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Hittite Auslautsgesetze Revisited

I. Absolute Final Vowels

A. Short Vowels

1. Unaccented *-i: generally preserved after both obstruents and sonorants.

★ a. In present active verb endings *-mi*, *-si*, *-weni*, *-teni* and adverbial *kuwapi* ‘where; when’ < **k^wó-bhi*; also in D-LSg *kēti* ‘this’ < **ké-dhi* (Szemerényi 1956: 63 & Georgiev 1971: 65) and contra Melchert (1994: 183) also in indefinite *-kki* < **-ki* (NB distribution *kuiški*, *kuinki*, *kuitki*, *kuedanikkⁱ* with particle *-kki* **only** when last vowel of base is *-i-*!). Compare Latin *ci-trā* ‘on this side’, Lith *šis* ‘this’, etc.

b. Regularly lost in assibilated *-ts* < **-ti* (e.g. *hanz(a)* ‘in front’ < **h₂énti* = Latin *ante* etc. as per Jasanoff 1976: 126), but preserved before *-ya* ‘also, and’ through late NH (Abl *-az* but *-azzi=ya*) and also analogically restored in P3Sg and P3Pl active verbal endings *-zzi* and *-nzi* (but NB rare regular outcome in *ēšz(a)* ‘is’ or *išhiyanz(a)* ‘they bind’; see *GrHL* §11.8). Also preserved in infinitives in *-wanzi* < Abl-Inst **-wenti*, probably due to close nexus with following finite verb (so also Kloekhorst 2008: 957, but analogical addition of *-i* after finite forms unlikely). Specially conditioned apocope in Imv2Sg *ī* ‘go!’ < **i-dhi* and *-nut* < **-nú-dhi* (NB shifted accent, as per Kimball 1999: 192), as in Latin *dīc, fac* etc. (see Weiss 2009: 147).

c. Indeterminate whether regularly lost in final *-ri*: *-i* in medio-passive *-ri* secondary after active present endings, so **possible** that Hittite *šēr* ‘above, over’ = CLuvian *šarri* < **séri* (but Hittite may equally well reflect endingless locative **sér*, while Luvian may be trivial innovation with productive ending). Unlikely with anaptyxis < **sri* (Oettinger 1993: 155) in view of *š(a)rā* < **sr-ó*.

2. Accented *-í: certainly preserved in monosyllabic *kī* < **kí*; probably but not assuredly in accented D-LSg *-Cī* < **-Cí* (difficult to exclude entirely *-Cī* < DSg **-ei*; see below I.C.3).

3. Unaccented *-u: preserved in active third person imperative endings *-tu* and *-ntu* (and spread from there to first person etc.).

4. Accented *-u: no certain examples, but NB conjunctions *nu* < **nu* and *šu* < asseverative **h₁su* (thus with Zimmer 1994: 165 & Dunkel 1998: 57, given clear association of *šu* with **preterite** predicates, as per Weitenberg 1992: 327-8; notion of *šu* remade from **só* and comparison with Irish *se*, as per Watkins 1963: 14, extremely unlikely). Reason for absence of expected **nū* and **sū* from accented conjunctions **nú* and **h₁sú* remains to be explained.

★5. Unaccented **-e*: contra Melchert (1994: 183-4) clear regular result is Hittite *-a*.

- a. Enclitic 2Sg D-A *-tta* < PA **-te* with regular shortening of unaccented PIE **tē*; likewise with Josephson (1972: 419) Hittite *-(a)šta* by metanalysis < **-te* = CLuvian *-tta* and HLuvian */-ta/* (NB never rhotacized and never spelled with *tā*; see Rieken 2008a: 640-1); also in synchronic allative *apēda* < **-dhe* parallel to *kēti* < **-dhi* above. Also almost certainly in indefinite *-kka* (*kuēlka*, *kuēzka*, *kuiēška*, *kuiuška*, *kuedaška*) < **-ke*, in view of OLatin *-ce* (conceivable but far less likely < **-ko*, for which there is no other evidence in use as a particle). See also I.A.10 below.
- b. But lost either by apocope or assimilation in *-kku* < **-kʷe* (see for rare preserved sense ‘and’ Watkins 1985). NB that preserved *-a* in examples under 5.a could represent *[-ə]*, thus instead of apocope quite possible **-kʷe* > **-kʷə* > **-kʷu* > *-kku*.
6. Accented **-é*: lengthened and raised to *-ī*, as in ImpfImv2Sg *akkuškī* ‘drink!’ and *azzikkī* ‘eat!’ < **-ské*. On adverb and prefix *pē* see I.C.2 below!
7. Unaccented final **-o* appears as *-a*: certain in medio-passive endings with regular loss of final **-r* (see below III.A.3) 3Sg *-tta* < **-to* and 3Pl *-nta* < **-nto*; also in *anda* ‘in(to)’ < **éndo* and geminating *-a* ‘also, and’ < **-h₂o* (**o* required by Lycian *-ke* ‘also’).
8. Accented final **-ó* appears as *-ā* certainly in *p(a)rā* < **pró* (for Hittite *p(a)rā* as locative ‘before’ as well as allative ‘forth’ see *p(a)rā hand(ant)ātar* ‘providence’ as per Puhvel 1991: 101 and *duwān p(a)rā* ‘long ago’ and renewed *pēran parā* ‘ahead (of time)’ in Melchert 2008).
9. Unaccented final **-a* results in *-a* in ~~Pret1Sg *-h₂a* < **-h₂e* [Ha] and Pret2Sg *-tta* < **-th₂e* [tHa]~~.
10. Accented final **-a*: perhaps in *ištarna* ‘between, among’ < **ens-tér+* (Puhvel 1984: 482 contra Kloekhorst 2008: 418-9), if with Dunkel (2008: 403-8) Latin *-ne* of *superne* etc. reflects PIE **-na*. Definitely not < **-nē* (Melchert 1994: 184), but **-ne* remains possible.

B. Long Vowels

1. Long **ē* > *ē* (probably shortened when unaccented). Given syntax (occurs with indicative); prohibitive negative *lē* represents dissimilated **nē* attested in other Anatolian languages (perhaps starting from **nē=man* ‘would that not’, as per Oettinger 1994: 310). Derivation from Imv2Sg **leh₁* (Kloekhorst 2008: 523 et al.) leaves syntax unexplained. Pret3Pl *-ēr* < **-ēr*.
2. Long **ō* > *a* when unaccented, as in OH neuter *n*-stem N-API *šarāma* ‘bread rations’ < **-mō* (Gertz 1982: 298-9) and N-API plurale tantum *karza* ‘swift’ < virtual **kérts-ō* (Nussbaum, p.c., revising Rieken 1999: 391-2).
3. Long **ū* in 2Sg subject **tū* required by */u:/* in 1Sg subject *ú-uk* (NB spelling with *ú* precludes preform in **-uh₂*, since latter would lead to **u-uk* */o:g/*; see Kloekhorst 2008: 59 on *a-aš-šu-u* */a:sso:/* ‘goods’ < **-uh₂*). But preform **tuh₁* also possible (see IV.C.2 below).

C. Diphthongs

1. Unaccented **-oi* > *-e* securely in enclitic OH 3PDat *-šše* < **-soi*.
- ★2. Accented **-oi* > *-e* securely in pronominal AnimNPI *-e* < **-oi* in *kē* ‘these’, *apē* ‘those; they’ and also NeutN-API *kē* and *apē*, as per Jasanoff 2008: 145-8. Also likely in *pē* ‘hin-’ < **poi*, as per Eichner (1973: 78) contra Melchert (1994: 133). NB HLuvian †*pa-si-ya-* ‘throw away’ does **not** exist! Attested *pa-sa-yá-tu-* (KAYSERĪ §18) highly unlikely to spell /passya-/. Preform **poi* accounts for shape of *pēhute/a-* ‘carry, bring’ and compatible with all other verbs with *pē-*, including *pai-* ‘go’ (but all attested forms easily derivable from **pói-h₁i-* with accented preverb and zero-grade root, contra Kloekhorst 2008: 616-8 with unbelievable spelling interpretations and needless complex sound changes).
3. Unaccented **-ei* **probably** results regularly in OH P3Sg *-e* in *war(a)šše* ‘plucks, harvests’ < virtual **wórsei* (see also OH/OS *mazze* ‘resists’), but evidence is less than robust.
4. Accented **-ei*: no sure examples.
5. Unaccented **-ai* > Hittite *-e* certainly in OH Pres1Sg *-h₂e* < **-h₂ei* [-Hai].
6. Accented **-ai*: no sure examples.
7. Accented **-ōi* in amphikinetic neuter nouns in *-āi* with shifted accent, as in *haštāi* ‘bone; bones’ < **h₂esth₂ōi* etc.
8. Accented **-ēi* > *-ē(i)* in *kulēi* ‘fallow land’ < virtual **k^wlh₁-ēi* < **k^wélh₁-o-* (see Oettinger 1995: 211-14) and in *utnē* ‘land’ < **ud-nēi* < **wédeno-* (see Oettinger 2000: 185ff.). Derivation of NeutN-API *kue* < **k^wēi* (Melchert 2004: 140) possible, but **k^wói* as in *kē* and *apē* (see above I.C.2) more likely.

II. Interior Vowels in Final Syllables

A. Short Vowels

1. Short **i* appears as *i* whether accented or unaccented: *kuiš*, *kuin*, *kuit* and likewise *šalliš*, *šallin*, *šalli* etc.
2. Short **u* appears as *u* whether accented or unaccented: *g(a)nut* ‘by the knee’ < virtual **gⁿú-t* and *daššuš*, *daššun*, *daššu*.
3. Accented short **e* > *ē* in Inst *kēt* < **kéd* (Melchert-Oettinger 2009: 60) and in Pret1PI and Pret2PI *-wen* ~~NP exc. such as~~, *-ten* < **-wén*, **-tén* (Yoshida 1997: 191-2).
4. Unaccented short **-en#* > *-an* in supine *-škewan* (Yoshida 1997: 192) and local particle *-an* < cliticized **en*. Unaccented **-es#* > *-iš* in *nēpiš* ‘sky, heaven’ < **nébhes*.
- ★5. Accented short **o* > *ā* in AnimNSg *kāš*, *apāš* and NeutN-ASg *apāt*. Accented **-óm#* > */o:n/* (spelled *-u-un*) in AnimASg *kūn*, *apūn* (Kloekhorst 2008: 99, revising Melchert 1994: 186-7). NB makes very problematic derivation of *mān* ‘how; as; if, when’ < **móm* and equation with Lycian *mē* ‘as; thus’! Dubious derivation < Inst **méh₂m* [mām] by Dunkel (1997: 72-4).

6. Unaccented short **o* > *a* in NeutN-ASg *-an* < **-om*, as in *pēdan* ‘place’ < **pēdom* (NB *iugan* ‘yoke’ < **yugóm* must then be analogical in either vocalism or accent) and in Pret1Sg **-an* < **-om*, remade as *-an-un*.
- ★7. Accented **-óms#* > /-o:s/ (in *ku-u-uš* and *a-pu-u-uš*), as per Kloekhorst (2008: 99), revising Melchert (1994: 186-7). Fate of unaccented **-oms* (and **-ŋs*) remains less than certain. Kloekhorst (2008: 56-7) assumes *-ú-uš* is regular spelling for AnimAPI in OH, thus /-us/, replaced by /-os/ in NH, based on later spellings with *-u-uš*. But NB that neither **-oms* nor **-ŋs* should ever have been spelled plene! Of 10 exx. of *-ú-uš* cited by Kloekhorst, 8 (including all OS and MS) are of type *ta-lu-ga-ú-uš*, *ḫar-ša-ú-uš*, *kap-pí-ú-uš*, entirely parallel to *ta-lu-ga-e-eš*, *ap-pé-ez-zi-e-eš* (cf. *ḫa-an-te-ez-zi-ú-uš* missed by Kloekhorst), argued convincingly by Kloekhorst (forthcoming) to reflect use of *-e-* to mark [y] after *-Ci-* sign. Thus use of *ú* surely parallel, to mark hiatus-filler ([ʔ] or [w]), not vowel quality. Change to use of *u* likely to align with real quality of following vowel, not OH to NH sound change, as per Kloekhorst (see below III.B.1 for similar change with /-on/). Clinching evidence wrongly dismissed by Kloekhorst (2008: 168): API *a-ku-u-uš-š=a* ‘also sea-shells’ (OH/OS) to *u*-stem *aku-*! Shows even **-ums* > **-ūs* > **-ōs* > /-o:s/ (shortened when unaccented). Thus in all likelihood also same result for **-oms* and **-ŋs*.

B. Long Vowels

1. Accented long **ē* > *ē* in hysterokinetic collectives in **-ēr* (still likely *ḫašduēr* ‘brushwood, twig; splinter’—see Rieken 1999: 346-7—and certain in **ḫappēr* ‘transactions, business’ required by *ḫappiriya-* ‘market-place’ > ‘city’—Rieken 1999: 317). Also in AnimNSg *ḫaštēr(a)* ‘star’ < **h₂stér+s*.
2. Accented long **ō* > *ā* in amphikinetic plurals such as *widār* ‘waters’ < **wedōr* (with shifted accent that cannot be due to the “*k^wetwores-Regel*”!). Shortened to *a* when unaccented: OH/MH NSg *antuwaḫḫaš* ‘human’ < virtual **én-dhweh₂-ōs*.
3. Accented long **ā* > *ā* in *duwān parā* ‘long before’ < **[dwa:m]* (by Stang’s Law from underlying ASg **dwéh₂m* ‘distance, long time’). See Melchert 2008.
4. Unaccented long **ō* > *a* in NSg *keššar(=šiš)* < **ḡhésōr* ‘hand’.
5. Unaccented long **ā* > *a* probable in *pēran* ‘in front’ < **pērām* ~ Grk. *πέρᾱν* ‘across, opposite’ with Dunkel 1997: 72 contra Melchert 1994: 135.

C. Diphthongs

Long **-ōis* with secondary accent > amphikinetic NSg *-āiš* (but ASg *-āin* unlikely to be regular continuant of **-ōy-ŋp*). PIE status of rare matching *-āuš* < **-ōus* uncertain.

III. Sonorants

A. Final Non-Syllabic

1. Final **-m* merges with final **-n* as *-n* (see various examples cited under II. above). Date of merger (Common Anatolian or pre-Hittite) difficult to determine.
2. Final **-ŷr#* > *-ŷr*: N-API **wedōr* with accent shift > *widār* and Pres3Sg of type **tuk-ór* > **tukkār* → *tuqqāri* ‘is visible; matters’ (Yoshida 1990: 112-4).

3. Final $*-Vr\# > -V$: N-API $*-Vr > -V$ in *partawa* ‘wings’, *ḥattata* ‘pieces of wisdom’ etc. (Melchert 1988), Pres3Sg of type $*kēi-tor > kitta$ ‘lies’ (Yoshida 1990: 112-4).
- ★4. Final $*-l$: no sure examples. *šuwī/ēl* ‘thread’ **could** represent hysterokinetic collective $*suh_1-ēl$ (after Eichner 1973: 54), but more likely substantivized neuter $*suh_1-īlom$ with syncope, as is certain for similar cases (Rieken 2008b: 249). See also Rieken 2008b: 250 for pronominal GSg in $-ēl < \text{syncopated } *-ēlos/m$, contra Oettinger 1999: 264.

B. Final Syllabic

1. Final $*-m > -un$, as in athematic Pret1Sg. **Probably** $/-om/$, based on sporadic NS spellings *pa-(a)-u-un* and *e-ep-pu-u-un* (thus with Kloekhorst 2008: 609), but plene spelling can hardly represent vowel length, and MH/MS shows rather *pa-a-ū-un* (3x). Thus use of $-ū/-u-$ not true plene, but to mark transition sound in hiatus $/pa_on/ < *pōi-h_1y-m$. Cf. II.A.7 above on AnimAPI ending.
2. Other final $*-R > -aR$ (via $*-oR$ —see immediately below). NB development must be ordered after loss of final $*-r$ after unaccented vowel in III.A.3 above! Examples for $*-r\#$ in N-ASg *wātar* ‘water’, *uttar* ‘word’ etc. $< *-r$ and $-ātar < *-tr$ (types in $-mar$ and $-eššar$ are secondary Hittite creations). Also in Pret3Pl $-ar < *-r$ such as *šapašiyar* ‘spied’ (pace Kloekhorst 2008: 244). Result of **post-vocalic** $*-w_r$ is likewise $-war$, as in generalized N-ASg of verbal noun. Examples for $*-p$ in N-ASg $-man < *-mp$ (*lāman* ‘name’ $< *h_1nēh_3-mp$ etc.) and $-an < \text{secondary } *-p$ (*lāgan* ‘inclination’ etc.); for latter see Melchert 2007-2008[2010]. Probable $*-l$ in N-ASg of deverbatives in $-al$ (*ard-al* ‘saw’, *išḫiyal-* ‘binding’ etc.). Syncopated $*-ōlom$ less likely in view of unsyncopated $-āla- < *-ō-lo-$ in adjectives (then animate “agent-nouns”) such as *genzuwala-* ‘merciful’ (see Rieken 2008b: 251).
- ★3. Final $*(C)w_r > *-CwoR > -CuR$ at least for liquids. Result surely $/-CoR/$, with regular lowering of $*o > a$ as in regular $*-R > -aR$ blocked by preceding $*w$, which is then lost by dissimilation. **Not** unmotivated resyllabification of $*-w_r > -uR$ (Melchert 1994: 132): e.g. *ḥenkur* ‘offering’. For interpretation as $/-CoR/$ NB spellings of $a-ni-u-ur$ with analogical postconsonantal treatment of $*-Cw_r$ and secondary accent, for which see examples like *pīt-tu-u-la-* ‘snare’, hypostasized from genitive $*‘that of spreading out’$ to virtual $*pēth_2-w_l$, $*pēth_2-wén-s$ $*‘spreading out’$ (thus w/ Rieken 1999: 472 after Puhvel 1979: 211, pace Kloekhorst 2008: 681). NB **cannot** belong to type of syncopated $*-ū-los/m$ (Rieken 2008b: 252-3), since latter show consistent expected $/u:/$, as in *iš-ḫi-ū-ul* ‘treaty’. Examples for $*-w_r\#$ lacking.

C. Interior Syllabic

For final $*-ms\#$ in AnimAPI ending see II.A.7 above.

IV. Obstruents

A. Final Stops

1. Final $*-t$ (after voiceless obstruent) preserved by addition of prop-vowel in *mi*-conjugation (where NB postvocalic ending was preserved as per preceding): Pret3Sg *ēšta* ‘was’ $< *h_1és-t$. Generalized after all obstruents: NB Pret3Sg *e-ku-ut-ta* ‘drank’ $/e:y^wta/$. See Yoshida 1993: 23 with refs.

2. Final **-d* (after V and R) preserved as *-d*: pronominal NeutN-ASg *apāt*, *-at* etc. < **-od*, endless locative *šiwat* ‘day’, Inst < Abl **-d* in *kiššart(a)* ‘hand’, *wedand(a)* ‘water’, *kēt* ‘this’ (NB for original ablatival sense *kitpantalaz* ‘from this time on’ and suppletive enclitic possessives in *-it* for ablative). See Melchert-Oettinger 2009: 54. Loss of final stop in NeutN-ASg of stems in **-nt* probably already PIE. Final **-g̃* in *ú-ug* ← **éḡ* after loss of final **-h₂* also kept (see below IV.C.4). Contra Melchert 1994: 85 generalization of voiced stop here probably PIE: Goddard 2007: 122-3 w/ refs.
3. Whether *hi*-conjugation Pret3Sg *-š* continues **-s-t* with regular loss of **-t* or simply **-s* cannot be determined on phonological grounds.
4. No sure examples for original final labial stop. Preservation of final stops of all points of articulation in Imv2Sg may be due to trivial analogical restoration/maintenance: *ēp* ‘take!’, *ḥark* ‘hold!’, etc. NB *eku* ‘drink!’ with labiovelar /é:gʷ/ vs. *lāḥ* ‘pour!’ below.

B. Final **-s*

1. Regularly preserved after vowel: see various nominal cases endings and OH/MS Pret2Sg ending *-Vš*.
2. Also maintained in AnimNSg of stems in dental stop and **-nt*: *karāz* to *karād* ‘innards’, *šwaz* ‘day’ ← **dyéw-ot-s*, *-anz(a)* < **-e/ont-s*, etc.
- ★3. Maintained after other stops and *-ḥḥ-* by anaptyxis, especially *hi*-conjugation Pret3Sg in *-iš* (arguably **after** loss of final **-t* in **-s-t*—see IV.A.3 above): *akkiš* ‘died’, *ḥuwappiš* ‘hurled’, etc. and with analogical vocalism also *maniyahḥiš* ‘handed over’ etc. See Melchert 1994: 174 with refs. Also surely analogical in MH *ḥatteš* ‘pricked’ (Oettinger 1993: 155). Also after **h₁* ([ʔ] or [h]) in N-ASg *āiš* ‘mouth’ < **(h₁)óh₁(-)s* (Melchert 2010).
4. NB lost in secondary final sequences **-Car/ls* < **-Cr/los* with syncope and new anaptyxis: AnimNSg *ḥuppar* ‘bowl’ < virtual **h₂úpros*, AnimNSg *šarnikzil* ‘restitution’ < **-tilos* (see Melchert 1993 and significant revisions by Rieken 2008b: 246-50). Suggests Imv2Sg examples such as *karš* ‘cut!’ may show analogical restoration/maintenance.

C. Final Laryngeals

1. At least **h₂* regularly lost after vowel, via intermediate step of “lenition”: NB with Eichner (1973: 59) *miyaḥuwant-* ‘mature’ (single *-ḥ-*!) reflecting **myaḥ* < **m(h₁)y-éh₂* ‘growth’. Geminate *-ḥḥ-* of *mēnaḥḥanda* ‘facing, opposite’ < allative **méneh₂* plus *anda* ‘into’ (Nikolaev 2010: 68) due to initial **h₁* in adverb?? I.e., virtual **méneh₂ h₁endo*? Next stage of loss of “lenited” laryngeal with compensatory lengthening indirectly attested in *-ātar* < **-āt̪* (NB with regular “lenition” after accented long vowel, contra Melchert 1994: 69; see Melchert 2007: 2-3 after Jasanoff) and *-āwar* < **-āw̪*. Also directly in lexicalized *āššū* ‘goods’ (NB spelled *a-aš-šu-u*, thus /a:sso:/ with lowering of /u:/ before **h₂*: see Rieken 2005: 537 with refs. and Kloekhorst 2008: 59) and OH substantival *mekkī* ‘a lot’ < virtual **méḡh₂ih₂*. Otherwise final **-Vh₂* represented by short vowel (*-a*, OH and MH *-i* and *-u*, as per Watkins 1982: 282-3, pace Prins 1997: 209-11 and passim, et al.). Absence of any direct lexicalized *-ā* < **-eh₂* more likely accidental than due to difference in chronology of shortening of *-ā* vs. *-ū* and *-ī* (see Watkins 1982: 281).

2. Final **-Vh₁* probably reflected in neuter *i*-stems reflecting old duals: e.g. ^{GIS}*ēlzi* '(balance) scales' < **-tī* < **-tih₁* (see Puhvel 1984: 270 and Rieken 1994: 52, who cites further plausible examples). Far less certain is *-a* (synchronically interpreted as collective plural) < thematic **-oh₁*. Other examples cited by Puhvel (1969: 61) are extremely dubious, but *šākuwa* 'eyes' may indirectly continue **-oh₁* taken from thematic examples. Compare IV.C.4 below. 2Sg subject **tī* in *zīk* **could** represent **tu-h₁* (Schrijver 1999: 157), but real **tū* with monosyllabic lengthening also possible. See I.B.3 above for impossibility of preform **tuh₂*. Hittite *šākuwa* 'eyes' **may** reflect secondary reflex of thematic **-oh₁* (so cautiously Watkins 1986: 61³³).
3. No clear examples for final **-Vh₃*. Imv2Sg *dā* **probably** reflects regularly **dóh₃* (or alternatively **déh₃*), but generalization of dominant allomorph *dā-* from rest of paradigm cannot be excluded.
4. At least **h₂* regularly lost after stop: OH NeutN-ASg *mēk* 'much' < **mégh₂*, OH/OS CollPl *anīat=šet* 'his regalia' < **-ot-h₂* (assumption of spelling error entirely gratuitous), 1P subject *ūg* 'I' ← **ēg* < **égh₂*.
5. Final **-h₂* also lost after sonorant in *ke/itkar* 'at the head' < **kéd* 'here' + endless locative **kérh₂* (see Nussbaum 1986: 96ff.). Preservation of **h₁* or **h₃* in same environment implausible. Imv2Sg *walḥ* 'strike!' < **welh₃*- shows trivial restoration/preservation just like *šāḥ*, *šanḥ* (*ša-an-ḥa/ša-na-aḥ*) 'seek, search!' < **senh₂*-.

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