PAIWAN PHONOLOGY AND PROTO-AUSTRONESIAN DOUBLETS

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1. PAIWAN'S IMPORTANCE IN AUSTRONESIAN STUDIES[1]

Paiwan is unique among Formosan languages in showing nearly one-to-one correspondences with putative Proto-Austronesian (PAN) obstruent segments - all the other Formosan languages show extensive mergers and splits in reflexes of PAN stops. Structurally Paiwan, similarly to some of the other Formosan languages, is characterised by an extreme richness of productive derivational processes. Here as in phonology, Paiwan appears to be quite conservative, and thus is of great interest in comparative studies of morphological and syntactic characteristics of earlier stages of Austronesian. Here also Paiwan's phonological transparency suits it unusually well to such use.

This communication presents a summary of Paiwan reflexes of PAN phonemes, then shows how insights on problems such as that of PAN doublets may be gained from the examination of Paiwan dialect variants and 'pseudo-doublets'.

2. PAIWAN REFLEXES OF PAN PHONEMES

Paiwan reflexes of PAN phonemes are outlined in Figure 1. For comparison, reflexes of PAN phonemes in other Formosan languages are shown in Figure 2. Attestations of Paiwan reflexes are given in the Appendix.

FIGURE 1
Paiwan Reflexes of PAN Phonemes[2]

In this communication *t is used to represent the PAN segment $*t_1$ in Dahl's (1973) notation; *c represents $*t_2$ and *kʸ; *d equates to $*d_1$ and *Z; *dʸ represents *dʸ and $*d_2$; and *ḍ represents $*d_3$. Dahl has noted that all Formosan languages appear to have merged PAN $*t_2$ with *kʸ, $*d_1$ with *Z, and $*d_2$ with *dʸ.[3]
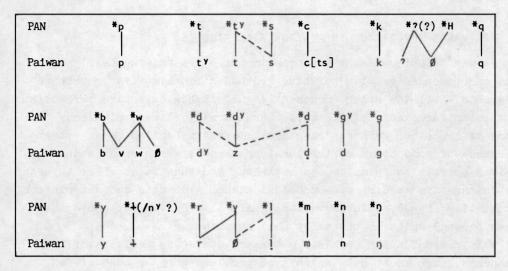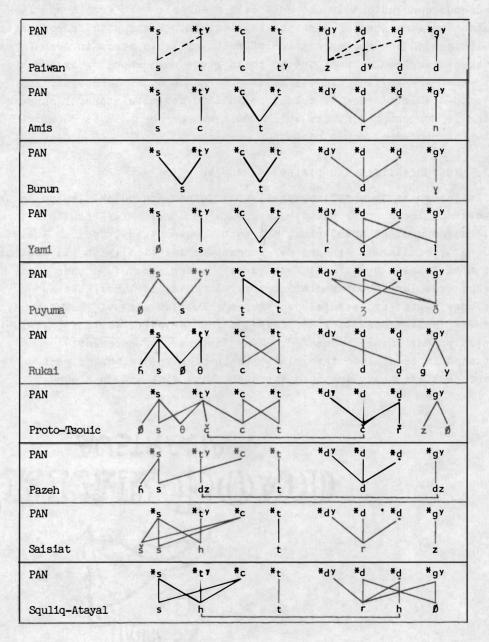
FIGURE 2
Comparison of PAN Reflexes in Selected Formosan Languages
For further discussion and attestation see Ferrell 1976.

3. PAIWAN DIALECT VARIANT FORMS

Several phenomena found in Paiwan could, despite the transparency
of its regular reflexes of PAN, lead the unwary investigator to reach
erroneous conclusions if the only data available were from a single
dialect or consisted of a restricted lexicon. Forms with frozen affixes
could lead to the reconstruction of multi-syllabic stems in 'Pre-Paiwan';
restructuring could tempt one to posit stems not demonstrably cognate
with what are in fact closely related forms in other languages; and
'pseudo-doublets' (see 4. below) could lead to postulation of supposed
phonemic mergers and splits which would be spurious. Even putative
'new PAN phonemes' could be set up erroneously.

3.1. *IRREGULARITIES AND DIALECT BORROWING*

In Paiwan as in most languages, unexplained irregularities do occur
between dialects. For example, /a/ = /a/ and /u/ = /u/ regularly across
all Paiwan dialect boundaries, but note Kuɬaɬáu ɬakay, Tjuábar ɬukay
'swing'. Similarly, /t/ and /s/ correspond identically in all dialects,
but note Kuɬaɬáu vurati, Tjuábar vurasi *'sweet potato'*. Other note-
worthy examples of inter-dialect irregularities include: Kuɬaɬáu
qatʸuḍay, Qatsílay qatʸuḷaɬ *'earthworm'*; Kuɬaɬáu qatʸuvi, Makazayazáya
atʸuviɬ *'snake'*; and various dialect forms ḷa-ḷapit, ḷa-ḷatip, ḷa-ḷabic,
ḷa-ḷacip *'bat (winged mammal)'*. Many instances of apparently uncon-
ditioned inter-dialect irregularities involve the velar and post-velar
stops /k ʔ q/, shown in three representative dialects in Figure 3.

FIGURE 3

Reflexes of Post-velar Stops in Three Paiwan Dialects

Note that in Kułałáu and Tjavuáłi /k ʔ q/ all are found, whereas
Tjałakávus lacks /q/.

Kułałáu	Tjavuáłi	Tjałakávus	
/ʔ/	/ʔ/	/ʔ/	
ʔəʔə	ʔəʔə	ʔəʔə	*'nope!'*
/q/	/q/	/ʔ/	
qadid	qadid	ʔadid	*'bitter'*
quma	quma	ʔuma	*'field'*
vaqu	vaqu	vaʔu	*'millet'*
naŋuaq	naŋuaq	naŋuaʔ	*'good'*
umaq	umaq	umaʔ	*'house'*
/k/	/k/	/k/	
kəḍi	kəḍi	kəḍi	*'little'*
kuka	[vuyu]	kuka	*'chicken'*
məkəł	məkəł	məkəł	*'run'*
iku	iku	iku	*'tail'*
/k/	/ʔ/	/ʔ/	
kasiw	ʔasiw	ʔasiβ	*'tree'*
kałat	ʔałat	ʔałat	*'bracelet'*
nəka	nəʔa	nəʔa	*'none'*
tʸamaku	tʸamaʔu	tʸamaʔu	*'tobacco/cigarette'*
vaik	vaiʔ	vaiʔ	*'leave'*
ałak	ałaʔ	ałaʔ	*'child'*

The distribution of these types of apparent irregularities among
Paiwan dialects does suggest rather extensive borrowing between dia-
lects, which would be consistent with the 'doublet' or 'dialect-
borrowing' phenomenon so frequently posited in comparative Austronesian
studies.

3.2. FROZEN AFFIXES

Cross-dialectal studies of Paiwan show considerable variation in
the preservation of forms occurring only with 'frozen' affixes. For
instance *vay (< PAN *bəɣay) *'give'* is found in Kułałáu dialect only
on the affixed form pa-vay *'give'*, but in other dialects the stem vay
is fully productive. Similarly *cəkad occurs in Kułałáu only in the

complex form və-cəkad-an *'middle/centre'*, but Qatsɫay dialect has
cəkad-an *'middle/centre'*. In connection with this example, note that
və- is not a productive affix in modern Paiwan.

  In some cases all dialects show only affixed forms, as vaqu-an *'new'*.
In other instances all dialects show only affixed forms, but the frozen
affix may be different in each dialect; e.g. Kuɫaɫáu va-rəquŋ, other
dialects sa-rəquŋ *'snore'*; Kuɫaɫáu vuɫiɫi, Qatsɫay quɫiɫi *'leucoderma'*.

  In all dialects a suspiciously large number of apparently irreducible
stems of more than two syllables begin with a restricted number of
elements. Prominent among these latter are va-, və-, vu-, tᵛa-, ca-,
sa-, ka-, ku-, ḷa-, ḷi-, qa-, qu-. Occasionally there is internal
evidence for suspecting these to be frozen prefixes, as in the case of
Kuɫaɫáu *'middle/centre'* (supra): note qapuḷu *'trunk/stem'*, puḷu *'haft/
handle (as of hoe)'*; qunəvuɫ *'dusty'*, cəvuɫ *'smoke'*. But in numerous
instances there is no such internal evidence for treating these as
prefixed elements in Paiwan, which means that if they do in fact rep-
resent ancient prefixes, they were already 'frozen' in some stage that
we can only refer to at present as 'Pre-Paiwan'.

  Related to these are other suspected frozen affixes which appear to
be complex in nature, notably kaḷi-, qaɫi-, qaḷi-, quɫi-, quḷi-, vaḷi-,
vuɫi-, vuḷi-: kaḷiḍuŋuḍuŋuɫ *'butterfly'*, qaɫimumudan/quɫipapuduan/
quḷipapunu *'crown of head'*, qaḷiḍuḍu *'taro (sp.)'*, quɫimamadas *'cater-
pillar (sp.)'*, quɫimamaraw *'beetle (sp.)'*, quɫimaciḷu *'vine (sp.)'*,
quɫiməzaw *'dizziness'*, quɫipəpə *'butterfly (sp.)'*, quɫicacəŋəḷaw
'dragonfly', quɫivaŋəraw *'rainbow'*, quɫicapudus *'ants (sp.)'*, quɫicaca
'tree (sp.)', quḷivawvaw *'curtain'*, vuɫicikacik *'tree (sp.)'*, vuḷiŋaɫaw
'coil up', vaḷiŋaɫaw *'cross-legged'*, vuḷiɫawɫaw *'whirlwind'*. It will
be noted that traces of several of this type of putative frozen affixes
are found in many Austronesian languages from other geographical areas,
and would be an interesting subject for further comparative study.

  A somewhat different problem arises concerning otherwise identical
forms with contrasting initial segments. Examples are: zaɫum *'water'*,
caɫum *'carry water'*; ḷədəp *'to plunge into'*, tədəp *'inside/interior'*;
umaq *'house'*, tᵛumaq *'inside of house'*. Currently productive prefixes
in Paiwan are all of the form CV- (cf. tᵛə-zaɫum *'do at water'*, ma-si-
zaɫum-an *'carry water'*); however, these contrasting frozen forms look
very much like the products of earlier paradigms. Many of the putative
PAN doublets reconstructed by Dempwolff similarly differ only in
initial segments and may conceivably represent similar processes since
fallen into disuse in Austronesian languages. This is certainly a
fruitful area for further study.

3.3. RESTRUCTURING

Various Paiwan dialects show different types of restructuring. In
Kuɬaɬáu, for instance, the phonetic merging of contiguous like vowels
has led to such restructuring as the following: caumumu *'ferret-badger'*
(< *ca-umu-umu); qaususu *'fallen leaves'* (< *qa-usu-usu); ɬaɬak *'child
(familiar term)'* (< *aɬa-aɬak). Compare also Kuɬaɬáu vuvu-an *'nest'*
(< *uvu-uvu-an) with Tjuábar ruvu, other dialects uvuvu; Kuɬaɬáu
kaḷaḷa *'orchid'*, Qatsíɬay ka-əḷa-əḷa. Reduplication appears to be
involved with much restructuring, as seen also in the following:
Makazayazáya muzi-muzip *'animal'* (< ʔ/m/uzi-ʔ/m/uzip, cf. Kuɬaɬáu
q/m/uzi-quzip); Kuɬaɬáu ɬavi-ɬaviŋ, other dialects ɬavi-aviŋ *'shore'*.

One further type of restructuring must be mentioned. This may be
exemplified by Kuɬaɬáu k/in/a-cau-cau-an and k/in/a-cava-cavan, free
variants for *'body (of person or animal)'*. Whether one of these forms
may represent dialect borrowing is a moot point; the process involved
in the formation of the second form appears to be fairly straight-
forward (the first form is considered to be regular inasmuch as cau
'person' is a fully productive stem, whereas there is no evidence of
a separate stem *cavan). Kuɬaɬáu stress is regular on the penultimate
vowel, thus cau-cau *'person'* [ca.u.cá.u]; in discourse this may be
realised phonetically as [caw.cáw]. Now in Kuɬaɬáu dialect final /w/
becomes /v/ under affixation, thus a hypothetical root *caw plus affix
/-an/ would become [cá.van]. If this latter form came to be considered
to be a separate stem *cavan in certain 'frozen' complex words, then
cava-cavan would represent regular reduplication of the reconstructed
form.

4. PAIWAN DOUBLETS AND 'PSEUDO-DOUBLETS'

True doublets, in the sense of two words in the same dialect derived
from the same source by different routes of transmission, are no doubt
common in Austronesian languages.[4] These may represent 'dialect
borrowing', which is as frequently appealed to in Austronesian studies
as the rubric 'ceremonial object' is invoked by archaeologists to
'explain' any artifact of which the function is unknown, or borrowings
from related languages. However, the large number of so-called doublets
reconstructed for Proto-Austronesian by Dempwolff and his successors
makes us suspicious of the facile 'borrowing' explanation, particularly
in view of the generally tenuous nature of the glosses we can assign
to reconstructed proto-forms. Several types of phenomena occur in
Paiwan which may serve to call closer attention to the question of
doublets and related problems in Austronesian languages.

Phonologically similar forms with identical glosses occur fairly
frequently within single Paiwan dialects. Examples are: rəgrəg ∿
rətˠrətˠ∿ rəzrəz *'cut with sawing motion'*, mi-rəŋrəŋ∿ v/ar/əŋvəŋ
'blazing (fire)', ḷiməqu∿ ḷaməqudˠ∿ ḷamədˠ *'to swallow'*, -səḷak∿ -vəḷak∿
-vaḷak *'to swell'*. These are similar in type to free variants such as
b/in/iqu∿ v/in/iqu *'banded krait'*, ra-zaɬum∿ ra-dˠaɬun *'Taiwan green
snake'*. Such variants may in particular instances represent borrowing
and thus perhaps qualify as true doublets; however, the frequency with
which free variants are encountered in the world's languages makes it
questionable for us to posit such variants automatically as doublets
in the ordinary sense.

Extremely common in Paiwan are what I shall call 'pseudo-doublets'
- phonologically similar forms with related but not identical glosses,
occurring within the same dialect. Consider the following sets:
ziwziw *'wave something back-and-forth'*, ḍiwḍiw *'signal by waving a
burning brand'*; kaḷus *'a ditch, furrow'*, ma-qaḷu *'deeply furrowed
(terrain, or sow's belly)'*; mu-ḷabus *'escape from inside'*, ma-ḷavut
'escape; become lost to someone'; v/aḷ/uŋavuŋ *'pin-feathers'*,
p/aḷ/uŋapuŋ-an *'down, small feathers'*; ɬaqic *'scar (from burn)'*, vakic
'scar (of wound)'.

If some of the preceding sets of 'pseudo-doublets' may be suspected
of representing phoneme split/restructuring or dialect borrowing, such
sets as the following can hardly be explained away in this manner:

caqəv	*'cover, lid'*
taquv	*'cap (of mushroom)'*
ɬaquv	*'cover for millet beer jug (leaf or cloth)'*
ɬakəv	*'protect, ward off attack'*
ḷakup	*'loose covering (as roof, vine)'*
ḷaub	*'to cover (as water covers ground)'*
cauv	*'to cover (as with blanket)'*
cukəv	*'large, removable cover (as for cook-pan)'*

Nor do the Paiwan hesitate to invent new 'pseudo-doublets', as
evidenced by such terms as puday *'maize'* (cf. paday *'rice'*, paḍay
'discoloured peanut kernel'). It is amusing to speculate on the
dilemma of an unsuspecting comparativist faced with a seeming PAN *a =
Paiwan /u/ correspondence (PAN *pagˠey *'rice'* > Paiwan puday *'maize'*
< *'grain' < *'rice'*!) if paday had happened to have dropped from the
Paiwan lexicon before being recorded by linguists!

5. CONCLUSIONS

'Dialect borrowing' has for many years been the catch-phrase for
brushing aside the problem of the large number of putative doublets
reconstructed for PAN. Data from an actual Austronesian language,
Paiwan, have shown that similar forms may in fact represent various
phenomena including (1) true dialect borrowing (probably a small per-
centage of cases), (2) free variants, (3) restructuring, (4) frozen or
no-longer-productive affixes (such as za+um *water*, ca+um *carry water*,
which may represent earlier paradigms), (5) 'pseudo-doublets', and
(6) analogously invented forms. Many putative PAN doublets may in
fact turn out to be the result of processes similar to these; at any
rate the question should be examined further.

Awareness of the possibilities of processes similar to these having
been at work in PAN should raise a healthy note of caution for Austro-
nesian phonological reconstructions. Working either from a limited
lexical base or with a naïve phoneme-to-phoneme bias could easily lead
an investigator to erroneous conclusions with regard to correspondences
with PAN. The investigator could also easily fall into the trap of
positing 'new PAN phonemes', based upon different reflexes in daughter
languages, of forms which were in fact not paradigmatically identical
in Proto-Austronesian and/or the daughter languages in question.

APPENDIX
Paiwan Reflexes of Proto-Austronesian

A.1. *p = Paiwan /p/: *panaq 'arrow/shoot' /panaq/; *piliq 'choose'
/piḷiq/; *punay 'dove' /punay/; *sipi 'dream' /səpi/; *tˠapaw 'roof'
/tapaw/ 'hut'; *siɣup 'suck' /siup/ 'inhale'.

A.2. *t = /tˠ/: *tiaɬ 'belly' /tˠiaɬ/; *tud₂uq 'drop/leak' /tˠuzuq/;
*pitu 'seven' /pitˠu/; *[]utaq 'vomit' /utˠaq/; *qətut 'flatulence'
/qətˠutˠ/.

A.3. *tˠ = /t/: *tˠutˠu 'breasts' /tutu/; *tˠuquɬ 'carry on head'
/tuquɬ/; *watˠu 'dog' /vatu/; *itˠa 'one' /ita/; *bəɣatˠ 'husked rice'
/vat/ 'seed'.

A.4. *c = /c/: *cuɬu 'roast' /cuɬu/; *caliŋa 'ear' /caliŋa/; *maca
'eye' /maca/; *kucu 'head-louse' /kucu/; *kaɣac 'bite' /kac/; *[d₁z]əkəc
'adhere' /dˠəkəc/.

A.5. *s = /s/: *sapuy 'fire' /sapuy/; *səpat 'four' /səpatˠ/; *kasiw
'tree' /kasiw/; *daqis 'forehead' /dˠaqis/; *(kus)kus 'nail/claw'
/k-a-ɬ-uskus-an/.

A.6. *k = /k/: *kaən 'eat' /kan/; *kali 'dig' /kaḷi/; *likud₂ 'back'
/ḷikuz/; *taɬək 'cook' /tˠaɬək/ 'cook for journey'; *aɬak 'child'
/aɬak/.

A.7. *q = /q/: *qauɣ 'bamboo' /qau/; *qud₂aŋ 'crustacean' /quzaŋ/;
*liqəɣ 'neck' /ḷiqu/; *baɣəqaŋ 'molar' /vaqaŋ/; *taɣaq 'plane/whet'
/ta-taq/; *pəɬuq 'full' /pəɬuq/.

A.8. *b = /v/: *biɣaq 'arum' /viaq/ 'leaf (sp.)'; *bətˠuɣ 'satiated'
/ma-vətu/; *lubaŋ 'hole' /ḷuvaŋ/; *labaw 'rat' /ku-ḷavaw/; *laba 'big'
/mə-ḷava/ 'wide'. [NOTE: words ending in /-v/ are fairly common in
Paiwan, but I have thus far not positively linked any of these with
PAN *-b.]

A.9. *b = /b/: *bibi 'duck' /bibi/; *cabcab 'beat' /cabcab/ 'slap'.

A.10. *-w = /-w/: *babaw 'above' /vavaw/; *cakaw 'steal' /cakaw/;
*laŋaw 'blow-fly' /ḷa-ḷaŋaw/ 'house-fly'; *qagˠaw 'sun' /qadaw/.

A.11. *w = /v/: *watˠu 'dog' /vatu/; *tˠiwa 'nine' /siva/ [NOTE /s/
for *tˠ.]

A.12. *w = /∅/: *walu 'eight' /aḷu/; *(w)aḏa 'exist/be present'
/m-aza/; *luwaq 'spit out/vomit' /pa-ḏə-ḷuaq/ 'make gagging sound'.

A.13. *d₁ = /dʸ/: *d₁anaw 'lake' /dʸanaw/; *d₁uɣi 'thorn' /dʸui/;
*lud₁aq 'spittle' /ḷudʸaq/ 'betel spittle'; *qanʸud₁ 'float/drift'
/qa+udʸ/.

A.14. *Z = /dʸ/: *Zilaq 'tongue' /dʸiḷaq/ 'lick'; *Zəɣami 'straw/
stubble' /dʸami-a/ 'rice-straw'; *qu[Z/d₁]a+ 'rain' /qudʸa+/.

A.15. *d₂ = /z/: *d₂ataɣ 'flat' /ma-zatʸa/ 'level'; *d₂aya 'upland'
/zaya/; *tʸəd₂u 'hiccup' /təzu(q)/; *qud₂ip 'live/life' /q-m-uzi-quzip/
'animal'; *satəd₂ 'bring' /satʸəz/ 'return something'; *likud₂ 'back/
behind'. [NOTE exceptionally /z/ from *d₁ and from *Z in: *d₁amaɣ
'light/torch/resin' /zama-n/ 'torch'; *Zalaŋ 'rare/expensive' /pa-zaŋaḷ/
[metathesis].]

A.16. *ḏ = /ḏ/: *ḏusa/*ḏewsa 'two' /ḏusa/; *uḏay 'worm' /qa-tʸ-uḏay/
'earthworm'; *kuḏkuḏ 'rasp' /kuḏkuḏ/ 'weeding hoe'; *pa[ŋ][ ]ḏa+
'pandanus' /paŋuḏa+/. [NOTE exceptionally /z/ from *ḏ: *waḏa 'exist/
be present' /m-aza/; *ḏə-ḏəm 'dark' /zəm-zəm/ 'pitch-dark'.]

A.17. *gʸ = /d/: *pagʸay 'rice-plant' /paday/; *bagʸaq 'inform/
communicate' /vadaq/; *qapəgʸu 'gall' /qapədu/; *pigʸa 'how many'
/pida/; *qugʸiŋ 'charcoal' /qiduŋ/ [metathesis].

A.18. *g = /g/: *gacəl 'itch' /gacəḷ/; *garuc 'scratch' /garuc/ 'comb';
*gəmgəm 'fist' /gəmgəm/; *[t]agəraŋ 'ribs' /tʸagəraŋ/ 'trachea'.

A.19. *H = /∅/: *bəHi[ ] 'woman' /va-vai-an/; *qumaH 'field' /quma/;
*amaH 'father' /kama/.

A.20. *y = /y/: *[ ]acay 'die' /pacay/; *sapuy 'fire' /sapuy/; *bəɣay
'give' /vay/; *gayaŋ 'spear' /gayaŋ/.

A.21. *+ = /+/: *+imatək 'leech' /+imatʸək/; *+acəŋ 'vegetable'
/+acəŋ/; *a+ak 'child' /a+ak/; *tu+a 'eel' /tʸu+a/; *quba+ 'grey hair'
/quva+/.

A.22. *r = /r/: *giriŋ 'growl' /giriŋ/; *garuc 'scratch' /garuc/
'comb'; *[t]agəraŋ 'ribs' /tʸagəraŋ/ 'trachea'.

A.23. *ɣ = /r/: *kəɣət 'to cut off' /kərətʸ/ 'to cut ramie'; *qaɣutʸ
'allowed' /qarut/ 'portion'; *wiɣi 'left (hand)' /viri/; *[ ]uɣitʸa
'squid' /sərita/. [NOTE also doublets: *tʸi+aɣ 'light' /tə+ar/ 'light',
/ma-si+ar/ 'squint from brightness'.]

A.24.   *ɣ = /∅/: *ɣumaq 'house' /umaq/; *uɣac 'vein' /uac/; *qatˠiɣa
'salt' /qatia/; *kiɣim 'send' /kim/ 'search for'; *buɣuk 'rotten'
/ma-vuk/; *baqəɣu 'new' /vaqu-an/; *ikuɣ 'tail' /iku/; *qəcəluɣ 'egg'
/qəciḷu/; *sapaɣ 'lay mats' /sapa/; *layaɣ 'sail' /ḷa-ḷaya/ 'banner'.

A.25.   *l = /ḷ/: *laba 'big' /ma-ḷava/ 'wide'; *lima 'five' /ḷima/;
*lubaŋ 'hole' /ḷuvaŋ/; *qulu 'head' /quḷu/; *[d₁Z]alan 'road' /dˠaḷan/;
*buluq 'bamboo (sp.)' /vuḷuq/ 'spear'; *ŋilu 'rheumatic pain' /ŋiḷu/
'pain'; *gacəl 'itch' /gacəḷ/; *capəl 'patch' /capəḷ/. [Note excep-
tional *l = /∅/: *kilac 'lightning' /kiac/.]

A.26.   *m = /m/: *maca 'eye' /maca/; *ɣumaq 'house' /umaq/; *d₂aɬum
'water' /zaɬum/; *sa[l]um 'odour' /sa-ḷum/ 'ripe/fragrant'.

A.27.   *n = /n/: *wanaɬ 'right (hand)' /navaɬ/ [metathesis]; *panaq
'shoot/arrow' /panaq/; *kaən 'eat' /kan/.

A.28.   *ŋ = /ŋ/: *ŋilu 'rheumatic pain' /ŋiḷu/; *[ŋ]agˠan 'name'
/ŋadán/; *baɣəqaŋ 'molar' /vaqaŋ/; *qud₂aŋ 'crustacean' /quzaŋ/.

N O T E S.

2. Paiwan data in this paper represent Kulalao [kuɬaɬáu] dialect
unless otherwise noted.

3. Studies in phonologically more complex languages such as Atayalic
are not yet far enough along for us to be truly certain at this point
that all Formosan languages do in fact share all these mergers, or that
the latter are not shared with any extra-Formosan languages. To the
extent that these mergers may be shared by all Formosan languages (and
only by Formosan languages), that the Formosan languages may form a
discrete Austronesian subgroup would be strongly indicated.

4. Blust (1970:148, note 13) mentions that over 10% of Dempwolff's
PAN lexicon represents doublets of other reconstructions. Blust further
cautions against unwarranted proliferation of phonemes, and notes that
doubleting is 'extremely common' in living Indonesian languages.

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