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Introduction

Hello, and welcome to the April 2009 issue of DNA Tribes® Digest. In mainland East Asia, substantial genetic continuity is observed throughout a large "core" zone that includes the North Chinese, South Chinese, Tibetan, and (to some extent) Southeast Asian genetic regions. However, we have seen in previous articles that outside this core East Asian zone, genetic patterns from other continents become more prominent: in the Altaian region to the west (where Northern European contributions are observed¹); in the Arctic region to the north (where American Indian contributions are observed²); and in the Malay Archipelago to the south (where links to Australia and Polynesia are observed³).

In this issue, we will explore genetic relationships among populations and regions along the Pacific Rim of Asia, at the outer geographical periphery of the East Asian family of regions. As we have seen elsewhere in the world, some of these populations and regions retain genetic patterns characteristic of neighboring or even distant parts of the world.

Best regards and Happy Mother's Day, Lucas Martin DNA Tribes

¹ For more information, see: <u>http://www.dnatribes.com/dnatribes-digest-2008-11-28.pdf</u>.

² For more information, see: <u>http://www.dnatribes.com/dnatribes-digest-2008-10-25.pdf</u>.

³ For more information, see: <u>http://www.dnatribes.com/dnatribes-digest-2009-01-31.pdf</u>.



Genetic Relationships along the Pacific Rim of Asia

In this study, we examined genetic relationships among populations and regions in the Pacific Rim of Asia, beginning with the Japanese region, continuing counter-clockwise to Taiwan, then to the Philippines, and finishing in Guam. For each region and population studied, genetic contributions from all other world regions were estimated.



Figure 1: Locations of Asia-Pacific populations surveyed in this article.

The Japanese Region

Background: The Japanese genetic region characterizes modern populations of the Japanese Archipelago, a group of islands in the Pacific Ocean east of the Korean Peninsula and Manchuria. The English name "Japan" is derived from the Chinese term *Riben* (meaning "Sun's Origin"), similar in meaning to the native Japanese term *Nippon*.

Japan has been settled since at least 35,000 BC, and early Paleolithic (Old Stone Age) artifacts found in Japan from this period include the earliest examples of tool technologies not



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found elsewhere in the world until the beginning of the Neolithic (New Stone Age) tens of thousands of years later. Beginning approximately 14,000 BC, a culture known as the Jōmon (meaning "cord-patterned," after a style of pottery) emerged in Japan based on a semi-sedentary economy that combined hunting and gathering with some agricultural practices and produced unique handmade pottery (some of the earliest known pottery in the world). Jōmon artifacts are similar to other early findings near the Amur River in Manchuria to the west of Japan, suggesting an early link with this part of mainland Asia (the North Chinese genetic region identified by DNA Tribes® analysis). It is thought that early Japanese populations expanded during this time, when global temperatures and sea levels were somewhat higher than today, and then contracted when the climate cooled.

Later, indigenous Jōmon cultural development was influenced by new Yayoi cultures that expanded from Kyūshū (the southernmost Japanese island) beginning around 500 BC, bringing new bronze and iron technologies and rice paddy farming, perhaps introduced to Japan via eastern China and southern Korea. These new Yayoi cultures appear to have existed side by side and then blended with Jōmon practices, expanding northwards to establish the foundations of the new Japanese culture that has continued to the present day. Today, the Japanese people speak a unique language that is written using a combination of pictorial characters (similar to written Chinese) as well as adapted syllabic scripts representing sounds.

In addition to the predominant Japanese ethnic group descended from the fusion of Jōmon and Yayoi cultures described above, northern parts of Japan are also home to the Ainu people. The Ainu are thought to be descended from indigenous Jōmon peoples, with some additional ancestry from neighboring Nivkh (formerly known as Gilyak) peoples of Sakhalin Island and eastern Manchuria. According to Ainu *Yukar* (traditional oral literature), the Ainu (or *Utari*, "comrades") have lived in Japan for a hundred thousand years before the Children of the Sun (modern Japanese) came. The Ainu speak a unique language and are known for customs such as lip tattooing for women and growing long beards for men. Ainu have also been noted for physical features such as abundant facial and body hair and projecting facial bones (also associated with Jōmon era skeletons). Ainu religious practices traditionally included reverence for nature, including certain animals such as the bear, striped owl, and killer whale (orca).

Although Ainu specific reference data are not presently available, this study will evaluate genetic characteristics of modern Japanese populations, who are thought to be descended from the fusion of Jōmon and Yayoi populations.

Genetic analysis: Genetic contributions to Japan from 35 world regions⁴ presently identified by DNA Tribes[®] analysis were estimated. Results are illustrated in **Figure 2** and summarized in **Table 1** below.

⁴ A map illustrating the genetic world regions presently identified by DNA Tribes® analysis can be viewed at: <u>http://dnatribes.com/populations.html</u>. Amazonian, Andean, Arctic, Athabaskan, Central American, Mayan, Mexican, North Amerindian, Ojibwa, Patagonian, and Salishan contributions were listed as "American Indian." The Japanese world region was excluded to avoid self-reference.



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Figure 2: Estimated genetic contributions to the Japanese region.

Genetic Region	Estimated Contribution
North Chinese	74.2%
Eastern India	10.7%
American Indian	7.7%
Australian	4.8%
Other	2.6%
Table 1. Estimated constinue on the basis	

Table 1: Estimated genetic contributions to theJapanese region.

Discussion: Results in **Table 1** indicate a predominant genetic contribution of 74.2% from the North Chinese genetic region⁵. This might reflect connections with Manchurian populations dating to the Jōmon and earlier Paleolithic periods, as well as more recent contacts such as those that introduced rice paddy farming and metalworking practices from mainland Asia at the beginning of the Yayoi period. These North Chinese genetic patterns characterize Japanese populations as primarily related to other East Asian peoples.

⁵ The North Chinese genetic region is discussed in greater detail in the January 2009 issue of DNA Tribes® Digest, available at: <u>http://www.dnatribes.com/dnatribes-digest-2008-12-26.pdf</u>.



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However, substantial contributions from outside of East Asia are also identified, including Eastern India (10.7%), American Indian (7.7%), and Australian (4.8%) contributions. The Eastern India and Australian contributions might reflect early coastal migrations in Asia, which have been discussed in previous articles of DNA Tribes® Digest⁶. The American Indian contribution might reflect contacts with Alaska and North America, perhaps mediated through far eastern Siberia and the Kamchatka Peninsula to the north of Japan, where peoples such as the Chukchi and Koryak share Arctic genetic characteristics with Yupik and Inuit (Eskimo) peoples of Alaska⁷. These results indicate that although Japanese populations are primarily related to neighboring peoples of East Asia, they also retain distinctive genetic characteristics that might date to early contacts along the oceanic periphery of Asia.

The Ami of Taiwan

Background: Taiwan, previously known as Formosa (from a Portuguese term meaning "beautiful island"), is a large island directly east of Guangdong Province, China. Taiwan is thought to have been settled for tens of thousands of years and is home to several aboriginal ethnic groups (together comprising 2% of Taiwan's population) who speak Austronesian languages distantly related to Malay and Polynesian languages. The great diversity of Austronesian languages spoken in Taiwan has led some linguists to speculate that Austronesian languages originated in Taiwan before spreading out to more distant parts of the Pacific Ocean⁸.

The shape of Taiwan has been compared to a sweet potato, geographically characterized by a mountainous zone in the eastern part of the island and a plains zone in the more populated west of the island. Beginning in the seventeenth century, Han Chinese began to settle in Taiwan and interact with its aboriginal peoples. In this process, the aboriginal peoples in the western plains who assimilated to Han culture were known to the Chinese as "ripe" or "cooked," and those living in the eastern mountain areas removed from colonial influence as "green" or "raw."

Among these "green" indigenous peoples traditionally living in the mountainous eastern part of Taiwan are the Amis (meaning "north") or Pangcah (meaning "human"), who are the largest indigenous ethnic group in Taiwan today. Amis are known for their matrilineal kinship structure and pottery making, and their use of rice paddy agriculture has supported comparatively large settlements. Today Amis are also prominent in urban parts of Taiwan.

Genetic analysis: Genetic contributions to Ami (indigenous Taiwanese) from 36 world regions presently identified by DNA Tribes® analysis were estimated. Results are illustrated in **Figure 3** and summarized in **Table 2** below. Because data available for Ami are limited, this analysis is preliminary only.

⁷ Relationships between far eastern Siberia and Alaska and North America are explored in the October 2008 issue of DNA Tribes® Digest at: <u>http://www.dnatribes.com/dnatribes-digest-2008-10-25.pdf</u>.
 ⁸ For information about genetic relationships about other Austronesian-speaking peoples, see: <u>http://www.dnatribes.com/dnatribes-digest-2008-09-27.pdf</u> (discussing Polynesians) and <u>http://www.dnatribes.com/dnatribes-digest-2009-01-31.pdf</u> (discussing Malays).

⁶ For more information, see: <u>http://www.dnatribes.com/dnatribes-digest-2008-09-27.pdf</u> (discussing relationships in South Seas populations) and <u>http://www.dnatribes.com/dnatribes-digest-2009-01-31.pdf</u> (discussing relationships in populations and regions along the coastal Silk Routes).



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Figure 3: Estimated genetic contributions to Ami (indigenous Taiwanese).

Genetic Region	Estimated Contribution
Malay Archipelago	57.8%
North Chinese	17.5%
South Chinese	13.7%
Japanese	11.1%
Other	0.0%

 Table 2: Estimated genetic contributions to

 Ami (indianama Trimun and)

Ami (indigenous Taiwanese).

Discussion: Results in **Table 2** indicate the largest contribution from the Malay Archipelago (57.8%). This might reflect early relationships among Austronesian-speaking cultures that have spread throughout the Pacific Ocean. However, this also suggests the possibility that Taiwan has been not only an origin point but also a recipient of gene flow from maritime populations living further south, perhaps including contacts pre-dating the spread of Austronesian languages. Also



identified are North Chinese (17.5%), South Chinese (13.7%), and Japanese (11.1%) contributions, suggesting maritime gene flow from Asian peoples to the north of Taiwan.

The Atayal of Taiwan

Background: The second largest indigenous group in Taiwan living today is the Atayal (meaning "genuine person" or "brave man"), whose historical territories are in the mountainous northeastern part of Taiwan. The Atayal language is classified as Austronesian, but is said to be substantially different from all other indigenous languages of Taiwan. In the past, Atayals were feared among Han settlers for their practice of conducting headhunting raids on farm workers, and were later known for a rebellion during the period of Japanese occupation in 1930.

The Atayal are also known for their crafts traditions as well as their use of facial tattooing for men and women, a practice also found among the indigenous Ainu of northern Japan discussed above as well as Polynesians and North American Indian cultures such as the Yupik.

Genetic analysis: Genetic contributions to Atayal (indigenous Taiwanese) from 36 world regions⁹ presently identified by DNA Tribes® analysis were estimated. Results are illustrated in **Figure 4** and summarized in **Table 3** below. Because data available for Atayal are limited, this analysis is preliminary only.

Discussion: Results in **Table 3** indicate genetic contributions not only from East Asian regions (as was seen for the Amis), but also from American Indian and Pacific Ocean regions. The two largest contributions observed are from East Asia: Japanese (32.9%) and Southeast Asian (22.3%), for a total contribution of 55.2% from East Asian genetic region.

However, substantial contributions are observed from the Arctic region (18.4%) that characterizes populations of far eastern Siberia as well as coastal Alaska. Also observed is an additional 18.8% contribution from other American Indian genetic regions. This might reflect processes and contacts similar to those that brought American Indian genetic patterns to the Japanese genetic region (perhaps mediated by cultures in contact with the ancestors of the Ainu), as well as other northern parts of Asia¹⁰.

<u>http://www.dnatribes.com/dnatribes-digest-2008-11-28.pdf</u> (discussing the Altaian region of Siberia and the Finno-Ugrian region of northern Europe), and <u>http://www.dnatribes.com/dnatribes-digest-2008-12-</u>26.pdf (discussing further traces of contact with American Indian populations present in Asia).

⁹ A map illustrating the genetic world regions presently identified by DNA Tribes® analysis can be viewed at: <u>http://dnatribes.com/populations.html</u>. Amazonian, Andean, Athabaskan, Central American, Mayan, Mexican, North Amerindian, Ojibwa, Patagonian, and Salishan contributions were listed as "Other American Indian," and the Arctic contribution was listed separately.

¹⁰ These relationships are discussed in greater detail at <u>http://www.dnatribes.com/dnatribes-digest-2008-10-</u> <u>25.pdf</u> (discussing links between far eastern Siberia and North America),

Although researchers usually presume that genetic links between Asian and American Indian populations reflect traces of proto-American Indian populations thought to have migrated from Asia to North America, an alternate (and perhaps more parsimonious) inference suggested by available data might be that some subsequent gene flow has taken place from the Americas to Asia.



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A Polynesian contribution of 7.6% is also identified, which might reflect contacts among Austronesian-speaking peoples discussed above or else earlier maritime contacts among populations surrounding the Pacific Ocean.



Figure 4: Estimated genetic contributions to Atayal (indigenous Taiwanese).

Genetic Region	Estimated Contribution
Japanese	32.9%
Southeast Asian	22.3%
Other American Indian	18.8%
Arctic	18.4%
Polynesian	7.6%
Other	0.0%

Table 3: Estimated genetic contributions to Atayal(indigenous Taiwanese).

The Philippines

Background: The Philippines (named for King Philip II of Spain) is a nation composed of over seven thousand islands, comprising the Philippine Archipelago. The Philippines is today the world's twelfth most populous country, with over 90 million inhabitants and a large international diaspora of overseas Filipinos living in the Americas, the Near East, Asia, and Europe.

The Philippines have been settled since at least 30,000 BC. The earliest Filipino peoples are thought to have been the ancestors of modern ethnic groups such as the Aeta, who have been described as *Negritos* or *Pugot* and are known for their darker pigmentation and smaller stature. It has been speculated that Aeta communities might reflect an early stratum of settlement in



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Island Southeast Asia based on that apparent physical similarity to communities of the Andaman Islands and the Malaysian Semang people (known as *Orang asli* or "original peoples").

Another early wave of immigrants is thought to have come from Taiwan approximately 4000 BC, as part of the larger dispersion of Austronesian languages throughout the Malay Archipelago and more distant locations such as Polynesia and Madagascar¹¹. Since that time, populations of the Philippines have maintained contacts with seafaring Malay peoples, who brought successive waves of Hindu, Buddhist, and Islamic culture from more westerly peoples. During this period, the Philippines was ruled by several local maritime kingdoms, including in some cases kingdoms based in other parts of Island Southeast Asia such as the Srivijaya Kingdom based in what is today Indonesia¹².

More recently, the Philippines was colonized by the Spanish Empire beginning in the 1500's AD. Under the Spanish colonial system, some settlement from Spain and Latin America took place in the Philippines, as well as a larger scale formal adoption of Spanish surnames among native Filipinos that did not necessarily reflect intermarriage. Substantial numbers of Chinese also settled in the Philippines during the same period, in many cases eventually intermarrying and integrating into Filipino society.

Today, the two primarily languages spoken in the Philippines are English and Tagalog (also known simply as Filipino), one of the over 180 Austronesian languages spoken throughout the Philippines.

Genetic analysis: Genetic contributions to the Philippines from 36 world regions presently identified by DNA Tribes® analysis were estimated. Results are illustrated in **Figure 5** and summarized in **Table 4** below.

Discussion: Results in **Table 4** indicate the largest genetic contribution as from the Malay Archipelago region¹³ (72.2%). This is consistent with Filipino origins among Austronesian-speaking peoples and substantial genetic continuity with other parts of Island Southeast Asia. However, contributions were also identified from northerly regions of East Asia, including the North Chinese (16.8%) and Japanese (6.3%) regions. These might reflect additional maritime contacts with populations living to the north of the Philippines, perhaps including contacts during ancient times as well as more recent colonial era settlements.

Also identified was a Polynesian contribution of 3.2%, suggesting the possibility of additional contacts with Polynesian peoples beyond those that characterize the Malay Archipelago region as a whole.

¹¹ This is described in greater detail in <u>http://www.dnatribes.com/dnatribes-digest-2008-09-27.pdf</u>.

 12 Ibid.

¹³ *Ibid.*, in which genetic characteristics of the Malay Archipelago as a whole are discussed.



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Figure 5: Estimated genetic contributions to the Philippines.

Genetic Region	Estimated Contribution
Malay Archipelago	72.2%
North Chinese	16.8%
Japanese	6.3%
Polynesian	3.2%
Other	1.5%

Table 4: Estimated genetic contributions to thePhilippines.

The Chamoru of Guam

Background: Guam is one of the Mariana Islands, a small group of volcanic islands located roughly between Japan and New Guinea. More broadly, Guam is considered part of Micronesia, a large part of the Pacific Ocean islands north of both Melanesia (which includes Papua New Guinea as well as smaller islands) and Polynesia. The native people of Guam are known as Chamoru, also known by the Spanish name *Chamorros*. The Chamoru are thought to be descended from Austronesian-speaking peoples who settled Guam from Island Southeast Asia approximately 2,000 BC.

Guam was discovered by the Portuguese explorer Fernando Magellan in 1521, whose crew received supplies from the Chamoru, who then took a Spanish boat. Magellan's crew had not expected to give anything in return for the supplies and interpreted this as theft. In response, Magellan's conducted an armed raid on the Chamoru, recovering the lost boat but also burning several houses and killing several Chamoru men. For this reason, the Mariana Islands were

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nicknamed the *Islas de los Ladrones* or "Islands of the Thieves." Guam was subsequently used by the Spanish as a way station for voyages between Mexico and the Philippines, and was later acquired by the United States after the Spanish-American War.

The Chamoru language is classified as Austronesian, and similarities to other Austronesian languages of the Philippines as well as Polynesia have been observed. Chamoru people today are descended from native populations of Guam, as well as from Spanish who settled during the colonial period and more recent newcomers including Polynesians.

Genetic analysis: Genetic contributions to Chamoru from 36 world regions presently identified by DNA Tribes® analysis were estimated. Results are illustrated in **Figure 6** and summarized in **Table 5** below.



Figure 6: Estimated genetic contributions to Chamoru (Guam).

Genetic Region	Estimated Contribution
European	38.6%
Malay Archipelago	30.7%
Polynesian	19.1%
Arctic	11.5%
Other	0.0%
Table 5. Estimated a	anatia aantuilaatiana ta

Table 5: Estimated genetic contributions toChamorros (Guam).



Discussion: Results in **Table 5** indicate genetic contributions from several sources, reflecting the early origins of the Chamoru as well as more recent colonial contacts. The largest contribution identified was European (38.6%), most likely reflecting recent intermarriage with Spanish and other European settlers.

The Malay Archipelago (30.7%) and Polynesian (19.1%) contributions might reflect older pre-colonial settlements by Austronesian-speaking peoples. However, the Polynesian contribution might also reflect more recent intermarriages with Polynesians. Also identified is an Arctic contribution of 11.5%, similar to Arctic and other American Indian contributions observed in other populations of Asia and the Pacific. This suggests the possibility of early contacts with populations far to the north in eastern Siberia or Alaska, perhaps by way of lands such as Kamchatka, Japan, and smaller islands of Asia's Pacific Rim.

Conclusion

In each of the Pacific Rim populations and regions studied, we have observed substantial genetic continuity with neighboring regions. However, results also suggest the possibility that several of these Pacific Rim peoples have had substantial maritime contacts with populations outside of Asia, including contacts with Polynesian and perhaps American Indian peoples.



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http://dnatribes.com/sample-results/dnatribes-global-survey-regional-affinities.pdf

More detailed background information about genetic relationships among world regions and populations is available in issues of DNA Tribes® Digest, which can be found at:

http://dnatribes.com/news/news.html