2. Phonology PIE > Proto-Germanic

<u>Phonemic system of PIE (traditional)</u> (cf. KÜMMEL 2007: 428)

	labial	dental	palatal	labiovelar	velar	uvular	glottal
tenues	*p*	*t*	*k̂* [k̟-k]	$k^{u̯}$	*k* [k̠-q]		
mediae	*b*	*d*	*ĝ* [ɡ̟-ɡ]	$g^{u̯}$	*g* [ɡ̠-ɢ]		
aspiratae	b^h [b̤ʱ]	d^h [d̤ʱ]	$\hat{g}^h$ [ɡ̟̈ʱ-ɡʱ]	$g^{u̯h}$ [ɡ̈ʷʱ]	g^h [ɡ̠̈ʱ-ɢ̈ʱ]		
frikative		*s* / ~z/				h_2 [x̠-χ]	h_1 [h]
approxim.			*i̯* [j]	*u̯* [w]		h_3 [ɣ̠-ʁ]	
vibrant		*r* / ~r̥/					
lateral		*l* / ~l̥/					
nasals	*m* / ~m̥/	*n* / ~n̥/					

short vowels — long vowels

i *u* (*ī*) (*ū*)

e *o* *ē* *ō*

a? *ā*?

<u>Phonemic system of Proto Germanic</u> (cf. KÜMMEL 2007: 457, Moulton 1972: 142f.)

	labial	dental	alveolar	palatal	labiovelar	velar
fortes	*p*	*t*			$k^{u̯}$	*k*
lenes	*b-β*	*d-ð*	*z̦*		($g^{u̯}$-$ɣ^{u̯}$)	*g-ɣ*
frikatives	*ϕ*	*θ*	*s*		$x^{u̯}$-$h^{u̯}$	*x-h*
approxim.				*i̯* [j]	*u̯* [w]	
vibrant			*r*			
lateral		*l*				
nasals	*m*	*n*				

short vowels — long vowels

i [i-ɪ] *u* [u-ʊ] *ī* [iː] *ū* [uː]

e [ɛ] *ē*,*ǣ* [ɛː] *ō* [ɔː]

a [ɑ] (*ā* [ā])

Diphthongs: *ai̯*, *eu̯*, *au̯*

A. Major developments (in rough chronological order)

Vowels

- **VH$ > *V:* (as in all IE languages)
- (post-)PIE **o*, **a* > PGerm. **a*: **g^hosti*- 'stranger' > **gasti*- 'guest' (> Run. -*gastiz*, Goth. *gasts*, OHG, OS *gast*), cf. Lat. *hostis*, OSC *gostь.*
- **ō*, **ā* > *ō*: PIE **seh$_2$gi̯e*/*o*- > PGerm. **sōkii̯e*/a- 'search' (> Goth. *sokjan*, OS *sōkian*), cf. Lat. *sāgīre.*
- **ē* > *ǣ* (disputed): PGerm **mǣrii̯a*- ‚famous' (> Goth. -*mereis*; Run. -*mariz*, OHG, OS *māri*, OE *mœre*, ON *mœrr*)
- **Osthoff's law:** shortening of long vowls before resonant + consonant: OInd. *pā́rṣṇi*- vs. **fersnō* 'heel' (> Goth. *fairzna*, OHG *fersana*).
- secondary **u* from epenthesis before **R̥*, see below.
- secondary **a* from epenthesis next to **H*, see below.
- *i*-mutation (*umlaut*) of **e* (probably post-PGerm, i.e. Common Germanic): **$h_1$esti* > **ist*(*i*) 'is' (> Goth. OHG *ist*), cf. Lat. *est*.
- raising of *e* before *NC*: *(*s*)*kreng^{h}o*- > **χringa*- 'ring' (OHG, OS, OE (*h*)*ring*)
- **ei̯* > *ī* (probably Common Germanic): **b^hei̯d^h*-*e*/*o*- > **ƀīđ*-*e*/*a*- 'ask, bid' (> Goth. *beidan*, OHG *bītan*, ON *bíða*), cf. GK *πείθομαι.*
- -*e#, -a#* > *Ø*: preterite 1.Sg. **banda,* 3.Sg. **bande* 'band' > **band*
- -*V*(-) > *Ø* in third syllables: D.Instr. Pl. *-*mi*/*az* > *-*mz* (> Run. -*mR*)

Schematic synopsis of the development of PGmc sonants:

	short vowels	long vowels	diphthongs	reson.
PIE	*a *e *i *o *u	*ā *ē *ī *ō *ū	*ai *ei *oi *au *eu *ou	*R̥ *H̥
normal dev.				
PGmc.	*a *e *i *u	*ā *ē$_2$ *ē *ī *ō *ū	*ai *au *eu	*uR
special cond.s				
PIE	*a *e *i *o *u (/_nk$^{(u̯)}$ with loss of *n* + comp. lengthening)	*e_nK, *e_i, i̯		

For PGmc.	…are possible PIE sources:
*a	*a, *h$_2$e, *o, *h$_3$e, Ho, *H between consonats
*e	*e
*i	*i, *e_nK, *e_i, i̯
*u	*u, *R̥
*ā	*a or *o_nk$^{(u̯)}$ with loss of *n* + compensatory lengthening
*ē	*ē, *eh$_1$
*ē$_2$	*ei in certain environments, loan words?

*ī	*ī, *iH, *ei, *e oder *i_nk$^{(\underset{\circ}{u})}$ with loss of n + comp. lengthening
*ō	*ā, *eh_2, *ō, *oH, *eh_3
*ū	*ū, *uH, *u_nk$^{(\underset{\circ}{u})}$ with loss of n + compensatory lengthening
*ai	*ai, *$h_2$ei, *eh_2i, *oi, *$h_3$ei, *Hoi, *eh_3i
*au	*au, *$h_2$eu, *eh_2u, *ou, *$h_3$eu, *Hou, *eh_3u
*eu	*eu, *$h_1$eu, *eh_1u

Consonants

- *Centum* development: merger of „palatals“ and „(plain) velars“ to velars (*$\hat{k}$/k > pre-Germ. *k, *$\hat{g}$/g > *g, *$\hat{g}^h$/g^h> *g^h) without any traces of the palatals. Labiovelars are principally preserved (*k^u > Goth. ƕ, *g^u > Goth. gw).

  Indo-Iranian, Baltic, Slavic, Armenian and Albanian show *Satem* development: Merger of velars und labiovelars to velars, preservation and affrication/spirantization of the palatals.

- PIE *-t-t- [t^st] > PGerm. *ss

- **Grimm’s law**

PIE	*p	> *f	*b	> *p	*b^h	> *b	*posttonic*
	*t	> *þ	*d	> *t	*d^h	> *d	
	*k	> *χ	*g	> *k	*g^h	> *g	*and in initial*
	*k^u	> *$χ^w$	*g^u	> *k^w	*g^{uh}	> *g^w	*position*

  examples:

  PIE *péku- > PGmc. *feχu- ‘cattle; belongings, wealth’ (> Goth. *faihu*, OHG *fihu*, OE *feoh*), cf. OInd. *páśu-*, Lat. *pecū*;

  *g^uét-e/o- > *k^ueþe/a- ‘say’ (> Goth. *qiþan*, OS *quethan*, OE *cweđan,* ON *kveða*), cf. Arm. *koč̣ᶜem*;

  *h_2ék^ueh_2- > a$χ^w$ō- ‘water’ (> Goth. *aƕa*)*,* cf. Lat. *aqua*;

  *tr̥bo/eh_2- ‘timber; house’ > *þurpa- ‘?’ (> Goth. *þaurp* ‘farmland’, OHG *dorf* ‘village’, ON *þorp* ‘settlement’), cf. Osc. *trííbúm*;

  *dék̑m̥ > *teχun ‚10’ (> Goth. *taihun*, OS *tehan*, OE. *tīen*), cf. Gk. *δέκα*, Lat. *decem*;

  *$h_1$eg$h_2$om > *ek(an) / ik(an) ‘I’ (> Goth. *ik*, Run. *ek*, *eka*, *ik,* ON *ek,* OHG *ih,* OS), cf. OInd. *aham*, Lat. *ego*;

  *b^hér-e/o- > *ƀere/a-‘bear, carry’ (> Goth. *bairan*, OHG, OS, OE *beran*, ON *bera*), cf. OInd. *bhárati*, Lat. *ferō*;

  *d^hóg^{uh}o- ‘heat’ > *đaga- ‘day’ (> Goth. *dags*, OHG *tag*, OE *dæg*, ON *dagr*), cf. Lith. *dãgas*;

  *g^hai̯so- > *gai̯za- ‘spear’ (> OHG, OS. *gēr,* ON *geirr*), Gk. *χαῖος*;

  *g^hong^h-e/o- > *gange/a- ‘go, walk’ (> Goth. *gaggan*, OHG, OS, OE *gangan*, ON *ganga*), cf. Lith. *žeñgti*.

  Note: *st, sk, sp preserved: *strou̯-éi̯e/o- > *strau̯ii̯e/a- ‘strew’ (> Goth. *straujan*, OHG. *strouwen*, *Ofrs*. *strēwa*), cf. Lat. *struere*; *sker-e/o- > *skere/a- (> OHG *skeran*, OE *sceran*, ON *skera*), cf. Gk κείρω; *spreng^h-e/o- > *sprenge/a- ‘leap, jump’ (> OHG, OS, OE *springan*, ON *springa*), cf. Lith. *spreñgti.*

But: *pt > *ft; *$k/k/k^{u}t$ > *χt: *$kaptó$- > *$\chi afta$- 'caught' (> Goth. *hafts*, OHG. *haft*), cf. Lat. *captus*; *$(H)oktéh_3(u)$ > *$a\chi tā\underset{\frown}{u}$ > Goth. *ahtau*, OHG, OS *ahto*), cf. OInd. *aṣṭá*(*u*), Gk. *ὀκτώ*.

[further deveolpment: *χ, *χ^{w} > *h, *h^{w} before vowels]

- **Verner's law**
  Þ > Đ in voiced environment except: word initially and posttonic (PIE accent!):

**f*	**f*
	β/b
**þ*	**þ*
	ð/d
*χ	*χ
	ɣ/g
*χ^{w}	*χ^{w}
	$\boldsymbol{\gamma^{w}/g^{w}}$
[**s*	**s*
	***z* (> *r*)**]

  <u>examples:</u>

  *$ph_2tér$- > **fađer*- 'father'(> OS *fadar*, ON *faðir*), cf. Gk *πατήρ*;

  **teknó*- > **þegna*- (> OHG *degan*, OS *thegan*, OE *đegn*, ON *þegn*)*,* cf. Gk. *τέκνον*;

  **lo̯isé̯i̯e/o*- > *lai̯zii̯e/a*- ‚teach' (OHG *lēren*, OFrs. *lēra*; Goth. *laisjan*).

- *χw, *χw, **gw* = *χ^{w}, *k^{w}, *g^{w}: *$h_1(e)\hat{k}\underset{\frown}{u}os$- > *$e\chi^{w}a$- 'horse' (> got. *aiƕa*-, ON *jór*), cf. OInd. *áśva*-.

- delabialization of labiovelars next to (secondary) **u* and before **j*: *$g^{uh}\mathring{n}tí$- > PGerm.*$g^{w}unði$- > **gunði*- 'fight'; *$\underset{\circ}{u}\mathring{l}k^{u}íh_2$- → *$wulg^{w}jō$- > **wulgjō*- 'she-wolf'.

- delabialization of labiovelars before (PIE!) **ō* and perhaps **o*: *$g^{u}o\underset{\frown}{u}$- > *$k^{w}ō$- > **kō*- 'cow'; *$g^{u}olb^{h}o$- > **kalba*- 'calf'.

- distance assimilation of labiovelars to a preceding labial: *$penk^{u}e$ > *$fen\chi^{w}e$ > **femfe* '5'; *$wul\chi^{w}a$- > **wulfa*-; *$\underset{\circ}{u}\mathring{l}k^{u}íh_2$- > *$wulg^{w}ī$- > **wulbī*-.

- *g^{wh} > *g^{w} > #*b*- (disputed) besides > #*w*-: *$g^{uh}ed^{h}\underset{\frown}{i}e/o$- > **bedja*- 'bid, ask'; *$g^{wh}ono$-> **bana*- 'killing' besides *$g^{uh}ormó$- > **warma*- 'warm', cf. Gk. *θερμός*.

- preservation of *g^{w} only after nasal, otherwise > **w* or **g/ɣ*: *$h_3nog^{uh}lo$- > **nagla*- 'nail' (> ON *nagl*, OE *nægl*), cf. Gk. *ὄνυξ, -υχος*.

- **Holzmann's law:** "sharpening" of PGerm. **j*, **w* under specific (disputed) conditions: **Hōu̯i̯o*- > **āja*- > **ajja*- 'egg' (> ON *egg*, OHG *ei*); **du̯oi̯*(*H*)*óom* > *$twajjō^{n}$ '2nd, Gen.' (> Goth. *tvaddje*, ON *tveggia*, OHG *zweio*).

- **Kluge's law:** assimilation of *n* on preceding plosives after unaccented vowel: **TN* > *TT*; **DN* > *TN/DD* > *TT* with subsequent degemination after long vowels, diphthongs and consonants: PIE *$b^{h}ugnó$- > **bukna*- > **bukka*- 'goat' (> On *bokkr*, OHG *boc*), cf. Avest. *buza-*;*b^{h}ud^{h}n-* 'bottom, ground' > PGerm. **b^{h}udn-* > **butn-* > **butt-* (→ ON *botn*, OE. *botm*). [Details disputed.]

- **R̥* > **uR*: **u̯l̥ku̯o-* > PGerm. **wulfa-* 'wolf' (> Goth. *wulfs*, ON *ulfr*), cf. OInd. *vŕ̥ka-*;
  **g^{u}m̥ti-* > **k^{w}umđi-* (> Goth. *ga-qumþs*, OHG *cumft*), cf. Gk. *βάσις*.
- loss of laryngeals (with compensatory lengthening if tautosyllabic)
- "*H̥*" > **a* in initial syllables: **ph$_2$ter-* > **faðer-* 'father' (> Goth. *fadar*, OHG *fater*), cf. OInd. *pitár-*.
- Assimilations: **ln* > **ll*: **pl̥h$_1$nó-* > **fulla-* 'full' (> Goth. *fulls*), cf. OInd. *pūrṇá-*
  **nu̯* > **nn*: **gén(H)u̯-* > *kinn* 'chin'.

B. Minor laws

- **Cowgill's law**: laryngeal "sharpening" of pretonic **-Hu̯-*: **g^{u}ih$_3$u̯ó-* > PGerm. **k^{u}ik^{u}a-* 'alive' (> ON *kvikr*, OE *cwicu*), cf. Lat. *vīvus*.

- **Dybo's law**: virtually, shortening of pretonic long vowel before resonant: **u̯iHró-* > PGerm. **wira-* 'man' (> Goth. *wair*, ON *verr*, OHG *wer*), cf. OInd. *vīrá-*.
  [most likely: lack of compensatory laryngeal lengthening by different syllabification]

- **Lühr's law:** resonant germination by laryngeal **RH* > *RR*: **u̯elh$_1$-* > OHG *wellan.*

- **Mahlow's law**: **ōu̯* > **ō* in internal position (cf. Kroonen 2013: XXVf.): **b^{h}eh$_2$u̯-* > **bōan* 'live, dwell' (> Goth. *bauan*), cf. OInd. *bhávati*.

- loss of nasals before **χ* and emergence on nasal vowels **ã, *ĩ, *ũ* (probably Common Germanic): **pn̥k^{u}sti-* > **funχsti-* > **fũhsti-* 'fist' (OE *fýst*, OHG *fūst*), cf. OCS *pęsti*.

Schematic synopsis of the development of PGmc consonants:

	tenues	mediae	mediae aspiratae	sib.	resonants
PIE	**p *t *k *k^u*	**b *d *g *g^u*	**b^h *d^h *g^h *g^{uh}*	**s *z*	**i̯ *u̯ *r *l *n *m*
1.Cons.-shirft/VL		(Verner)			
PGmc.	**f *þ *χ *χ^u*	**p *t *k *k^u*	**ƀ *đ *g *g^u*	**s *z*	**i̯ *u̯ *r *l *n *m*
special cond.s					
PIE	**p *t *k *k^u* */s_* **t /p,k,k^u_*		**g^{uh}*:_K,V[+dark?] **g^{uh}*:_V[+hell?] **g^{uh}*: # _ ?		**m* (perhaps PGmc in initial position)

For PGmc.	… are possible PIE sources:
**f*	**p*, *k$^{u̯}$ after labial +V
**þ*	**t*
**χ*	**k*, **k*, *k$^{u̯}$ _ *t*
*χ$^{u̯}$	*k$^{u̯}$
**p*	**b*, **p* after *s*
**t*	**d*, **t* after *s, p, k, k,* k$^{u̯}$, emergence in **sr*
**k*	**g*, **ĝ*, **k*, **k* after *s*
*k$^{u̯}$	*g$^{u̯}$, k$^{u̯}$ after *s*
**ƀ*	*b^h, **p* (VL)
**đ*	*d^h, **t* (VL)
**g̶*	*g^h, *$\hat{g}^h$, **k* (VL), **k̂* (VL), *g$^{u̯h}$ _C, V [+dark]
*g̶$^{u̯}$	*g$^{u̯h}$, *k$^{u̯}$ (VL)
**s*	**s*
**z*	**s* /_ voicd C, **s* (VL)
**i̯*	**i̯*
**u̯*	**u̯*, *g$^{u̯h}$ /_ V [+palatal, *a*]
**m*	**m*, **m̥* (> *um*)
**n*	**n*, **m* /_ #, **n̥* (> *un*)
**r*	**r*, **r̥* (>*ur*)
**l*	**l*, **l̥* (> *ul*)

Further development

North West Germanic (?)

- *a*-mutation: *i > e, u > o* /_*ā, ō, ū*
- secondary **ē₂*, if not PGmc.
- unstressed **ai̯*, **au̯* > **ē*, **ō*
- **þl* > **hl*

West Germanic

- lowering of PGerm **ē* (*ǣ*) > *ā*
- various apokopes and syncopes of final short vowels; epenthesis in -*CR*#
- phonologization of *i* mutation
- rhotacism **z* > *r*
- gemination of plosives before *i, r, l*: **sitjan* > *sittjan*;

High German:

- High German consonant shift ("Second sound shift"):

1. tenues > fortis fricatives in weak positon (V_); > affricates in strong position (/#_, C_):

	strong	weak
**p*, $*p^h$	*pf*	*ff*
**t*, $*t^h$	*zz* [ts]	*zz* [ss]
**k*, $*k^h$	*ch* [kx]	*hh* [xx]

2. mediae > tenues

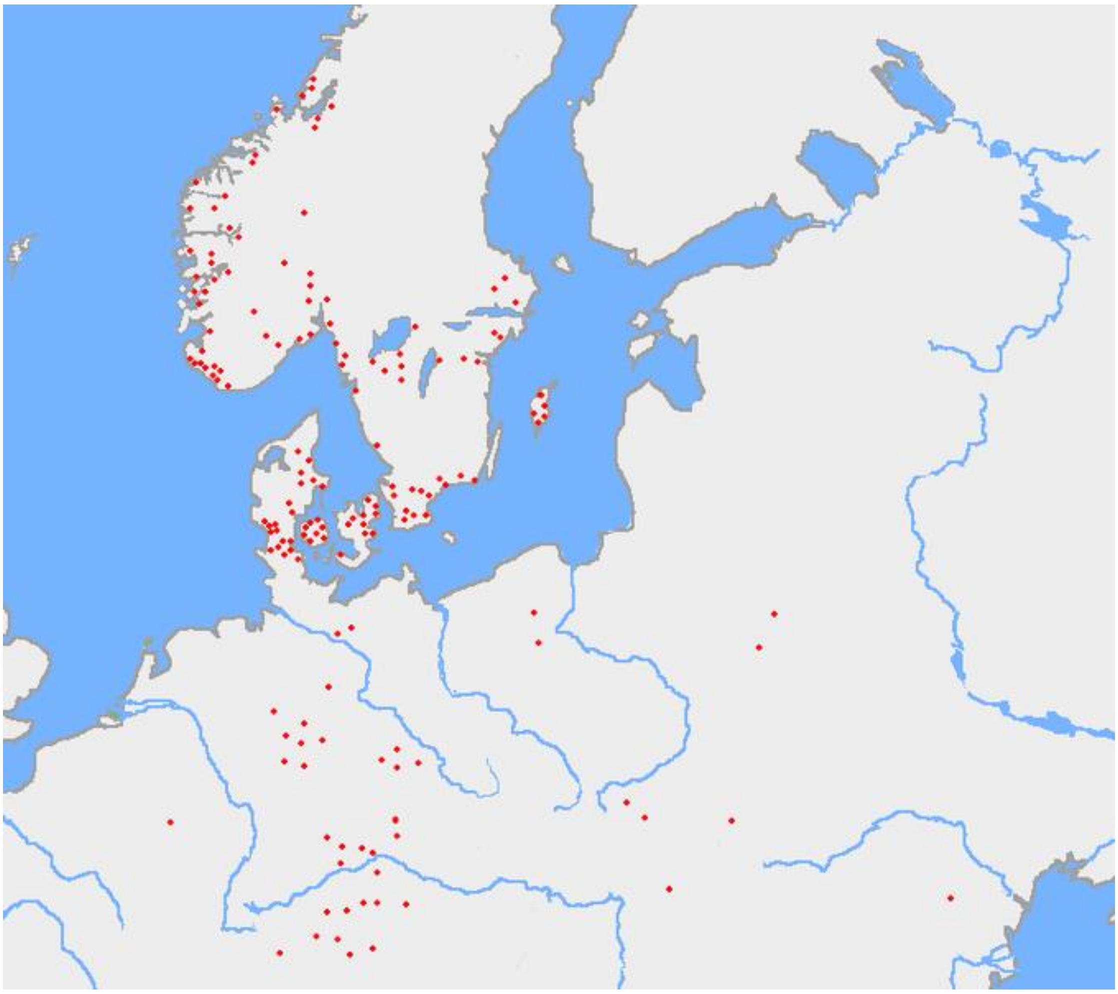
*b > p
*d > t
*g > k

- *i*-mutation: a) “primary umlaut”: **a* > *e*, b) “secondary umlaut” after loss of **j*: *a, o, u* affected

Runic inscriptions

- about 260 inscriptions in the Elder Futhark, ca. 150 – 700 AD
- “Proto-Norse” language, though some of the oldest texts don’t show clear features of North Germanic → better term: “Runic (Germanic)”
- Proto Norse is besides Gothic the most archaic stage of Germanic with only few phonological innovations:
    - *a*-mutation: **i*, **u* > *e*, *o* /_*a, ō, ē* [shared with WGerm.]
    - Secondary **ē* of different (and partly unclear) origin [shared with WGerm.]
    - unaccented **ai̯*, **au̯* > **ē, ō* [shared with WGerm.]
    - **þl* > **hl* [shared with WGerm.]
    - **b,* d,* g* > plosives /_#, /N_ and when geminated, otherwise *β, ð, ɣ*
    - **ai* > *ā* /_*h, r*: *faihide* > *fahide*
    - final devoicing: **gaβe* ‘gave’ > *gaf*; **gang* > **gank* > ON *gakk* ‘go!’
    - assimilations **nþ* > *nn*, **lþ* > *ll*: **anþara-* ‘other’ > ON *annarr*

Map of the distribution of Elder Fuþark inscriptions (before 600 AD):



[https://en.wikipedia.org/wiki/Elder_Futhark#/media/File:Elder_futhark_inscriptions.png]

Futhark from the Kylver stone, Gotland (5th c. AD)

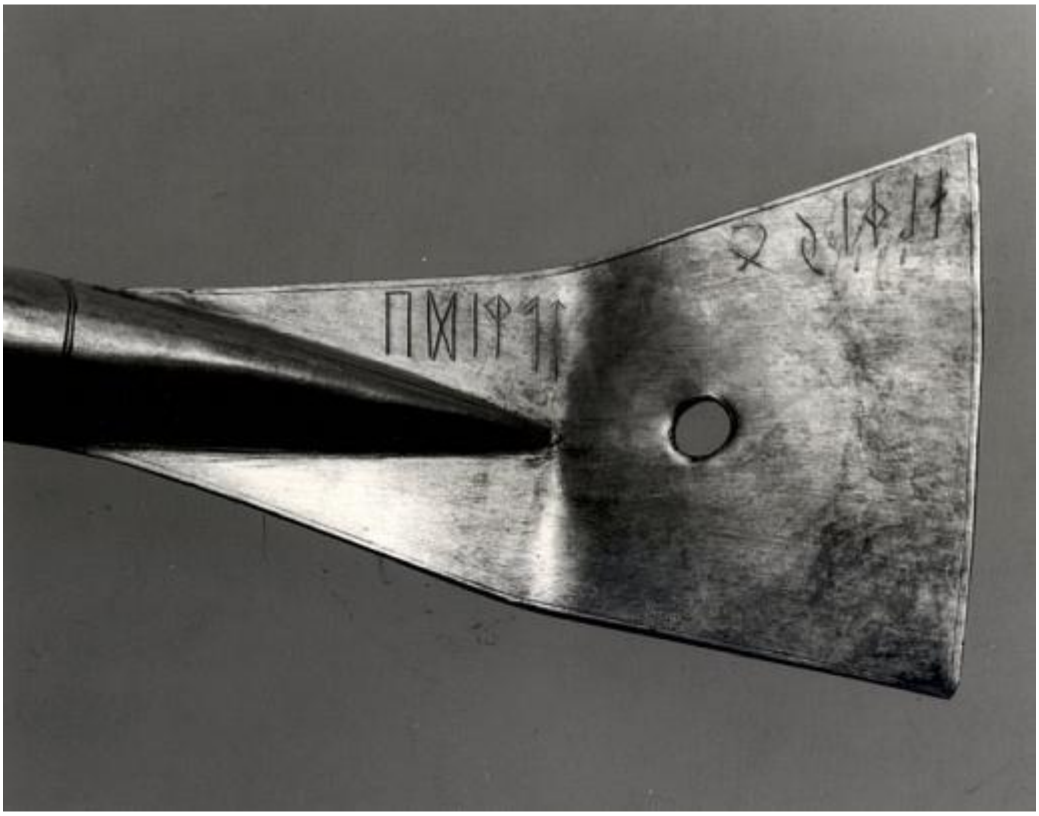
Texte sample I: Comb of Vimose (150-210 AD)

[http://www.arild-hauge.com/arild-hauge/141_DR207_Vimose-kam_NMC.jpg]

harja

- personal name, *i̯an*-stem
- < PGmx. **χari̯an*-, cf. OHG, OS *Herio*

Texte sample II: Shield grip of Illerup Ådal 2 (210-260 AD)



[http://runer.ku.dk/userfiles/image/ImgCache/845/rune03b_259.jpg]

niþijo tawidē

- **nīþii̯a/ōn-*, personal name based on PGmc. **nīþa-* ‘jealousy; fight’ (> Goth. *neiþ*, OHG *nīd*, OS *nīth*, OE nīð, ON *níð*)
- *tawidē*:3.sg.ind.pret. wk.V (besides *tawidai*); < **tau̯i̯e*/*a*- ‘do, make’ (> Goth. *taujan*, OHG. *zouwen*)

Texte sample III: Stone of Rosseland (200-400 AD)

*ek*ˌ *wagigaz*ˌ *irilaz*ˌ *agilamudon*

Photo: Universitetsmuseet i Bergen

[http://www.runenprojekt.uni-kiel.de/daten-bank/bilder/66.jpg]

Texte sample IV: Stone inscription of Kaleby (c. 200-470 AD)

Þrawijan haitinaz was [?

Texte sample V: Rock inscription of Valsfjord (c. 400 AD)

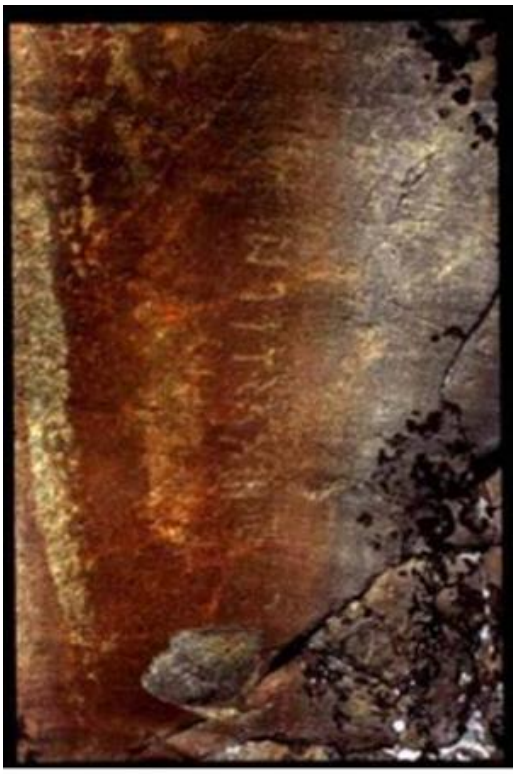


Photo: Edith Marold

ek hagustaldaz þewaz godagas

[http://www.runenprojekt.uni-kiel.de/datenbank/bilder/31.jpg]