about 1km/yr (Hamilton & Buchanan 2010). The Paleolithic recolonization of the Levant and Europe proceeded at about 0.4-0.8 km/yr (Fort et al. 2004). The Pama-Nyungan spread to recolonize the interior of Australia after a millennia-long drought moved just under 4000 km in about 5000 years for an average rate of 0.77 km/yr (McConvell 1996; rate calculation Nichols 2008). The early stage of the Algonquian spread across North America probably involved an expansion from the vicinity of the Snake River in western Idaho as the Altithermal period peaked on the Columbia Plateau and began to ameliorate on the Great Plains, to the upper Mississippi and west of Lake Superior (Hill 2004, drawing on Denny 1991), about 1900 km in about 1700 years, so about 1.1 km/yr. Otherwise, we have evidence only from spreads of new technologies or archaeological horizons through already inhabited land. The most studied and most modeled of these is the spread of the Neolithic across Europe, for which various models yield rates from about 0.7 to about 1.1 km/yr (Fort 2007). Thus any overland colonization and spread is unlikely to have proceeded faster than about 1 km/year.

Unfortunately, we have no firm archaeological evidence for rates of coastal spread in initial colonization, chiefly because the postglacial sea-level rise has obliterated archaeological evidence for the settlement of most of the inhabited world. The Polynesian colonization of the Pacific, if measured only during its peak migration period, proceeded rapidly, about 9 km/yr (Nichols 2008 for the calculation, sources referenced there for the dates), but the early Polynesians were horticulturalists who could produce and store food for long sea journeys, they used sailing technology unavailable during the Paleolithic, and in any case long-distance open-ocean island colonizations are not a good model for coastal movement by coastal specialists.

Here is where linguistic evidence can be useful. Spread rates can be calculated for every language family whose geographical range is known (all modern language families and some ancient ones) and whose age can be measured or estimated. We have very good datability wherever there is inscriptional attestation of ancient languages (such as Latin, Vedic Sanskrit, and Archaic Chinese, ancestral respectively to the Romance, Indic, and Chinese families) or archaeological evidence (as for Indo-European, firmly datable to the western Eurasian steppe at about 6000 BP: Anthony 2007, Darden 2001, Chang et al. submitted). For the vast majority of the world's c. 350 language families, dating is much less precise, relying on computational methods whose accuracy is improving but suboptimal, estimates that assume regular rates of vocabulary loss when that is known to be variable, and comparisons of levels of diversity (grammatical, lexical, etc.) to those of more firmly dated families. It needs to be emphasized, though, that while such dates are quite approximate, they can probably be assumed to lie within a millennium of the actual date; there is really no mistaking a family of Romance-like divergence (Romance is about 2000 years old) for a family of Indo-Iranian-like divergence (about 4000 years) or Indo-European-like divergence (6000 years).

A language family's rate of spread is then the diameter of the language's range at its widest, divided by its (approximate) age (Nichols 2008). This measure is only approximate, not only because language family ages are often approximate but also because attested ranges of families may have retracted from former maxima or expanded due to post-colonial events that have no analog in earlier times. Increasingly though, historical and linguistic research are able to identify even these confounding factors. Furthermore, rates need not be measured precisely in order to test hypotheses about the first colonization of the Americas. Recall that the linguistic evidence generally points to a considerably earlier colonization than the archaeological, genetic, and paleoclimatological evidence indicate. The null hypothesis is then that colonization was not earlier than the time frame of the convergence of those three sciences, and the question is whether that null hypothesis can be falsified. Therefore, where migration rates are concerned, we only need to show that even the fastest plausible spread rates could not have brought people starting from the southern edge of the ice sheets post-LGM to Monte Verde, Chile by 14,100 BP.[5] This means that the fastest migration and spread rates, even if unsustainably fast or unrealistically fast for the environment, are conservative because, by shortening the migration time, they favor the null hypothesis.

These measures are valuable because language families are numerous, so spread rates can be averaged and compared across a number of variables (Nichols 2008). Rates prove to be systematically sensitive to geography: they are faster at high latitudes, in continental interiors, and in dry or seasonal climates than at low latitudes, near coasts, and in subtropical and tropical climates. They are not particularly sensitive to the difference between foraging and food-producing economies. They are of course quite sensitive to modes of transport, so that spreads using horses, wheeled vehicles, or ocean sail-craft cluster among the fastest spread rates. It appears that spreads involving language shift move somewhat faster than those involving demographic replacement or spread, and migrations move faster than demographic expansions. Spreads do not move at constant rates; whenever there is evidence they prove to have short bursts of peak movement followed or interspersed by pauses, and comparisons of other factors need to take this into account. The fastest spreads involve beeline migrations along established routes and/or to known destinations. For these various reasons, the fastest spread tabulated there is that of the Lapita archaeological horizon across Oceania at 20 km/yr, either carrying or accompanying the spread of the Oceanic subbranch of Austronesian across island Melanesia (Kirch 1997, 2000, 2010, Donohue & Denham 2012): it was a spread of food producers using advanced ocean voyaging technology and spreading by beelines through an established voyaging and trading network, and it is the short-term peak spread rather than the entire history of the Lapita culture and the Oceanic subbranch of Austronesian.[6] This spread is obviously not an appropriate model for the coastal settlement of the Americas.

---

[5] The distance can be walked, of course, in a few years. At issue here is not human walking speed but rates of migration and ethnic spread.

[6] Another apparent sprint is the rapid spread of Clovis fluted points across much of North America in some 200 years, a rate of about 24 km/yr (Anderson et al. 2005, Waters & Stafford 2007), but in view of its antiquity and the inherent nature of the archaeological record it is likely that sites from both the earliest and latest ends of its spurt are still to be found. In any event the Clovis culture cannot be connected to any language family, so it cannot be compared to the linguistically based rates used here. Hamilton & Buchanan 2010 give an overall spread rate of 7.6 km/yr for the entire Clovis spread.

The fastest of the plausible spread rates applicable to the colonization of the Americas is that for Pacific Coast Athabaskan (British Columbia to northern California in 400 to 700 years, depending on interpretations of the archaeology), from 2.9 to 5 km/year (near-coastal),[7] or the Numic spread through the Great Basin (2 km/yr, interior), for the higher latitudes; and the southward spread of Pama-Nyungan in eastern Australia (0.68 km/year; coastal) or the eastward spread of Western Desert in central Australia (1.6 km/year; interior). At these rates, moving from the lower Columbia (where the glaciers ended) to Monte Verde would require a start date well before 20,000 BP and probably before 25,000 BP. These rates are the carefully cherry-picked fastest ones in order to favor the null hypothesis, and the distance is calculated from just south of the ice sheets in order to bypass the thorny question of how people entered North America during glaciation in the first place. Despite this support they easily falsify the null hypothesis.

It is conceivable that all of the ages given for language families are systematically too old, so that movement has actually been faster than calculated here – though it is highly unlikely that the various dates, estimated using various means by different linguists, would all err in the same direction. It is also conceivable that all the language-family diameters systematically underestimate the actual greatest range achieved in the family's spread (e.g. by undetected loss of territory to neighboring language families, though those families are usually also measured here) – but (again in order to favor the null hypothesis) diameters have been measured from edge to edge when spreads have rarely begun at the very edge of a range, so the rates are artificially fast in the first place. It is more plausible, though still unlikely, that initial colonization rates were systematically, and substantially, faster than the rates calculated from extant language families – though as noted above spreads by expansion, or into previously unoccupied land, generally appear to have been slower than spreads by language shift, the main driver of language spreads in already inhabited land. It is also worth emphasizing that no spread could have been sustainable if it had moved the frontier faster than the expanding society could fill the range at least to the extent of making it possible for small migrating groups at the frontier to find marriage partners for their younger generations, as this generally requires access to a total population of at least about 500 individuals (Moore 2001, 1987).

To summarize, the linguistic evidence consistently yelds rates of diversification and spread that clearly imply a much greater age for the American population than the genetic, archaeological, and paleoclimatological evidence suggests. The main unknowns arise in connection with initial coastal colonization, rates of Pleistocene coastal spread, and frequencies of high-latitude coastal spreads. Archaeological information that is straightforwardly obtainable on land, such as site densities and high-latitude technology, will probably never be available for glacial-age coastal societies because the postglacial sea-level rise has generally obliterated the sites. Still, recent growth of interest in comparative cross-cultural study of ancient maritime adaptations (Bicho et al. eds. 2011) and a handful of recently undertaken underwater archaeological surveys (ibid., especially the editors' Preface) give hope that more will soon be known. Simulation and modeling can compensate for data gaps: Bulbeck 2007 models the human spread from Africa to Sahul as a rapid patchwise

---

[7] This was a series of beeline migrations to known destinations: "Moving in small raiding parties, … followed the Columbia River across the Plateau and through the Cascades to the Pacific" [southward along either the Cascades or the coast] (Golla 2011:257-258). The other rates cited in this paragraph are from Nichols 2008.

spread from estuary to estuary by people capable of paddling and storing water. The rates he mentions range from 0.7 km/yr, comparable to the linguistically and archaeologically derived rates for various spreads mentioned above, to 4 km/yr, a rapid rate, suggesting that at least some of the coastal spread could have been fairly rapid, especially that between southern California and central Chile, where estuaries are the rich spots on an otherwise fairly dry coast. Recall from above, though, that a still faster rate of spread for the entire distance from the lower Columbia to central Chile is required to settle Monte Verde from a post-LGM start by its attested time. For now we are left with a mystery: linguistic evidence of several types demands much earlier dates for the first settlement of the Americas than other relevant sciences do. The linguistic evidence is plentiful enough and rigorously enough compiled and analyzed that it cannot simply be dismissed.

Linguistic population structure in the Americas

The evidence reviewed above suggests that, in the early stages of colonization, societies remained primarily coastal and spreads and migrations must have moved southward along the coast, with occasional movements into near-coastal environments. The terrestrial archaeological record shows only the sites that were far enough inland to be above the present shoreline, which must be a small sample of the total and not from the very earliest landfalls but from after enough time had passed to enable the coastal settlers to familiarize themselves with inland resources and forage well inland. Monte Verde, Chile, is 15 km from the nearest estuary environment and 90 km from the coast (Dillehay et al. 2008, Erlandson et al. 2008) and has both seaweed and inland plant remains, implying that coastally oriented people were foraging inland and/or that trade had developed between inland and coastal peoples.

In view of the generally high linguistic and cultural diversity of Pacific coast populations, there is likely to have been a continuous stream of occasional coastal immigrants resulting from predominantly counterclockwise gradual movement around the Pacific Rim from perhaps as far south as Southeast Asia and ultimately reaching Tierra del Fuego. Inland immigration from Beringia began somewhat later and/or involved fewer immigrations and a less dense population until 13,000 BP when Clovis points appear rapidly in numerous sites across interior North America. Clovis technology appears to be that of inland big-game hunters, and it is not known whether it reflects an overland immigration from Beringia or an offshoot of a society ultimately spread from the coast.

At some point the coastal immigrant stream was entered by a distinct linguistic population (perhaps a single language or family, perhaps a set of unrelated representatives of a grammatically definable language area). This happened after colonization was well underway but much earlier than the traceable age of any demonstrated language family. This new population brought to the American Pacific Rim a number of structural properties found with observable frequency around most or all of the Pacific Rim linguistic area including Oceania and New Guinea: numeral classifiers (Bickel & Nichols 2006), elaborate possessive classification (Nichols & Bickel 2011), personal pronoun systems with first person *m* and second person *n* (Nichols & Peterson 1996, 2011), verb-initial basic word order, large consonant inventories, and a number of others (Bickel & Nichols 2006).[8] There are no corresponding grammatical traits characteristic of only the inland American languages; such prototypically American traits as head-marking morphosyntax, its concomitants noun incorporation (Caballero et al. 2008) and polysynthesis, verb-based derivational morphology, and others are found in both the Pacific Rim population and the interior.

Fig. 1 shows one of the Pacific Rim traits, numeral classifiers, in a worldwide genealogically and geographically distributed sample of languages from the Autotyp database (Bickel & Nichols 2002ff.). Numeral classifiers are grammatical morphemes that are obligatory in noun phrases with a numeral, and which reflect one or more properties of the quantified noun. They are well known to be common in Asian languages, e.g. these Mandarin examples (Norman 1988:157, Ramsey 1987:68; classifiers boldface; in the interlinear, CL = general classifier, STRIP and VOLUME are quick glosses of classifiers reflecting the shape of the counted noun):

*yí-**ge** rén*	*yì-**tiáo** hé*
1-CL man	1-STRIP river
'one man'	'one river'
*liang-**ge** rén*	*liang-**ben** shu*
2-CL person	2-VOLUME book
'two people'	'two books'

They are common not only in Asia but also in Pacific-facing coastal regions of Melanesia and the American Pacific coastal region.[9]

FIGURE 1 ABOUT HERE

We thus have an asymmetrically overlapping American linguistic population with a discernable Pacific Rim population but no distinctive hallmarks of the rest of the languages. Language families have the same sort of distribution: some originally coastal or near-coastal families have substantial inland extensions, such as the Salishan family, originally coastal but now extending well into the intermontane region, and the Algic family, whose western branch, Algonquian, extends from the Great Plains to the Atlantic coast. If the interpretation given above of the distribution of early North American archaeological sites is correct, the

[8] Bickel & Nichols 2006 use a geographically-based definition of the Pacific Rim area: from Pacific (or Pacific-facing) coast and offshore islands inland up to the far side of the major coast range. Pacific Rim traits are those found with significantly higher frequency in the Pacific Rim population than in the adjacent geographical areas (such as intermontane North America, lowland South America, interior and southern New Guinea). See also Nichols et al. 2013. On this approach the definition of the area and the identification of structural properties typical of it are entirely separate.

[9] A few tokens can be expected by chance in any continent: Gil 2011 surveys Africa more densely and finds three tokens, but they have no particular geography. He also includes optional classifiers, which increases the density of attestation in the Pacific Rim and expands the area in the directions of its expansion and migrations from it. In Eurasia, many Turkic languages have optional classifiers; ancestral Turkic originated in the vicinity of Manchuria (Janhunen 1996:216), i.e. in or near the Pacific Rim area, and the trait must reflect that origin.

same was true of the human population in the early stages of colonization: some coastal societies foraged well inland, so that much of the early inland population may well derive from the coast but not vice versa. Thus the overlapping distribution and asymmetrical discreteness of the Pacific Rim and other linguistic populations may partly reflect differential composition of the north Siberian and Beringian population versus the Asian coastal population, but if so the reflection is not straightforward. It is interesting that the coastal population (linguistic and archaeological) appears to have had more input into the interior population than vice versa.

Thus, from the linguistic standpoint, Asia-to-America migrations began very early – earlier than either archaeological or genetic evidence suggests – and early settlement was probably primarily coastal. By the time today's linguistically detectable language families had come into existence, the Pacific Rim and interior/Atlantic linguistic populations had become different to some extent though with overlap. That difference reflects processes of population formation and areal spread in the long-colonized Americas, though in some respects it may also derive from differences between the Asian coastal and Beringian linguistic populations of the Pleistocene. Structural grammatical properties, at least those most prone to be stably inherited, in detectable frequencies may be traceable somewhat farther back than language families, but they too change and dissipate over time, so it is quite unlikely that the typological profile of the American Pacific Rim linguistic population, or the American population overall, is now faithful to any Asian structural profile of the time frame of initial colonization seen in the genetic and archaeological evidence, much less the older time frame implied by the linguistic evidence.[10], [11]

[10] Bickel 2013 and Nichols 2010 on different grounds find that even the most stable structural properties are unlikely to last in detectable frequencies as long as 20,000 years. One or another trait might survive much longer in one or another language, but frequencies among that language's sisters or neighbors are very unlikely to exceed chance, making it impossible to detect ancient families or ancient areas on the strength of just structural typological properties.

[11] I thank the Embassy of Kazakhstan, the Permanent Delegation of Kazakhstan to UNESCO, and the Harriman Institute (Columbia University) for making possible the second Great Migrations conference, which among other boons suggested some of the new lines of thought in this work. The research reported here was supported in part by the NSF and the Max Planck Institute for Evolutionary Anthropology, Leipzig; support for the Autotyp database has additionally been provided by the Committee on Research of the University of California, Berkeley, the University of Leipzig, and the University of Zürich.

References

Anderson, David G., D. S. Miller, S. J. Yerka and M. K. Faught. 2005. Paleoindian database of the Americas: Update 2005. *Current Research in the Pleistocene* 22.91-92.

Anderson, David G. and J. Christopher Gillam. 2001. Paleoindian interaction and mating networks: Reply to Moore and Moseley. *American Antiquity* 66:3.530-535.

Anthony, David W. 2007. *The Horse, the Wheel, and Language: How Bronze Age riders from the Eurasian steppes shaped the modern world*. Princeton, NJ: Princeton University Press.

Bicho, Nuro Ferreira, Jonathan A. Haws and Loren G. Davis (eds.). 2011. *Trekking the Shore: Changing Coastlines and the Antiquity of Coastal Settlement*. New York: Springer.

Bickel, Balthasar. 2013. Distributional biases in language families. In Balthasar Bickel, Lenore Grenoble, David A. Peterson and Alan Timberlake, eds., *Language Typology and Historical Contingency*, 415-444. Amsterdam: Benjamins.

Bickel, Balthasar and Johanna Nichols. 2006. Oceania, the Pacific Rim, and the theory of linguistic areas. *BLS 32S: Languages and Linguistics of Oceania.* Volume? Pps?

Bickel, Balthasar and Johanna Nichols. 2002. The Autotyp research program. Online: www.spw.uzh.ch/autotyp/ (accessed June 1, 2014).

Blust, Robert A. 2009. *The Austronesian Languages*. Canberra: Research School of Pacific and Asian Studies, Australian National University.

Bowern, Claire and Harold Koch. 2004. *Australian Languages: Classification and the Comparative Method*. Amsterdam-Philadelphia: Benjamins.

Bulbeck, David. 2007. Where river meets sea: A parsimonious model for *Homo sapiens* colonization of the Indian Ocean and Sahul. *Current Anthropology* 48.315-321.

Caballero, Gabriela, Michael J. Houser, Nicole Marcus, Teresa McFarland, Anne Pycha, Maziar Toosarvandani and Johanna Nichols. 2008. Nonsyntactic ordering effects in noun incorporation. *Linguistic Typology* 12:3.383-421.

Chang, Will, David Hall, Chundra Cathcart and Andrew Garrett. Submitted. Ancestry-constrained phylogenetic analysis supports the steppe chronology of Indo-European origins.

Darden, Bill J. 2001. On the question of the Anatolian origin of Indo-Hittite. In Robert Drews, ed., *Greater Anatolia and The Indo-Hittite Language Family*, 184-228. Washington, DC: Institute for the Study of Man.

Denny, J. Peter. 1991. The Algonquian migration from Plateau to Midwest: Linguistics and archaeology. In William Cowan, ed., *Papers of the 22nd Algonquianist Conference*, 103-134. Ottawa: Carleton College.

Donohue, Mark and Tim Denham. 2012. Lapita and Proto-Oceanic: Thinking outside the pot? *Journal of Pacific History* 47:4.443-457.

Erlandson, Jon M., Michael H. Graham, Bruce Bourque, Debra Corbett, James A. Estes and Robert S. Steneck. 2007. The Kelp Highway hypothesis: Marine ecology, the coastal migration theory, and the peopling of the Americas. *Journal of Island and Coastal Archaeology* 2:2.161-174.

Erlandson, Jon M., Madonna M. Moss and Matthew Des Lauriers. 2008. Life on the edge: early maritime cultures of the Pacific Coast of North America. *Quaternary*

Science Reviews 27.2232-2245.
Erlandson, Jon M., Todd M. Braje and Michael H. Graham. 2008. How old is MV II? Seaweeds, shorelines, and pre-Clovis technology at Monte Verde, Chile. *Journal of Island and Coastal Archaeology* 3:2.277-281.
Erlandson, Jon M. and Todd M. Braje. 2011. From Asia to the Americas by boat? Paleogeography, paleoecology, and stemmed points of the northwest Pacific. *Quaternary International* 239.28-37.
Erlandson, Jon M., Torben C. Rick, Todd J. Braje, Molly Casperson, Brendon Culleton, Brian Fulfrost, Tracy Garcia, Guthrie Daniel A., Jew Nicholas, Douglas J. Kennett, Madonna M. Moss, Leslie Reeder, Craig Skinner, Jack Watts and Lauren Willis. 2011. Paleoindian seafaring, maritime technologies, and coastal foraging on California's Channel Islands. *Science* 331.1181-1184.
Fort, Joaquim. 2007. Mathematical models of the Neolithic transition: A review for non-mathematicians. *British Archaeological Reports* S 1964.211-216.
Fortescue, Michael. 2005. *Comparative Chukotko-Kamchatkan Dictionary*. Berlin: Mouton de Gruyter.
Fortescue, Michael, Steven A. Jacobson and Lawrence D. Kaplan. 1994. *Comparative Eskimo Dictionary with Aleut Cognates*. Fairbanks, AK: Alaska Native Language Center, University of Alaska Fairbanks.
Gil, David. 2011. Numeral classifiers. In Matthew S. Dryer and Martin Haspelmath, eds., *The World Atlas of Language Structures Online*, Leipzig: Max Planck Institute for Evolutionary Anthropology.Online: http://wals.info/chapter/55 (Accessed May 14, 2014)
Gilbert, M. Thomas P., Dennis L. Jenkins, Anders Götherstrom, Nuria Naveran, Juan J. Sanchez, Michael Hofreiter, Philip Francis Thomsen, Jonas Binladen, Thomas F. G. Higham, Robert M. Yohe, II, Robert Parr, Linda Scott Cummings and Eske Willerslev. 2008. DNA from Pre-Clovis human coprolites in Oregon, North America. *Science* 320.786-789.
Golla, Victor. 2011. *California Indian Languages*. Berkeley-Los Angeles: University of California Press.
Hamilton, Marcus J. and Briggs Buchanan. 2010. Archaeological support for the three-stage expansion of modern humans across northeastern Eurasia and into the Americas. *PLoS One* 5:8, e12472
Hill, Jane H. 2004. Language spread among hunter-gatherers: The North American evidence. Presented at Conference in Honor of Murray B. Emeneau, Berkeley, February 2004.
Hoffecker, John F., Scott A. Elias and Dennis H. O'Rourke. 2014. Out of Beringia? *Science* 343.979-980.
Janhunen, Juha. 1996. *Manchuria: An Ethnic History*. Helsinki: Suomalais-ugrilainen Seura.
Kirch, Patrick V. 2010. The peopling of the Pacific: A holistic anthropological perspective. *Annual Review of Anthropology* 39.131-148.
Kirch, Patrick V. 2000. *On the Road of the Winds: An Archaeological History of the Pacific Islands before European contact*. Berkeley: University of California Press.
Kirch, Patrick V. 1997. *The Lapita Peoples: Ancestors of the Oceanic World*. Cambridge, MA: Blackwell.

Madsen, David B. (ed.) 2004. *Entering America: Northeast Asia and Beringia before the last glacial maximum*. Salt Lake City: University of Utah Press.

McConvell, Patrick. 1996. Backtracking to Babel: The chronology of Pama-Nyungan expansion in Australia. *Archaeology of Oceania* 31.125-144.

Moore, John H. 2001. Ethnogenetic patterns in native North America. In John Terrell, ed., *Archaeology, Language, and History: Essays on Culture and Ethnicity*, Westport, CT: Bergin & Garvey.

Moore, John H. 1987. *The Cheyenne Nation: A social and demographic history*. Lincoln: University of Nebraska Press.

Nichols, Johanna. 2010. Language families, macroareas, and contact. In Raymond Hickey, ed., *The Handbook of Language Contact*, 361-379. London: Blackwell.

Nichols, Johanna. 2008. Language spread rates as indicators of glacial-age peopling of the Americas. *Current Anthropology* 49:6.1109-1117 plus supporting online material.

Nichols, Johanna. 2000. Estimating dates of early American colonization events. In Colin Renfrew, April McMahon and Larry Trask, eds., *Time Depth in Historical Linguistics, volume 2*, 643-663. Cambridge: McDonald Institute for Archaeological Research.

Nichols, Johanna, Alena Witzlack-Makarevich, and Balthasar Bickel. 2013. The Autotyp genealogy and geography. Online: www.spw.uzh.ch/autotyp/ (Accessed: May 29, 2014).

Nichols, Johanna and Bickel, Balthasar. 2011. Possessive classification. In Matthew Dryer and Martin Haspelmath, eds., *TheWorld Atlas of Language Structures Online.* Leipzig: Max Planck Institute for Evolutionary Anthropology.
Online: http://wals.info/chapter/59 (Accessed May 11, 2014)

Nichols, Johanna and David A. Peterson. 1996. The Amerind personal pronouns. *Language* 72.336-371.

Norman, Jerry L. 1988. *Chinese*. Cambridge: Cambridge University Press.

Perego, Ugo A., Alessandro Achilli, Norman Angerhofer, Matteo Accetturo, Maria Pala, Anna Olivieri, Baharak Hooshiar Kashani, Kathleen H. Ritchie, Rosaria Scozzari, Qing-Peng Kong, Natalie M. Myres, Antonio Salas, Ornella Semino, Hans-Jürgen Bandelt, Scott R. Woodward and Antonio Torroni. 2009. Distinctive Paleo-Indian migration routes from Beringia marked by two rare mtDNA haplogroups. *Current Biology* 19:1.1-8.

Ramsey, S. Robert. 1987. *The Languages of China*. Princeton: Princeton University Press.

Ross, Malcolm D., Andrew K. Pawley and Meredith Osmond (eds.) 2008. *The Lexicon of Proto Oceanic, 3: Plants*. (Pacific Linguistics.) Canberra: Research School of Pacific and Asian Studies, Australian National University.

Schurr, Theodore G. 2004. The peopling of the New World: Perspectives from molecular anthropology. *Annual Review of Anthropology* 33.551-583.

Tamm, Erika et al. 2007. Beringian standstill and spread of Native American founders. *PLOS One* 2:9.e829.

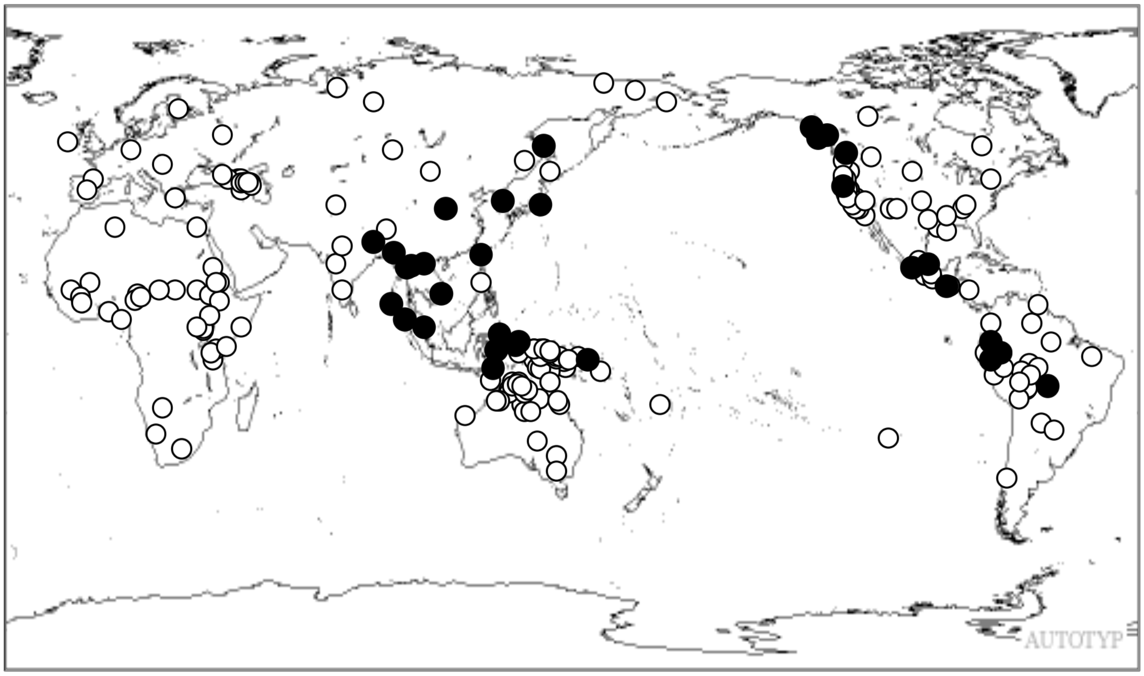
Waters, Michael R., Thomas W. Stafford Jr., H. Gregory McDonald, Carl Gustafson, Morten Rasmussen, Enrico Cappellini, Jesper V. Olsen, Damian Szklarczyk, Lars Juhl

Jensen, M. Thomas, P. Gilbert and Eske Willerslev. 2011. Pre-Clovis mastodon hunting 13,800 years ago at the Manis site, Washington. *Science* 334.351-353.

Waters, Michael R. and Thomas W. Stafford Jr. 2007. Redefining the age of Clovis: Implications for the peopling of the Americas. *Science* 315.1122-1126.

Willerslev, Eske et al. 2014. Fifty thousand years of Arctic vegetation and megafaunal diet. *Nature* 506.47-51.

Fig. 1. Languages with numeral classifiers (*N* = 211)



○ **No numeral classifiers** ● **Numeral classifiers**