

Some notes on animals and plants for Proto-Austronesian speakers

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Man's life has always depended on animals and plants, a dependency most directly relevant to primitive societies. What animals and plants were available to the Proto-Austronesian (PAN) people of Taiwan 5,000 BP and earlier? What animals and plants had been domesticated at that stage? What animals and plants were endemic, with other alien species introduced to the island at later stages? In this paper I shall address myself to such problems, drawing upon various disciplines, including linguistics and archaeology, as well as zoology and botany. Lists of PAN cognates for animals, plants, and a few related cognates are given in the appendices.

Keywords: Austronesian, cognates, animals, plants, domesticated, culture history

1. Introduction

It is now generally believed that Taiwan is the Austronesian homeland (Blust 1985), and the greatest diversity of Formosan languages is probably in southern Taiwan (Ross 2009). An aim of this paper is to work out part of the culture history of Proto-Austronesian (PAN)¹ speakers through reconstructed vocabulary (Zorc 1994). We cannot simply go to a zoo, a botanical garden, or a supermarket in modern Taipei to find out what flora and fauna were available to the PAN speakers of southern Taiwan about five millennia ago. They had a much smaller variety of plants and animals than we have today. For the prehistoric period, we can only rely on historical reconstructions.

1. Abbreviations used in this paper are: <A 'assimilation'; <M 'metathesis'; PAN 'Proto-Austronesian'; PMP 'Proto-Malayo-Polynesian'; sp. 'species'.

People have to live on the animals and plants that are available to them, wild or domesticated. Some are endemic, while the others are alien species introduced to Formosan natives at later stages.

Wild animals, such as bear, leopard, wild pig, deer, and monkey, must have existed on Taiwan before the arrival of man; that is, long before the last glacial age (18,000 ~ 12,000 BP).

In the mid-19th century, the celebrated British naturalist Alfred R. Wallace discovered that “the floral and faunal assemblages of the Greater Sunda islands closely resemble those of the Asian mainland, whereas those of the islands further to the east resemble those of Australia” (Blust 1982). In honor of its discoverer this major zoogeographical boundary came to be called the “Wallace Line”. The Wallace Line was then extended to include Borneo and Taiwan. Placental mammals are found mostly west of the Wallace Line, while marsupial mammals are found only east of the Wallace Line. Placentals include pig, ruminants (deer, cattle, and goat), monkey, leopard cat, hare, civet, otter, and pangolin in Taiwan. Blust (1982) argues that the distribution of the cognate terms for placental mammals in Austronesian languages, in conjunction with subgrouping, points to the west of the Wallace Line as the Austronesian homeland.

In short, animals and plants are not only the main sources of food consumed by people, but their distribution also sheds light on human migration.

2. Linguistic evidence²

Linguistic evidence indicates that the Proto-Austronesian speakers were hunters, gatherers, and agriculturalists at about the same time, ca. 5,000 BP or earlier. They ‘hunted’ (*qaNup) wild animals with ‘dogs’ (*wasu) or ‘trapped’ (*qaCeb) them, and caught fish with ‘fish poison’ (*tuba) or a ‘basket trap’ (*bubu). They could track down wild animals by their ‘trail’ (*qeNuR). They ‘shot’ (*panaq) wild animals or ‘birds’ (*qayam) with a ‘bow’ (*busuR) and arrows. At the same time, they cultivated ‘rice’ (*pajay) and ‘millet’ (*baCaR, *beCeŋ, *zawa) with a ‘hoe’ (*tatak) on a ‘farm’ (*qumah). They ‘threshed’ (*eRik) grains by trampling, pounded grains in a ‘mortar’ (*Nesun) with a ‘pestle’ (*qaSeluh), and ‘winnowed’ (*tapeS) grains with a ‘winnowing basket’ (*Rinu). They ‘cooked’ (*taNek), ‘broiled’ (*CuNuh), or ‘roasted’ (*Da(ŋ)Daŋ) food on a ‘fire’ (*Sapuy), or ‘ate’ (*kaen) it ‘raw’ (*ma(ŋe)taq).

Some animals and plants were available to the Formosan natives at the early stage of Proto-Austronesian. These animals include *wasu ‘dog’, *beRek

2. Much of this is taken from Blust & Trussel’s (ongoing) *The Austronesian Comparative Dictionary*.

'domesticated pig', *babuy 'wild pig', *(qa)Nuan 'deer',³ *luCuj 'monkey', *qaRem 'pangolin', *(ku)labaw 'rat', *SulaR 'snake', *buhet 'squirrel', *Sanaq 'otter', *tuNa 'freshwater eel', *qaCipa 'river turtle', *Ciqaw 'type of river fish', *qayam 'bird', *ba-Ruj 'dove sp.', *punay 'dove sp.', *tikuRas 'partridge', *lawaR 'flying squirrel', and so on. A few cognates are attested only in Formosan languages without any external evidence in Malayo-Polynesian languages, e.g. the large land animals *Cumay 'bear' and *lukeNaw 'clouded leopard'. Reflexes of these two Formosan cognates are not attested in any of the Malayo-Polynesian languages outside Taiwan, although these two animals are also found in Borneo. Similarly, reflexes of *Sidi 'goat', *sakeC 'muntjac deer', *Sanaq 'otter', *RiNaS-an '(male) pheasant', *SiSiN 'omen bird', and *waNu 'honeybee' are attested only in Taiwan. It would be far better if we could find external evidence, to safeguard against mutual borrowing among Formosan languages. Some evidence has been reported in Kra-Dai languages spoken mostly in continental Southeast Asia, e.g. Hlai *mui* 'bear' and *na:ʔ* 'otter' (Ostapirat 2005), although the genetic relationship between Austronesian and Kra-Dai languages has not been firmly established as yet.

The river fish or marine life includes *tuNa 'freshwater eel', *Ciqaw 'type of river fish', *gaRan 'crab sp.', *qudan 'shrimp', *tubak 'cowrie shell', *guRiCa 'octopus', *qiSu 'shark', and *paRiS 'stingray'. People ate not only their meat, but also some of their eggs, *piRaS 'roe'.

The PAN speakers also had to put up with pests and parasites, including *kuCuh 'head louse', *CumeS 'body louse', *(qa)timela 'flea', *banaw 'bedbug', *Nimatek 'jungle leech', *(qaNi)meCaq 'paddy leech', and unwelcome bugs such as *lanjaw 'fly', *walaq 'spider', *Sipes 'cockroach', *qalu-Sipan 'centipede', and *aNay 'termite'. People carried lice or their eggs (*liseqeS) and fleas (*(qa)timela) with them without knowing it when they traveled and moved to a new land.

Formosan natives also probably ate rats and snakes in olden times, just as some still do. Some domesticated animals have been introduced to Taiwan only in the past few hundred years. For instance, horses were not introduced to Taiwan until the 17th century, as seen in Kavalan *kbayu* 'horse' which is a loan from Spanish *caballo* 'horse'.

Edible plants include: PAN *NaCeŋ 'vegetables', *pajay 'rice plant', *baCaR 'millet sp., *Panicum*', *beCeŋ 'millet, foxtail millet, *Setaria*', *zawa 'millet sp.,

3. The term refers to both deer and cattle in some Formosan languages: Bunun *qanvan*, Thao *qnuan*, Pazih *nuan* (<A, n/l), Siraya *louan* 'deer, cattle', while it refers only to cattle in two others: Budai Rukai *loaŋə*, Paiwan *luan* 'cattle'. The term refers to both deer and cattle, namely animals with *uReŋ 'horn', excluding goat. Cattle bones have not been found in archaeological sites in Taiwan until rather late dates. Bones of water buffalo were recently found in an archaeological site in Tainan during the iron period (Cheng-Hwa Tsang, pers. comm.). There is no evidence that they existed in Taiwan any earlier.

Setaria, *CebuS ‘sugarcane’, *quSun ‘mushroom’, *qaNuNan ‘*Cordia* sp.’, *lukuC ‘*Asplenium nidus*’, *ameCi ‘*Solanum nigrum*’, *panuDan ‘pandanus’, beNbeN ‘banana’, *tanaq ‘*Aralia decaisneana Hance*’, *Samaq ‘an edible grass, *Lactuca indica*’, *qaRiDan ‘beans, peas’, *apuR ‘betel chew’, and inedible but useful to make a living, or even annoying: *biRaQ ‘leaf, inedible taro sp., *Alocasia*’, *(za)laCeŋ ‘nettle sp., *Laportea*’, *baNaR ‘*Smilax opace/china*’, or *banaw ‘*Smilax* sp.’, *baNhiR ‘cypress’, *CeŋeR ‘plant sp., *Bischofia javanica*’, *qauR ‘type of bamboo’, *buluq ‘type of bamboo’, *kawayan ‘type of bamboo’, *Riaq ‘cogon grass, *Imperata cylindrica*’, *quay ‘rattan’, *puluC ‘*Urena lobata*’, *saleŋ ‘pine tree sp., *Pinus*’, *taNiud ‘mulberry’, *tuba ‘fish poison sp., *Derris*’, the last of which was used to catch fish. The natives used bamboos, rattan, pine tree, and cogon grass to build houses/huts, and/or make baskets, traps, etc. They also ate *buaq ‘fruit’ and *Cubuq ‘bamboo shoots’.

Reflexes of PAN *saleŋ ‘pine tree’ are widely attested in Taiwan and the Philippines, but not elsewhere (Blust 1985: 49–50). Although reflexes of PAN *baŋaS ‘plant sp., *Melia azedarach* Linn.’ are attested only in Formosan languages, not outside Taiwan, yet archaeological evidence indicates its plentiful use as firewood about 5,000 BP (Tsang & Li 2013: 117).

Rice, millet, and possibly sugarcane (*tebuS) were some of the cultivated plants that pre-Austronesian speakers may have brought with them to Taiwan from continental Asia, specifically western China, when they arrived and colonized Taiwan. According to Vavilov (1926, 1951), the Chinese center of the cultivated plants includes these plants. The related cognates for the plants are: *pajay ‘rice plant, unhusked rice’, *beRas ‘husked rice’, *Semay ‘cooked rice’, *bineSiq ‘seed for next planting’, *qeCah ‘husk of grains’, and *zaRami ‘rice stubble’⁴ (Blust 1985); *baCaR ‘millet, *Panicum miliaceum*’, *beCeŋ ‘millet, *Setaria italica*’, *zawa ‘millet, *Setaria italica*’; see Li (2015b) for a discussion of linguistic and archaeological evidence for rice and millet and the related terms in Taiwan.

3. Wild vs. domesticated/cultivated

The number of wild animals and plants is clearly much larger than that of domesticated or cultivated. The number of domesticated animals or cultivated plants gradually increases over time.

The domesticated animals included dogs and pigs at the PAN stage 5,000 BP or earlier. The main function of the dog was to help ‘hunting’ (*qaNup). The

4. Reflexes of this cognate are found in five Formosan languages, whose lexical forms refer to rice or millet straw. So it may be more appropriate to gloss it as ‘straw’. See Appendix 1, under ‘plants’.

archaeological evidence excavated from the archaeological sites in the Tainan Plains indicates that the natives treated the dog as an important companion, as it was buried like a human being (Tsang & Li 2013: 112, 114). Reconstructed PAN vocabulary includes *babuy ‘wild pig’ and *beRek ‘domesticated pig’.

It is problematic to try to reconstruct a word for ‘chicken.’ Reflexes in the Formosan languages indicate that a proto form of either *taRekuk or *teRakuk may be reconstructed, e.g. RukTa *tarokok*, AmiSa *tulakuk* ‘chicken’, but without any external evidence. Although the cognate forms for ‘duck’ are attested in Paiwan *bibiq*, Saisiyat *bibi?*, Taokas *bibi* < PAN *bibiq, they sound like a case of onomatopoeia. Taiwan did not have any cat until rather late.⁵ The forms for ‘cat’ are mostly onomatopoeic in Formosan languages, such as *ɲiaw* or the like.

It is not always clear at what stage a certain animal or plant was domesticated. It has been reported that rice domestication took place in the Lower Yangze region of China between 6,900 and 6,600 years ago, based on genetic evidence (Fuller et al. 2009). It is said that domestication of millet predated that of rice in China. Pre-Austronesian speakers must have brought with them domesticated rice and millet when they left the southeast coast of China about 6,000 BP to settle down in Taiwan (Li 2015a).

The plant *taNiuD ‘mulberry’ was probably not cultivated until recently. Formosan natives enjoy its fruit.

Except for the plants mentioned above, most cultivated plants in Taiwan were not introduced to Taiwan until a few hundred years ago. Their cognate forms cannot be reconstructed at the PAN level. These cultivated plants include potato, sweet potato, taro, corn/maize, pumpkin, cucumber, bottle gourd, sponge gourd, guava, papaya, pineapple, coconut, mango, plum, peach, pear, persimmon, loquat, water melon, sesame, eggplant, tomato, garlic, pepper, ginger, cinnamon, beans, peas, peanut, etc. (Tsuchida 1977). Some of these cultivated plants as well as onion, asparagus, celery, strawberry, custard apple, and tobacco, came originally from the Americas (Vavilov 1926, 1951; Lee 2013), and so did a few domesticated animals, such as turkey. Hence they were not introduced to Taiwan until after Columbus discovered the Americas in 1492. There are three possible routes from the Americas to Taiwan: (1) via the South Pacific islands; (2) via Europe and China, Japan or Java; or (3) via Spain and the Philippines (Lee 2013).

5. The cat is not one of the twelve animals in the duodenary cycle, used to symbolize the year in which a person is born. This tradition is generally found in languages of southwestern China and continental Southeast Asia. It seems clear that cat was not introduced to China and Taiwan until rather late.

4. Archaeological evidence

Some historical linguistic reconstructions are confirmed by archaeological evidence. For instance, a fair amount of rice and millet unearthed from the archaeological sites in Tainan Science Park have been dated 5,000~3,300BP (Tsang 2012). The cognates for rice are well attested in all the major subgroups of the Formosan languages, while two cognates for millet (*beCeŋ and *zawa) are attested only in languages in the south (Rukai and Puyuma). Both linguistic and archaeological evidence indicates that there is an uninterrupted history of rice planting by the Formosan natives, whereas millet planting may have been discontinued about 3,000 ago (Li 2015b). The lack of archaeological evidence for millet could be due to its small size.

There are limitations in archaeological evidence, just as in linguistics. It is unlikely that archaeological excavations will confirm linguistic reconstructions for the parasites and small insects, such as louse, flea, fly, or termite.

5. Using plants for different purposes

The Formosan natives have used plants for different purposes. In addition to consuming the edible plants for food, some plants are also used for medical purposes (Li 1994); e.g. *NayaD ‘Formosan elderberry, *Ebulus formosana*, *Sambucus formosana* Nakai’ is used to reduce infection, and *DakeS ‘camphor laurel’ is processed for drugs. Some other plants are used for ritual ceremonies, e.g. the important role played by *Riaq ‘cogon grass (*Imperata cylindrica*, *Miscanthus sienensis* Anders)’ during the *pashtaʔay* ceremony of the Saisiyat.

They have used *Daqu ‘soapberry, *Sapindus mukorossi*’ for cleaning and washing clothes, and *CeŋeR ‘dye yam, *Discorea rhipogonioides*’ for dyeing.

6. More work needs to be done

In conclusion, we need more specific knowledge about when and what cultivated plants and domesticated animals were introduced to Taiwan. No single field of specialization can give a satisfactory answer to such a problem. This requires interdisciplinary study, such as linguistics, archaeology, breeding of cultivated plants, and raising of domesticated animals.

Acknowledgements

An earlier version of this paper was presented at PNC 2012 Annual Conference and Joint Meetings, University of California, Berkeley, December 7–9, 2012 and then at the 47th International Conference on Sino-Tibetan Languages and Linguistics, Kunming, October 17–19, 2014. I'd like to thank Robert Blust, Shigeru Tsuchida, Lawrence Reid, and an anonymous reviewer for their valuable comments and for Tsuchida's providing me with some cognate forms. See Appendix 1 for a list of cognates for animals and plants.

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Appendix 1. List of Formosan cognates for animals and plants⁶

To identify these cognates, I have consulted dictionaries and wordlists of Formosan languages, including Blust (2003), Cauquelin (2015), Ferrell (1982), Li (1994), Li & Tsuchida (2001, 2006), Rata (2013), and Tsuchida (1977, 1982).

6. While most of these reconstructions can be traced back to Proto-Austronesian, a few are not attested outside Taiwan, such as *Sidi ‘goat’, *waNiS-an ‘wild pig’, *RiNaS-an ‘pheasant’, *Sanaq ‘otter’, *DakeS ‘camphor laurel’, and *NayaD ‘Formosan elderberry’. Blust labels these as

Animals:

- *qaRem > AtaMx⁷ *qagum*, Tso *hi-arm-uða*, Kan *kani-arum-ai*, Sar *arəmə*, Bun *qalum*, Pai *qam*, Tha *qatum*, Sai *ʔæləm*, Paz *azəm*, Ami *qaləm*, Kav *iəəm* ‘pangolin’
- *(qa)Nuarj, > Kan *ʔi-nuanə* ‘female deer’, Sar *ta-i-ʔuanə* ‘female muntjac’, Bun *qanvanj*, Tha *qnuan* (< A n/t), Paz *nuanj* (< A n/l), Sir *louanj* ‘deer, cattle’; RukBu *loanə*, Pai *luanj* ‘cattle’
- *sakeC (PAN-F) > Tso *taʔacə* (t--irregular), RukBu *akəcə*, Bun *cakut*, Pai *takəc*, Tha *takiθ*, Ami *cakət* ‘muntjac deer’
- *wasu > RukMg *aθoo*, BunN *acu*, Pai *vatu*, Puy *su-an*, Tha *atu*, Sai *ʔæhəʔ*, Paz *wazu*, Ami *wacu*, Kav *wasu* ‘dog’
- *titu (PAN-F) > Kan *tama-titu*, Sar *tama-titu*, Tha *titu*, Kav *titu* ‘puppy’, Paz *titu* ‘cub, young animal’
- *babuy > Tso *fuðu*, Kan *vavulu*, RukBu *baboy*, Pai *vavuy*, PuyPn *babuy*, Ami *fafuy*, Kav *babuy* ‘wild pig’, Sed *babuy*, Bun *babu*, Tha *fafuy*, Sai *babuy*, Ami *fafuy*, Kav *babuy*, Sir *vaboy* ‘domesticated pig’. This term must have referred to ‘pig’ in general (Blust 2002)
- *beRek > Tso *frəʔə*,⁸ RukBu *bəəkə*, PuyKl *vəəkə* ‘domesticated pig’
- *waNiS > Tso *hisi*, Kan *anisi*, Sar *aʔii-ʔa*, RukBu *valisi*, Bun *vanis*, Sai *waliʃ*, Paz *walis*, AmiSa *wədiš* ‘boar’s tusk’, *aljis* ‘tooth’
- *waNiS-an > RukTo *valisanə*, Bun *vanis*, Sai *waliʃan*, Tha *wədiʃ* ‘wild pig’
- *luCuŋ > Bun *hutunj*, Puy *lutunj* (t- irregular), Tha *ruθun*, Sai *ʔosonj*, Ami *lutunj*, Kav *ɣutunj*, Sir *rouŋ* ‘Formosan rock monkey’
- *Cumay (PAN-F) > Tso *cmoi*, Bun *tumað*, Pai *cumay*, Tha *θumay*, Ami *tumay*, Kav *tumay* ‘Formosan black bear’
- *lukeNaw⁹ (PAN-F) > AtaMx *ak-liʔ*, Sed *rkəl-ic*, Tso *rʔuho*, Kan *ukunau*, Sar *lukuʔtu*, RukBu *ʔikolaw*, Bun *huknaw*, Pai *ʔikuljaw*, Puy *ʔikulaw*, Tha *rukðaw*, Sai *ʔoklaw*, Ami *lukdaw*, Kav *ruqŋaw* ‘clouded leopard’

“PAN-F” in his Austronesian Comparative Dictionary, assuming that they are reconstructible at PAN level, but lost outside Taiwan.

7. Abbreviations of language and dialect names as used in this paper are: Ami, Amis; AmiSa, Sakizaya dialect of Amis; AtaMx, Mayrinax dialect of Atayal; AtaSk, Skikun dialect of Atayal; AtaSq, Sqliq dialect of Atayal; Bab, Babuza; Bkl, Bikol; Btk, Bontok; Bun, Bunun; BunC, central dialects of Bunun; BunN, northern dialects of Bunun; Ceb, Cebuano; Fav, Favorlang; Haw, Hawaiian; Ifg, Ifugao; Ilk, Ilokano; Jav, Javanese; Kan, Kananavu; Kav, Kavalan; Kel, Kelabit; Kpp, Kapampangan; Mal, Malay; OJv, Old Javanese; Pai, Paiwan; Paz, Pazih; Puy, Puyuma; PuyKl, Katipul dialect of Puyuma; PuyLp, Lower Pinglang dialect of Puyuma; PuyPn, Peinan dialect of Puyuma; PuyTam, Tamalakaw dialect of Puyuma; Ruk, Rukai; RukBu, Budai dialect of Rukai; RukMg, Maga dialect of Rukai; RukMn, Mantauran dialect of Rukai; RukTa, Tanan dialect of Rukai; RukTo, Tona dialect of Rukai; Sai, Saisiyat; Sal, Salayar (S.W. Sulawesi); Sar, Saaroa; Sed, Seediq; SedTr, Truku dialect of Seediq; Sir, Siraya; Tag, Tagalog; Tao, Taokas; TB, Toba-Batak; Tha, Thao; Tso, Tsou; Yam, Yami.

8. All Tsou forms are based on the Duhtu dialect (my own field notes), in which *r* is retained reflecting PAN *l or *R, and ə reflects PAN *e.

9. Most Formosan languages reflect *u for the first vowel, while Rukai, Paiwan, and Puyuma reflect *i of this cognate form.

- *Sidi (PAN-F) > Bun *sidi*, Pai *sizi*, Puy *siri*, Tha *sisi* (<A), Sai *firi*, AmiSa *sidi*, Kav *siði*, Bas *sili* ‘goat’
- *butuN (PAN-F) > AtaMx *butul*, Sai *botol*, Kav *buwut* (<M), ‘Formosan gem-faced civet 果子狸’, PuyLp *butul* ‘weasel 黃鼠狼’
- *(ku)labaw > Kan *tuunjiiji-lavau*, RukBu *koʔabaw*, Pai *kuʔavaw*, Puy *kuʔabaw*, AmiSa *kala-baw* (<A), Kav *m-rabaw*, Fijian *ka-lavo* ‘rat’
- *SulaR > RukMg *sura-a*, RukTo *soaʔ-a*, RukMn *ʔoʔaʔ-a* ‘snake’
- *qayam > Tso *ðomə*, Sar *alamə*, RukBu *aðaðamə*, BunC *qaðam*, Pai *qaya-qayam*, PuyPn *ʔayam*, Paz *ayam*, Kav *alam*, Ami *qayam*, Sir *aiam* ‘bird’; Fav *adam* ‘omen bird’; Kan *alam*, Sai *ʔæyæm* ‘meat’
- *baRuj > Tso *ho-foru*, Kan *ta-varuru* (<A), Bun *balu*, Tha *faʔuð*, Sai *baʔoð*, Kav *banur* (<M) ‘dove sp.’; Ilk *bálog* ‘wild pigeon’
- *punay > Tso *pnoi*, Kan *punai*, RukBu *ponay*, Pai *punay*, Puy *punay*, Sai *ponay*, Mal *punai* ‘pigeon, dove sp.’
- *tikuRas > BunN *tikulac*, Puy *tikuras*, Tha *tikuʔat*, Ami *tikulac*, Kav *tiqwis* (<A) ‘bird sp., *Bambicola thoracica*, partridge 竹雞’; Maranao *tikogas* ‘type of bird’
- *lawar > Tso *rvorə*, Kan *laarə*, Sar *laarə*, RukTo *avaʔ-a*, Bun *haval*, Pai *lava*, Tha *rawəð*, Kav *rawar* ‘flying squirrel’; Ml *kəla-lawar* ‘bat’
- *qekun > Ami *qkun*, Kel *əkun* ‘owl’
- *RiNaS-an (PAN-F) > AtaMx *gila-qun*, SedTr *gla-qun*, Bun *linas*, Tha *ʔiðafan*, Sai *ʔilafan*, Paz *xilasan* ‘male of Swinhoe’s blue pheasant’
- *teRakuk ~ *taRekuk (PAN-F) > Tso *trooʔu-a*, Kan *tarikuuk-a*, Sar *turukuuk-a*, RukTa *taro-kok*, Bun *tulkuk*, PuyLp *tərkuk*, AmiSa *tulakuk*, Kav *traquq* ‘chicken’
- *balaCuk > Pai *vaʔacuk*, Sai *baʔasok*, Ceb *balalátuk* ‘woodpecker’
- *SiSiN (PAN-F) > AtaMx *sisil-iq*, Sed *sisil*, Kan *sisini*, Sar *iiti*, Pai *sisilj*, Sai *fifil*, Paz *sisil*, Kav *sisin* ‘omen bird, *Garrulax canorus taewanus* Swinhoe 畫眉’
- *waNuh (PAN-F) > Ata *waluʔ* ‘beehive’; Sed *walu*, Kan *aanu*, Sar *auʔu*, Bun *vanuʔ*, Sai *waloʔ*, Paz *walu*, AmiSa *waðu*, Sir *hou-walou* ‘honeybee’; RukBu *valu*, Pai *alju* ‘honey’; Puy *walu* ‘sugar’, *walu-walu-an* ‘honeybee’
- *tuNa > AtaMx *tula-qiy*, Ruk *tola*, Pai *tjulja*, Puy *tula*, Tha *tuða*, Sai *tola*, Paz *tula*, AmiSa *tuða* ‘freshwater eel’
- *qaCipa > AtaSq *qsipaʔ* ‘soft-shelled turtle’, Tso *acipa*, Bun *qacipaʔ*, Tha *qθipa*, Sai *kæ-ʔsipaʔ*, Paz *sipa* ‘river turtle’, Kpp *antipa* ‘type of turtle’
- *gaRan > AtaSq *kagan*, Sed *karan*, Bun *kalan*, Tha *kaʔan*, Sai *kaʔan*, Paz *kaxan*, Ami *kalan*, Sir *kagan* ‘crab’
- *Ciqaw > AtaMx *ciqaw*, Tso *cðou*, Kan *ciʔau*, Sar *ciʔau* ‘type of river fish 苦花, 固魚’; Pai *ciqaw* ‘fish (gen.)’; Chamoro *tiʔao* ‘goatfish’
- *paRiS > Sir *pagig*, Tag *pági* ‘stingray’
- *qiSu > Pai *qisu*, Ceb *ihu*, OJv *hyu* ‘shark’; Ami *qiso* ‘whale’
- *guRiCa > Pai *gurica* ‘squid, octopus’, Kav *qlita*, Yam *koyta*, Sal *kurita* ‘octopus’
- *qudan > Pai *quzan*, PuyKl *ʔəðan*, AmiSa *quan* ‘shrimp’, Tag *ulán* ‘shrimp, lobster, crayfish’
- *piRaS > Ruk *piasə*, Tha *piʔaf*, Sai *piyaf*, Kav *piʔas* ‘roe’, TB *pira* ‘egg’
- *Sanaq (PAN-F) > AtaMx *sanaq*, Tso *snoo*, Kan *sanaʔə*, Sar *sanaʔə*, RukTo *sana*, Pai *sanaq*, Tha *janaq*, Ami *sanaq*, Kav *sani*, Fav *channa* ‘the Chinese river otter’, Sir *hanna* ‘fox’
- *tubak > Kan *tuvakə*, Sar *tuvakə*, RukMg *tbakə*, Pai *tjuvak*, Haw *kupa* ‘cowrie shell’

- *lanjaw > AtaMx *anjaw*, Sed *ranjaw*, Ruk *a-[a-lanjaw* ‘big fly’, Pai *la-lanjaw*, Puy *ŋa-ŋa[aw* (<M), Tha *ranaw*, Sai *lanjaw*, Paz *ranjaw*, Kav *ranjaw* ‘small fly’, Tso *t-roŋo* ‘honeybee’, Kan *taa-ŋalau* ‘gnat’
- *beRŋaw > PuyTam *vərarəŋaw* ‘bluebottle fly’, Tag *banyaw* ‘botfly’
- *walaq > PaiBu *ʔalj-walaq*, PuyTam *waraH* ‘spiderweb’, Sir *rawa* (<M) ‘spider’, Kalamian *lawak* (<M) ‘spider’
- *kakaCu (PAN-F) > AtaSk *kkasuʔ*, Bun *kakatu*, Paz *kakasu*, Ami *kakatu* ‘spider’
- *kuCuh > AtaMx *kucu* (female form), Sed *qu-hij*, Tso *ʔcuu*, Kan *kucu*, Sar *kucuʔu*, Ruk *koco*, Bun *kutu*, Pai *kucu*, Puy *kuʔu*, Tha *kuθu*, Sai *koso*, Paz *kusu*, Ami *kutu*, Kav *qutu* ‘head louse’
- *CumeS > AtaMx *lum-iq* (<A), Sai *somæh*, Paz *sumah*, Ami *tumus* (<A), Kav *tuməs* ‘body louse’
- *liseqeS > RukBu *a-[isəəsə* (<A), BunN *icqus*, Pai *ljisəqəs* (<A), Sai *liʔfif* (<A, <M), AmiSa *licaʔəs* ‘nit of louse’
- *qatimela > Tso *timro*, Kan *ʔatimua*, Sar *ʔatimula*, Pai *qatjim-tjim*, PuyKl *ʔatim[ə*, Tha *qa-ti-tira*, Sai *kæ-ʔtim*, Kav *timya*, Ami *qatimla* ‘flea’
- *banjaw > Bun *banju* ‘greenbottle fly’, Kav *banjaw* ‘tiny flies surrounding garbage’, Ami *fanjaw* ‘bedbug, rice insect’, Tag *bəŋaw* ‘botfly’
- *Nimatek > Kan *ʔa-nimətək-a*, Sar *ʔa-ʔimətək-a*, RukBu *limatək*, Pai *ljimatjək*, Puy *limatək*, AmiSa *ʔa-ʔimatək-ay* ‘jungle leech’, Tag *lima:tik* ‘leech’
- *wiNi > Bun *vini*, AmiSa *wiði* ‘water leech’
- *(qaNi)meCaq > Kan *niməcaə*, Sar *ʔaʔi-maa-maca*, ‘paddy leech’, Ami *la-lintaq* (<A) ‘mountain leech’, Mal (*ha*)-*lintah* ‘leech’
- *aNay¹⁰ > Kan *l-aianə*, Sar *l-aiəʔ*, RukBu *v-alay*, Puy *ayan*, Tha *ayað*, Paz *alay*, Itbayat *anay* ‘termite’, Bun *anay* ‘white ant’, Pai *ayalj* ‘termite nest’
- *Sipes > AtaMx *ha-hipux* (<D), Sai *hipih* (<A), Paz *hipət*, Kav *sipəs*, Yam *ipəs* ‘cockroach’
- *qatabaj (PAN-F) > Kan *ʔa-ta-tavanə*, Sar *ʔa-ta-tavanə*, RukTo *atabanə*, Bun *qatavanə*, Pai *qatjatjavanə* ‘cockroach’
- *qalu-Sipan > Tso *r-ərpə*, Kan *ʔ-al-alipənə*, Sar *ʔ-al-alipə*, Sai *ʔa[ə-ŋa-hipan*, Paz *h-ar-ipən*, Kav *ʔusipan*, Mal (*h*)-*alipən* ‘centipede’
- *buhet > Ata *bhut*, Sed *b<ri>huc*, Kan *vuútu*, RukBu *buu-buutu*, Bun *puhut* (<A), Pai *vutj*, Puy *vut*, Sai *ka-bohæt* (<A), Paz *buhut* (<A) Ami *fohət*, ‘squirrel’, Tag *buʔot* ‘rabbit’

Plants

- *pajay > AtaSq *pagay*, Sed *payay*, Tso *pai*, RukBu *pagay*, Bun *pəð*, Pai *paday*, Tha *pəðay*, Sai *pəðay*, Ami *panay*, Kav *pany*, Mal *padi* ‘rice plant’
- *beRas > Tso *fərsə*, Kan *vəra*, Sar *ə-vəraə*, RukTo *bəʔasə*, Pai *vat*, AmiSa *bəlac*, Kav *bəʔas* ‘husked rice’
- *Semay > Paz *sumay*, Ami *həmay*, Kav *ʔmay* ‘cooked rice’
- *qeCah > RukBu *əca*, PuyKl *ʔəʔa*, Tha *qθa*, Sai *kæ-ʔsəʔ*, Ami *ʔtah* ‘husk of grains’
- *bineSiq > BunTbk *binsiq*, Puy *biniʔ*, Sai *binʔiʔ*, Tha *fa-finʔiq*, Tag *binhiʔ* ‘seed for next planting’
- *zaRami > BunIs *dumali* (<M) ‘millet straw’, AmiSa *lalami* (<A), Pai *djami-a*, Puy *darami-an* ‘rice straw’
- *baCaR > AtaSk *bacax*, AtaMx *basag*, SedTr *basag*, Sai *basal*, Tao *basau* ‘millet’, *Panicum miliaceum*’

10. Note the metathesis of *N and *y in Kanakanavu, Saaroa, Puyuma, and Thao.

- *beCeŋ > Sar ʔə-vəcəŋə,¹¹ RukBu bəcəŋə ‘millet, foxtail, *Setaria italica*’
- *zawa > Puy dawa ‘millet, *Setaria italica*’¹²
- *balaysan (PAN-F) > Puy balaysan, Kav braysan ‘sorghum’¹³
- *tebuS > Tso təfsə, Kan tənəsə, Sar i-tənə, RukMg tbusu, Bun cibus, Pai tjəvus, Sai ka-tbof, Paz tubus (<A), Ami təbus, Kav təbus ‘sugarcane’
- *NaCeŋ > Kan natəŋə, Sar ʔatəŋə, RukBu lacəŋə, Pai ljacəŋ, Ami latəŋ, Ilk natəŋ ‘vegetables’
- *qauR > AtaMx qau-a-g, Tso oru, Kan ʔauru, Sar ʔauru, Bun qaul, Pai qaul, Tha qaut, Sai ʔəæʃ, Ami qaul, Kav iuə ‘bamboo sp., *Bambusa*’
- *buluq > RukTa bolo, Pai vuljuq, PuyPn buʃuʔ, Sai boʃəʔ, Paz buru, Ami fuluq, *Bambusa* sp.’
- *kawayan > RukBu kavaðanə, Pai kavayan, Puy kawayan ‘bamboo sp., *Bambusa spinosa*’
- *quay > AtaMx qua-ni, Sed qwa-rux, Tso uə, Kan ʔuai, Ruk ovay, Bun quað, Pai quay, Puy ʔuay, Tha quay, Sai ʔəay, Paz way, Ami qoay, Kav uay, Bas uay, Bab choa, Sir uwəg ‘rattan’
- *biRaq > RukTa bia, Puy biraʔ, Sai biʃəʔ, Tha ʃitaq, Kav biʃi, Tao bixax, Bab bia ‘leaf’, RukTo biʔa ‘Alocasia’
- *tuba > AtaSq tuba, SedTr tuba, Sai ta-toba, Paz ta-tuba, Jav tuba ‘fish poison, *Derris* 魚藤’
- *paŋuDaN > Kav paŋðan ‘pandanus’, Ata paŋran, RukBu paŋoqalə, Pai paŋuqalʃ, Puy paŋuqal, Sai paŋran ‘pineapple’
- *lukuC > RukBu ʃukucu, Pai ʃjukuc, Puy ʃukuʃ, Ami lukut ‘parasitic plant sp., *Asplenium nidus* 山蘇’
- *Riaq > Tso v-rio, Kan rəʔəʔ, Sar əʔəʔa, Bun liaq ‘cogon grass, *Imperata cylindrica* 白茅’; Sal rəa ‘sword grass, *Imperata*’
- *qaRisam > Tso resmə, Sar ʔariamə, BunIs haslam (<M), Sai ʔəʃəhæm, Kav qiisam ‘miscanthus stalks, stems of cogon grass’, Ami qaləcam ‘dried reed stalks usable for firewood’, Bkl aqsam ‘*Lygodium* sp.’
- *Daqu > Kan caaʔu, Sar caaʔu, RukTo ɖaw, Bun daqu, Pai zaqu, Puy ɖaʔu, Ami raqu ‘soapberry, *Sapindus mukorossi* 無患子’; Ceb daʔu ‘*Dracontomelum* sp.’
- *baNaR > AtaMx balag, SedTd balaw ‘plant sp., *Smilax opace*’, Tso ʃkorə ‘plan sp., *Smilax china*’, Kan vanarə, Sar vaʔarə, RukTo balaʔ-a ‘plant sp., *Smilax oxyphylla*’, Bun banal ‘plant sp., *Smilax opace/china*’, Pai valja, Tha fa-fatað ‘plant sp., *Smilax china*’, Sai ba-balaʃ, Kav banəʔ 台灣菝葜, Ilk banag, Btk banal ‘plant sp., *Smilax bracteata*’ (Tsuchida 1976: 140)
- *baNhiR > Tso fahri, RukBu baali ‘cypress’; Sar vaʔiri, Pai valji, Sai balih[-əh ‘board’; BunC banhil ‘cypress, board’; MI banir ‘buttress-like projection from a tree-trunk’ (Tsuchida 1976: 140)
- *CeŋeR > Sar cəŋəʔə ‘type of plant with red sap’, Pai cəŋu ‘dye yam (plant sp., *Discorea rhipognioides*) 薯榔’, Ceb tuŋuq ‘kind of mangrove, the bark of which is used for dyeing’ (Wolff 2010)
- *quSun > AtaMx qhuŋ, Tso uŋo, Kan uŋu, Sar uʔuŋ-a (<M), RukMn ʔoŋo, Bun quuŋ, Ilk uoŋ ‘edible mushroom’

11. The Saaroa form might be a loan from the Mantauran dialect of Rukai *vəcəŋə* ‘millet’. If so, this cognate is found only in Rukai plus Malayo-Polynesian languages.

12. This cognate is found only in one Formosan language, Puyuma, but with external evidence.

13. Sed *brisan* and Amis *balaysan* ‘sorghum’ show irregular correspondences. The Amis form is a loan from Puyuma, but the source language of the Seediq form is unknown.

- *salerj > AtaMx *hauj* (female form), Sed *haruj*, Tso *sronj*, Kan *aləjə*, Sar *aləjə*, RukBu *aləjə*, BunN *caaj*, Pai *taləj*, Tha *tarin*, Sai *hə[ə]j*, Ami *caləj*, Ilk *saləj* ‘pine tree’
- *taNiuD > AtaSq *tliu?*, Tso *tahðucu*, Kan *taniucu*, Sar *təhucu*, RukBu *talioqo*, Itb *tanjud* ‘mulberry tree’
- *ameCi > Tso *mici*, Kan *m-amici*, Sar *l-amici*, RukBu *amici*, Pai *s-amci*, PuyKl *lamfi*, Tha *q-amθi*, Btk *amti* ‘plant sp., *Solanum nigrum* 龍葵’
- *laCej > Sai *kəeh-[asəj]*, Kav *p-ratiŋ*, Ami *l-id>atəj*, Ojv *la-latəj* ‘stinging nettle sp., *Laportea* 咬人狗’
- *puluC > Kan *puucu*, Pai *puluc*, Puy *pu[uf]* ‘plant sp., *Urena lobata* 野棉花; Tso *ta-prucu* ‘a species of grass whose seeds easily stick to clothes in a line’, Ojv *pulut* ‘sticky sap, bird lime’
- *Cubuq > Kan *cuvu?u*, Sar *cuvu?u*, Pai *cuvuq* ‘bamboo shoot; RukMn *ʔa-cuvu* ‘treetop; To *tupu* ‘to grow up’
- *buaq > Puy *bua?*, Bab *boa*, Sir *voa* ‘fruit; Kan *vua?ə* ‘orange, pomelo; Bun *buaq* ‘plant sp., *Machilus*; Pai *vuaq* ‘round, edible tuber; Kav *bui* ‘bloom; Ibg *bua* ‘fruit’
- *qaNuNaj > Tso *həhə?* ‘a plant sp. whose small sticky fruit is eaten after long cooking, *Cordia* 破布子; Kan *ʔununanj* (<A) ‘*Cordia myxa*’, Sar *ʔuʔlanə?* (<A) ‘*Cordia* sp.; RukMn *ololaj* (<A) ‘*Cordia myxa*’, Puy *ʔalulaj*, Tag *anunanj* ‘*Cordia dichotoma*’, Mal *nunanj* ‘a tree with fruit producing a sticky sap used as gum’
- *qaRa > AtaMx *qaa?*, Sai *ʔə[ə]?* ‘type of fern, *Alsophila pustulosa* 蛇木; Old Jav *hara* ‘*Ficus* sp.’
- *Cuqer > Pai *cuqu* (<A), Puy *ʔuʔur* (<A), Sai *səʔə[* (<A), Ami *toʔor*, Ifg *tuwol* ‘plant sp., *Bischofia javanica* 茄苳’
- *baNbaN > Pai *valjvalj* ‘reed, *Cycas taiwaniana*’; Sai *banban*, Paz *balabal* ‘palm; Ami *fatfat* ‘woody part of rattan’, Tag, Bkl, Ilk *bamban* ‘*Donax cannaeforjis*: plant with clustered stems used for weaving baskets or making fish traps’
- *waRed > RukMn *aʔəʔə* ‘type of vine’, BunN *valu?* ‘vine, *Millettia reticulata* Benth. 葛藤; Pai *vaudj* ‘vine, creeper’, Maranao *waged* ‘vine’, Mar *ward* ‘vine, snake’
- *biNuaq > Tso *fkuo*, Kan *vinua?ə*, Sar *viʔua*, RukMg *lboo* (<M) ‘plant sp., *Hibiscus taiwanensis*; Pai *viluaq* ‘plant sp., *Oreopanax formosana*’
- *beNbeN (PAN-F) > Sed *bləbul*, Tso *fhəfhə*, Kan *tavənvənvə*, Sar *tavəʔvəʔə*, RukBu *bəʔəbəʔə*, Bun *bunbun*, Pai *vəljvəlj*, Puy *bəʔbəʔ*, Tha *fiðfið*, Paz *bəʔəbəʔ*, Hoa *bulbul* ‘banana’
- *tanaq (PAN-F) > Tso *tnoo*, Kan *tana?ə*, Sar *tanəʔə* (<A), Ruk *tana*, Pai *tjanaq*, PuyPn *tana?*, Tha *ta-tanaq*, Paz *tana*, Kav *tani*, Ami *tanaq* ‘plant sp., *Aralia decaisneana* Hance 刺楸’
- *NayaD (PAN-F) > AtaMx *laya?*, Tso *hðocə*, Kan *nalacə*, RukBu *la[ə]qə*, BunN *naða?*, Pai *ljayaz*, Puy *layaq*, Sai *layar* ‘plant sp., *Ebulus formosana* 有骨消’
- *Samaq (PAN-F) > Kan *sama?ə*, RukBu *sama*, BunN *samaq*, Pai *samaq*, PuyKl *amah*, Tha *famaq*, Paz *sama*, Kav *sami*, AmSa *samaq* ‘plant sp., *Sonchus oleraceus* Linn. 苦蕒菜, plant sp., *Lactuca indica* 萵苣’
- *DaRa (PAN-F) > AtaMx *raga?*, SedTn *dara*, Bun *dala?*, Tha *ʔata* (<A), Sai *ra[ə]?*, Paz *daxa* ‘maple tree 楓’
- *DakeS (PAN-F) > AtaMx *rakus*, Tso *cʔosə*, Kan *cəkəsə*, RukBu *qəkəsə*, Bun *dakus*, Pai *qakus*, Puy *qəkəs*, Tha *fakif* (<A), Sai *rakəf*, Paz *dəkəs*, Kav *raqəs*, AmiSa *rəkəs* ‘camphor laurel 樟’

- **baŋaŋ*¹⁴ (PAN-F) > Tso *fjosə*, Kan *vaŋasə*, Sar *vaŋaə*, RukBu *baŋasə*, Pai *vaŋas*, Sai *baŋaf*, Paz *baŋas*, Kav *baŋas*, Ami *vaŋas* ‘plant sp., *Melia azedarach* 苦楝樹’
- **keRiw* (PAN-F) > AtaMx *kgiy*, SedTr *kərig*, BunN *kaliv*, Puy *kəriw*, Tha *kliu*, Sai *ka-kliw*, Paz *kixiw* (<A), AmSa *kəliw*, Kav *qəwiw* ‘hemp plant’
- **qaRiDaŋ* (PAN-F) > AtaMx *qagiran*, Pai *qarizən*, Paz *xaidən* (<M) ‘beans, peas (generic)’, Tso *rəŋji* (<A), Kan *ʔarican*, Sar *ʔarisan*, Bun *qalidən* ‘pigeon peas’; Fav *əran* ‘type of small beans’ (Tsuchida 1982: 71); Sir *agisan* ‘broad beans’

Appendix 2. Related cognates

- **qeNuR* > SedTr *əlug*¹⁵ ‘path’; RukTa *olo*, Pai *qəlju* ‘animal trail’; Bun *ma-qunul* ‘ambush (in hunting)’, *qunul-an* ‘animal haunt’; OJv *hənuu* ‘road, way’
- **busuR* > Ata *b<in>uhug*, Sed *bh-niq*, Tso *fsuru*, RukTo *bosoʔo*, Bun *bucul*, Tha *futuʔ*, Sai *bəæhæʔ*, AmiSa *bucul* ‘bow’; Kav *busuə* ‘bowstring’; Paz *buzux* ‘arrow’
- **baRah* > AtaSq *bagah*, Sed *bagah*, Kan *vaara*, Sar *varaʔa*, Sai *baləh*, Bab *bagga*, Sir *vaga*, Ami *balah* ‘charcoal’; Sai *baʔəh* ‘embers’
- **qumah* > Ata *quma-qumah*, Kan *ʔuuma*, RukBu *oma-oma*, Bun *quma*, Pai *quma*, Puy *ʔuma*, Sai *ʔəm-ʔəmah*, AmiSa *qumah* ‘field, farm 田’; Ata *qumah* ‘to weed’, Tso *mo-mo* ‘to work in the field’
- **tatak* > Paz *tatak*, Kav *tatak*, Ami *tatak* ‘hoe’; Sed *t<m>atak* ‘to weed, cut grass’
- **taRaQ* > Tha *tataq* ‘chips from adzing wood’
- **tektek* > RukTa *təkətəkə*, Bun *tuktuk*, Puy *ma-tək*, Sai *təktək* ‘to chop wood into pieces’
- **taRaQ* > Tha *tataq* ‘chips from adzing wood’, Ilk *tagə* ‘to shape by cutting’
- **taDaw* (PAN-F) > Puy *taɖaw*, Paz *tadaw* ‘knife’
- **RabiS* (PAN-F) > Sai *labif*, Kav *ʔabis* ‘small knife’
- **Nesun* > AtaMx *luhun*, Tso *suhju*, Sar *ʔunu*, RukBu *loonu*, Bun *nucun*, Puy *lusun*, Kav *insun*, Sai *ləhəŋ* ‘mortar’
- **qaSeluh* > Ata *qasuuʔ*, Sed *səru*, RukBu *asoʔo*, Bun *qasauʔ*, Pai *qasəlu*, Tha *qafuruʔ*, Sai *ʔəʔoʔoʔ*, Paz *suru*, Kav *səru*, Ami *qasulu*, Tao *haruru* ‘pestle’
- **qaCeb* > Tso *cəʔə*, Sar *ʔacəvə*, Bun *qatuʔ*, *hatub* (Isbukun), Sai *ʔəsəb*, Kav *itəb*, Btk *ʔátəb* ‘deadfall trap to catch small animals’
- **bubu* > Tso *fuu*, Puy *buʔbuʔ*, Kav *bubu*, AmiSa *pubu* (<D) ‘bamboo basket trap to catch fish’
- **aray* (PAN-F) > Tso *roi* ‘scoop-net’, Sar *m-ia-arai* ‘to catch fish with a scoop-net at a waterfall’, RukTa *aʔay*, Pai *aray*, PuyKl *aray* ‘casting net’ (Tsuchida 1976: 243)
- **taNek* > AtaMx *t<um>aluk*, Sai *t<om>alək* ‘to cook’
- **Da(ŋ)Daŋ* > Tso *t<m-a>ŋəcŋə*, Kan *c<um-a>caŋəcaŋə*, Sar *s<um>a-saasənə*, RukMg *qŋəqŋə* ‘to dry by fire’; Ruk *qəŋəqəŋə* ‘hot’, PuyKl *ð<əm>azan*, Tha *pa-sansan*, Paz *mu-dadan* ‘to get warm by fire’; Pai *zaŋzaŋ* ‘bodily heat’; Paz *dadan* ‘to roast’

14. The Tagalog form *baŋaʔ* ‘fan palm’ may be related, but the final -ʔ and the meaning are problematic.

15. Loss of the initial *q-* in this form is unexplained. The initial *q* or *qa* is inexplicably lost in certain forms in Seediq, e.g. **qaRem* > *aruŋ* ‘pangolin’, **qaSeluh* > *səru* ‘pestle’, proto-Atayalic **qhiran* > *hiran* ‘shoulder’, PA **qalan* > *alan* ‘village’ (Li 1981: 249).

- *CuNuh > AtaMx *c<um>uluh*, Tso *c<m>uhu*, Bun *ma-tunuh*, Pai *c<əm>ulju*, Sai *s<om>oləh*, Ami *mi-tuluh* ‘to bake, broil, roast’
- *qaNup > AtaMx *q<um>alup*, Kan *?<um>a-ʔanupu*, Sar *?<um>a-ʔatupu*, RukBu *wa-alopo*, Bun *qanup*, Pai *q<əm>aljup*, Sai *?<əm>alop*, Ami *mi-qadup* ‘to hunt’; Sar *mu-atu-atupu*, Puy *pa-ʔalup*, Paz *m-alup* ‘to hunt with a dog’; Tso *hup-a* ‘hunting territory’
- *panaq > Tso *pono*, Kan *mua-panaʔə*, Ruk *wa-pana*, Bun *manaq (panaq-)*, Pai *p<ən>anaq*, Puy *p<ən>anaʔ*, Tha *panaq*, Sai *p<om>anæʔ*, Paz *pa-pana*, Kav *p<m>ani*, Ami *mi-panaq* ‘to shoot’
- *tapeS > AtaMx *t<um>apus*, Tso *m-opsu*, Kan *t<um>a-tapəsə*, Sar *t<um>a-tapəə*, RukTo *wa-tapəsə*, Bun *ma-tapus*, Pai *tj<əm>apəs*, Tha *t<m>apif*, Paz *mu-tapəs*, Kav *t<m>apəs*, Ami *mi-tapəs* ‘to winnow’; Tag *tahip* (<M) ‘to winnow’, MP *tahep-an (<M) ‘winnowing basket’
- *Rinu > AtaMx *ginuʔ*, Paz *xinu*, Bkl *ginu* ‘winnowing basket’

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Publication history

Date received: 11 December 2015

Date accepted: 1 March 2016