# Mi ochondrial DNA Anal i of Ancien Per ian Highlander

 $K - S + \frac{1}{2}N A + \frac{2}{3}S + G + \frac{3}{4}I S + \frac{4}{4}$ 

 $^{1}D$  A N H B N H I M

in alla jon and oad and i a chi ect al and ce amic the hip of Pa ca cancha da e back  $\rho$  he eign of he Inca king To a Inca ( on of he king Pachac j Inca Y an i), a o ima el in he la e 15 h cen (Kendall, 1985). Ba ed on a chi ect e, ce amic, and o he a ifact fo nd in a ocia jon, he b ial ha Bingham e cata ed a Pa ca cancha and Pa allac a can be a igned  $\rho$  he e iod of he Inca con ol of he U bamba Valle, fom ca. mid-15 h  $\rho$  ea l 16 h cen the (Bingham, 1913; Kendall, 1985; MacC d, 1923). Ote he a 20 ea in addition  $\rho$  he afo emen-joned o k led b Kendall, he e ha been m ch effor  $\rho$  el cida e Inca and e-Inca occ a jon along he "Sa-

 $e_{\mu}$ ed in the HVR 1 region. F the character i a jon of

inde enden 1, ing he mono le PCR me hod  $\rho$  ma i-mi e he ob ne of PCR. A 1-µl ali o of he PCR od c a e a a ed b elec o ho e i in an 8-cm na i e ol ac lamide gel (10% T, 5% C) con aining 1 × TBE b ffe (H 8.0) i h nning b ffe (0.5 × TBE, H 8.0). DNA band e e de ec ed b 1 a iole i adia ion af e aining i h e hidi m b omide (Fig. 2).

#### Da a anal i

Da a anal i Wi h im or ed kno ledge of he global m DNA ee in ecen, ea, an nde anding of he c, e of m DNA da a and a igning he m DNA e o a lace in he global m DNA ee hare been im li ed. Con ol-egion mo if e e iden i ed fo a majo i of he majo ha log o and hei bha log o (Alre -Silra e al., 2000; Bandel e al., 2001; Kiri ild e al., 2002; Kong e al., 2003; Maca la e al., 1999; Ma ama e al., 2003; Q in ana-M ci e al., 1999; Ma ama e al., 2003; Q in ana-M ci e al., 1999; Yao e al., 2002, 2003). The efo e, e a igned each m DNA o ha log o acco ding o he HVR 1, HVR 2, and coding- egion da a, ing he da a and cla i ca ion ee de c ibed abore, ch ha each am le a alloca ed o he malle t named ha log o o hich i belonged. If he ha log o had f he cha ac e i ed bha log o , an a e i k a a tached o he name of he ha log o o indica e ha he ha log o a co id no be iden i ed f he (Table 3). Since ere al egment of he ame m DNA e a anal ed inde endent m DNA o elevantha -log o , e cla i ed hem f he in o mae nal line, ba ed on he n cleoide change ob e ted in he con ol and coding egion. To el cida e biological ela ion hi he4420-1...,4493a

To el cida e biological ela ion hi he4420-1...,4493a

		ABLE 3.	N &	₿N					
Si e and ecimen		Ma e nal	M +	tajon in egmen <sub>t</sub>			APLP anal	mal i <sup>3</sup>	
	Ha log <sub>r</sub> o	line	$16209{-}16402~(16000{+})$	$128-267^{2}$	$10382 - 10465 \ (10000 +)$	5178	8794	14318	9 b
Pa ca cancha									
195 F	$\mathrm{A}^{*}$	A*-1	223 <b>290 319</b> 362	$146\ 235$	CRS		T		0
208	$A^*$	A*-1		146235	CRS		Т		2
216	$\mathbf{A}^*$	A*-2		$146\ 153\ {m 235}\ 260$	CRS				7
192	$B4^*$	B4*-1	<b>217</b> 272 362	CRS	CRS				I
213	$B4^{*}$	$B4^{*}-2$	217 289	143	CRS				I
198	$B4^*$	$B4^{*-2}$	<b>217</b> 289	143	ND				I
203	$B4^*$	$B4^{*-3}$		$146\ 215$	CRS				I
210	$B4^*$	$B4^{*}-4$	<b>217</b> 228 379N	214	CRS				1
212	$B4^*$	$B4^{*-5}$	214 <b>217</b> 262	231N	CRS				1
214	$B4^*$	$B4^{*}-6$	<b>217</b> 278	$146\ 215$	CRS				1
227	$B4^*$	$B4^{*-7}$	<b>217</b> 357	143	CRS				I
233	$B4^*$	$B4^{*}-8$		CRS	CRS				1
230	B4a	B4a-1		CRS	CRS				1
193	C*	C*-1		146 <b>249d</b>	398 <b>400</b>			C	7
204	š	C*-1		$146\ 249d$	398 400			U i	5
$\frac{211}{2}$	C*	C*-2	223 <b>298</b> 325 <b>327</b>	249d	ND			C	27
Pa allac a									
680	$B4^*$	$B4^{*}-2$	217 289	143	CRS				I
978	$B4^*$	$B4^{*}-3$		$146\ 215$	CRS				1
681	$B4^*$	B4*-9	<b>217</b> 296N 321 363 390	$214\ 234$	CRS				I
686	$B4^*$	$B4^{*}-10$	217	152	CRS				1
689	$B4^*$	$B4^{*}-10$	217	152	CRS				1
687	$B4^*$	$B4^{*}-11$	217	CRS	CRS				1
974	$B4^*$	B4*-11		CRS	CRS				I
981	$B4^*$	$B4^{*}-12$	<b>217</b> 268 348 378 379		CRS				I
989	$B4^*$	$B4^{*}-13$	<b>217</b> 294	$143\ 210$	CRS				I
677	$B4^*$	B4*-14	217	152, 204	CRS				1
683	B4a	B4a-2	217 261	CRS	CRS				1
976	B4a	B4a-3	<b>217 261N</b> 357	143	CRS				I
678	B*	B*-1		CRS	398			. (	Ι
682	Č	C*-1	223 <b>298</b> 325 327	146 195 <b>249d</b>	398 400			5	21
$\frac{975}{2}$	č	C*-3	223 246N <b>298</b> 325 327 373		398 400			U č	21
676 2.20	أ ت	C*-1?	223 <b>298N</b> 325N 327		398 400			చ	21
977	D*	D*-1	325 362N	CRS	398 400	A			27
H a a	č	č	000 000 000 000		000 000			ç	c
033	ۍ ڈ	T-20			530 <b>400</b>			ט כ	2 0
897	Ċ,	C*-4	223 <b>298</b> 325 <b>327</b>		392 400			с С	7
<sup>1</sup> All ol mo <sub>r</sub> , hic if		are n mbered according previ ed CRS (A	ed CRS (And $e_{t}$ e $e_{t}$ al., 1999). CRS deno $e$	deno <sub>f</sub> e ha <sub>t</sub> e enceof	of egmen $_t$ i iden įcal $\rho$ ewi ed CRS, and N indica $e$ no $_t$ de $\rho$ mined.	ed CRS, aı	nd N indica	ιε no <sub>t</sub> deε	mined.

ecore, and e encing a e of 61.5% and 70.8%, e-ecirel. In con, a, of even individ al fom he H a a, onl to (0.28.6%) e.e cce f ll e enced. Ha log o di tib jon fo, he o al am le a a follo : 8.6% A, 65.7% B, 22.9% C, and 2.9% D. Ha -log o f e encie of con em o a. Ame indian o la-jon and ancien no h coa tam le a e al o ho n in Table 4. F- a i tc f om ha log o f e encie among egional o la jon a e ho n in Table 5. An e ac te t of diffe en ja jon be teen each ai of o la jon evealed a j icall igni can difference e ce t be-teen he ancien highlande, and con em o a, cen al Andean o la jon ( igni can  $F = 0.180 \pm 0.054$ ). To inte iga e he ela jon hi among he a elli e comm ni je of he o al e ac of Mach Picch, m DNA e ence of Pa ca cancha and Pa allac a e e com a ed. Ha log o f e encie of Pa ca cancha and Pa allac a a e ho n in Table 6. Gene ic dive i te l fo, he e to i e a e ho n in Table 7. Mean n mbe of ai i e difference and n cleo ide dive i ta e light la ge, in he Pa ca cancha.

he Pa ca cancha.

## DISCUSSION

#### Haplogro p pro le of indi id al e amined in he pre en d

We fond hat ha log o B a he motif e entamong keletal am le anal ed in he Inca-e iod e ident of he U bamba Valle, follo ed b ha log o C, A, and nall D. The motif incise feat e of he ha log o o le of individ al e amined in the e entit dent di the high fee enc of ha log o B (65.7%; 23 of 35 individ al; Table 3 and 4). Cla if ing individ al el amined in the entit of the part of the second secon al in  $\rho$  mar, al un, labor of and 4, cha in ing multiplication at in  $\rho$  mar, al line e led in ha log  $\rho$  B having at lea t 18 different line in 23 individ al . In  $\rho$  he of d, the high fie enc of ha log  $\rho$  B i not cated b he concentration of individ al on a eci c mar, and line line

Ha log o B i he common ha log o in con\_em oa Cen al Andean o la jon. When he ha log o o le of he e ancient e iden of he U, bamba Valle a com a ed i h ha of o he So h Ame ican o la jon, he forme, ho ed a clear o imit o he mode n Cen al Andean o la jon ha a e di tib ed ima il in he Pe, tian and Bolitian highland (Table 4). Thi nding i ho, i ing con ide ing he highland loca jon

nding i not i ing, con ide ing the highland loca ion

of he d a ea. on he o he hand, he ancien highlande, con ide abl diffe f om individ al of he ancien no h coa comm nit in e m of m DNA ha log o f e enc. Va io line of a chaeological evidence indica e in ima e c  $f_{\pm}$  al in e ac ion be een he ancient no h coa al o la ion and con em o aneo Ec ado ian and Co-lombian o la ion (Shimada, 1995, 1999; Shimada  $e_{\pm}$  al., 1997, 2000). Rela i el high fe encie of ha -

A, eologia e Hi  $\rho$  ia del Pe, ) and Ja ane e ho  $\rho$ g a-he, Y aka Yo hii fo, hei, a i ance in he collection of poh am le ed in he mDNA anal i. Re each b K.-I.S. fo, hi t d a o, ed b G an tin-Aid fo, Scient c Re each 13575017 fom he Mini , of Ed cation, Science, S o, t and C lt e, Ja an.

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