

THE GENETIC ETHNOGRAPHY OF THE NATIVE AMERINDIANS OF ECUADOR

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ABSTRACT

The aim of this paper is analyze the main characteristics of the Native Amerindian groups of Ecuador, and to perform a benchmark review of this issues as a basis of future anthropological, forensic and biomedical research. In 2001, the ecuadorian official data registered 830,418 indigenous, which represent 6.83% of the overall population. They are grouped in 14 Indigenous Nationalities: Kichwa, Waorani, Secoya, Siona, A'i Cofan, Shuar, Achuar, Shiwiar, Zapara, Andoans, Chachi, Awá, Tsa'Chila and Epera. The Kichwa Nationality also has 14 Peoples known as Otavalo, Natabuela, Karanqui, Kayambi, Saraguro, Kañari, Salasaca, Chibuleo, Waranka, Panzaleo, Puruhá, Kitu Kara and Kichwa of the East. Native languages cover eight different linguistic families, one of them is an isolated language spoken by the Waoranis. It found only 31 studies related with the genetics in 5 different ethnic groups, since 1980 to 2009. Mostly of them on genetic markers that have showed interesting anthropological conclusions. This paper pretends to cover this empty of knowledge due to the absence of specific information, especially in the field of native genetics. However, this is the first manuscript that collects and describe in detail information as demographic, ethnicity, language and genetics on the Native populations of Ecuador.

Keywords: Native Amerindian, Ecuador, Genetics, Kichwa, Waorani, Secoya, Siona, A'i Cofan, Shuar, Achuar, Shiwiar, Zapara, Andoans, Chachi, Awá, Tsa'Chila, Epera.

INTRODUCTION

Demography

Ecuador is a mega-diverse country. This is the name given to any of the 17 countries with the highest biodiversity levels on Earth and that now are threatened by the development

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(**Ceballos et al. 2009**). Megadiversity was originated as a term in the context of biodiversity conservation in the late of 1980s (**Mittermeier 2000**). These countries are mainly tropicals, such as those in south-east Asia and Latin America. Together they count on 70% of the biodiversity of the planet, making up the 10% of the surface area of the planet (**Beck et al. 2008**).

Amongst these countries, Ecuador has the smallest area with just 256,370 Km², namely 0.17% of the terrestrial surface of the planet, and in consequence it is the country with the greatest biodiversity in comparison to his area. It harbors an outstanding variety of habitats along pronounced elevational and wet–dry gradients. The high beta diversity along these gradients, situated within the peak of species-richness at tropical low latitudes, favors an enormous biological diversity that is rivaled by only a few other regions in the world (**Brehm et al. 2008**).

The western Amazon is the most biologically rich part of the Amazon basin and is home to a great diversity of indigenous ethnic groups, including some of the world's last uncontacted peoples living in voluntary isolation (**Finer 2008**).

This concept of megadiverse is also applicable to the human ethnic diversity found inside the country. The variety of faces, features and skin colors is probably the best expression of diversity in Ecuador. The Native Americans Indians, Blacks, Whites and Mestizos that currently live in this country are, in one way or another, the result of a long, complex process of the merging of several human groups (**Long et al. 2009**).

Ethnicity

Ecuador comprises three main ethnic components, classified not by importance but by the number of inhabitants and by their own self-knowledge, namely: (a) urban populations, Mestizos (b) indigenous Native Americans, who comprise over 30 multi-ethnic and pluricultural groups and (c) Afro-American black populations who are descendants of slaves and who inhabit specific regions of the country, mainly in the provinces of Esmeraldas and Imbabura and, small groups spread throughout the Ecuadorian coastline (**González-Andrade et al. 2007**).

Language

According to UNESCO (**UN-PFII. 2008**), approximately 600 languages have disappeared in the last century and they continue to disappear at a rate of one language every two weeks. Up to 90 percent of the world's languages are likely to disappear before the end of this century if current trends are allowed to continue. Moreover, fewer and fewer children are learning indigenous languages in the traditional way, from their parents and elders. In an increasing number of cases, indigenous languages are used only by elders. Geographically close linguistic groups have a higher genetic correlation than those that have been classified into large linguistic families (**Wang et al. 2007**).

Genetics

There is growing interest in the population genetic studies in Latin America, specially in our country, particularly thanks to our rich ethnographic landscape. This is based on the unique, new, "with hardly five centuries of crossbreeding", and relatively homogenous history of the region, particularly following the discovery of the continent. Studies of genetic variation have the potential to provide information about the initial peopling of the Americas and the more recent history of Native American populations.

Furthermore, in the last five centuries, original populations came into contact, interacted and mixed, thus producing the current ethnic admixture. These are, in chronological order, the Indigenous Native Americans, a close group deriving from Central Asia; the Europeans, mainly Spaniards and Portuguese; and the Africans, who were brought as slaves to Latin America from Equatorial Guinea.

The aim of this review is analyze the main characteristics of the Native Amerindian groups of Ecuador and perform a benchmark review if this issues, as a basis of future research, to develop indicators that reflect the situation of the nationalities and indigenous peoples in the country, taking into account their cultural specificity.

SUBJECTS AND SOURCE OF INFORMATION

This review evaluates the demographic, ethnic, language and genetics issues of the Native Amerindian groups of Ecuador. The data arise from the data National Institute of Statistics and Census (**INEC 1990 and 2001**), as other documents related and published by the same institution. It used also the data provided by the System of Indicators for Nationalities and Peoples of Ecuador, SIDENPE, a subsystem of the SIISE (**SIDENPE 2003**). This database was created as a public information instrument for the Council for the Development of Ecuadorian Nationalities and Peoples, CODENPE, technically autonomous and in partnership with the Integrated Social Indicators System of Ecuador, SIISE.

Several data arise als of the direct observation and contact with the communities by the author because no source of social statistics can provide by itself all required information to assess the true standard of living of the Nationalities and Peoples of Ecuador.

Medline published papers were used as database either. A few related publications on Genetics in the Amerindian groups of Ecuador were retrieved from 1980 to 2009. Direct and indirect interviews were also conducted for the identification of some researchers and ther researchs. Review of abstracts and full-text papers were performed for the ascertainment of studied subjects of papers.

DISCUSSION

1. Demography

According with the United Nations, UN, it was estimated that there are more than 370 million indigenous people spread across 70 countries worldwide (**UN-PFII. 2006**). In

Ecuador, according to the INEC (**INEC 2001**) there are 830,418 indigenous, which represent 6.83% of the overall population of the country. For 2009, it was estimated that this value could increase three times more, arising at least the 30% of the overall population (**Chisaguano 2006**). Although there are no up-to-date statistics, approximately one of every four Ecuadorians belong to nationalities or current Native Amerindian peoples. Table 1 shows the population growth across the time.

It was estimated either that for the year 2001, 9.2% of the population belonged to a household in which either at least one member of the family self-identifies as indigenous or speaks an indigenous language. The average indigenous household has 4.8 members, compared to 4.2 for non-indigenous households, and the average age of the indigenous population is 25.5 years, compared to 27.6 years for the non-indigenous population (**The World Bank 2004**).

Poverty in Ecuador affects mostly rural areas and indigenous households. In 1998, indigenous people were among the poorest groups in Ecuadorian society, with a poverty rate of 87%. Extreme poverty is about 56% for indigenous people. Indigenous people between the age of 30 and 34 have, on average, only 6.9 years of formal education, compared to 9.6 years for non-indigenous people.

There may be important differentials in the quality of education between schools to which indigenous and non-indigenous children attend, as well as differentials in outcomes related other factors, such as the language in which the courses are taught. In 2001, only 57% of indigenous children aged 5 to 18 attended the school and did not work. Moreover, 28% of indigenous children were working, and one out of three did not go to school at all (**The World Bank 2004**).

The portion of deliveries assisted by a professional health care provider is much lower for the indigenous mothers (33%). The mortality rate of all sons and daughters born alive is 10.5% for indigenous mothers, compared to 5.1% for non-indigenous mothers. Chronic malnutrition affects a disproportionate larger number of indigenous children under five years old (59%) compared to non-indigenous children (26%).

Indigenous families also depend more heavily on health care delivered by public health centers or sub-centers and have lower rates of health insurance coverage than non-indigenous families.

Table 1. Overall population of Indigenous in Ecuador across the time

Year	Variables	Population of Indigenous	% of the overall population	Reference
1950	Language	347,745	10.9	INEC 1950
1990	Language	362,500	3.8	INEC 1990
1995	Geographics	3'055,678	26.7	Chisaguano 2006
1998	Language	616,844	5.5	INEC-CODENPE 1998
2001	Language and self-identification	1'682,875	15.0	INEC-ENEMDUR 2001
2001	Language and self-identification	830,418	6.8	INEC 2001
2003	Estimation data	1'157,498	9.5	Chisaguano 2006; and CODENPE 2002

Source: several; elaboration: author.

2. Ethnicity

The Ecuadorian Indigenous are grouped in 14 Indigenous Nationalities and 14 Kichwa Peoples scattered around the country. The main Nationalities are the Kichwa, Waorani, Secoya, Siona, A'i Cofan, Shuar, Achuar, Shiwiar, Zapara, Andoans, Chachi, Awá, Tsa'Chila and Epera and, the Kichwa Nationality also has 14 Peoples known as Otavalo, Natabuela, Karanqui, Kayambi, Saraguro, Kañari, Salasaca, Chibuleo, Waranka, Panzaleo, Puruhá, Kitu Kara and Kichwa of the East.

In the last years, a new group has been identified in the provinces of Guayas and Manabí called Manta-Huancavilca-Puná. They speak Spanish only that it makes difficult to accept its validity as a pure indigenous group. Further studies are necessary to confirm this asseveration.

All indigenous speak at least two languages, including the Spanish and, in some cases they can speak until four different native languages due mainly to the high cultural diversity and the permanent contact between these peoples (**CODENPE 2002**). The most numerous group is the Kichwa with the ~92% of the total. The other native groups have a fewer individuals, and some of them are almost extinct currently. Table 2 shows these differences.

The location of settlements and indigenous communities is so important because many authors tend to confuse the groups among themselves and, often they make wrong inference above each different the group. It is known that most groups are scattered along the benchmarks listed below.

Table 2. Distribution of ethnic groups by population

Nationality	N=	%
Kichwas	760,739	91,61
Shuar	52,697	6,35
Chachi	5,465	0,66
Awa	3,283	0,40
Achuar	2,404	0,29
Waorani	1,534	0,18
Tsa'chila	1,484	0,18
A'i Cofán	1,044	0,13
Shiwiar	612	0,07
Zapara	346	0,04
Siona	304	0,04
Secoya	240	0,03
Manta-Huan-Puná	201	0,02
Epera	65	0,01
Total	83,0418	100,00

Source: **INEC 2001**. Elaboration: author.

Location of the Amazonian (Eastern Region) Nationalities

Waorani

They live in the province of Pastaza, in the Arajuno county, at the parish of Curaray; in Orellana province, in the Orellana county, at the Dayuma parish and, also in the Aguarico county, around of the the parishes of Tiputini, Yasuní and Santa María of Huiririma. In the Napo province, they live in the county of Tena, at the parish of Chontapunta. The native groups without external contact are the Tagaeri, Taromane and Oñamenane.

Secoya

They live in the province of Sucumbíos; in the Shushufindi county, parish of Saint Roque and, in the Cuyabeno county, parish of Tarapoa. Also they live along the shores of the Aguarico river. The main communities are San Pablo of Catëtsiaya and Secoya Remolino Ñe'ñena, located in the parish of San Roque at the Shushufindi county; and in the Eno parish in the Tarapoa and Cuyabeno region.

Siona

They live in the province of Sucumbíos, in the parish of Puerto Bolívar at the county of Putumayo and, in the parish of San Roque at Shushufindi county. They have three communities Puerto Bolívar, Bi'aña and Orahuëaya'

A'i Cofan

They inhabit in the province of Sucumbíos, in the parishes of Dureno y Jambelí at Lago Agrio county; in the county of Cascales, parish El Dorado of Cascales and, the counties of Cuyabeno, parish Cuyabeno and Sucumbíos, parish La Bonita. They have six main communities Sinangüé, Zábalo, Chandía Na'en, Tayosu Conqqe, Dovuno y Dureno.

Shuar

They inhabit broadly the provinces of Pastaza, Zamora Chinchipe and Morona Santiago, along of the Pastaza and Marañón Rivers. They live in 668 communities. The Muraya Shuar people, the people of the mountains, are located in the valley of the Upano river; the Untsuri Shuar, called "the numerous people" as they self-call, are located between the Cóndor y Cutucú cordillera and, finally, the Pakanmaya Shuar that inhabit the Transcutucú zone.

Achuar

They live in 56 different small communities, with almost 830 families; 33 in the province of Morona Santiago and 23 in the province of Pastaza along of the Macuma y Huasaga rivers.

Shiwiar

They are small communities located in the parish of Corrientes river, Pastaza county in the province with the same name. The main communities comprise Kurintsa, Tunguintsa, Cambantsa, Panintza, Chuintza, Tanguntza, Juyuintza, Pientza and Bufeó.

Zápara

They are a few individuals that live admixed with other communities in the province of Pastaza, in the parishes of Sarayacu and Tiger river. They live in the communities of Cuyacocha, Conambo, Pindoyacu, Balsaura, Wiririma, Torimbo, Shiona along of the Tiger river and, Jandiyacu, Llanhama Cocha, Mazaramu in the Sarayacu parish.

Andoans

They have rediscovered recently after several years. They remained hidden for long time because no one knew in the rain forest due mainly that they lived between the Kichwas but with the arrival of evangelism, it begins to change the history of this ethnic group. They were forced to learn the language of Kichwas (Quechuan) as an imposition. Despite this, they retained their customs and their original language intact. They are the last ethnic group discovered and recognized in Pastaza, so there is no exact information of its protagonists and they are a living testimony of their own existence. Currently, they live in the community of Pucayacu in the parish of Montalvo, at the south east of Puyo, province of Pastaza. The younger grandchildren and descendants of the ancestors Andoa start an intense struggle, to be recognized. In the first instance, it exist 500 to 600 individuals of this group.

Kichwas of the East

They have two big communities, the Napu Kichwas Runa (Quijos) of the upper Napo river and the Canelos Kichwas. They are spread in the provinces of Pastaza, Napo, Sucumbíos and Orellana, in the Quijos and Canelos counties.

Location of the Coastal Nationalities**Chachi / Cayapas**

They live in the province of Esmeraldas, along of the Cayapas, Santiago, Onzolé, Canandé and Rosario rivers. The communities are divided by zones: norte, central and south. In the north they live in the San Lorenzo county, parish of Tululbí; in the Eloy Alfaro county at the parishes of San José of Cayapas, Telembí, Santo Domingo of Onzole, San Francisco of Onzole, Borbón and Atahualpa. In the central region, they live along the Río Verde river, parish of Chumundé and, in the Quinindé county at the parishes of Cube and Malimpia. Finally, in the south area, they inhabit the parishes of San José of Chamanga and San Gregorio in the Muisne county.

Awá

They live in the province of Esmeraldas, in the county of San Lorenzo, parishes of Tululbí, Mataje (Santa Rita) and Alto Tambo. In the province of Carchi in the county of Tulcán, parishes Tobar Donoso and The Chical (Maldonado) along of the border with Colombia. In the province of Imbabura, in the San Miguel de Urucuí county, parishes of La Merced of Buenos Aires, and in the parish of Lita at Ibarra's county.

Tsa'Chila

They live in the province of Santo Domingo de los Colorados, in the parishes of Puerto Limón and la Aurora. They comprise the communities of Cóngoma Grande (Santo Juan), Los

Naranjos, El Búho de los Colorados, El Poste, Peripa, Chigüilpe, Otongo Mapalí and Filomena Aguavil (Tahuaza).

Table 3. Distribution of main Native Amerindian ethnic groups of Ecuador by name, language, related groups inside the country, population and, location

Ethnic group	Other names	Language	Related groups	Population	Provinces of location	Neighbour Country with related group
Amazonian groups						
Waorani	Huaoroani Aucas Jibaros	Wao Tiriro	None	~ 2,000	Pastaza, Orellana, Napo	None
Secoya		Paicoca	Siona	~ 380	Sucumbíos	Perú
Siona		Paicoca	Secoya	~ 400	Sucumbíos	Colombia
A'i Cofan	Cofanes	A'ingae		~ 800	Sucumbíos Pastaza, Zamora	Colombia
Shuar		Shuar Chicham	Achuar	~ 110,000	Chinchipe, Morona Santiago	Perú
Achuar		Achuar Chicham	Shuar	~ 5,500	Pastaza, Morona Santiago	Perú
Shiwiar		Shiwar Chicham	Shuar Achuar	~ 700	Pastaza	Perú
Zápara	Zaparos	Zapara		~ 114	Pastaza	Perú
Andoans		Shimigaes, Gayes.	Zaparos	~ 600	Pastaza	Perú
Kichwas of the east	Alamas Runas	Kichwa	Quijos, Záparas, Omaguas, Tucanos, Shuar, Achuar, Siona Secoya and Kichwa from highlands	~ 80,000	Pastaza, Napo, Sucumbíos, Orellana	Perú Colombia
Coastal groups						
Chachi	Cayapas	Cha'palaa	Awá Tsaçhila	~ 8,000	Esmeraldas	None
Awá	Kwaiker or Coaiquer	Awapít	Tsa'chila Chachi	~ 3,080	Esmeraldas, Carchi, Imbabura	Colombia
Tsa'Chila	Colorados	Tsa'fiqui	Awá Chachi	~ 2,640	Santo Domingo de los Colorados	None
Epera		Sia Pedee (Wamuna o Epera)	Eperara Sia (Embera) from Colombia	~250	Esmeraldas	Colombia
Highlands groups						
Kichwa	Runas	Kichwa		~ 1 million	From Carchi until Loja	Perú Colombia

Source: several. Elaboration: author.

Epera

They live in the parishes of Borbón and La Concepción at the Eloy Alfaro's county in the province of Esmeraldas. The communities comprise Borbón, Capricho, Palma, Bella Aurora, La Concepción and Santa Rosa.

Kichwa

The most numerous group, they live spread in the highlands since of the province of Carchi in the north until the province of Loja. Kichwa speakers include the subgroups of Karanki, Natabuela, Otavalo, Kayambi, Kitu-Kara, Panzaleo, Chibuleo, Salasaka, Waranka, Puruhá, Kañari and Saraguro.

3. Language

The Native Amerindian Languages of Ecuador

According with UN, the original languages disappear at a rate of one language every two weeks. Up to 90 percent of the world's languages are likely to disappear before the end of this century if current trends are allowed to continue. This is the present case, of the Zaparo and Andoan languages. Only a few elders know the original language. If it does not teach the language to the younger, these almost extinct languages it shall go with them to the grave (**El Comercio newspaper 2009**). Saving indigenous languages is a matter of great urgency, it is crucial to ensuring the protection of the cultural identity, of their dignity, and of their traditional heritage. In the figure 1, it shows the distribution of the eight main linguistic groups that Native Amerindians of Ecuador speak currently. One important thing to remark is that the only isolated/unclassified Native language belong to Waoranis, the last nomad tribe of hunters-gatherers of Ecuador. It thinks they speak a pre-columbian language.

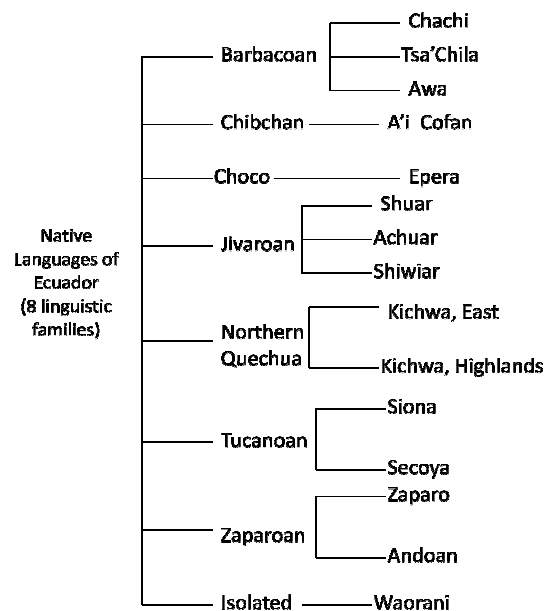


Figure 1. Distribution of the main linguistic groups of Ecuador

Table 4. Distribution of the languages by ethnic group

Linguistic classification	Ethnic group	Language	Alternate name	Characteristics of the language
Barbacoan, Cayapa-Colorado	Chachi	Cha'pala	Cha'palaachi, Chachi, Cayapa	It is spoken in northern Ecuador. "Cha'palaachi" means "language of the Chachi People". Cha'palaachi has an agglutinative morphology. It is also case marking, with a Subject-Object-Verb word order.
Barbacoan, Cayapa-Colorado	Tsa'Chila	Tsa'fiqui	Tsafiqui, Tsáfiki, Colorado, Tsáchela, Tsachila, Campaz, Colima	It means "word" in Tsa'fiqui language.
Barbacoan, Pasto	Awá	Awapit Awa-Cuaiquer	In Colombia: Coaiquer, Quaiquer, Kwaiker, Awa, Awa Pit, and Cuaiquer In Ecuador: Awa, Awapit, and Cuaiquer.	It is spoken in northwestern South America. It has 21,000 speakers nearly all in the Colombian pacific slopes, with 1,000 speakers in an adjacent area of Ecuador. Most males also speak Spanish, however, children and females are predominantly monolingual. Literacy is less than 1% in their native language, and under 5% are literate in the auxiliary Spanish language. The language uses the subject-object-verb structure and uses the Latin alphabet.
Chibchan, Cofán	A'i Cofan	A'ingae	A'i, Kofán, Kofane	Approximately 60% of Cofan speakers in Ecuador are literate in their own language. There is extensive bilingualism with Spanish on both sides of the border. Inter-marriage with Siona people and Secoya people also promotes bilingualism. The language is written in the Roman script and has ten vowels (five with and without nasalization) and twenty-eight consonants. Cofan has been classified as one of the Chibchan languages, but this appears to be due to borrowed vocabulary.
Choco, Embera, Southern	Epera	Sia Pedee	Wamuna, Epena Cholo, Emberá-Sajja, Epená, Epéna Pedée, Epená Sajja, Saija, Southern Embera, Southern Empera.	It means "voice of brave reed". They use the Spanish as a second language. Almost 50% of the population is functional bilingual.
Jivaroan	Shuar	Shuar Chicham	Chiwaro, Jibaro, Jivaro, Shuara, Xivaro	It means "people, in the Shuar language, Shuar live in various places - thus, the <i>muráya</i> (hill) shuar are people who live in the foothills of the Andes; the <i>achu</i> (swamp-palm) shuar (or <i>Achuar</i>) are people who live in the wetter lowlands east of the Andes (Ecuador and Peru). Shuar refer to Spanish-speakers as <i>apach</i> , and to non-Spanish/non-Shuar speakers as <i>inkis</i> .

Linguistic classification	Ethnic group	Language	Alternate name	Characteristics of the language
Jivaroan	Achuar	Achuar Chicham	Achual, Achuale, Achuar, Achuara, Jivaro	Achuar means “the people of the aguaje palm”.
Jivaroan	Shiwiar	Shiwar Chicham		The language is a mixture of Quichua and the Achuar dialect of Jivaroan. The current generations are trilinguals: Shiwiar Chicham, Kichwa and Spanish.
Northern Quechua or <i>Quechua II B</i>	Kichwa	Kichwa	Kichwa	Northern Quechua or <i>Quechua II B</i> , spoken in Ecuador (Kichwa), northern Peru, and Colombia (Inga Kichwa). The most widely spoken varieties are Chimborazo Highland Quichua and Imbabura Highland Quichua. It belongs to Quechua II or <i>Quechua A</i> or <i>Peripheral Quechua</i> or <i>Wamp'una</i> , a macrolanguage
Northern Quechua or <i>Quechua II B</i> , spoken in Ecuador (Kichwa)	Kichwa of the east	Kichwa		Napo Lowland: Ingano, Lowland Napo Quichua, Napo Quichua. Northern Pastaza: Alama, Bobonaza Quichua, Canelos Quichua, Pastaza Quichua, Sarayacu Quichua.
Tucanoan, Western Tucanoan, Northern, Siona-Secoya	Secoya	Paicoca	Ecuadorian Siona, Angotero.	This language is spoken by 297 Secoya people in Ecuador and 144 in Peru.
Tucanoan, Western Tucanoan, Northern, Siona-Secoya	Siona	Paicoca	Siona, Sioni, Pioje, Pioche-Sioni	Ecuadorian Siona is distinct from Siona of Colombia.
Unclassified /isolated	Waorani	Wao Tiriro	Huao, Auishiri, Aushiri, Wao, Sabela, Ssabela, ; autonym: Huao Terero; pejorative: Auka, Auca	It is a language isolate spoken by this people. Waorani has three varieties: Tiguacuna (also known as Tiwakuna), Tueti (also known as Tiwi Tueti, Tiwi) and, Shiripuno.
Zaparoan	Zápara	Zápara (almost extinct)	Sáparaan, Zápara, Zaparoano, Zaparoana Kayapwe	It is an endangered language family of Peru and Ecuador. Zaparo is a nearly extinct language from the borderlands of Peru, spoken by only one person out of an ethnic population of ~170, in the Pastaza Province. The members of the Zaparo group now speak Kichwa, though there is a language revival effort. Zaparo is sometimes confused with Andoa, though the two languages are distinct. It has a subject verb object word order.
Zaparoan	Andoan	Andoan or Gae	Shimigae, Semigae, Gae, and Gay.	Andoa is an extinct Zaparoan language originating from Peru. It was found in the Pastaza River region of Peru, and not found at all in Ecuador. The ethnic group speaks either Pastaza Kichwa or Spanish because they are integrated into others ethnic group. In Ecuador there is still one fluent speaker who is attempting to teach the language to others to keep it alive.

Source: **Gordon RG 2005**, and others. Elaboration: author.

Table 5. Main studies performed on Native Amerindian groups of Ecuador by genetic marker

Marker analysed	N=	Conclusion	Reference
Waorani			
Y-chromosome STRs: DYS19, DYS389I, DYS389II, DYS390, DYS391, DYS392, DYS393, DYS385ab, DYS437, DYS438 and DYS439	35	Ninety-nine different haplotypes were observed in the Mestizo sample, 91 in the Kichwas, 97 in the Afro-Ecuadorians and 6 in the Waoranis. As expected, the largest genetic distance exists between the Mestizo, the African and the Waorani samples pointing to a rather strong geographical and socio-cultural isolation.	González-Andrade et al. 2009
Mitochondrial DNA	35	All individuals belong to haplogroup A and specifically to subhaplogroup A2 due to transitions C1611T and A153G. They also harbour transition A663G, checked by direct sequencing. One of the individuals shows a back-mutation at position 16111. It might reflect a past founder effect and subsequent isolation of this population.	Cardoso et al. 2008
Kaposi Sarcoma Herpes Virus (Serology) KSHV DNA (PCR and genotyping)	38	38 Waos and 41 Sionas. The Amerindian KSHV strains characterized were of subtype E at all loci and all had the K15 P allele	Whitby et al. 2004
IgE, IgG, IgM, IgA, and immunoglobulin allotypes	16	Hyperimmunoglobulinemia E syndrome exists among only one subgroup of Huaorani, the Ditaron	Kron et al. 2000
HLA class II	6	High frequencies of both <i>HLA-DRB1*0407</i> and <i>HLA-DRB1*1602</i> alleles	Blagitko et al. 1997
HLA class II	5	They found a new HLA-B variant and described four new alleles and, they indicated that the HLA-B locus can evolve rapidly in isolated populations.	Watkins 1992
IgE titers	-	The cutaneous mast cells of healthy Waorani have active IgE receptors. The high circulating plasma concentrations of IgE in the Waorani do not prevent adoptive cutaneous sensitization with pollen-specific IgE antibodies.	Larrick 1985
RBC enzymes, immunoglobulin allotypes, and dermatoglyphics	-	They are highly inbred and homogeneous population and they share limited genetic traits with the neighboring Jivaro Indians and are isolated from other tribal populations in South America.	Larrick 1985
IgE titers	227	They reported the world's highest concentrations of IgE and low prevalence of atopic disease in tropical populations. They concluded that genetic factors and a high prevalence of parasitic infection may be involved.	Kaplan et al. 1980
Chachi (Cayapas)			
ApoE genetic variation on fertility	26	26 Cayapa women and 57 afroecuadorian women. The highest number of children was found to be associated with the e*4/e*3 genotype; the e*4/e*3 genotype frequency (0.50) in the African-Ecuadorian women with 9–17 children was about three times that of the women with 0–8 children (0.14) (P 5 0.02).	Corbo et al. 2004

Marker analysed	N=	Conclusion	Reference
ABO gene: 0 allele, exons 6 and 7	-	317 individuals of the O phenotype from five different ethnic groups. Twenty-one O alleles were characterized. The nine alleles differed from either the O01 allele (four out of nine) or O02 allele (five out of nine) by one to three point mutations. The number of different O alleles in population samples varied greatly: the highest number (13) was observed in Akans, and the lowest (5) in Amerindians.	Roubinet et al. 2001
Mitochondrial DNA	204	204 individuals HIV1 and 30 individuals HIV1 and II. They founded Thirty four polymorphic sites, along with the 9-bp deletion, define 10 distinct mtDNA haplotypes (C 1–C10) in 30 individuals randomly chosen.	Rickards et al. 1999
HLA class II	-	The identification of previously unreported (and presumably newly arisen) HLA-DRB1 alleles among isolated Amerindian groups, DRB*08042 in Ecuador, suggests that these alleles may have been generated since the colonization of the Americas (about 20-30,000 years ago).	Erllich et al. 1997
ApoB: XbaI, EcoRI, and Ins/Del ApoE: CfoI	96	The frequencies of the X+ (0.182), R+ (1.000), and Del alleles (0.432) at the three APOB sites were found to be higher than and to differ significantly from those reported for East Asians.	Scacchi et al. 1997
C7 M/N allotyping	124	The highest allele frequency of C7*N observed in any population examined so far (0.36 versus 0.225 or lower). It may reflect the effect of a small founder population followed by a high degree of genetic isolation.	Sölder et al. 1996
Factor V Leiden genes	57	In non-Europeans the prevalence of FV mutation is at least 7 times lower than in Europeans and provide indirect evidence of a low prevalence not only of the FV Leiden gene but also of other genes leading to more severe thrombophilia.	Pepe et al, 1997
ALDH 2	50	Three of the 39 samples showed virtual absence of the ALDH2 (Mitochondrial aldehyde dehydrogenase. These data confirm the existence of a mitochondrial ALDH deficiency among South American Indians. The molecular origin of the ALDH2 deficiency is unknown.	Novoradovsky et al. 1995
HLA class II	100	The most common DPB1 haplotype of DRB1*08042 is DPB1*1401, whereas that of its putative progenitor DRB1*0802 is DPB1*0402. This suggests that the two allelic lines have been separated for many generations. The time required for the rare recombination events and selective forces necessary to produce and maintain two additional DRB1*08042-DQB1 haplotypes is further evidence that this allele is not of very recent origin.	Titus-Trachtenberg et al. 1995
HLA class II	13	Three new variants of HLA-B39 and one new variant of HLA-B15 were found in the Cayapa: HLA-B*3905, HLA-B*3906, HLA-B*3907, and HLA-B*1522, suggesting that many of these new HLA-B alleles may have evolved since the Paleo-Indians originally populated South America.	Gerber et al. 1995

Table 5. (Continued)

Marker analysed	N=	Conclusion	Reference
HLA class II	100	They reported a new Cayapa DRB1 allele, DRB1*08042, which arose by a G->T point mutation in the parental DRB1*0802, contains a novel Val codon (GTT) at position 86.	Titus-Trachtenberg et al. 1994
Six GM and two KM markers	47	47 Cayapas, 18 Afroecuadorians. The Cayapa demonstrated three GM phenotypes, two of which are common to other South American Indian tribes. The frequency of KM1 positive Cayapa Indians (63%) is similar to other South American Indian tribes, but is significantly greater than the Huaorani of eastern Ecuador (2%), the only other Ecuadorian Indian group for whom limited immunoglobulin allotype data are available ($\chi^2 = 35.8, P < 0.0001$).	Kron et al. 1994
EcoRI, RsaI, and MspI RFLPs of the COL1A2 genes	38	The most remarkable finding is the high frequency (22%) in the Cayapa of the E(-)R(-)M(-) haplotype, which is absent in the Indonesians and reaches only 5% in the Tharus, The genetic similarity between the Cayapa and the Asians so far analyzed.	Pepe et al. 1994
ACPI, ADA, AKI, CA2, ESD, GLO1, G6PD, PGD, PGM1, PGM2, SODA, and HB	164	The Cayapa show allele frequencies typical of those of South American Indians. The absence of the CA2*2, G6PD*A, G6PD*A- HBB*S, and HBB*C alleles and the low PGM1*1A and PGM1*2A and high PGM1*1B allele frequencies indicate that very little (no more than 2%), if any, genetic admixture has occurred with the black community living in the same area.	Rickards et al. 1994
F13A, F13B, ORMI, AHSB, C6, C7 and APOC2 Shuar	139	The findings confirm, whenever the comparison was possible, quite a good resemblance of the Cayapa with other Native American populations.	Scacchi et al. 1994
Leptin levels	59	The body fat and levels of insulin and leptin are higher in the population more dependent on agriculture for living. The leptin concentrations from the hunter/gather communities are the lowest mean value ever reported from a population of healthy females.	Lindgärde et al. 2004
ALDH I	99	42% of deficiency of aldehyde dehydrogenase isozyme I (ALDH, or EB)	Goedde et al. 1986
T'sa Chilas/Colorados			
EcoRI, MspI and RsaI (RFLPs) of the COL1A2 (type I collagen) gene Kichwas	80	They suggested that the presence of a low level of genetic relatedness between the Colorado and the Cayapa, despite their supposed common ethnogenesis.	Babalini et al. 2005
Y-chromosome STRs: DYS19, DYS389I, DYS389II, DYS390, DYS391, DYS392, DYS393, DYS385ab, DYS437, DYS438 and	91	Ninety-nine different haplotypes were observed in the Mestizo sample, 91 in the Kichwas, 97 in the Afro-Ecuadorians and 6 in the Waoranis. As expected, the largest genetic distance exists between the Mestizo, the African and the Waorani samples pointing to a rather strong geographical and socio-cultural isolation.	González-Andrade et al. 2009

DYS439	
15 autosomal STRs and 11 Y-chromosome STRs, admixture analysis	Contributions to Mestizo-Y chromosomes were estimated to be 70% European, 28% Amerindian, and 2% African, whereas in autosomes the contributions were 19%, 73%, and 8%. As for Afro-Ecuadorians, their contributions to the male line are 44% African, 31% European, and 15% Native American. Autosomal admixture was estimated as 56%African, 16% European, and 28% Amerindian.
	González-Andrade et al. 2007
15 Autosomal STRs: TH01 CSF1PO TPOX VWA D13S317 D3S1358 D5S818 D7S820 D21S11 D18S51 PENTA E D16S539 PENTA D D8S1179 FGA	It were reported the allele frequency distribution of 15 STR loci that have proven to be extremely useful for forensic casework. It was compared the Kichwa population with Aymara Amerindians (Bolivia), Quechuas (Bolivia), Mapuches, Tehuelches and Wichis (Argentina), Huichol, Puerepecha, Tarahumaras (Mexico), and did not revealed significant differences at HUMTH01, HUMVWA and CSF1PO genetic markers.
	González-Andrade et al. 2006
7 Autosomal STRs: CSF1PO, TPOX, TH01, D13S317, D16S539, D5S818, and D7S820	It were reported the allelic frequencies of 7 STRs that it were used in the calculation of matching probabilities in forensic casework.
	González-Andrade et al. 2004

Source: cited inside the table. Elaboration: author.

Table 4 shows the distribution of the Native languages by ethnic group; it includes some features of each language. Most of them are almost extinct because the high influence of the Kichwa and the Spanish over the local culture of these peoples.

4. Genetics

The Perception of the Genetics in the Amerindian Peoples

Throughout the years indigenous people have been exploited by every government and by every non-indigenous person to who contacted. This is the origin of the permanent scepticism about the scientific research. Their lands were colonised and their cultures marginalized and, they were forced to adapt to new costumes and languages. Now, they try to understand the value of their own bodies and how they can protect to themselves.

The indigenous cosmologic vision is different from the mestizos and of the whites. They have a refined capacity to develop and manage diverse forms of knowledge within a single cultural environment. They do not need to understand the essence of the life to continue living. This is the main reason for what they reject all kind of genetic study even when they can suspect that is beneficial for them.

However, they operate on the basis of relationships rather than contracts. The secret of a good relationship is the mutual respect and the understanding of their requirements. They need time and patience to allow that the scientists make an approach to them. In conclusion, genetics is not important for the daily life of these communities. Despite this, they have understood that the blood is important for the health, and is a part of their wealth. It is important to keep a code of conduct, based in strong ethical principles, to achieve the best results in a frame of mutual reciprocity.

Genetic Studies in Native Populations of Ecuador

Table 5 explains the main studies performed on Native Amerindian groups of Ecuador by genetic markers analyzed and the main conclusion derived for each study. It can see the few studies made it on this field, despite of the anthropological importance of these groups. In our country. It found only 31 studies related with genetics in 5 different ethnic groups, since 1980 to 2009. It can say that one study by year is the average. Despite that, the results have showed very interesting anthropological conclusions.

CONCLUSION

The absence of specific information about nationalities and indigenous peoples of Ecuador has been a main problem for researchers for long time. While information exists regarding various themes, these do not achieve a national reach. This paper pretends to cover this specific empty of knowledge, as well as it aims to be a source of reference for future research in the field of anthropological genetics.

CONFLICT OF INTEREST

The author declares does not have any conflict.

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