1. Introduction

1.1 In Proto-Indo-European (PIE), the basic root structure was that of consonant plus vowel plus consonant, or CeC, in which C stands for any consonant and e for any vowel. When both of the consonants in a root were stops, there were certain restrictions as to their possible combinations.

PIE had three different types of stops, traditionally called voiceless (tenues), voiced (mediae) and voiced aspirated (mediae aspiratae). There are nine possible orders in which these three types of stop could appear in a CeC-root, if they were freely combinable. It appears that they were not, however. In the manuals of Indo-European linguistics (e.g. Szemerényi 1980: 92, Mayrhofer 1986: 95-19, Beekes 1995: 162), three constraints are usually put on the initial and final root consonants: the structures tenuis-media aspirata, media aspirata-tenuis and media-media (*TeDh-, *DhTe- and *DeD- respectively) do not occur. The only exception is that the first combination is admitted if preceded by *s- (s mobile included), for instance *steil-.

1.2 Ferdinand de Saussure was the first to observe that a tenuis and a media aspirata cannot co-occur in a single PIE root. As his pupil Meillet put it (1912: 60): «On peut avoir *beudh- ou *bheudh-, mais non *peudh-; *beudh- ou *bheud-, mais non *bheut-».

It is striking that the sonant, which Meillet includes in his root structure, has disappeared from contemporary manuals. This raises the question whether this implies that a root structure *TeRDh-, *DhTeD- and *DeRD- respectively do not occur. The only exception is that the first combination is admitted if preceded by *s- (s mobile included), for instance *steig-.

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1) The following cover symbols for PIE reconstructions are used in this article: C = any consonant, R = any resonant (u,i,r,l,m,n), H = any laryngeal, T = any voiceless stop, D = any voiced unaspirated stop, Dh = any voiced aspirated stop.
2.1 Many scholars have looked for an explanation for the TeRDh^- root structure constraint. Meillet (1912: 61) assumed an assimilation of T to D^h if both occurred in the same word. The problem was not much heeded in the following decades, until the discussion around Bartholomae’s Law and Grassmann’s Law in the 1960’s and 1970’s. The subsequent revision of the traditional phonemic system reconstructed for PIE, after the publication in 1973 by Gamkrelidze-Ivanov and Hopper of their theories on PIE stops, has offered the opportunity not only to reformulate the constraint, but also to modify its explanation.

2.2 We can distinguish between two fundamentally different approaches to the root structure constraint.

2.2.1 The root structure TeRDh^- D^hT once existed, but disappeared due to later developments. A good example of this type of explanation is Kurylowicz’s assumption (1968: 339) that Bartholomae’s Law is responsible for removing roots with a voiceless and a voiced aspirate stop at the same time. This theory was elaborated by Miller (1977: 376): “It is just possible that roots of the form *dhek and *tegh do not exist because they merged historically into a form *dhegh by the same assimilation process that changed a sequence like *-[bh+dh-] (BL).” This assimilation process is essentially the same as the one that Meillet describes.

2.2.2 The root structure TeB^h^- B^hT never existed in PIE. The regular assimilation of two consonants across a vowel could point to a suprasegmental feature, such as tone. In a tone language, different consonant types often have different influences on a neighbouring vowel. This reminds us very much of the recent work on Balto-Slavic accentuation, by Dybo and others, which has shown that the accentuation of a word depends on its root structure. Furthermore, nominal accentuation of Sanskrit and Greek, traditionally termed ‘musical’, was shown by Lubotsky (1988) to depend largely on the consonantal structure of the root in PIE. These data lead to the supposition that PIE itself was a tonal language, in which the tonal patterns of a word depended on the morpheme structure (Kortlandt 1986: 158, Beekes 1995: 154). This would explain the root structure constraint we are dealing with, for if the consonant type T in PIE caused a different tone from D^h, the combination of both types in a single root would have been impossible.

The hypothesis that consonant types affect tone, which we saw above, was reversed by Kortlandt (1986: 159), because it “does not account for the rise of distinctive tone in syllables which do not contain obstruents. It is therefore probable that the proposed PIE tones were older than the distinction between voiceless stops and voiced aspirates.” We find this theory written out in Lubotsky 1988: 208–209. It starts from a hypothetical stage in which PIE had tones. PIE would have had two tones at that time, high and low, and originally only two types of stops, T and glottalized T’ (= D). Subsequently, the tones influenced the stops, so that T changed to D^h in the neighbourhood of a low tone, and remained T elsewhere. Added to the fact that the occurrence of a high and a low tone in one and the same root is impossible, this would then explain the root constraint: D^h originated from T.

2.3 The two different approaches to the root structure constraint can both explain most of the problems concerning PIE root structure (the following points have been taken from Miller 1977: 376–379). Both can account for the rise of suffix doublets such as *-tmol-/-dhol-, -*tlo-/*-dhol-, -*to-/*-dho-, etc. Both can account for the root structure constraints *TeRDh-, *D^hT- and DeD-, at least if the type D is interpreted as glottalized, which would explain the impossibility of the structure DeD-. Both can explain the type stegh-, one from the absence of assimilation after r-, the other from a form *teke-
with a low tone, if we assume that -i- was not susceptible to change by tone after r-

Only one point could draw a clear line. Miller has proposed that *dhek- and *tegh- both merged into *dhegh-. This predicts a number of homophonic diaspurate roots and, indeed, one finds in Pokorny such doubles as *bheidh- 'dig' (113) beside *bheidh- 'oppress, bend' (114), etc. Such doubles would be hard to explain from the tonal theory described above, as roots of the form *D<e>D could have only one origin in the tonal theory, viz. from original *D<p>D in Beekes' view, from *TeT with a low tone in Kortlandt's explanation. However, some of the doubles Miller lists seem doubtful, and closer investigation would probably invalidate the evidence.

Moreover, we find other homophonic roots in Pokorny, such as Ker. (574–78), pel- (798–805), per- (809–19), skel- (923–28), sel- (1136–45), uer- (1150–52), etc., which remain unexplained in any theory concerning the PIE stop system. The cause of the homophonic diaspurate roots may therefore lie outside of the stop typology.

2.4 Traditionally, the lemmata with the structure CeR/CReC that violate the root constraint are explained by the assumption that they contain a consonantal root enlargement that was added to the root after the root constraint ceased to operate. Such an enlargement could have been a transparent suffix at the time, which modified the meaning of the verbal root, but we cannot exclude analogical formations in PIE already, such as the «Reimworthildungen» which Güntert (1914, especially p. 195–196) discusses.

An (incomplete) list of such roots from Pokorny can be found for instance in Schmitt-Brandt (1967: 20–21). Their explanation as post-root structure constraint would imply that the latter had already ceased to operate before the desintegration of PIE. We shall return to this point in the conclusion (par. 4.5).

3. Evidence

1. Pok. 516 *kadh- 'to look after, cover protectingly' Pokorny gives words from three families, viz. Italic, Celtic and Germanic. Lat. cassis, tidis 'helmet', according to Walde-Hofmann I: 177, might be an Etruscan loan. Furthermore, it may contain any dental.

Ofr. caii 'hate', sometimes 'love', is reconstructed as *kad-t-i or *kad-t-i by Vendryes (LEIA – C 22), and can be compared with Goth.

hatis, OHG haz 'hate', and possibly with Skt. ri-śday 'concerned with the stranger', Gr. xībος 'worry, mourning' with a long root vowel. This points to a root *kHa-.

The dental in the Germanic forms (OE kade 'careful', OHG huota 'care') could be derived from either *-t- or *-d-; according to Kluge-Seebold s.v. Hat, they belong to a root *kat-.

The evidence for *-d- is weak; Latin cassis is uncertain and Germanic allows no positive identification of the original dental.

2a. Pok. 518 *kagh-/*kogh- 'to enclose; wicker' Pokorny gives cognates from Italic, Celtic and Germanic. The limited distribution and unusual ablaut of the these words a priori suggest a recent formation.

Latin caulis (sheep-fold) etc. may have developed from *kaholae, cf. Ernout-Meillet s.v. colum 'sieve, fish-trap', but this remains uncertain. The etymology of cohum 'strap connecting the plough-beam to the yoke' and incohô 'to begin' is uncertain as well (Ernout-Meillet s.v.). Oscar KAHAD 'takes', Umbrian cehfeh, inf. pres. med-pas.1 to be taken are still derived from a PSab. root *kag- by Meiser (1986: 78). Rix (1976), discussing cehfeh, tentatively reconstructs a PIE root *(i)kH (<g>²).

As to Celtic (W. cæ 'enclosure' etc.), the forms may contain either *g- or *g²-.

The Germanic forms (OHG hag, OE hage 'hedge' etc.) point to *(k)H(o)g² - but, as Kluge-Seebold state (s.v. Hag), «die Sippe macht nicht den Eindruck altererbter Wörter».

2b. Pok. 518 *kaghlo- 'small, round stone, gravel'; Germ. 'hail' According to Pokorny, this word family belongs to the preceding root, but the semantic connection is difficult, as it is based only on the notion of 'roundness'.

Gr. xōkʰgʰ 'gravel' may perhaps be reconstructed as *kh₃gʰ₄-lo-;  

3 Such is the traditional analysis of cehfeh, with an ending -fi derived from PIE *-di²i, compare Avestan -di. A different analysis has been proposed by van der Staaan (1995: 169f) for cehfeh and the related Sabellian forms Oscan SARBAEIR, Umbrian pikhefè and HERIF, viz. as 3 sg. mediopassive futures. Synactically, a future meaning is conceivable for all forms, and formally the ending could reflect *b₄w₁- + r + r, parallel to the Latin b-future.
The doublet ἵναξίας may have been formed on the basis of ἵναξίας 'snail, twisted shell' (Frisk s.v.). According to Frisk (III: 122), the word ἵναξίας is an onomatopoeic formation. Origin from a non-IE language has also been considered for this word, cf. Furnée 1972: 345, 391.

OHG hagal 'hail' and its Germanic cognates may show either *-k- or *-g-.

A reconstruction as *khu* - - *lo- seems possible but doubtful, especially as far as Greek is concerned.

3. Pok. 542 *keibh-, keigh- 'fast, violent'

For *keibh-*, Indic and Germanic evidence is adduced, for *keigh-*. Indic, Germanic and Slavic. Skt. sīham and sīhni-, both 'fast', are probably cognate (KEWA III: 350), but their etymology is uncertain. Mayrhofer is reluctant to connect sīham with Goth. haijits 'quarrel' etc.

He seems less reluctant in connecting sīhni- with Germanic and Slavic. In Germanic, however, OE hīgian 'to strive for', ModE hie 'to hurry' is isolated. Russ. sīgat 'to jump' is ambiguous because in the West-Russian dialects from which this form comes (Vasmer II: 622), pretonic *ia- < *ia- is phonetically identical to *i-; which means that the form can just as well be derived from the root *ieg- 'to attack, grab', although the semantic connection of the latter with 'to jump' is not obvious.

Moreover, the root reconstruction presents formal problems: a reconstruction as *kieiH- cannot explain Goth. haijits. A possible form *kieiH-, giving *ai- in Gothic and -i- in Sanskrit (in zero-grade) through laryngeal metathesis (see Schrijver 1991: 512–536 for discussion) would give Skt. bh-, whereas *kieiH- or *kieiH- would give a rather unusual root structure CeC-C-C-, if a root enlargement is added. These problems indicate that the different root enlargements are post-PIE.

One might try to connect this entry with the root *keiH-[H]- 'to stir, move' (Pok. 538/9) that we have e.g. in Latin cieb, ciere 'to stir, call', citus 'fast', etc., and Greek hom.pret. eiteb (with i due to metrical lengthening) 'followed, roamed'. Semantically, this fits very well, but

......

The exact form of this root is hard to determine (cf. Schrijver 1991: 237–8).

I conclude that the forms that Pokorny adduces do not allow us to reconstruct a PIE root.


To match these forms to modern standards, we must probably replace the first reconstruction by *kneHb-. The second form, containing three consonants after the root vowel, can hardly reflect a PIE root. Four branches are adduced for this entry.

The first is Greek. According to Frisk (I: 884), Gr. xivηη 'itch', ακισφον (Hes.) 'stinging nettle' must be separated from xīναρος 'weaver's card', xivtaio 'to scratch, tear apart'. The short a in the latter two words is hard to explain: *khnab- would give *knaap-, and *knhabep- would give *kanap-. We must then resort to the assumption that a secondary zero grade was introduced into these forms. Κέφαλ­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­–

Germanic (OIC. *hnafa ‘to cut’, etc.) may contain either *-ḅ- or *-p-. The forms would point to an o-grade, but of a root without a laryngeal; from *kn̂ṭhob- we would expect Gm. *hn̂ab-. De Vries remarks s.v. *hnafa that words containing *hn- usually are <Sonserbilden> within Germanic, with an affective meaning.

Pokorny further mentions two names, viz. the Celtic god (Mars) *Cnabetius and Runic (G.) *Hnab(i)das (a surname that survived in OE Hnaef, OHG Hnabi ‘the maimed one’), which are discussed by Gutenbrunner (1935). According to him, they may represent -tie- and -to-participles respectively, of the Germanic verb *hnafa ‘to cut’, which would then show -ḅ-. The Celtic name occurs only in the area of the Treveri and could point to close Celtic-Germanic contacts. This is an argument to separate it from the other Celtic forms.

The Baltic forms (Lith. *knabū ‘to peel’, *knībū ‘to disturb, tickle’, etc.; see Fraenkel I: 277 for more forms) are part of a large group of words in Baltic containing *kn- with expressive meaning. This means that this group is likely to have suffered various analogical changes, the starting point of which is hard to determine.

I conclude that, as far as the phonetics are concerned, a connection between any of these branches is either difficult or impossible. Semantically, the problems are equally large: the two nominal stems, ‘itch’ in Greek, ‘fleece’ in Celtic, may be connected if one keeps in mind that (stinging) nettles were used for weaving but they are hard to connect with the two verbal stems, ‘to cut’ in Germanic and ‘to peel; to tickle’ in Baltic.

No common origin can be reconstructed for these words.

5a. Pok. 563: a dh-enlargement of the root *kenu-<, kneu-. Two branches are supposed to show *-ḍ-. In Greek, *kn̄ō̄t-: *kn̄ō̄tikà, *kn̄ō̄tikûn: *kn̄ō̄tō̄un (Hes.) are the only forms added; they probably represent recent formations derived from the verb *kn̄ō̄o ‘to scratch or knock softly’ (Frisk s.v. *kn̄ō̄o).

As was mentioned above, Germanic forms with *hn- are likely to have been remodelled (cf. de Vries ad *hnafa), which renders the Germanic words (OIC. *hnīdōa ‘to hit’ etc.) uncertain. Compare also Klu-

Niete ‘metal pin’ on *hnīdōa: ‘weitere Herkunft unklar’.

As Pokorny admits himself, Latvian kņūsts, *du ‘to itch’ is inconclusive as regards the dental, and, moreover, it is part of a large group of Latvian words formed with *kn- with expressive meaning (cf. Mühlenbach-Endzelin II: 241–254). As in the case of Germanic words with *hn-, remodelling may have taken place in this group of words.

5b. Pok. 563 a bh-enlargement of the root *kenu-, kneu-.

Only OIC. *hnyfill ‘short and blunt horn (of a lamb)’ and Germanic cognates are adduced, but the Germanic family may contain either *-ḅ- or *-p-; *hnīdōa has a variant *hnīfīl with the same meaning.

This does not leave us any ground for a PIE reconstruction.

6. Pok. 579 *kerðhò, *kerðhà ‘troop, row’

Six branches of Indo-European are adduced. Mayrhofer (KEWA III: 309) separates IIR. (Skt. *śardhà ‘herd, troop’ etc.) from the Greek and European forms on semantic grounds. The original Aryan meaning of *śardh- ‘power’ would be difficult to connect with the original concept of ‘order, succession (of pastures)’ found in Germanic and Balto-Slavic. His reasoning is not convincing. Compare Toporov (s.v. OPr. *kerdàn ‘time’), who defines the meaning of the PIE root *kerḍ- as *...: a certain multitude, the constituents of which are ordered in a fixed way as a planned alternation. The meaning could connect it with the PIE root *eki ‘to cut’ (Pok. 938).

Greek *sardhòs, *sardh f. ‘heap of cut corn, hay-stack’ has quite a different meaning, which renders the connection uncertain (Chantraine 1966, II: 566). This word poses the additional problem of a different formation. Furnée (1972: 354, 365) mentions with different suffixal vocalism *sardhò, acc. -iv (H.) and *xωρθάς (s.l. in H.), *xωρθάς (inscr., H.) ‘heap, sheaf’.

As to Celtic, W. *cordā ‘tribe, clan’ is reconstructed by Pokorny as *kordhà. Another option is *kori-o- (cf. W. *ardhò ‘to plough’ < *ar-i-e-); this has the advantage of a better connection with other Celtic (Olr. *eire ‘troop, army’, Gall. *kort-.) and Germanic forms (Got. *kerthi, ModHG *hert ‘army’ etc.).

Germanic (Got. *hafthā < *kerdhà ‘herd’), Baltic (Lit. *skerdhius)

*) In fact, Skt. *śardhà could very well reflect *skerdhio-, according to A. Lubotsky (forthcoming); *skerdhio- > IIR. *śardhīa- > *śardhā- > PInd. *s̄erdu- > (Grassmann’s Law) *sērḍu- > *śardhā-.
been discussed by Derksen (1996: 36-41). On the other hand, the verb(s) of which (s)keřdzius is derived, viz. skereti 'to slaughter, to stab' and kiri 'to hew off, to strike, to fell (with an axe, a sword, a whip, etc.)' have circumflex intonation as well. The circumflex intonation points to *-d- rather than *-t-. On the strength of Lit. (s)keřdzius, we may assign the Germanic, Baltic and Slavic forms for 'herd; shepherd' to the root (s)ker- 'to cut'. This leads us to the following result: we have two isolated reconstructions, *kor-to- for Celtic and (possibly) *kordus- for Greek. The probable PIE form is *(s)kefdh-, attested in Indo-Iranian, Balto-Slavic and Germanic.

7. Pok. 590 *(s)keubbh-, an enlargement of the root 2. keu-, keu- 'to bend'.

Pokorny states between brackets: «einschließlich von Worten, die bh oder b enthalten können». Four branches of Indo-European are adduced here.

There seems to be no consensus about the Vedic forms. For the forms kubhra- 'high-lumped bull' and kubhr- 'hunch-back', mayrhofer assumes PIE origin; this is rejected by Kuiper (1991: 31), who regards the -bh- as a Sanskritized foreign -b-, on account of the variants of these words listed by Turner (CDIAL).

Kakubh- 'top', is derived by Mayrhofer from the same Indo-European stem as the preceding forms. He explains the words kakúd- (f) 'top', kaksúd- (f) 'throat' as dissimilations from kakúbh- in the bh-causus.

The connection with Latin and Greek, however, seems very uncertain: Lat. cacímen 'top' was probably rebuilt after actímen, id., which leaves the original form unclear. Greek κυοφί 'stooped, bent' contains an η (cf. κυοφίς 'hunch') not occurring in Sanskrit. Related words in Greek also have -η-, -η- and -η- (cf. Furnée 1972: 176, 284).

The Germanic forms, e.g. OHG hāba, Ocl. hāfa 'tilt' (a covering or coarse cloth), may contain either *-b- or *-p-.

Too many doubts exist to reconstruct a PIE form. Not to be connected is Russ. kubhar 'humming-top' and its family: it belongs, with Russ. kub 'cup', to nr. 8.

8. Pok. 592 *kumbh-, mostly kumbh-

For this entry five branches are adduced, of which only the first one might contain evidence for *-b-.

Skt. kumbha- 'jar, pitcher' and Av. xumba- 'bowl' may be reconstructed as *xumbh- (a), but this remains uncertain in view of Greek κυοίνη 'basin, bowl', κύοβος 'bowl', which can hardly be separated on semantic grounds. As Kuiper states (1991: 63), "it is not uncommon for b in foreign words to be naturalized as bh."

The forms from the other four branches, viz. Greek (κυοίνη 'basin, bowl etc.), Latin (-cumbh- 'to lie down'), Celtic (Mlr. comm 'barrel', W. cum 'valley etc.) and Germanic (Ocl. -huppy- 'hip etc.', are all derived by Walde-Hofmann (s.v. cubō) from *kumbh-. Greek κυοίνη etc. is clearly related to the forms mentioned above under nr. 7 (Furnée 1972: 176, 284). Latin -b- instead of -bh- is suggested by Faliscan cupa 'cubat' as opposed to e.g. lūfera 'libertia', showing that PIE -b- > Fal. -p- and PIE -b- > Fal. -f-; cf. Giacomelli 1963: 114-5.

It is clear that this entry cannot be used as evidence for a root with the structure *TeRDh-.

9a. Pok. 594 *(s)keubbh-, an enlargement of the root 2. keu- 'to shine, clear'.

As far as *-b- is concerned, Pokorny addsuce - apart from Arm. surb 'pure, sacred', which may be an Iranian loan (cf. Mayrhofer KELWA III: 357) - only Indo-Iranian cognates. S.v. subh- 'beautiful, shining', Mayrhofer mentions Ptryg. partu-soubra, and Heth. îuppi- 'pure, sacred'. The reading of the Phrygian inscription, however, is probably partus-soubra (see Haas 1966: 105), whereas Hittite does not allow a decision on the labial and, moreover, usually has no palatalization. Watkins (1975) connects îuppi- with Umbr. iopo/iupa 'sacralized flesh' and reconstructs *seup-.

9b. Pok. 594 *(s)keuddh-

As far as *-d- is concerned, Pokorny adduces only Skt. śāndhati
'to purify' and its family. It has no certain connections outside Indo-Iranian (cf. EWAia II: 657).

The root etymology is clear, but the suffix is not attested outside Indo-Iranian.

10. Pok. 608 *kneigʷh-, kneih- 'to bend, be inclined'

The meaning of Umbr. conges 'conixus' is unclear, and so is its connection with the root *kneigʷh- (Meiser 1986: 88), which is reflected in Lat. *kneius 'to contract'.

Go. kneinsan 'to be inclined' may have its -w- due to contamination with *kleisus 'to lean' (Lehmann 1986 s.v.), but the other Germanic languages can reflect *kneigʷh-.

Pokorny (1994) offers a different solution for the two Germanic reflexes: -w- from *gʷhw before a front vowel, -g- before a back vowel. Paradigmatic levelling would then lead to Go. -w- vs. ON, OE, OS, OHG -g-. This solution was previously offered by Streitberg (1896: 123).

A problem with this entry is its restricted distribution. If it is Indo-European, we have a root structure *TeRDh-.

11a. Pok. 617 labial enlargement (-hh-) of the root *kɾaːu-, kɾau-, kɾu- 'to pile up, cover up, hide'.

Only Greek χώρειν 'to hide' and its derivatives are adduced here, which renders the reconstruction for PIE uncertain. Lith. kruoti 'to pile up, etc.' and OCS kromy 'to cover' show that the root must have contained a laryngeal, which is absent in Greek.

11b. Pok. 617 (still citing Pokorny:) dental enlargements seem to be (i.e., of the same root as in 11a above):

Cluge-Seehold (s.v. ModHG rüsten 'to prepare for') derive the Germanic forms (e.g. OSl. hruad poet. 'coat of mail', OHG hrast 'equipment'), given by Pokorny, from a Gmc. root *hreuda-a-, and state «vielleicht daneben auch -h-».

Lith. kraidinti, -ina 'to have loaded', the only non-Germanic form which Pokorny mentions for *dʰ-, contains the productive causative suffix -dinti.

The evidence is too narrow a basis to assume a PIE enlargement *dʰ-.

12. Pok. 617 *krebh-, krobat-, Krembh- 'to trust'??

Pokorny adduces Sanskrit and Celtic forms. Skt. śāmbhate (Dhātup.) 'to trust' and its cognates are late, and therefore require «einer in-

The PIE root structure *Te(R)Dh-.

13. Pok. 623 *krut- (krebh-) 'to shake, swing'

Part of the forms given by Pokorny under this entry, belong to the root *krebh- 'to cover' that we have discussed above (or. 11). Pokorny's translation 'to shake, swing' is arbitrary.

Three branches of Indo-European are said to contain proof for this root, although for *dʰ- itself only the Germanic forms can be used. But these can have either *dʰ- or *t-, cf. Cluge-Seehold (s.v. Ried 'reed') and de Vries (s.v. hraustr 'strong').

Hilmarsson (1986: 162 f.) connects EToch. kru 'hollow stick' (Loc.sg. kárwan), WToch. Gen.pl. kárwats with Latin crüd 'shinbone' and derives both from PIE *krebh-st 'hollow stick, bone'. No dental is involved.

Lith. krušti 'to stir oneself' has *t-.

There is no proof for the structure *TeRDh- in this entry.

14. Pok. 625 *kseubh- 'to stagger, swing'

Pokorny gives Indo-Iranian and Slavic forms. As to Skt. kshubh- 'to stagger, tremble', Mayrhofer (EWAia I: 440) remarks: «Idg. wohl *kseubh, vgl. auch die ältere Zusammenstellung mit * skeubh-, Lit. skubi- 'fast, hasty' (...) nhd. schieben». As the metathesis would be unusual, the onomatopoetic character of the root may also be held responsible for the unusual form; thus Mayrhofer ad ksep- (EWAia I: 437), with reference to Kellens (1977: 200 f.).

According to Trubáček (ESS] 8: 153-155), *kseubh- yields *xub- in Slavic. *xubh- 'to stagger' would have its lengthened grade vocalism from derived imperfective lengthening of a non-attested verb *xub-ṭ(10). The problem is, that the nominal forms would be deverbatice, e.g. Cz. chyba 'mistake', Pol. czyba 'surely'.

(10) Trubáček seems to think that *xubh, as attested in Pol. dial. chyba 'to run, fly' represents the root vocalism lost elsewhere. I think the semantic difference is too large for this to be plausible. Moreover, this formation is isolated within Slavic.
Thus, we arrive at an Indo-Iranian-Slavic correspondence *kuesnh- 'to stagger'.

Quite possibly, the -s- in ks- has the same neutralizing influence on the velar as the s mobile in sk-. This would mean that, just like structures of the type *TeRD₄ are excepted from the root constraint, structures of the type *TeRD₃ are as well. Alternatively, one can assume a possible metathesis to have taken place relatively late in PIE, when the root constraint was no longer valid.

15. Pok. 627 *kudh- 'muck, dung'??

Pokorny adduces forms from Greek and Baltic. The Greek forms (στεργάτης, ἀπόστεργας etc.) are only found in glosses (Hes.). Chantraine (II: 597) wonders if κυκνόν 'sperm' (Hes.) could be derived from κυκνέο 'to hide', a verb with s mobile (Pok. 951). According to Fraenkel (II: 1030), the etymology of Lith. škdas, Latv. šķis 'muck, dung' is unclear (*sk-?; but we would expect sk-. < *sk-, cf. Kortlandt 1978). The acute accent would indicate that they contain *-d- instead of *-ã-. (Winter's Law).

As the exact relation remains unclear, PIE origin cannot be established for this entry.

16. Pok. 631 *kūṇdhr-, -no- in plant-names

Latin, Irish, Germanic and Lithuanian are said to contain forms of this word, e.g. Lat. combīnātum 'a kind of rush', Ir. cuimnog 'Angelica silvestris', Lith. švendrai 'reed, reed-mace' etc.

A. Heiermeier (1980) has devoted an entire book to the study of the forms adduced here and other connections that have been made. She leaves no doubt about the outcome: The equation *kūṇdhr-:*kūndhr-, *kūndhrnā cannot be maintained, because not a single form of this apparent IE plant-name can support it. Some forms simply do not exist, others represent secondary developments. For details I refer to Heiermeier's study.

17. Pok. 806 : as a dh-present to the root *pela-, plā- 'broad and flat, to extend' (the correct form of which is *pl∧C-):

Only Greek forms are adduced here. The verb πλάσμαν ( < *plathid) 'to form out of weak matter' may be a derivative of a dh-present (cf. πλάπτω 'to fill'). This category is productive in Greek. According to Chantraine (III: 911), the word has no certain etymology. Besides, the short a in plaC- is a problem: we would expect plaC- for *plh₂C-, and palaC- for *plh₂C-. The noun πακόδη 'flat fruit-cake' is called a 'Freundwort' by Frisk (II: 464).

No PIE reconstruction is possible.

18. Pok. 843 *pougo-/*pougho- 'pure, incorruptible' OIr. ēg 'pure, entire', ēgh 'integrity, perfection' and Cz. pohý 'pure, single' are the only forms Pokorny adduces.

The Old Czech forms of pouhý are pāhý and pūhý. The etymological dictionaries of Czech (Holub-Lyer, Machek) offer two etymologies: either pāhý has originated from metathesis of OCS. hůpý (> NCz. húpý) 'barren, empty', which stems from PSI. *glups, or, conversely, OCS. pūhý has given rise to hůpý and hůpiti 'to shade' by metathesis. In the latter case, the etymology would be *pukl̥g̊-, comparable to Lith. spilgti 'to die from lack of light (of plants)'. The semantic similarity in the latter case is striking, but Fraenkel does not mention a Slavic correspondence s.v. spilgti.

At any rate, both etymologies need an -i- in the root, rendering the connection with Irish untenable. Moreover, neither in Irish nor in Czech can we determine the original velar. See Vendryes (O-13) for a similar statement.

19. Pok. 1062 *telēgh- 'to hit'?

Pokorny mentions Sanskrit tarh- 'to smash' and Baltic forms. Mayrhofer (EWAia I: 636), however, reconstructs *tjantʰ-. For Skt. tarh- (cf. ApDhS. sthant- 'smashing') and cites Eichner (1982), who connects Ir. *(s)tarh- with Heth. štarh- 'to fall ill', štarn(n)k- 'to make ill', from PIE *stergʰ-.

The -r- would make it unrelated to Lith. teštū 'to urinate, wet oneself; to beat up' (see Fraenkel: 1078/9 for the semantic development). The latter seems to belong to the root *(s)tel- 'to let flow, urinate' (Pok. 1018), which we have e.g. in ModE. to taste 'to urinate, esp. of horses and cattle and Gr. στεσάω 'to drip'.

In both roots we have an s mobile.

20. Pok. 1067 *tegeb- 'to pull, stretch', ar. tengb-; *tēgho- 'heavy'. Enlargements of the root 1. ten- 'to pull, stretch'.

Pokorny provides Iranian, Armenian, Latin, Slavic, Lithuanian, Germanic and Tocharian forms.

As regards Av. ang- 'to pull, bend the bow', and Osset. tynzyn 'to spread' (cf. Ahaev 3: 337/8; < *vi-tan̥i-), we cannot determine whether they contain *-g- or *-gʰ-. Ernout-Meillet (680) remark that it
contains an «élargissement guttural qui se retrouve, notamment, dans des types affectifs et techniques; this does not exclude the possibility of PIE origin.

Armenian ɪ$tʰञ Caucus, gen. ɪ*$�ju 'thick' is the normal development of *$tʰ�ju-

WToch. *tei$kʰ-, *tɛi$kʰ-, EToch. tɛi$kʰ ‘to impede’ (cf. Hilmars­
son 1991: 97) may contain any one of the three velars, as they all merg­
ed in the voiceless velar in Tocharian. The semantic connection seems difficult to me.

Slavic *teɡʰskʰ 'heavy' etc., Lith. tinguš ‘slow’, Ols. *∗$pʰung ‘heavy’ etc. are supposed to show the adj. stem *tegʰ-$u-. In the first place, Ols. *∗$pʰung is ambiguous, and may show either *$pʰ- or *$gʰ-.

The Balto-Slavic facts must be examined more closely (1).

In Slavic, there are four forms that have reflexes in the modern lan­
guages: OCS -tę$nog - (tę$nų, -tę$nęź) ‘to draw, to pull’ and OCS tępə ‘anxiety, anguish’ show acc.p. b (non-acute intonation), whereas OCS tę$zkʰ ‘heavy’ and ChSl. tęgə ‘firm, tight’ show acc.p. c (ambi­
guous in regard to the original intonation). This points to original non-acute root intonation in Slavic, which makes the reconstruction *$tę$n-$ the only possibility (Winter’s Law).

In Lithuanian, we can compare four groups of words. I) The adjecti­
ves tę$nų, ti$nų ‘lazy’ (= OCS tę$zkʰ), tą$nų ‘unbendable’ (= ChSl. tęgə) show AP (4). As AP (4) is productive within Lith. u­
stems, an original AP (3) (acute root intonation) remains possible. II) The denominative verbs ti$nęź (tę$nų, tę$nęź, pret. ti$nęźą) ‘to be la­
y’, ti$nųti (ti$nų, ti$nęź) ‘to become lazy’ and ti$nęźęti ‘to make lazy’ belong to verb categories that often show metatony. Their acute intonation may therefore be secondary. III) The verb ti$nęźęti ‘to make lazy’, con­
versely, may have secondary circumflex intonation, if it stems from *ti$nų (AP (3)). IV) The only non-ambiguous form may be ti$nęźęti (ta$nę) ‘to eat greedily’, an iterative from a non-attested Lith. *tei$nęti (∗$tei$nų) ‘to pull, draw’; compare for the semantic development Dutch trekken ‘to pull, draw’ and trek hebben ‘to be hungry’.

Franækels connects the Lith. forms mentioned here (apart from tangę­
ti, which he does not mention) with Lith. stę$nę (sti$nę) ‘to try, seek’, stę$nę (sti$nę) ‘to harden’, stę$ną (AP (3), stę$ną (AP (4)) ‘elast­
ic, resilient; sturdy’. This is formally difficult (since the latter group has acute root intonation) and semantically not obvious. Furthermore,

it would be difficult to connect the latter group of words with the PIE root *teŋ-$ ‘to draw, pull’; because no forms with s-mobile occur from this root elsewhere. Baltic and Slavic then both point to the reconstruction *$tę$n-$.

The stem of Latin tęmō (∗tenkmo) (2) ‘pole’ corresponds exactly to Ols. pęδl (< *tenksło) ‘pole’. In both languages, however, the velar may have been neutralized before the -s, making it impossible to deter­
mine its original form. Kluge-Seebold, s.v. Deichsel, reconstruct a ver­
bal root *teŋ- ‘to pull’, as enlarged from *teŋ-.* The words for pole would then derive from an s-stem *teŋgos or *teŋ-$ot ‘the pulling’.

Summarizing, this entry gives the following results:

*Ir.:   possibly *teŋ-$gh-$ to pull, spread*
Arm.:   *$ngh-$ ‘thick’
Toch.:   possibly *∗$nk/g-$gh-$ ‘to impede’
Gmc.:   *∗$tenk-$gh-$ ‘heavy’
Sl.:     *teŋh-$ ‘heavy; to pull’
Lith.:   *teŋh-$ ‘heavy; to pull’
Lat., Gmc.:   *∗$tenk/g-$gh-$ ‘pole’

We can reconstruct a root *teŋ-$ ‘to pull’.

21a. Pok. 1073 *te$gh-$: an enlargement of the root 3. ter-, teta- ‘to rub, pierce’

Here Pokorny addsuce only OCS forms, viz. four forms of the verb ‘to jerk’, two with -z- (tėzati, tręzati), two with -g- (tręgati, tręgno­
ti). The occurrence of -z- next to -g- may be explained by analogical ex­
pansion of the progressive palatalization (cf. Vaillant 1966: #80). Pokorny reconstructs a palatalized velar *$gʰ-, but since this would give OCS -z- only, I prefer *$gʰ.

These forms could be connected with nr. 19 Ir. *r(* ātj-k (although this is semantically not convincing), but that would be impossible if the short falling pitch of Scr. ĭgati, ām ‘to pull, jerk’ (Skok 3: 499-500) indicates PIE *$g-, in which case the entry is irrelevant. The acute ac­

(1) I owe the explanation of the Balto-Slavic accentual facts to René Andries.

(2) Eichner (1992: 74³) suggests that tęmō may be derived from *∗tenkmō in­
stead of *tenkmo. He is countered by Isebaert/Seldeslachts (1994: 174 ³), who think that *tenkmo is possible, basing themselves on the relative chronology of H.N. Parker (1986: The relative chronology of some major Latin sound changes, Yale dis­
ss.), a dissertation that was inaccessible to me.
from elsewhere (p. 257) he suggests that the form arose by dissimilation of the descendant's form, which may contain either *-g- or *-g'-, and have no certain connection (Vendryes 1 T-154). This entry cannot be used for PIE reconstruction.

22. Pok. 1080 *bh-enlargement of the root *du-, *tu-, *tev-, *tuv-, *tuv- 'to swell'.

Four branches of IE are said to contain evidence for this root. From Latin and Greek, two isolated words are adduced: Lat. *tuber, -erus 'lump, swelling' (and OIr. *teafra), Gr. *tuv (the quantity of the v is unknown) 'plant, used for filling pillows and beds'. Semantically, they are hardly related, neither to each other nor to Celtic/Germanic.

Schrijver 1995: 419, following an earlier proposal by Greene, connects the Celtic forms OIr. *tuvaimh 'bend; hillock', W. *tuv 'miserable' may contain either *-g- or *-g'-, and have no certain connection (Vendryes 1 T-154). This entry cannot be used for PIE reconstruction.

23. Pok. 1089 *tragh, *tragh- and *tragh- 'to pull, move oneself; descendants'.

Pokorny comments: 'entspricht nicht der normalen Wurzelseile: ob durch Kontamination von *dhregh, *dreh- mit *tekh- *tekh- entstanden?' Elsewhere (p. 257) he suggests that the form arose by dissimilation from *dhregh, *драгh > dragh > tragh.

The forms from Latin, Celtic, Germanic and Slavic adduced by Pokorny are discussed by Schrijver (1991: 188-192, 349) in connection with Lat. *tragh 'to pull, drag, bring'. His discussion suggests a different division of Pokorny's material:

Firstly, OIr. *tragh, W. *troed etc. 'foot' can be connected with Goth. fragjan, OE *fregan 'to walk', OE frág 'time' etc. as *tr(e)ghg-. Secondly, OIr. *trag- 'ebb', W. *teio 'to ebb' etc. can be derived from *treHg-, *treHg- , but stand apart semantically from the first set of forms.

Thirdly, *trog- may be reconstructed for Ir. *tr(o)g- 'offspring' and Scr. trág, Gs. *tragos (acc.par. c.) 'footstep, trace', Scr. *trag (acc.par. a.) 'stock, family, race', Slavic -a- being due to Winter's Law. Latin trāhō, trāxi, trāctum 'to pull, drag, bring' is reconstructed as *tr(e)ghg-. By Schrijver, on the assumption that the -a- in the trāxi and the related trāgula 'a kind of dragnet' is not analogical. The fact that the a in trāhō is short, may perhaps be explained by a rule *CRHTC > Lat. CRaTC that Schrijver invokes; in this view, trāhō < *traghg- must continue an older athematic verb.

According to Schrijver, the connection of trāhō to either OIr. *tragh etc. or OIr. *trag etc., however, is unattractive for semantic reasons, and the first one would be formally impossible because of the conflicting laryngeals. We must then reconstruct three different verbs of the structure *TṛHDh-. none of which is attested in more than two branches of IE.

24. Pok. 1099 *treadh- 'to oppress'. Av. *dhvasti 'gets into a corner' is the only non-Germanic form adduced by Pokorny. It is a sk-present, which means that it can be derived from a PIE form *tuesg-. By way of Bartholomae's Law, this would give *tuesg-. Whence by cluster simplification *-ggh- > *-ggh-. This Celtic root *tuesg- seems to be cognate with the one mentioned under nr.22, with a nasal infix.
Isebaert/Seldeslachts (1994) propose to connect Tocharian AB *tuánkā- ‘to press in’ (in PP A tatwanku, B tatwankau, subj. or pres?) A tānwakār (Med.) (with o-grade) and Greek ὀντρα ‘to stuff, etc.’, ὀκτός (ὀντρο) with zero-grade of the root with the root *tueng₄, as well as possibly Lat. tōmentum from *tueng₃ s-mn to m-

As we have seen under nr. 22, this root could have either *-g- or *-l- in Celtic. If the Germanic forms of (pwenga- etc.) are cognate, we must reconstruct *_gh_. Baltic is then unrelated.

There is enough evidence to reconstruct a PIE root *tueng₄- ‘to oppress’. The Celtic evidence is not strong enough to permit the reconstruction of PIE’s mobile.

25. Pok. 1102 *tuibh- ‘hollow as a tube’

This entry contains some Greek words and one from Latin. Frisk (II: 712/3) calls ὀποιον ‘waste-pipe’ onomatopoetic, and ὀλιγον ‘hollow, defective’ analogical. This isolates Lat. tuba ‘shin-bone; flute’, which according to Emout-Meillet (691) has no certain etymology.

I conclude that we cannot establish PIE origin for these forms.

4. Conclusion

4.1 The investigation has yielded the following results:

a) Entries with an unreliable PIE etymology, which therefore cannot be used as evidence:

nr. 1: Pok. *kadh-

nr. 3: Pok. *kēbih-, kēgh-

nr. 4: Pok. *khēb-, kēbih-

nr. 5a: Pok. *kēnu-dh-, kēnu-dh-

nr. 5b: Pok. *kēnu-bh-, kēnu-bh-

nr. 7: Pok. *kēub-

nr. 8: Pok. *kumēb-

nr. 12: Pok. *krebh-, krēbh-, kremēb-

nr. 25: Pok. *tuibh-

b) Entries with a possible PIE etymology

nr. 2a:

As we have seen, a proto-form *kH₄g₄ could be posited for Italic, Celtic and Germanic. This is only a restricted area of Indo-European. Furthermore, there is no certain attestation of a full grade of this root.
4.3 It is striking that the best examples of the type *TeRD²* both contain a nasal. Conceivably, the nasal blocked a possible assimilation (cf. § 2.1 above), by neutralizing the articulation type of the -g⁸-, so that these forms escaped the root constraint.

The latter process has a parallel in the Latin development of *dhn*, *m* and *kn*, which have sometimes developed into -nd- and -ng-. This development was first investigated by Thurneysen (1883). Correspondences such as Lat. *fandus* – Skt. *kudhnás* 'bottom', Lat. *pando* – Greek *πονὸν* 'to spread, to expand' and Lat. *pango* – Greek *πήγγυς* 'to attach' show that a metathesis has taken place in the Latin words, which have their consonant clusters -nd- < *-dhn-*, -nd- < *-m-*, and -ng- < *-kn-, respectively.

Thurneysen compared this metathesis with the same process in Old Spanish, for instance 2nd pl. imperative *cortandos* 'cut for us' from *cortád-nos*. Old Spanish also retains traces of an intermediate phase, in which the stop was contiguous to a nasal on both sides, the original one to its right and the 'anticipatory' to the left: *dandnos* 'give to us' from *dáid-nos*. By nasal dissimilation, the form *dandnos* later gave way to the also attested *dandos*. Thurneysen assumed the same intermediate phase to explain the Latin forms. For instance, *pando* would have arisen as follows: *patnó > *pannó > *pandó > pandó*. It thus seems that the outcome of *t* and *dh* (and undoubtedly also *d*) after a (secondary) nasal in Latin is the same, viz. -d-.

In other words, the dental stops are neutralized into -d- after a (secondary) nasal. This would explain the absence of lengthened vowels in some Slavic words and the absence of acute intonation in some Lithuanian forms.

4.5 Finally, we can compare our explanation of the two exceptions to the root structure constraint in *TeRD²* with the different explanations of the root structure constraint *TeRD²* discussed in chapter two of this paper. The traditional theory of stop assimilation (cf. chapter 2.2.1) as well as the theory in which the stops impose a tone upon the vowel (cf. chapter 2.2.2 supra) are both compatible with the assumption of a neutralization after n.

In the case of a system in which vowels exert tone influence on the neighbouring stop (cf. chapter 2.2.2 infra), one must assume that the nasal did not let through the tone of the vowel, or that the -g⁸- in the two roots in question arose from a low tone in the next syllable.

4.6 Exceptions made for roots with mobile and roots of the structure *TeRD²*, the PIE root structure constraint has been shown to apply to both *TeD²* and *TeRD²* roots. There is no reason to assume that enlargements of the type *D²* could be affixed to a root *TeR*- in PIE times. Structures of the type *TeRD²* must have come into being after the disintegration of PIE, two root types excepted.

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