AMERICAN ORIENTAL
SERIES

VOLUME 80

EDITOR-IN-CHIEF

EDWIN GEROW

EDITORS

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AMERICAN ORIENTAL SOCIETY

NEW HAVEN, CONNECTICUT

1996

ON THE CHRONOLOGY OF SOUND CHANGES IN TOCHARIAN

Volume 1

From Proto-Indo-European to Proto-Tocharian

By

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AMERICAN ORIENTAL SOCIETY

NEW HAVEN, CONNECTICUT

1996

Sprachwissenschaftliches
Institut
der Universität Bonn
Inv.-Nr. 31104

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Contents

Abbreviations. . . . . p. xi
Preface. xiii
Introduction. xv
i. Purpose. xv
ii. Methodology: the uniformitarian principle. xv
iii. Methodology: etymologies and sound changes. xvi
iv. Methodology: proto-phonology and phonetics. xviii
v. On the reconstruction of PIE. xviii
vi. Presentation: a warning. xix
vii. The sound system of TA. xix
viii. The sound system of TB. xx
ix. Problems in the synchronic description of Tocharian. xxiv
Chapter 1. Proto-Indo-European. 1
1. The phonemes of PIE. 1
2. PIE allophones. 4
Chapter 2. The development of laryngeals in Tocharian. 7
3. *VX and *XV sequences (true vowels only). 7
4. *VXV sequences (including those involving *i and *u) and Sievers' Law. 10
5. Word-initial *XC-. 13
6. Word-initial *X̯R- (not including *Xi- and *Xu-). 15
7. *Xi and *Xu sequences. 17
8. *X̯RXC (not including *iXC and *uXC). 20
9. The sequence *ix before consonants and word-finally. 22
10. The sequence *ix^{w}C. 25
11. Other *iX sequences. 25
12. *uX before consonants and word-finally. 30
13. On the possible development of *uX to *ua (~ *wa). 32
14. Laryngeals between nonsyllabics; word-final *CX. 34
15. Chart. 37
Chapter 3. Early changes of stops. 39
16. Merger of palatals and velars. 39
17. Loss of *b^{h} (and other voiced aspirates?) after nasals. 42
18. PT *kəntwó, *kəntwá- 'tongue'. 45
19. Grassmann's Law. 47
20. Devoicing of aspirates. 47
21. Adjustment of reduplicating syllables. 48
Chapter 4. PIE *y and *d, and related matters. 51
22. Intervocalic *y. 51

23. The source of pre-PT *ō. 56
24. Final *s in monosyllables. 59
25. 'Son'. 61
26. PT *wú 'two'. 63
27. Loss of preconsonantal *d. 64
28. Labiovelars (including *w) and *i. 66
Chapter 5. Syllabic resonants, consonant clusters, and Auslautgesetze. . . . 67
29. Syllabic resonants. 67
30. *m word-finally and before apicals. 69
31. Initial and medial three-consonant clusters with internal *s. . . . 71
32. Loss of final consonants. 74
33. Loss of final *i. 76
34. Affrication of *t(h)y and assibilation of *-t(h)i. 79
35. Word-final *oy. 80
36. Word-final *or. 86
37. Chart. 87
Chapter 6. Early shifts of back vowels. 89
38. Word-final *ō. 89
39. Unrounding of *o. 90
40. Unrounding of *ō. 93
41. *ā in final syllables. 94
42. Rounding of *ā. 97
43. U-umlaut. 98
44. Lowering of word-initial *ə. 99
Chapter 7. Palatalization. 101
45. The pre-PT consonant system before palatalization. 101
46. Palatalization of single consonants by front vowels. 102
47. Palatalization of consonant clusters by front vowels. 111
48. Palatalization of consonants by *y. 116
Chapter 8. Restructuring of the vowel system. 119
49. Ö-umlaut. 119
50. Loss of vowel length. 124
51. The development of pre-PT *ö. 132
52. *ə, *i, *u, and semivowels in PT. 133
53. Adjustments of the system of ablaut. 135
54. Chart. 139
Chapter 9. Further restructuring of the consonant system. 141
55. Analogical adjustments of palatalization. 141
56. *sʸ > PT *ṣ. 145
57. Affrication of *d and *dʸ. 146
58. Deaffrication of palatalized affricates. 147

59. The development of palatalized dorsals. 148
60. Affrication of *tʸ. 151
61. *ml > *bl. 152
62. Devoicing of obstruents. 152
63. Deaspiration. 153
Chapter 10. Late sound changes. 155
64. Loss of intervocalic *w and contraction of adjacent vowels. . . . 155
65. Liquid metathesis and the problem of 'third'. 158
66. A-umlaut. 160
67. O-umlaut. 163
68. Loss of stops before nasals. 164
69. *ln > ll. 165
70. Chart. 165
71. The PT phonemic system. 167
Bibliography. 169
PIE index. 181
PT index. 186
TA index. 191
TB index. 196

Abbreviations

Arabic numerals in boldface with no prefixed letter refer to sections of the body of this volume; small Roman numerals in boldface refer to sections of the Introduction. Arabic numerals in boldface preceded by "A" or "B" refer to sections of the second volume, which is still in preparation. Numerical designations of the form "255a7" (not in boldface) refer to the Berlin texts (Sieg and Siegling 1949; Sieg, Siegling, and Thomas 1953; Thomas 1983); other texts are cited according to the conventions of Krause 1952:310-2.

Titles of journals.

AGAW	Abhandlungen der Akademie der Wissenschaften in Göttingen
BSL	Bulletin de la Société de Linguistique de Paris
GGA	Göttingische gelehrte Anzeiger
HS	Historische Sprachforschung
IF	Indogermanische Forschungen
JAOS	Journal of the American Oriental Society
JIES	Journal of Indo-European Studies
MSS	Münchener Studien zur Sprachwissenschaft
NTS	Norsk Tidsskrift för Sprogvidenskap
TIES	Tocharian and Indo-European Studies
TPS	Transactions of the Philological Society
ZPSK	Zeitschrift für Phonetik, Sprachwissenschaft, und Kommunikationsforschung
ZVS	Zeitschrift für vergleichende Sprachforschung

Other abbreviations.

I omit from the following list common Latin-based abbreviations (such as "i.e., e.g., etc.") and a few others that are generally used in English writing (such as "fn.").

abl.	ablative	c.	central (dialect)
abs.	absolutive	caus.	causative
acc.	accusative	coll.	collective
act.	active	dat.	dative
adj.	adjective	dial.	dialect
Alb.	Albanian	e.	eastern (dialect)
all.	allative	fem.	feminine
aor.	aorist	gen.	genitive
Arm.	Armenian	Gk.	Greek
AV	Atharvaveda	Goth.	Gothic
Av.	Avestan	Hitt.	Hittite
C	consonant	Hom.	Homeric

IE	Indo-European	pf.	perfect
inf.	infinitive	PG	Proto-Germanic
inj.	injunctive	Phryg.	Phrygian
inst.	instrumental	PIE	Proto-Indo-European
intrans.	intransitive	PIIr.	Proto-Indo-Iranian
ipf.	imperfect	PIr.	Proto-Iranian
iptv.	imperative	pl.	plural
Lat.	Latin	pres.	present
Lith.	Lithuanian	pret.	preterite
loc.	locative	Prim. Ir.	Primitive Irish
Luv.	Luvian	pron.	pronoun
masc.	masculine	PT	Proto-Tocharian
MHG	Middle High German	ptc.	participle
mid.	middle	R	resonant
mp.	mediopassive	Rum.	Rumanian
N	nasal	RV	Rigveda
N̥	syllabic nasal	R̥	syllabic resonant
neut.	neuter	sg.	singular
nom.	nominative	Skt.	Sanskrit
obl.	oblique	subj.	subjunctive
OCS	Old Church Slavonic	syll.	syllable(s)
OE	Old English	TA	Tocharian A
OHG	Old High German	TB	Tocharian B
OIr.	Old Irish	them.	thematic
OLat.	Old Latin	trans.	transitive
ON	Old Norse	U	high vowel
OPruss.	Old Prussian	V	vowel
OS	Old Saxon	vbl.	verbal
opt.	optative	W	semivowel
PA	Proto-Anatolian	w.	western (dialect)
PB	Proto-Baltic	X	laryngeal
PBS	Proto-Balto-Slavic	1	first person
PC	Proto-Celtic	1ary	primary
p.c.	personal communication	2	second person
perl.	perlative	2ary	secondary
		3	third person

Preface

This is the first of two projected volumes on the chronology of sound changes in the development of the Tocharian languages. It traces their development from Proto-Indo-European to Proto-Tocharian; the second volume will treat the development of the two attested languages, A and B, from Proto-Tocharian.

I began making notes on the chronology of Tocharian sound changes in the summer of 1986; this volume had essentially reached final form by the end of 1992.

I am grateful to George Cardona, Olav Hackstein, Jörundur Hilmarsson, Henry Hoenigswald, Jay Jasanoff, Joshua Katz, Ronald Kim, Sara Kimball, Manfred Mayrhofer, and Craig Melchert, who read earlier drafts of this work, in whole or in substantial part, and made numerous valuable suggestions for its improvement. I do not think that any of them agrees with me on all points. I am also grateful to Stanley Insler for unfailing help in seeing the book through the press. All remaining errors, obscurities, and infelicities are my own.

I would also like to express my gratitude to the Department of Linguistics and the School of Arts and Sciences of the University of Pennsylvania, who generously allowed me to take a leave from teaching during the entire academic year 1988-9, during which I completed a rough draft of this volume.

My greatest debts of gratitude are to my mentors, Prof. Anna Morpurgo Davies and the late Prof. Warren Cowgill; to my colleagues and students at the University of Pennsylvania and elsewhere, who have offered me the best of friendship and fellowship; to my whole family, for continued and unstinting support of every kind; and especially to Beth Randall, who has endured her husband's linguistic obsessions with remarkable patience and alleviated them with common sense and good humor.

others? The present study should be viewed in that light, and the methodological points discussed below are intended to contribute to the realism of my research.

iii. Methodology: etymologies and sound changes.

There is more uncertainty and disagreement concerning the sound changes that have occurred in Tocharian than in almost any other area of IE linguistics. This is due in part to the number and complexity of the changes involved, and in even greater part to the fact that relatively few Tocharian words have obvious IE etymologies. However, methodological difficulties are also involved.

One might suppose that uncertainties regarding sound changes in Tocharian can be resolved by proposing many new etymologies for Tocharian words; presumably such a procedure would greatly increase the number of examples of individual sound changes, and so would place the proposed changes on a firmer footing. Apparently many scholars have drawn just such a conclusion; at any rate, the "etymological method" of research in Tocharian has been and continues to be extremely popular. Yet the etymological approach is BAD METHODOLOGY, which leads to fatal errors for the following reasons.

Strictly speaking, a relationship between languages can only be PROVED by demonstrating that the similarities between them cannot reasonably be attributed to borrowing or to chance. For Tocharian this is not problematic: the extraordinarily high preponderance of r-stems among the basic kinship terms and the reappearance of word-final *-r* in the mediopassive primary endings 3sg. *-tär*, 3pl. *-ntär* are sufficient to prove that these languages belong to the Indo-European family. But in order to progress beyond a mere demonstration of relationship one must employ traditional comparative techniques based on the discovery and exploitation of sound correspondences. Unfortunately, unless the linguistic relationship being investigated is very close, only a small minority of the historically genuine sound correspondences will appear to be statistically significant; the rest will be too rare. How, then, can we distinguish genuine correspondences and cognates from mirages?

There is one procedure, and only one, which elevates comparative reconstruction above the level of mere guesswork. That procedure is the RIGOROUS application of the comparative method, based on the recognition of STRICT sound correspondences and ultimately on the observation that sound changes which have been carried to completion in a linguistic community are almost always completely regular (i.e. are "sound laws"). ALL etymologies which are not based on those principles are in effect *Gleichklangsetymologien;* by themselves they have no probative value at all, and any hypothesis which crucially depends on such etymologies will be forever beyond proof. (That is true even of putative cognate sets which contribute to probabilistic proofs of relationship: in the aggregate the similarities they exhibit are most unlikely to be the result of chance, but individual examples can and do exhibit chance resemblances.) But this circumstance creates a methodological paradox: we cannot propose reliable Tocharian etymologies until we have discovered the sound laws, yet we can only discover the Tocharian sound laws by the analysis of reliable etymologies!

The paradox can be resolved only by adducing support of another kind for our etymologies, and for most the only available support is inherent plausibility. Tocharian words which agree closely in meaning with solidly reconstructed PIE words, and which strongly resemble those PIE words in shape, and which are unlikely to have undergone analogical changes (because they are derivationally isolated), can be accepted as the reflexes of those PIE words on the grounds of inherent plausibility. Sound laws can be worked out on the basis of these basic etymologies; further etymological proposals can then be tested against those sound laws, and the reliable etymological base of Tocharian can thus be expanded step by step. But even though this is the only feasible course, we must not forget that the core of "plausible" etymologies on which it is based constitutes an inherent weakness, and that weakness must be minimized by keeping the basic etymological core to a minimum. As Jochem Schindler observed to me some years ago, "It is a matter of which etymologies one cannot do without."

It follows that we can improve the reliability of our proposed Tocharian sound laws not by finding more etymologies, but by accepting FEWER. That is exactly what I have tried to do. The vast majority of the Tocharian etymologies that I have accepted in this book are so plausible that they were proposed within the first few decades of serious research on Tocharian; few later etymologies have been admitted, and I have proposed very few of my own. I have also tried to apply rigorous standards to etymologies in other IE languages and to the reconstruction of the PIE lexicon, rejecting, for example, a great deal of material included in Pokorny 1959.

It should be emphasized that this is not in any sense a revolutionary idea or procedure. It is the logical result of a determination to take the regularity of sound change seriously; as such it is implicit in and exemplified by the work of all my teachers and mentors and of careful historical linguists generally. It is also the most clearly principled way to meet the challenge of Klaus Schmidt (1980:396-7), who rightly calls for higher standards in Tocharian etymological studies. I am therefore resolved to ignore any criticism which suggests that I have accepted substantially too few etymologies (though of course individual cases are always subject to discussion). Conversely, there is a real danger that I have accepted too many etymologies—especially my own etymological suggestions—and the reader should bear that in mind.

I have omitted bibliographical references for etymologies which were proposed before about 1940 and have generally been accepted; the reader will find the relevant bibliography in Van Windekens 1976. Tocharian sound changes which had become generally accepted by about 1960 are likewise adopted without comment. Citations are given for all etymologies and sound changes proposed later, and I have identified my own suggestions. Finally, note that by no means all the opinions about

Introduction

i. Purpose.

The present work attempts to determine the order in which sound changes occurred in the development of the Tocharian languages from PIE. In order to address that question I have naturally been obliged to determine exactly what sound changes occurred; in fact, investigation of the changes and of their relative chronology has proceeded *pari passu*, and the result is necessarily a treatise on Tocharian historical phonology as a whole.

This book is NOT a summary of what is known about the development of Tocharian, still less of received opinion, and it should not be used as such; in particular, nonspecialists should not rely on this book alone for their information regarding the historical phonology of Tocharian, since the opinions expressed in it are specifically my own (and sometimes mine alone).

ii. Methodology: the uniformitarian principle.

Like most linguists, I accept the proposition that language change occurring in the same general circumstances always exhibits the same general characteristics; in other words, I subscribe to the "uniformitarian principle". In accordance with the uniformitarian principle, historical linguists work by extrapolating from observed facts and patterns of language change to periods and areas in which observation is not possible; in fact, that is the only scientific basis for the study of unobservable language change. It follows that reconstructions of protoforms, hypotheses regarding prehistoric linguistic changes, etc., are not "algebraic formulas" which have no relevance to anything else; rather, they represent attempts to recover real languages spoken by real populations in real space and time, and the changes which those languages actually underwent in the course of their history. To be sure, all such reconstructions and hypotheses are perforce approximate—"inaccurate" might actually be a better word—because there are always substantial limitations on the amount of information that can be recovered (if only because vocabulary replacement is universal). But the limitations are purely practical and do not invalidate the uniformitarian principle.

The attempt to fix the relative chronology of prehistoric sound changes is in effect an attempt to push the uniformitarian principle to its limit: if the changes occurred in real time, why not try to determine which ones occurred before which

any etymology or sound change expressed in the literature are cited; considerations of space have dictated that those which, in my opinion, cannot be right be passed over in silence. (Of course it is also possible that some have been omitted inadvertently; I will be grateful to colleagues for calling such cases to my attention.)

iv. Methodology: proto-phonology and phonetics.

Throughout this book I have tried to posit sound changes which are not only regular but also phonetically plausible (though that has not always been feasible, given existing gaps in the evidence). It seems clear that demanding phonetic plausibility of our reconstructions can help to narrow down the range of acceptable hypotheses; moreover, if we take the uniformitarian principle seriously (and consequently strive for maximal realism of reconstructions), we cannot simply ignore the phonetics of prehistoric phonological systems.

However, such an attention to phonetics brings with it a serious methodological pitfall. Strictly speaking, only phonemic changes can be recovered by the comparative method (Hoenigswald 1960:75-82 and passim), and only hypotheses regarding phonemic change are susceptible of watertight proof. It is therefore necessary to distinguish carefully between the postulation of phonemic changes and judgments about the probable phonetics of ancestral phonemes, and I hope that I have done so in every case. In particular, arguments about the relative chronology of changes based on phonetic considerations are much less probative than demonstrations of phonemically crucial chronologies, and the reader is urged to keep that constantly in mind.

v. On the reconstruction of PIE.

I have tried to make my conception of the PIE sound system as clear and explicit as possible; the reader will find that it is relatively conservative. I have made no concessions to those who still reject the conclusion that PIE had three "laryngeal" consonants, since the evidence for that conclusion is overwhelming. On the other hand, I have argued vehemently against the "glottalic theory" in section **1**, note 4 (in spite of my personal regard for Professor Ivanov), since experience suggests that even the clearest evidence against a popular hypothesis will be ignored if it is not presented with sufficient force to startle those readers who have already made up their minds on the basis of inadequate evidence.

I accept a tightly constrained theory of PIE ablaut (in effect, Jochem Schindler's system for nominals and the traditional system for verbs); the reader will note, for example, the scarcity of lengthened ō-grades. Of course I posit such a system because I am convinced that it comes closest to recovering the real state of affairs in PIE; but in any case it is clear that SOME constraints are necessary, since otherwise our etymologies will lack the necessary rigor even if all the conditions discussed above are met.

vi. Presentation: a warning.

In discussing individual sound changes I have tried to distinguish carefully between phonetic and phonemic changes, between different reasons for positing particular chronological orderings, and between different degrees of probability that a particular ordering is correctly posited. However, in the chronological charts that periodically summarize my findings it is virtually impossible to represent such differences clearly. The reader is therefore warned NOT to use the charts out of context.

Furthermore, it is very often the case that two sound changes cannot be placed in any chronological relation. In such cases the charts are exceptionally useful, since they reveal at a glance the absence of any discoverable chronological connection between two changes. Conversely, the presentation of evidence in the text poses problems: in adducing individual words as evidence for particular sound changes, and in summarizing the changes that affected each word, I must often impose an order on unorderable changes so as to single out the change under discussion. The numeral 'seven', PIE *septṃ, is a case in point. In Tocharian the final syllable of this word was modified by changes affecting syllabic resonants and word-final consonants (see **29**, **30**, and **32**); the initial syllable was affected by palatalization and the restructuring of the vowel system (see **46**, **50**, and **56**). It cannot be demonstrated with certainty that those two sets of changes interacted; consequently we cannot know (for example) whether the final syllable had undergone any sound changes by the time the shape of the initial syllable had begun to change. Yet in citing this word as evidence for the changes in question I must make some arbitrary decision regarding the undiscoverable chronology, so as to highlight whatever sound change is under consideration at the moment (see the sections referred to). At best I can only try not to posit orderings of particular changes known to be incorrect—and, perhaps, to keep my arbitrary decisions consistent with one another. Consequently the reader must NOT rely solely on the cited examples for definitive statements regarding the chronology of changes.

In short, only the text of this volume makes coherent claims regarding the chronology of sound changes in Tocharian; neither the chronological charts nor the citations of examples are intended to stand without the text.

vii. The sound system of TA.

The following sketches of the sound systems of TA and TB are intended to provide information necessary to the understanding of the main text; they are not meant to be definitive. I omit sounds found only in interjections or loanwords. For further information see especially Krause 1952:1-22, Krause and Thomas 1960:39-74, and Marggraf 1970.

So far as can be determined from the writing system, the "classical" phonemes of TA are the following (in their usual spellings):

p	t	ts		c	k	y		w
		s	ṣ	ś		i	ä	u
m	n			ñ	ṅ	e	a	o
	l		r	ly			ā	

In structuralist terms the velar nasal is clearly a phoneme, since the sequences *nk*, *ñk*, and *ṅk* all contrast: cf. *nankuräṣ* 'having disappeared', *wlāñkät* 'Indra', *klaṅkañ* 'vehicles'. In generative terms surface *ṅ* arises from /n/ before /k/ at a particular point in the derivation (thus e.g. in *kätäṅkātsi* 'to transcend', in which the nasal is an infix, but not in *nankuräṣ*, in which *nk* arises by a later rule of vowel syncope).

The following consonant alternations in TA have resulted from palatalization of consonants in the pre-PT period (for which see **46** through **48**) and subsequent changes:

t ~ c	n ~ ñ	tk ~ ck	ṅk ~ ñś
ts ~ ś	l ~ ly	tt ~ cc	nt ~ ñc (~ -ñś)
s ~ ṣ		ṣt ~ śś	
k ~ ś			

In a generative analysis the right-hand members of these alternations arise from a morphologically conditioned rule of palatalization (which does not affect labials, /r/, or the round semivowel /w/, and applies vacuously to /y/).

Under any analysis the phoneme /n/ is reflected as *ṃ* (i.e. nasalization of the preceding vowel) when word-final or followed by a sibilant.

Vowel alternations include *i* ~ *e* and *u* ~ *o*, both morphologically conditioned, as well as complexly conditioned alternations among the central vowels. The commonest vocalic alternation is *ä* ~ *Ø*. A fairly rare alternation parallel to the last is exemplified by such paradigms as the following:

suk 'good fortune', loc. $s_u kaṃ$, instr. *sukyo*, pl. $s_u kuntu$;

kus 'who?, what?', obl. $k_u cac$, all. $k_u cäṣ$;

pres. 3sg. $l_u kuṣ$ and $l_u käṣ$ 'it illuminates', 3pl. *lukseñc*, ptc. *luksamāṃ*.

In classical structuralist terms the status of *u* is unclear, though it is evidently nonsyllabic. In generative terms this alternation reflects an underlying vowel /ŭ/ which differs from /ä/ in being rounded and from /u/ in being subject to syncope.

Prevocalic *y* and *w* alternate respectively with *i* and *u* in other positions. In TA the uncommon tautosyllabic sequences *āy* and *āw* (e.g. in *āy* 'bone' and *wāwlu* 'covered (ptc.)') are best analyzed as VC sequences, not as diphthongs.

viii. The sound system of TB.

The TB sound system is somewhat more complex than that of TA. The "classical" phonemes include the following nonsyllabics:

p	t	ts		c	k	y	w
		s	ṣ	ś			
m	n			ñ	ṅ		
	l		r	ly			

In structuralist terms the velar nasal is clearly a phoneme, since the sequences *nk*, *ñk*, and *ṅk* all contrast: cf. *ṅke* 'however', *ñkante* 'silver' (and unstressed *ñke* ← /ñəke/ 'now'), *nketär* 'it will perish'. In generative terms surface *ṅ* arises from /n/ before /k/ at a particular point in the derivation (thus e.g. in ptc. *piṅkemane* 'writing', in which the nasal is an infix, but not in *nketär*, in which *nk* arises by a later rule of vowel syncope).

As in TA, there is a large and pervasive set of alternations ultimately resulting from palatalization of consonants in the pre-PT period, but the TB alternations differ slightly in detail:

t ~ c	n ~ ñ	tk ~ cc	ṅk ~ ñc
s ~ ṣ	l ~ ly	tt ~ cc	nt ~ ñc
k ~ ś	w ~ y	sk ~ ṣṣ	
		st ~ śc	

In a generative analysis the right-hand members of these alternations arise from a morphologically conditioned rule of palatalization (which does not affect /r/ and applies vacuously to /y/). Though palatalized labials do not appear as such on the surface in TB, underlying /pʸə/ surfaces as [pi] (and presumably /mʸə/ as [mi], though the synchronic evidence is meager); a few forms suggest that underlying /tsʸə/ likewise surfaces as [tsi] (see **58** and **B11**).

The status of *py*, *tsy*, *ky*, and *my*, which appear only as root-initial consonants in some class II preterites (where some other verbs show normal palatalized consonants), is unclear.

Under any analysis the phoneme /n/ is reflected as *ṃ* (i.e. nasalization of the preceding vowel) when word-final or followed by a tautosyllabic sibilant.

The vowels of TB cannot be discussed realistically apart from the stress accent, which is phonemic. A thorough and reliable description of the accent system of TB is Marggraf 1970.

A minimally abstract analysis of the TB vocalics would perhaps posit six simple vowels:

/i	ə	u
e	a	o/

In the central and eastern dialects of TB (see **ix** below) the central vowels participate in the following alternations, governed by the stress accent:

underlying	stressed	unstressed
/ə/	a	ä ~ Ø
/a/	ā	a

Note that *ä* appears only in closed syllables, while in open syllables syncope of unstressed /ə/ occurs. It seems reasonably clear that surface *ā* is phonetically [a] or the like, *a* is somewhat higher (perhaps [ʌ]), and *ä* is higher still (probably [i]; cf. Jasanoff 1978:33). The only one of these phenomena that appears in the western dialect is the syncope of unstressed /ə/; one finds *ä* and *a* written indiscriminately for /ə/, and *a* and *ā* for /a/, without regard for the accent.

At a slightly deeper level of analysis, prevocalic *iy* and preconsonantal *i* can be analyzed as /əy/, while prevocalic *uw* and preconsonantal *u* can be analyzed as /əw/. This is part of the PT vocalic system, inherited without significant change in TB; for further discussion see **52**.

TB preserves the PT ablaut system fairly faithfully, except that PT *ë has become /e/ or /a/; see **53**, **66**, **B1**, and **B2** for further details.

The TB system of diphthongs is complex; any reasonable presentation must include a discussion of variation and dialect differences. I will here treat the diphthongs individually, discussing problems as they become relevant. Of earlier treatments the best is still Krause 1952:6-7.

The commonest TB diphthongs are *ai* and *au;* they reflect earlier tautosyllabic *ay and *aw and are the merger products of various other diphthongs as well (see below). How they were pronounced is unclear, since the native alphabetic symbols used to spell them are unitary (not composed of *a* and *i* or *u*); for the reasons noted in the next paragraph they CANNOT have been [aį] and [aų]. In western texts they are often spelled *aiy* and *auw*, and in all dialects the spelling *aiy* is normal before *y* (e.g. in *paiyye* 'foot' and *maiyya* 'power'; but one normally finds *auwV*, not *auwwV*, which is surprising). One possible interpretation of this pattern is that *ai* and *au* actually represent (phonetic) monophthongs [ɛ] and [ɔ] respectively, and that *aiy* and *auw* are used to spell forms in which the monophthongization is not yet complete (either because of the diphthong's phonological environment or because monophthongization has not reached completion in the dialect in question). Support for such an interpretation is perhaps to be found in the sporadic spelling of *o* for *au* (e.g. in Berlin 247, 281, and 295; see Krause 1952:7) and in the startling reverse spelling *tsälpauyträ* 295b4 (= *tsälpoytär* '(who) might be delivered'). However, other interpretations are also possible; the interchange of *o* and *au*, for example, might simply reflect graphic confusion (cf. especially the remarks on Berlin 295 in Sieg, Siegling and Thomas 1953:185). However they were pronounced, *ai(y)* and *au(w)* seem to function as diphthongs, and I will continue to treat them as such.

Tautosyllabic *āy* and $ā_u$ occur only in word-final position (e.g. in *āy* 'bone' and $tallā_u$ 'poor'), where they contrast with *ai* and *au* (e.g. in *snai* 'without' and *märsau* 'having forgotten'). These surface diphthongs of highly restricted distribution always reflect underlying /-áyə/ and /-áwə/ with regular loss of final /-ə/ (the examples just given are underlyingly /áyə/ and /talláwə/) or a contraction of accented /á/ with *-i* or *-u* (in the fem. sg. forms of 'that': nom. $sā_u$, obl. $tā_u$, gen. *tāy*); thus they are not underlyingly diphthongs.

The distribution of the diphthong e_u (*ew*) is more complex. PT *ëw and *ew merged as *ew in TB (see **B2**). In the western dialect tautosyllabic *ew is largely preserved as e_u, though it varies sporadically with *au(w);* in the central and eastern dialects it has merged with *au*. Typical examples include w. $klye_u ṣälle$ = c./e. *klyauṣalle* 'which should be listened to', w. *larewññe* = c./e. *larauñe* 'love', w. $nese_u$ = c./e. *nesau* 'I am', etc. Underlying /-éwə/, however, consistently surfaces as $-e_u$ in all dialects; examples include ke_u 'cow' and derived adjectives in $-e_u$ (e.g. $perne_u$ 'noble, dignified', derived from *perne* 'status, dignity'). It has been suggested that the failure of these latter e_u to merge with *au* is the result of analogy with related forms (Krause 1952:7 Anm. 1) or of the fact that the sequence is dimorphemic (Stumpf 1990:80-1), but it is also possible that the loss of word-final /ə/ did not occur until after the merger of tautosyllabic *ew with *au* in the central and eastern dialects (so that the final diphthongs of ke_u, etc. were not tautosyllabic when the merger occurred). A third category of e_u includes only the masc. obl. sg. of the pronoun 'that', which in the western dialect is usually ce_u (rarely *cau*) but in the others varies between ce_u and *cau*. The unique behavior of this form is evidently connected with the fact that it is the only example of a contraction of *e* with *-u*, though by itself that is not a full explanation of the phenomenon.

Inherited tautosyllabic *ow merged with *au* in all three dialects. In the western dialect underlying /-ówə/ surfaces as $-o_u$ (*-ow*) varying with *-au*, but the other dialects exhibit only *-au;* thus w. $tärko_u$ = c./e. *tärkau* 'having left'.

The dialects are more nearly uniform in their treatment of *ey. Normally this diphthong merges with *ai(y)* in all dialects when tautosyllabic; exceptions fall into two categories. On the one hand, there are several western examples of *meyyā* (= *maiyya*, in Berlin 248, 274, and perhaps 394) and one of *eynāke* (= *ainake*, 274a3); these could be survivals of inherited preconsonantal *ey. (I do not know whether *(a)[ne]yśai* 213b3 has been read correctly.) On the other hand, all dialects show variation in masc. *trey* ~ *trai* 'three' and masc. nom. pl. *cey* ~ *cai* 'those, these' (and the forms transparently derived from the latter, e.g. gen. pl. *ceynaṃts* ~ *cainaṃts* 'of these here'), as well as in the ipf./opt. paradigm *yey-* ~ *yai-* 'go' and the ipf. *ṣey-* ~ *ṣai-* 'be'. The source of the diphthongs in these latter cases is unclear; see **22**, **32**, **35**, note 3, and **48** for further discussion.

*oy is absolutely stable in all dialects of TB. In word-final position it can reflect PT *oy, e.g. in *toy* fem. 'these' < PT *tóy < post-PIE *tā́s (see **24**) and *yapoy* 'country' < pre-PT *yəpóy (see **B7**; cf. the unshifted accent of pl. *ypauna*), and a number of word-internal examples seem to be the result of analogy with word-final *-oy* (e.g. *toyna* fem. 'these here'; note also obl. *yoloyn* Berlin 147 fr. 7 for *yolaiṃ*,

apparently on the analogy of nom. *yolo*). Otherwise word-internal *oy* before consonants occurs almost exclusively in forms of *soy-* 'be satisfied', in which it can have been followed by PT *ə (syncopated in TB), and in imperfects and optatives, in which it evidently results from the contraction of stem-final /-a-/ with ipf./opt. *-i-*. This raises a suspicion, at least, that preconsonantal PT *oy has become *ai* in TB. For further discussion see 49, note 2.

Finally, a word should be said about the treatment of /ə/ in TB. Normally only unstressed /ə/ in open syllables is dropped, but in verse even stressed /ə/'s can be syncopated, apparently with a shift of the stress to another syllable. The usual apocope of word-final /ə/ is also suspended *metri gratia* in verse, and in that case the underlying /-ə/ surfaces as *-o;* see Krause 1952:7-10 for a collection of typical examples.

ix. Problems in the synchronic description of Tocharian.

Two unresolved problems in the description of the Tocharian languages deserve brief mention here.

The larger of the two problems concerns the systematic variation to be found among the corpus of TB texts. The usual interpretation, first advanced in Winter 1955, is that there are three main dialects of TB; however, Stumpf 1990 suggests that the differences between texts reflect their relative age (either time of transcription or time of composition, or to some extent both). It is true that on the whole the "western dialect" of TB appears to be the most conservative, and the "eastern dialect" the least so; but we can only accept Stumpf's hypothesis if EVERY characteristic of w. TB is more archaic, and EVERY characteristic of e. TB less archaic, than the corresponding characteristics of the other dialects—AND if the characteristics in question could plausibly have developed from each other in the chronology which the hypothesis requires. These logical requirements are so rigorous that the burden of proof must rest on Stumpf, and I am not yet convinced that all the relevant questions have been answered. Consequently I shall continue to regard the differences between TB documents as dialect differences, though recognizing that the question is still open.

The other difficulty is a matter of phonetic detail. In phonemic terms all sonorants are voiced and all obstruents voiceless in both attested languages, but the phonetic picture might have been quite different; in particular, there is a reasonable likelihood that Tocharian obstruents were voiced in voiced surroundings, and perhaps even that stops had (voiced) fricative allophones in certain environments (e.g. between vowels). Indications that such was the case include the following.

(a) In both languages there is some variation between *p* and *w* in noninitial position; for a collection of typical examples see Krause and Thomas 1960:69.

(b) The only surviving TB text written in the Manichaean alphabet often writes voiced stops and sibilants for their voiceless counterparts, usually in noninitial

position (though initial *b* for *p* also occurs). Unfortunately the spelling is inconsistent, so that clear inferences cannot be drawn (see von Gabain and Winter 1958:27).

This has consequences for the interpretation of those TB consonants written as geminates. (On the problem of geminates in TA see A17.) If intervocalic *t* was phonetically [d] or the like, it seems likely that *tt* was actually [t]—i.e., that obstruents were written double to indicate that they were voiceless even though the immediate environment was voiced. (The orthography of Khotanese, an Iranian language known to have influenced Tocharian, employs *tt, śś,* and *ṣṣ* in precisely that fashion; see Konow 1949:15, 17-8.) That would provide a plausible explanation for the *tt* of such a form as TB *tattaṃ* 'he puts', which reflects the single medial *d^h of PIE pres. *d^hé-d^hǵ-: apparently the stop has developed as though it were word-initial because it is stem-initial (see 55 with note 3), and the doubling of the *t* merely indicates that it has not been lenited. A similar development seems to be reflected in the geminate of iptv. *pokkāka* 'call!', and sporadically elsewhere. On the other hand, it is true that in most reduplicated and prefixed forms the root-initial consonant is not written double, and that is difficult to explain under the hypothesis just advanced. I shall continue to deal with attested forms as written, pending resolution of these problems.

Chapter 1. Proto-Indo-European.

Disagreements about the phonological system of PIE persist. In this chapter I describe the system that I accept, indicating briefly the evidence on which I base my decisions. It will be seen that I agree with Mayrhofer 1986b on all points of importance; that work should be consulted for further information.

1. The phonemes of PIE.

The segmental phonemes of PIE were the following:

obstruents					resonants			vowels		
p	t	ǩ	k	k^w	m	m̥		e	a	o
b	d	ǵ	g	g^w	n	n̥		ē	ā	ō
b^h	d^h	$ǵ^h$	g^h	g^{wh}	r	r̥				
	s	x́	x	x^w	l	l̥				
					y	i	ī			
					w	u	ū			

There was also a fairly elaborate system of pitch accent. It is clear that each phonological word could contain at most one high-pitched syllable, customarily marked with an acute accent (* ´); either there was also a contrast between two different types of high pitch (as on final syllables in Greek), or else certain underlying sequences of vowels which have contracted in all attested IE languages had not yet contracted in PIE. For possible Tocharian reflexes of this phenomenon see 4.

Syllabic resonants (except the rare *ī and *ū, on which see Mayrhofer 1986b: 171) participated in morphophonemic alternations with the corresponding nonsyllabic resonants; see note 2 for details.

The following set of morphologically conditioned vowel alternations, collectively called "ablaut", occurred in PIE:

ē ~ e ~ Ø ~ o ~ ō;

ā ~ a ~ Ø (see note 3).

It is likely that morphophonemic processes of voicing assimilation in clusters of stops also existed; see Mayrhofer 1986b:109-10, 115-6.

Notes.

1. *x́, *x, *x^w are the "laryngeals", usually written *h_1, *h_2, *h_3 respectively; their position in the phonemic chart is frankly speculative (cf. Beekes 1972b:45).

From the pattern of PIE syllabification it appears that they were less sonorous than resonants (Cuny 1912:101-3), but from the fact that they developed into vowels in various languages it seems most unlikely that they were stops; presumably they were nonanterior fricatives (cf. Mayrhofer 1986b:121-2). My orthography for these sounds is that of Cowgill 1973:271 fn. 1; I use *X to indicate a laryngeal the identity of which is not known.

2. In general, nonsyllabic resonants occurred next to vowels while syllabic resonants occurred elsewhere, except that after a heavy syllable a sequence *CRV was replaced by *CR̥V (Sievers' Law). I write the heavy Sievers variants as *CR̥V rather than *CR̥RV, since the nonsyllabic "offglide" after the syllabic resonant seems to have had no independent status in PIE. (At some point in the prehistory of Tocharian such offglides were reanalyzed as separate segments; see **4**, **52**, and **65** for discussion.) The system of alternations between syllabic and nonsyllabic resonants might have been governed solely by phonological factors for some resonant pairs, but clearly not for *y and *i; see Mayrhofer 1986b:158-68 for discussion of individual cases. I write syllabic and nonsyllabic resonants with different symbols partly for convenience, but also because I suspect that they were all separate phonemes in PIE.

3. *a, *ā must be posited to account for (a) cases in which an ablaut pattern *ā ~ *a ~ Ø occurs, e.g. PIE *swād- ~ *swad- ~ *sud- 'sweet' (Stang 1974), *wā́stu- ~ *wástu- 'settlement' (Normier 1980:254, 262 fn. 42), and *nās- ~ *nas- ~ (?) *n̥s- 'nose' (probably zero-grade *n̥s- > *uns- → PG *nus- in *nusō > OE *nosu*, *nus-i- > Netherlandic *neus*), and (b) cases of the correspondence Lat. *a* : Gk. α : Hitt. *a*, e.g. Lat. *albus* 'white', Gk. ἀλφός 'white leprosy', Hitt. *alpas* 'cloud' < PIE *alb^{h}os 'white' (Mudge 1931:252, Melchert 1986) and Lat. *alvos* 'belly', Gk. αὐλός 'flute', Hitt. *aulis* 'windpipe, blood sacrifice' < PIE *awl- 'tube (vel sim.)' (Kühne 1986:85-90, Kimball 1994:13-4). For additional examples see **5**, note 2, and Mayrhofer 1986b:169-70. I know of no o-grade forms to roots that indisputably contain *a.

There are also a few words in which we always find *o, even in categories in which *e would be expected; clear examples are PIE *ǩonk- 'hang' (Hitt. *gānki* '(s)he hangs (it) up', Goth. *hāhis* 'you suspend', Skt. *śáṅkate* '(s)he hesitates, (s)he doubts', Lat. *cūnctātur* '(s)he delays') and *pótis 'master, husband' with its derivatives and kin. These forms can be accounted for most straightforwardly by recognizing a "basic" *o (i.e. *o which is not the o-grade of *e). I know of no evidence that this *o participated in quantitative ablaut.

There were a few other PIE roots which did not ablaut. The clearest case is PIE *b^{h}uX- 'become'; cf. aor. 3sg. Skt. *ábhūt*, Gk. ἔφῡ < PIE *é-b^{h}uX-t, in which an e-grade root would be expected, and pf. 3sg. Skt. *babhū́va*, Gk. πέφῡκε ←< PIE *b^{h}e-b^{h}ūX-e, in which an o-grade root would be expected (cf. Jasanoff 1988a:299-300, McCone 1991:120-1, 127-31 with bibliography).

4. The "glottalic theory" of Gamkrelidze and Ivanov 1973 (and others), according to which *t^{h} should be reconstructed in place of traditional *t, glottalized *t' in place of *d, *d in place of *d^{h}, etc., is clearly mistaken. General reasons for rejecting it can be found in Vine 1988 (cf. also the cautious assessment of Hayward 1989:40-53); it should also be emphasized that the typological generalizations offered as motivation for the theory are inaccurate (Hock 1986:625-6 with references p. 670). Most importantly, hard evidence against the glottalic theory is adduced by Wolfgang Meid (1986:209-10 fn. 55 and especially 1987:9-11), who has demonstrated that the phonetics of Celtic and other loans into pre-Proto-Germanic and of the earliest Iranian loans into Armenian are extremely difficult to reconcile with the glottalic theory (though they pose no problem for the traditional reconstruction of PIE stops). A particularly convincing example is Arm. *partēz* 'garden', clearly borrowed from Iranian *paridaiza- 'walled enclosure, park' (Av. acc. pl. *pairidaēzaŋ;* Meid 1987:9). The Iranian word should NEVER have contained "*t' " or the like under any theory, since its root etymon is PIE *d^{h}eyǵ^{h}- 'mold, fashion (out of clay)' (cf. Gk. τεῖχος and τοῖχος and Oscan acc. pl. *feíhúss*, all 'wall', and Arm. *dēz* 'heap'), which in the glottalic theory would be "*deyǵ-" or the like. Unless we wish to suppose that PIE "*d" (glottalic theory) passed through a stage "*t' " during its development to PIr. *d, or that the latter was borrowed into Armenian as *t* in spite of the fact that Armenian already had a consonant *d*, we must accept a change *d > *t* for Armenian; in other words, we must either resort to complex ad hoc hypotheses about the phonetics of this word or reject the glottalic theory. Such examples can be multiplied; thus Jochem Schindler (p.c. 1985) adduces Arm. *arcat'* 'silver', another early Iranian loan, as counterevidence to the theory (since under the glottalic theory we must project the glottalized stops forward into Iranian—in spite of their merger with the voiced (aspirated) stops in that subgroup—in order to account for the shape of this Armenian word). I can only conclude that the glottalic theory is a monumental error which has not advanced the study of IE linguistics.

5. The phonetic nature of the voiced aspirates cannot be determined with certainty, but it seems likeliest that they were breathy-voiced stops with a breathy-voiced offglide ("aspiration") into following sonorant segments.

6. That PIE possessed three series of dorsals—conventionally called palatals, velars, and labiovelars—is not doubtful; Melchert 1987 has demonstrated conclusively that the three PIE voiceless dorsals remained distinct in Luvian (e.g. Luvian *ziyar, zīyari* 'is lying down' < PIE *ǩéyor, *kisāi-* 'comb' < *kes-, *kuit* 'what?' < *k^{w}íd; cf. also Morpurgo Davies and Hawkins 1988:177-82). The traditional statement of the "centum" development asserts that the palatals became velars, merging with inherited velars, in numerous IE languages; but since shifts of palatals to velars are rare among the world's languages (as Michael Weiss reminds me), phonetic plausibility might be better served by calling these three series of stops "midvelars, postvelars, and labiopostvelars" or the like. Nevertheless I retain the traditional terms to

avoid confusion. Note that complex systems of dorsals are typologically unremarkable; the languages of the Caucasus and of the northwest coast of North America provide numerous examples of such systems.

7. It does not seem possible to reconstruct a contrast between velars and labiovelars next to *w, *u, or *ū (see Weiss 1993:153-65 with bibliography). I shall assume that the neutralized back stops occurring in that position were phonemically velars (presumably the unmarked members of the velar/labiovelar opposition).

8. On the problem of PIE "*þ" see Schindler 1977 and Mayrhofer 1982a. Klaus Schmidt apud Mayrhofer 1990 s.v. *tákṣan-* suggests that TB *taktsāntsa* 'expert, capable (person)' is cognate with Skt. *tákṣā*, Gk. τέκτων 'carpenter'; Jochem Schindler (p.c. 1991) points out that if that etymology is correct, and/or if TB *ktsaitse* 'old' is really made to the root of Skt. *kṣi-* 'destroy', Gk. φθίνειν 'wane, pass away', PIE "*þ" could easily have been *ts, which would have survived unchanged in Tocharian. This hypothesis is very attractive, but neither of the etymologies adduced is compelling, since extensive analogical developments within the history of Tocharian must be posited to account for the shapes of the TB words.

2. PIE allophones.

Though the phonetics of protophonemes, being inaccessible to the comparative method, remains a matter of (informed) guesswork, the existence and nature of some allophones of the PIE phonemes can be inferred from their subsequent developments in the IE languages. At least the following highly probable statements can be made.

a) PIE */s/ had a voiced allophone *[z] next to voiced stops; it was probably breathy-voiced next to breathy-voiced stops (Mayrhofer 1986b:119).

b) PIE */tt/ was phonetically *[tst], and other apical-plus-apical clusters probably exhibited a similar medial sibilant in pronunciation (Mayrhofer 1986b:110-2; note the restriction proposed by Jochem Schindler ad loc., and cf. now the (inconclusive) discussion of Hilmarsson 1993b).

c) The laryngeal */x/ "colored" an adjacent */e/ to *[a]; there is no evidence that this *[a] was phonetically distinguishable from the independent phoneme */a/, since the two develop identically in all daughter languages. We can be absolutely certain that the vowel in question was structurally */e/ in PIE only when related forms exhibit lengthened-grade */ē/ rather than */ā/ (see Mayrhofer 1986b:132-4). What phonemic analysis one prefers for these PIE *[xa] and *[ax] depends on what theory of phonology one uses; as the form of the above statements shows, I have opted for the more abstract analysis.

d) The laryngeal */x^{w}/ rounded an adjacent */e/ to *[o]. It has been claimed that this *[o] was not phonetically identical with ablaut */o/, on the grounds that Brugmann's Law lengthened the reflex of the phoneme */o/ in an open syllable in Indo-Iranian but failed to lengthen the reflex of *[x^{w}o] = */x^{w}e/. However, no putative example of that failure is probative. Skt. *ánas* 'cart' = Lat. *onus* 'burden' could reflect PIE *x^{w}énos, but it might also reflect *x^{w}énXos or *ónXos (Mayrhofer 1986a s.v. *ánas-;* postconsonantal laryngeals still closed the preceding syllable when Brugmann's Law operated, as Kuryłowicz 1927:206-15 demonstrated). Skt. *ávis* 'sheep' = Lat. *ovis* etc. reflects PIE *xówis, not "*x^{w}éwis" (Kimball 1987:185, 189), and must therefore owe its short *a* either to an acrostatic oblique stem *xéwi- (cf. Schindler 1975b:4-5) or to analogy with the PIIr. prevocalic stem *áuy- (→ Skt. *ávy-* by analogy with preconsonantal *ávi-*). Skt. *áhis* 'serpent' = Gk. ὄφις might not have been affected by Brugmann's Law in any case, since the Law perhaps operated AS A SOUND CHANGE only when the following consonant was a resonant (cf. Skt. *práti* 'towards' < PIE *próti, *káti* 'how many?' < *k^{w}óti, *katarás* 'which (of two)?' < *k^{w}oteros, etc.), spreading to other environments later by analogy. Thus there is no clear evidence that the *[o] of PIE *[x^{w}o] and *[ox^{w}] (= */x^{w}e/ and */ex^{w}/) differed phonetically from the independent PIE phoneme */o/.

e) PIE */o/ was not colored by an adjacent */x/ (Beekes 1972a; see also Mayrhofer 1986b:135)—nor, presumably, by */x^{w}/, since */o/ was already a round back vowel—and *ē was not affected by an adjacent */x/ or */x^{w}/ (Eichner 1972:72, Peters 1980:314, Mayrhofer 1986b:132-4, 141, Jasanoff 1988b:227-32). It should follow a fortiori that */ō/ was not affected by either of these laryngeals. Clear examples of */a/ and */ā/ next to laryngeals have not been discovered (in part for the reason noted under (c) above).

f) Word-final laryngeals, at least when preceded by a syllabic, were dropped in pausa, and perhaps in some other sandhi environments (Kuiper 1947:210-12, Mayrhofer 1986b:149). This must have occurred after the coloring of vowels by laryngeals (see (c) and (d) above) had run its course, since the new final vowel retained the coloring of the lost laryngeal.

g) Various simplifications of consonant clusters had already occurred in PIE; a particularly clear example is the reduction of *ksḱ to *sḱ in pres. *pṛsḱé/ó- 'ask' (3sg. Skt. *pṛ́cchati*, Lat. *poscit*) < *pṛḱ- + *-sḱé/ó- (cf. full-grade *preḱ- in Lat. *precēs* 'prayer(s)').

See also Mayrhofer 1986b:117-8, 120-1.

Chapter 2. The development of laryngeals in Tocharian.

In Tocharian, as in most branches of IE, laryngeals were eliminated from the phonemic inventory. Most of the changes that affected laryngeals could have occurred early in the history of Tocharian, though proof that they did occur early is often lacking. A possible exception involves the sequences *Cxi and *Cxu, in which *x might have survived as a distinctive segmental phoneme until after palatalization had run its course (see 7). For convenience all the developments of laryngeals are treated here; the arrangement is thematic rather than chronological, since the relative chronology of these changes among themselves is largely indeterminable.

3. *VX and *XV sequences (true vowels only).

In Tocharian, as in most IE languages, *VX sequences were contracted before nonsyllabics as follows:

*eX́ > *ē
ex ([ax]) > *ā
ex^{w} ([ox^{w}]) > *ō
*oX > *ō

The contraction occurred before all other changes affecting long vowels; thus *eX́ and *ē developed identically in the following pair of words:

PIE *meX́nes- 'moon' (Lith. *mė́nuo* 'moon' and *mė́nesis* 'month') > *mēnes- >→ PT *m^{y}eñə- (with analogical loss of *-s-), nom. sg. *m^{y}eñe > TB *meñe*, TA *mañ;*

PIE *pxtḗr 'father' (Gk. πατήρ, etc.) > *patḗr > PT *pacér > TB *pācer*, TA *pācar.*

Note likewise the identical development of *ex and *ā:

PIE *b^{h}réxtēr 'brother' (Lat. *frāter*, etc.) > *b^{h}rā́tēr > PT *prócer > TB *procer*, TA *pracar;*

PIE *wā́stu 'settlement' (Skt. *vā́stu;* see 1, note 3) > PT *wóstə 'house' > TB *ost*, TA *waṣt.*

Similarly, the following three words exhibit identical vowels in PT:

PIE *ǵnex^{w}- 'recognize, know' (Gk. γνω-, etc.) > *gnō- > PT *kna- > TA *knā-*, e.g. in pres. ptc. *knānmāṃ* 'knowing'; PT *aknát^{s}a 'ignorant' > TB *aknātsa*, TA *āknats;*

PIE *ṓmsos 'shoulder' (Gk. ὦμος, Goth. acc. pl. *amsans*) > PT *ánsə > TB *āntse*, TA *es;*

PIE *g^{w}rox-mVr- 'heavy load' (ablaut as in *$ǵ^{h}$od-mVr- 'dung' > TB *kenmer* 'dung', Hitt. *kammar-s-* 'defecate', K. Schmidt 1980:409; cf. *g^{w}ṛxús 'heavy' > Skt. *gurús*, Gk. βαρύς) > *g^{w}rōmVr- > PT *k^{w}ramər > TB *krämär* 'burden' (cf. Schindler 1972:149).

That *ēX became *ē early in the history of Tocharian seems to be demonstrated by 'name' and by a sigmatic extension of PIE *ǵnex^{w}- 'recognize':

PIE *ǵnéx^{w}mn 'name' (cf. obl. stem *ǵnéx^{w}mn- in Skt. *nā́ma*, Lat. *nōmen*, etc.; Gk. ὄνομα shows violent remodelling of ablaut, Ringe 1990:224-5) > *nḗmən > PT *ñémə > TB *ñem*, TA *ñom* (on TA *o* < PT *e see **A5**; cf. Van Windekens 1962a:187);

post-PIE *ǵnēx^{w}-s- 'recognize' (Hitt. *ganeszi* '(s)he recognizes') > *gnēs- > PT *kñes- > TA pret. 2sg. *kñas-äṣt* 'you have become acquainted' (see Mayrhofer 1986b:141-2 and Jasanoff 1988b:228-32, both with references; the grammatical category of the TA form is elucidated in Hackstein 1993a:151-6).

Sequences of *VX in word-final position are less common, but the following seem certain:

PIE *duóǵ 'two' (Vedic Skt. *dvā́* (2 syll. in RV), Av. *duua*, Hom. Gk. δύω; for the word-final laryngeal cf. the acute accent of Lith. *dúo > *dù*) > *dwṓ (see also **26**) > *wṓ (see **27**) > *wṹ (see **38**) > PT *wú > TA masc. *wu* (Winter 1962b:29);

PIE *xn̥tb^{h}óǵ 'both' (Lat. *ambō*, Gk. ἄμφω; cf. Jasanoff 1976:125-7) > *antb^{h}ṓ (?; see **6**) > *antp^{h}ṹ > PT *antpú > TA fem. *āmpu-k;*

PIE subj. and them. pres. 1sg. *-ox > *-ō (Gk. -ω, Lith. -*ù*, etc.) > *-ū > PT *-u > TB subj. I (and probably pres. I) 1sg. -*u*, e.g. in *āyu* 'I will give', *yāmu* 'I will do' (Pedersen 1941:141).

The development of PIE *-ex, the commonest such sequence, is somewhat problematic. It might have become *ā in the first instance, as medial *ex did; but the subsequent development of word-final *-ex in Tocharian is identical with that of short *a, not with that of *ā. It seems possible that the PIE sandhi variant in which the laryngeal had been dropped (see 2 (f)) was generalized in pre-Tocharian (Peters 1991a:242); but note that such an explanation will not work for the similar phenomenon in Hittite (Melchert 1994 §4.1.6.3.1(2)). See also **41**.

The only PIE *XV sequence that is indisputably reflected in Tocharian is *xe (*[xa]), which became *a; note the identical development of the vowels in the following pair of words:

PIE *xéǵonti 'they are driving' (Lat. *agunt*, etc.) > *ágonti ~ *ágont > PT *akëñcə ~ *akën > TA *ākañc ~ *āke >⟶ *ākeñc*, but PT *akën > TB *ākeṃ;*

PIE *swadrós 'sweet' (cf. Gk. ἁδεῖν 'to please', and see **1**, note 3, with references) > PT *swarḗ (see **27**) > TB *swāre*, TA *swār* (Winter 1962b:29).

A very probable example of *x^{w}e (*[x^{w}o]) is the following:

PIE *x^{w}er- 'rise' (Lat. *orīrī*, Gk. ὄρνυσθαι) > *or- > PT *ër- 'evoke' (orig. causative *'make rise'), e.g. in class VIII pres. 3sg. *ërṣə ~ *ërṣəṣə 'it evokes' > TB

erṣä-ṃ, TA *aräṣ*. (One expects the reflex of an e-grade in a sigmatic present.)

The PT vowel is identical with the reflex of PIE *o, e.g. in

PIE *ǵómb^{h}os 'row of teeth' (Skt. pl. *jámbhāsas;* Gk. γόμφος 'peg', etc.) > PT *kḗmë 'tooth' > TB *keme*, TA *kam*.

Few *ǵe sequences can be reconstructed with certainty for PIE, and none is clearly reflected in Tocharian; clear examples of the reflex of *Xo also seem to be lacking. However, since Tocharian agrees with the vast majority of IE languages in undergoing the changes *xe > *a and *x^{w}e > *o, it would be very surprising if it did not also participate in the usual developments *ǵe > *e and *Xo > *o.

The above changes are very widespread in IE, and several seem to have occurred even in Anatolian (Eichner 1972:54, Melchert 1984a:37-8 with fn. 24, 1984b: 39, 1986, 1994 §4.1.3). But it does not follow that those changes occurred simultaneously in all branches of IE while they were still dialects of a single language. The PIE "laryngeals" were probably nonanterior fricatives (see **1**, note 1), and the loss of such sounds is a natural change that could have occurred several times independently; the same can be said of the compensatory lengthening of preceding vowels that accompanied the loss of laryngeals. Thus we cannot assert that these were very early changes in Tocharian on the grounds that they also occurred in other IE languages; the only grounds for suggesting that they occurred early in the chronology of changes is the fact that there is no difference in development between *xe and *a, between *ex and *ā, etc., a phenomenon that can be accounted for most economically by positing early loss of the laryngeals.

Notes.

1. It is sometimes difficult to determine whether a PIE form contained a simple vowel or a sequence of *VX or *XV. In cases for which decisive evidence is lacking I have written simple vowels. I have not always cited the evidence that justifies the reconstruction of a laryngeal in specific words, but I believe that my reconstructions are not controversial.

2. It will be noticed that I have treated the coloring of adjacent vowels by laryngeals as an allophonic development within PIE (see **2** (c) and (d)), but the loss of laryngeals as a development within the history of the individual branches. I have adopted that course because vowel coloring is uniform throughout IE (so far as we can determine) and clearly preceded the sandhi loss of word-final laryngeals (see **2** (f)), whereas SOME losses of laryngeals next to vowels clearly occurred within the individual histories of Anatolian, Indo-Iranian, and perhaps Armenian—or never occurred at all in those branches. Those losses of laryngeals which did occur in all branches (e.g. the loss of initial *ǵ- before a vowel) could be projected back into PIE, like the coloring phenomena.

3. The x-stem accusative endings *-exm, *-exns (*-exm̥, *-exn̥s?) seem to have become *-ām, *-ās already in PIE. This might reflect a specific sound change involving word-final nasals and nasal clusters (so Stang 1965, Mayrhofer 1986

163-4). But it is also worth asking whether acc. sg. *-ām, pl. (*-āns >) *-ās could have been constructed by analogy to the nom. sg. *-ā early in the separate histories of the individual branches of IE, gradually eliminating all traces of the presumably original forms *-exm, *-exns. (This has also been seen by Lindeman 1989. Such a change could not have happened in PIE, because the Anatolian evidence can be explained only if *-ex survived into Proto-Anatolian; see Melchert 1994 §4.1.6.3.1(2).)

4. *VXV sequences (including those involving *i and *u) and Sievers' Law.

The loss of laryngeals between vowels (largely a special case of the developments treated under **3**) gave rise to hiatuses. Some sequences of vowels in hiatus underwent contraction very early in Tocharian; a clear example is the following:

PIE *téxes fem. 'those' > *tấs (Skt. *tấs*, Goth. *þos*) > PT *tóy fem. 'these' (see **24** and **42**) > TB *toy*.

Such a contraction might also be reflected in the Tocharian primary 1sg. mediopassive ending:

PIE thematic mp. 1ary 1sg. *-o-xer (see note 1) > *-ōr (Lat. *-or*, OIr. *-ur*) > *-ar → PT *-mar (all stem classes), e.g. in subj. *yam(ə)mar 'I shall make (for myself)' > TB *yāmmar*, TA *yāmmār* (Van Windekens 1944:305, 1982:273 with bibliography)?

But the immediate pre-PT form *-ar could just as well reflect PIE *-xer.

But some hiatuses might have remained uncontracted long enough to give rise to special developments; a possible case is the following. Post-PIE *ō, whatever its source (see **3**), normally became PT *u in word-final position (see **38**) but *a elsewhere (see **40**). However, there are a few PT n-stem nom. sgs. in *-o that must reflect PIE nom. sg. *-ō, if only indirectly:

TB *okso* 'ox' < *wokʷso < PT *wəkʷsó (Normier 1980:263) < post-PIE *uksṓ (or the like; cf. Welsh *ych* < *uksī < PC *uksū < *uksō) ← PIE *uksḗn (Skt. *ukṣấ*, Av. *uxša*, Goth. gen. pl. *áuhsne*; see note 2);

TB *klyomo*, TA *klyom* 'noble' < PT *klʸomo < *klʸəwë-mo 'famous' (see **64**); the base is pre-PT *klʸəwë 'fame' < PIE *ḱléwos, while the suffix must reflect PIE *-mō (cf. Skt. *áśmā* 'stone', Gk. ἄκμων 'anvil' < PIE *xéḱ-mō 'stone' ← 'sharp(ened) stone').

We could account for the fact that these words do not end in PT *-u by suggesting that nom. sg. *-o-x̂ō, which would occur in Hoffmann derivatives of thematic stems (see Hoffmann 1955), remained uncontracted *-oō until after the raising of final postconsonantal *-ō to *-ū (see **38**); *-oō would then have contracted to *-ō, which would eventually give PT *-o, and that vowel could have been introduced analogically into the words in which it is attested. (This is an amplification and partial revision of the suggestion concerning TB *okso* made by Normier 1980:263. The situation in Germanic is comparable; see Jasanoff 1980:379-81.) But other solutions are also possible. For example, PIE n-stem nom. sg. *-ō could have been extended to

*-ōn, which might have become PT *-o. Such a possibility is suggested by PT *wəlo 'king' (TB *walo*, TA *wäl*), an nt-stem whose oblique base *lant- (TB, TA *länt-*) contains a vowel that can reflect post-PIE nonfinal *ō; that is, nom. sg. *wəlṓnts possibly > *wəlōn > PT *wəlo, whereas nonfinal *wəlōnt- > PT *lant-. (The distributional facts concerning 'king' were pointed out to me by Jochem Schindler in 1985.) In that case the *ō of *-ōn must have become different from other nonfinal *ō before the loss of word-final nasals (see **32**).

Corroborative evidence for the contraction solution of this problem might be sought in a somewhat different class of PIE endings. Various o-stem case endings show contraction of the thematic vowel *-o- with a following vowel; a typical example is dat. sg. *-ōy < *-o-ey. It is not clear whether the contraction had already taken place in PIE or occurred independently in the immediate daughter languages (though if the latter scenario is correct it occurred in all daughters). What is clear is that in Greek and Balto-Slavic the eventual result shows a type of accent which is also characteristic of syllables resulting from vowel contractions that are unquestionably language-specific and could have occurred much later. Thus the circumflex of Gk. dat. sg. masc./neut. ἐρυθρῷι 'red' < (pre-)PIE *x̂rudʰróey is identical with that of φορῶ 'I carry around, I wear' < φορέω < Proto-Greek *pʰoréyō < PIE *bʰoréyox but contrasts with the acute accent of πειθώ 'persuasion' ←< PIE *bʰéydʰō; similarly, the circumflex intonation of the ending of Lith. dat. sg. *rãtui* 'wheel' (which has not attracted the accent, see below) < PB *ràtõi < (pre-)PIE *(X)rótoey '(act of) running' is identical with that of the final syllable of *akmuõ* 'stone' < PB *akmõ < *-moō ← PIE *xéḱmō (*-oō < *-o-x̂ō, cf. the Tocharian scenario suggested above) but contrasts with the acute intonation of the final syllables of inst. sg. *ratù* (with accent by de Saussure's Law) < PB *ratố < PIE *(X)rótox́ and *degù* 'I burn (it)' < PIE *dʰégʷʰox. If any of the contracted o-stem endings survived in Tocharian and exhibited PT *-o, they would support the hypothesis that the *-o* of TB *okso*, etc. is the ultimate reflex of a contraction of vowels. Unfortunately no such ending survives in the inflection of Tocharian o-stems, and I can find no fossilized examples (e.g. in adverbs).

It now seems likely to me that the Sievers' Law sequences *-CiV- and *-CuV- (see **1**, note 2) remained disyllabic in Tocharian. A probable example of such a sequence occurs in Berlin 255a7:

TB obl. sg. *śeruweṃ* 'hunter', nom. **śeruwe* < PT *śeruwë < PIE *ḱḗruos (vṛddhi formation to *ḱerwos 'stag', Lat. *cervos;* Jasanoff apud Nussbaum 1986:8); in most TB documents this word appears as disyllabic *śerwe* (on which see **B23**). (Much labor would have been saved if I had not overlooked this example in Ringe 1991b.) Possibly another such sequence is exemplified by the PT adjective ending *-iyë (Krause and Thomas 1960:145-6), e.g. in PT *ñəkciyë 'divine' (> TB *ñäkciye*, TA *ñäkcí*), derivative of *ñəktë 'god' (> TB *ñakte*, TA *ñkät*). Phonologically this PT suffix could reflect the heavy Sievers alternant *-io- of the PIE adjective-forming suf-

fix *-yo- (see the discussion in Ringe 1991b:162-5 with bibliography), and the following example suggests that it does:

PIE *udriós 'watery' (derivative of *udro-, cf. Skt. *anudrás* and Gk. ἄνυδ-ρος 'waterless') > *urié (see **27**) > PT *wərʸiyĕ > TA *wri*, obl. *wriṃ*, TB *wríye* → *wrīyeṣṣe* (Winter 1962b:30, 1965a:202 fn. 20).

Unfortunately disyllabic *-io- (or its reflex) became a productive adjective suffix in Tocharian, appearing in numerous examples in which it cannot be the result of Sievers' Law (cf. Krause and Thomas 1960:145-6) but might reflect the analogical spread of the heavy Sievers variant—or be the reflex of non-Sievers *-io- (Mayrhofer 1986b:161), or of *-iXo-; consequently examples like the one just cited cannot be considered probative.

In any case it should follow that the PT sequences *-iyV- and *-uwV- also reflect PIE *-iXV- and *-uXV-; it is highly unlikely that PIE *-iXV- and *-uXV- could have become *-yV- and *-wV- (or the like) while PIE *-iV- and *-uV- remained disyllabic, since *-iXV-, *-uXV- should have passed through a stage *-iV-, *-uV- during their development to *-yV-, *-wV- (assuming that the sound changes involved were at all natural), and in that case none of the sequences under discussion would have remained disyllabic.

Relying on this inference, we can suggest that the development of the nom. of the 2sg. pronoun in Tocharian was as follows:

PIE *túX 'thou' (Lat. *tū*, Goth. *þū*) → *tuX-óm (cf. Skt. *tvám*, 2 syll. in RV) > *tuóm > PT *tuwé > TA *tu;* unstressed *tuwë > TB *twe*.

Finally, it is possible that word-initial *CuV-, *CiV- of any origin became PT *CwV-, *CyV-, at least when *V was not a high vowel (see immediately below); for the (ambiguous) evidence see **26**.

A sequence *uXi seems to have occurred in at least one stem, namely PIE *suXiw- 'son' (Peters 1980:253 fn. 210; cf. Hom. Gk. gen. sg. υἷος < *suywos < *suXiw-os), a derivative of *suX- 'give birth' (see **12**). The complex development of *suXiw- in Tocharian is discussed at length in **25**.

Notes.

1. That the PIE 1sg. mediopassive ending was secondary *-xe, primary *-xe-r has finally been demonstrated by Melchert 1989a:1, 1989b, 1992:44-8. The crucial form is Lycian 1sg. pret. mp. *a-xagã* 'I became' (lit. 'I was made, *factus sum*'), whose ending is cognate with Hittite *-hhahat* plus a particle; the vowel of the final syllable can reflect PA *a < *e next to PIE *x, but not PA and PIE *o (which would give Lycian *e*). PIE *-xe(r) can also account for the vowels of Gk. primary -μαι, secondary -μᾶν (> Attic-Ionic -μην) and PT primary *-mar, secondary *-ay (→ TB *-mai;* > TA *-e* → *-we?*—but see now the discussion of K. Schmidt and Winter 1992:54-5).

2. Many PIE lengthened-grade nominatives of masc./fem. singulars and lengthened-grade nom./acc. forms of collectives (→ neut. plurals) lacked the stem-final resonant. This is clearly the case for barytone n-stem forms (cf. Lat. *homō* 'human being', etc.; Skt. *rā́jā* 'king', etc.; Hitt. *hāras* 'eagle' < *xʷéro + *-s) and for the barytone nom. sg. forms of holokinetic i-stems (cf. Skt. *sákhā* 'companion' < *sókʷ-xo, Gk. πειθώ 'persuasion' ←< *bʰéydʰ-o). For other stem-classes, however, the evidence is less clear. In general I discount the evidence of Greek, whose regular final resonant can easily be the result of analogical change; to some extent I also discount Indo-Iranian and Balto-Slavic, whose regular absence of a final resonant can IN PART be analogical as well. Unfortunately there is no guarantee that the evidence of any other branch of IE is reliable either, since all forms of paradigms are constantly vulnerable to analogical change, and since the changes that would be involved are natural and repeatable. We can only try to estimate the likelihood that any particular reconstruction is correct. Hysterokinetic n-stem masc./fem. nom. sg. forms are a case in point. As Harðarson 1987:119-21 observes, we find final *-n in these forms both in Italic and in Anatolian, e.g. in Lat. *liēn* 'spleen' (cf. Skt. *plīhán-*) and in Hitt. *sumanz* 'cord' < *syuX-mén + *-s (cf. Gk. ὑμήν 'membrane'), and it is true that those two branches of IE hardly ever share innovations; it therefore seems reasonable to reconstruct nom. sg. forms of this class in *-én, and I accordingly reconstruct PIE *uksén 'bull, ox'. However, I do not thereby deny that the PIE form might actually have been *uksé (cf. Skt. *ukṣā́*, Av. *uxša*).

5. Word-initial *XC-.

In Tocharian, as in most IE languages, initial laryngeals before nonsyllabics were lost. Note the following examples:

PIE *ḱnéʰxʷmn̥ 'name' (see **3**; for the initial laryngeal cf. Arm. *anun*, Lakonian Gk. *ἔνυμα in Ἐνυμακρατίδᾱς) > PT *ñémə > TB *ñem*, TA *ñom;*

PIE *xster- 'star' (Hitt. *hasterz*, Gk. ἀστήρ, etc.; Watkins 1974) > PT *ścər- in pl. *ścərʸn̥ñə > TB *ściriñ*, TA *śreñ;*

PIE *xweḱ- 'blow' > *xwē- (Gk. ἄησι, Skt. *vā́ti* '(wind) blows'); participle *xuḱ-ónt-s 'wind' (Hitt. *huwanz* (?); but see Melchert 1994 §3.1(5)) → derivative *xwéḱn̥tos (Skt. *vā́tas*, Mayrhofer 1987:97 fn. 43 with bibliography) >→ *xwēntós (a further derivative, with vr̥ddhi and accent-shift?; Goth. *winds*, PC *wīntos > *wintos > Welsh *gwynt*) > PT *wʸenté > TB *yente*, TA *want;*

PIE *xʷnogʰ- 'fingernail, claw' (Gk. ὄνυξ, OE *nægl;* Lat. *unguis* < *xʷn̥gʰ-w-, Rix 1969:96) > *nëkʰ- → *nëkʰu- (see **43**, note 1) >→ PT pl. *mëkuwa 'fingernails' > TB *mekwa*, TA *maku* (Krause 1951b:203, 1956:196);

PIE *xʷreǵ- 'be/move in a straight line' (Gk. ὀρέγει '(s)he reaches', Lat. *regit* '(s)he directs'; cf. Hitt. *harganāu* 'sole (of the foot)', Weitenberg 1984:223-4) >→ PT *rək- 'reach, extend' (with analogical loss of palatalization, see **55**), e.g. in pret. ptc. *rërókuwə > TA *rarku*, pres. ptc. mp. *rəksëmanë > TB *räksemane;*

PIE *Xyewdʰ- ~ *Xyudʰ- 'be excited' (Skt. *úd . . . ayodhan* 'they leaped up in anger', Hom. Gk. ὑσμίνη 'press of battle', Lith. *judė́ti* 'be agitated') + pres.

*-sḱé/ó- >→ *yutsk- > PT *yutk-a- 'be worried' > TA *yutkä-* in pres. 2sg. *mar yutkatär* 'do not worry', etc. (Jasanoff 1975:111, Melchert 1977:123-4; cf. Schneider 1941:47; on the initial laryngeal see note 2 below).

The PIE initial laryngeal is less securely reconstructable in the following:

PIE *x́néwn̥ 'nine' (Gk. ἐννέα, Arm. *inn*, Skt. *náva*) > PT *ñúwə > TB, TA *ñu* (but both the Greek cognate and the Armenian exhibit considerable irregularities; Mayrhofer 1986b:126 fn. 115 doubts the initial laryngeal, but see now Peters 1991b);

PIE *x́rudʰrós 'red' (Gk. ἐρυθρός, Lat. *ruber*) > PT *rətrə̄ > TB *ratre*, TA *rätär*;

(post-)PIE *x́ludʰét '(s)he arrived' (aor. inj., > OIr. *luid* '(s)he went'; cf. Gk. ἦλυθε '(s)he came' with augment) > PT *ləcó '(s)he went out' > TB *lac*, TA *läc* (Cowgill apud Winter 1962b:22 with fn. 3);

PIE *x́ln̥gʷʰ- 'light' (Gk. ἐλαχύς 'little', ἐλαφρός 'light, nimble', Skt. *raghús* 'swift', *laghús* 'light') > PT *lən̥(k)ʷ- (see **17**) in TB *lañktse* (Van Windekens 1941:54);

PIE *xmelǵ- ~ *xml̥ǵ- ~ *xmolǵ- 'milk' (verb; Gk. ἀμέλγειν, Lith. *mélžti*) > PT *məlk- ~ *mëlk- in TB *malkwer*, TA *malke*, both 'milk' (noun);

PIE *xpélos '(a) wound' (Gk. ἄπελος 'open wound') > PT *pʸólə̄ > TB *pīle*, TA *päl* (Van Windekens 1949:301, 1966:256);

PIE *xʷbʰruX- 'eyebrow' (Gk. ὀφρῦς, Skt. *bhrúš*) >→ PT *pərwa- (see **13** and **65**) > dual TB *pärwā-ne*, TA *pärwā-ṃ*.

The loss of these laryngeals evidently occurred before the PT stage, since neither Tocharian language shows any trace of them. Further chronological precision is impossible, because this change does not interact with any other pre-PT sound change.

Notes.

1. The above examples refute the contention of Adams 1988:18, 33 that laryngeals gave PT *a when word-initial before obstruents. It is possible that PT *aks- 'proclaim, teach' does reflect a zero-grade form of PIE *eḱǵ- 'say' (Adams 1988:33, cf. Van Windekens 1976:159 with bibliography); but if it does, the *a- must be analogical, since it cannot be the sound-change reflex of PIE *x́-. For further discussion see **14** and **53**. That TB /aksa-/ 'wake up' is cognate with Gk. ἀκούειν, Goth. *hausjan* 'to hear' (Adams, loc. cit.; Van Windekens, loc. cit.) is scarcely possible; the semantic fit is poor, and the Greek and Gothic verbs can only reflect a PIE stem *xḱ-xows-ié/ó- 'prick up one's ears', not "*xkews- ~ *xkus-" or the like.

2. I reconstruct PIE *Xyewdʰ-, etc. on the evidence of the Greek reflexes, since it seems clear that at least some PIE *Xy- > Gk. /h-/; see especially Peters 1976. Schindler 1986 also points out that Skt. pres. 3sg. *yájate* 'he worships (with sacrifice)', perfect 3sg. *ījé* 'he worshipped' < *Xi-Xiǵ- and Gk. ἄζεσθαι 'show (religious) respect', ἁγνός 'holy, (ritually) pure', etc. point unequivocally to a root *Xyag- 'perform religious rites'.

6. Word-initial *XR̥- (not including *Xi- and *Xu-).

There is little evidence for the development of initial laryngeals before syllabic resonants in Tocharian. One of the clearest cases is

PIE *xn̥tbʰóx́ 'both' (see **3**) > *antbʰṓ > *antpʰṓ > PT *antpú > TA fem. *ämpu-k* (cf. Jasanoff 1976:125-7).

As Jasanoff has demonstrated (loc. cit.), the first element of this word is the stem *xent- 'front, forehead' (Hitt. *hant-*). The ablaut appears to be parallel to that of the adverb *xn̥tbʰí 'on both sides' (Gk. ἀμφί, Skt. *abhí*), which indisputably contains a zero-grade root; the accent of Gk. ἄμφω, gen./dat. ἀμφοῖν is not counterevidence, since it is very likely to be analogical to that of δύο, gen./dat. δυοῖν 'two' (on which see Cowgill 1985:13, 25-6). Both *-bʰ-forms seem to have been dissociated from *xent- at a very early date, so that analogical influence from the full-grade stem *xent- is unlikely. Thus there is a preponderance of evidence suggesting that the first syllable of PT *antpú reflects PIE *xn̥t- rather than *xent-, and 'both' is a fairly good example of PIE *xn̥- in Tocharian.

Note that the laryngeal in this word has apparently been vocalized to *a, the syllabic nasal *n̥ becoming nonsyllabic *n (automatically?). 'Both' thus appears to be a Tocharian example of Rix's Law, the sound change established for Greek (and in part for Latin) by Rix 1969, by which PIE word-initial *XR̥- > *VR-.

Unfortunately the other relatively clear example of *XR̥- in Tocharian flatly contradicts the evidence of 'both'; still worse, the counterexample also involves the PIE sequence *xn̥-:

PIE zero-grade *xn̥ǩ- 'reach (a place), bring' > *n̥k- > *ənk- (see **29**) > PT *ëṅk- (see **44**) > TB *eṅk-* 'grasp', e.g. in pres. 3sg. *eṅkastär*, subj. 3sg. *eṅktär*.

The PIE full grade was *xne(n)ǩ-; compare the following forms:

aor. 3sg. Skt. *ā́naṭ* '(s)he has reached/brought', Gk. ἤνεγκε '(s)he brought' ←< *é-xneǩ-t;

pf. 3sg. Skt. *ānáṃśa* '(s)he reached/brought', OIr. (pret.) *t-ánaic* '(s)he came' < *xe-xnónǩ-;

Gk. adj. διᾱνεκής 'continuous', bahuvrihi compound of διά 'through' and s-stem *ἄνεκος '(act of) bringing' with Wackernagel lengthening of the latter's initial vowel.

The Tocharian verb cannot reflect such a full grade, nor could it have developed from a secondary "*xenǩ-" (which would give PT "*aṅk-"). Note further that the Gk. adjective and the OIr. preterite show clearly that the PIE laryngeal was *x (the initial vowel of the Gk. aorist stem ἐνεγκ- reflecting short vowel assimilation across a resonant, see Peters 1977:67 and Mayrhofer 1982b:191 fn. 51 with bibliography; I am not convinced by Meier-Brügger 1987). Finally, we might expect to find a zero-

grade root in the Tocharian sk-present (at least if it is relatively old), and in the athematic subjunctive except for the active sg. forms (Cowgill 1967:171-5). Thus there is a preponderance of evidence that TB *eṅk-* reflects PIE **xɒ̯ḱ-*, and it is clear that the laryngeal in this root has been dropped rather than vocalized. (See also note 1.)

None of the apparent parallels that can be cited for either development of **XR̥-* in Tocharian is probative. Vocalization of the laryngeal, as in 'both', could have occurred also in the Tocharian word for 'white':

TB *ārkwi*, TA *ārki* 'white' < PT **arkw-i-* < **argu-* ←< PIE **xérgu- ~ *xr̥géw-* (Caland adjective; cf. PIE **xr̥grós* in Skt. *ṛjrás*, Gk. ἀργός 'shining, white', **xr̥gi-* in Hitt. *harkis* 'white');
but it is just as likely that the full grade of this root has been generalized in Tocharian (cf. Normier 1980:253, Hilmarsson 1986:100, 171). An initial laryngeal might have been dropped in the word for 'black':

TB obl. sg. masc. *erkeṃt*, TA nom. pl. masc. *arkaś* 'black' < PT **ërkʷënt- < *r̥gʷónt-* (see **29** and **44**) < PIE **(x́)r̥gʷ-ónt-* 'dark' (Krause and Thomas 1960:57, 66; cf. **(x́)régʷ-os* 'darkness' in Skt. *rájas* 'empty space', Arm. *erek* 'evening', Gk. Ἔρεβος 'hell', Goth. *riqis* 'darkness', and see also note 2);
but it is not certain that this word exhibited an initial laryngeal in PIE (Mayrhofer 1982b:186 fn. 30 with bibliography). Other putative examples of **XR̥-* are too improbable to be worth mentioning.

In sum, we do not even know what the regular outcome of PIE **XR̥-* in Tocharian was, let alone the relative chronology of the changes involved.

Notes.

1. It is at least thinkable that PT **ëṅk-* 'grasp' reflects **onk-* < post-PIE **xonḱ-* (as suggested tentatively by Jay Jasanoff, p.c.); such an ablaut grade also appears in the Old Irish perfective present *t-uici* '(s)he can bring, (s)he understands' < Prim. Ir. **to h-uggīt* < PC **onkīti*. But note that the o-grade of the latter form makes morphological sense if the stem was originally an intensive or causative (**onk-ī- < *onk-éye-*, formed by productive rule to zero-grade **ŋk- < PIE *xɒ̯ḱ-*, whence the anomalous position of the **o*—but see also immediately below); by contrast, there is no obvious justification for an o-grade root in the Tocharian verb. Alternatively, we could posit PT **eṅk- < *ēnk- < *xënḱ-*, comparing Hitt. *hi-(in-)ik-zi /ḫēnktsi/* '(s)he offers, (s)he grants' (see Peters 1975:41, Oettinger 1979: 171-7, Melchert 1994 §6.1.5.15 with bibliography) and perhaps OIr. *t-icc* 'comes', *-ricc* 'reaches, arrives' (McCone 1991:48-51); but we do not expect to find such an ablaut grade in the Tocharian forms (see above).

2. **(x́)regʷ-* might have been a present stem meaning 'be dark' or an aorist meaning 'get dark', in which case **(x́)r̥gʷónt-* would once have been the participle; but **-ónt-* could also be the Caland adjective suffix that appears in Skt. *bṛh-ánt-* 'lofty', etc. (as Jay Jasanoff reminds me). It seems extremely unlikely that the Tocharian

word reflects **xerǵ- ~ *xr̥ǵ-* 'white' (pace Hilmarsson 1986:170-1), especially since the latter survives as such in Tocharian.

7. **Xi* and **Xu* sequences.

Examples of PIE **Xi* and **Xu* in Tocharian are hard to find, in part because it is often difficult to determine the original ablaut grade which Tocharian forms reflect. For example, TB */wəs-/* 'rest, stay' (pres. 3sg. *wsaṣṣäṃ*, etc.) < PT **wəs-* might reflect **us-* by regular sound change (see **50**), and **us-* must then reflect PIE zero-grade **xus-* 'spend the night' (cf. Hom. Gk. pres. ἰαύειν < **xi-xus-*?); but the **w* of **wəs-* might also have been depalatalized by analogy (see **55**), so that **wəs-* could reflect the old e-grade: **wəs- ← *wy̆əs- < *wes-* (see **46** and **50**) < PIE **xwes-* (cf. Hom. Gk. aor. νύκτ' ἀέσαι 'stay the night').

A clear instance of PIE **x́i-* is the following:

PIE (zero-grade) **x́i-* 'go' (Gk. i-έναι, etc.) > **i-* > PT **yə-* > TB */yə-/*, TA *yä-*, e.g. in PT inf. **yətsi* > TB *yatsi*, TA *ytsi* (on the initial laryngeal see Peters 1980:103-6).
The laryngeal has apparently been lost, and the loss must have occurred before the complex restructuring of the vowel system (see **50**), which included the change of initial **i* to **yə*, but of noninitial **i* to *ə* with palatalization of the preceding consonant. (See also note 1.)

There are two words which appear to contain **x* between a consonant and a high vowel; neither example is completely certain, and each requires some discussion. The simpler case is the Tocharian word for 'fire', whose development I reconstruct as follows:

PIE **péxwōr* collective 'fire' (Schindler 1975b:10) → **pxuō̆r* (see below) > PT **puwár* (= */pəwár/*, see **52**) > TB *puwar*, TA *por*.
(I write **pxuō̆r* rather than **pxwō̆r* because I think it likely that the high vowel would automatically be syllabic after an initial stop-plus-fricative cluster; however, we should not exclude the possibility that this post-PIE form would have been syllabified as **pᵉxwō̆r*. See further below, and cf. **14**.) For the replacement of PIE **péxwōr* by **pxuō̆r* a close parallel can be adduced:

PIE **wédōr* coll. 'water' (Schindler 1975b:3-4) → **udō̆r* > Skt. pl. *udá́*, Gk. sg. ὕδωρ (with the recessive accent that is productive for Gk. neuter consonant stems).
(A similar change is the replacement **wédōr → *wedō̆r* > Hitt. pl. *widār*, though in that case the ablaut has not been adjusted to the accent pattern.) It seems necessary to assume this sort of replacement for Tocharian because **pxuō̆r* is the only preform that will account for the shape of the TB word; PIE **pex-* would have become **pā-*, which would give PT **po-* (see **42** and **50**), while **pox-* would have become **pō-*, which would give PT **pa-* (see **40** and **50**), and neither reflex could pr[illegible] resulted in TB *pu-*. Of course one could also posit much more complex

changes that would give the same result, but I doubt that any would be more plausible than what I have suggested. TA *por* is often thought to reflect a preform with a full-grade initial syllable (see e.g. Schindler 1967b:242-4 with bibliography). But the preservation of original ablaut in Tocharian nouns is rare (except for the nom. sg. of nonneuter consonant stems, Marggraf 1975:201-2), and it seems preferable to refer both attested words to the same PT form if possible. (See further **A22** on the development of the TA word.)

A more complex case is TB *skiyo* 'shadow', whose development I reconstruct as follows:

PIE *sḱxiéx- (*sḱ$_e$xyéx-?; see above) 'shadow' (Gk. σκιᾱ́, Couvreur 1950:128) > *skxiā́- >→ PT *skiyá- (= */skəyá-/, see **52**) > TB *skiyo*, obl. *skiyai*. The etymological connections of this word are clear enough (see note 2), but its phonology is puzzling; particularly surprising is the apparent failure of *i to palatalize the preceding consonant cluster (cf. **47**). It seems to be true that we have no other certain examples of PIE *ḱ or *k (or indeed any palatal or velar) before *i, and we could simply assert that *i did not palatalize these sounds in Tocharian (Normier 1980:256 fn. 19; cf. also Hilmarsson 1986:48). But it is clear that *i palatalized most other consonants, possibly including even *r (see **47**); and since dorsals are normally among the consonants most easily palatalized, it is phonetically very implausible to suggest that they resisted palatalization when other consonants did not. (Sara Kimball (p.c.) suggests that this may be an implicational language universal.) Nor is it likely that the *s caused the following *k to remain unpalatalized or to lose its palatalization subsequently (Hilmarsson 1986:335), since *sC clusters in general are subject to palatalization in Tocharian (see **47**). We must seek an alternative explanation, and the probable PIE inflection of this word offers one. If OCS *sěnĭ* 'shadow' < PBS *šainis is related, and if Gk. dat. pl. σκαιοῖς 'shadowy' is to be taken seriously (see note 3), the PIE stem is likely to have been *sḱexi- (see note 4 on the identity of the laryngeal); the noun from which Skt. *chāyā́* and Gk. σκιᾱ́ 'shadow' are descended can then be plausibly reconstructed as a collective in *-x with proterokinetic ablaut: nom. sg. *sḱéxi-x, gen. *sḱxi-éx-s, etc. (cf. already Debrunner and Wackernagel 1930:113-4; for the ablaut cf. *ḱer-x- 'head-bone', Nussbaum 1986:46, 106-9). Both Sanskrit and Greek have generalized the full grade of the suffix, making the word a regular ā-stem; but Sanskrit has generalized the full grade of the root, whereas Greek has generalized the zero grade. The Tocharian development can be reconstructed in at least two different ways:

a) possibly the ablaut alternation survived for a considerable period of time (at least in the root), resulting in pre-PT *skā́ya- ~ *skiā́- or the like; after palatalization (see **46** through **48**) the stem would be approximately *skóya- – *ṣiá- (the latter alternant perhaps with *-á- on the analogy of the former, but see **41**; a further development might have been *skó- – *ṣiá-, if intervocalic *y was lost—see **22** and **23**), and analogical levelling could then conceivably result in PT *skiyá-;

b) alternatively, PT *skiyá- simply reflects the PIE oblique stem *sḱxiéx- (see **41** on the stem-final vowel), in which case the laryngeal must have survived as some nonfront segment until after palatalization had run its course.

I have opted for the second alternative because it requires the reconstruction of fewer changes for which there is no independent evidence. However, it should be remembered that palatalization was a relatively late pre-PT change; that any laryngeal could survive until palatalization had run its course is very surprising—unless the laryngeal had already become *a (see **14**), as this one had not. Considerable caution is therefore advisable in drawing inferences from the shape of TB *skiyo*.

If the development of these two words has been reconstructed correctly, it would seem that PIE *(C)CxiV-,*(C)CxuV- gave PT *(C)CiyV-, *(C)CuwV- (phonemically */(C)CəyV-/, */(C)CəwV-/, see **52**), and that the high vowels of the PT forms MIGHT have developed only after palatalization had run its course. Since the individual sound changes which gave this eventual result are not recoverable with certainty, definite statements about the chronology of changes are out of the question; but at least the following conditional inferences might be made.

Laryngeals between syllabics normally became *a (see **14**). For some reason the two words under discussion were exempt from this change; perhaps the most likely reason is that the relevant sequences were still *Cxi-, *Cxu- when interconsonantal laryngeals became *a. However, it is at least possible that laryngeals simply failed to become *a before *y and *w; in that case 'shadow' and 'fire' could have contained sequences *Cəy-, *Cəw- even after the general change of laryngeals to *a in pre-PT (no matter what the PIE syllabification had been). But if *y was lost between *ə and a following vowel in Tocharian (see **23**), these words cannot have contained *ə when that loss occurred, since in that case all forms of 'shadow' would have lost their *y. Nor is it likely that 'shadow' was *skiā́- or the like (with *i in contact with *k) at that time, because (a) the attested sequence *ski-* cannot have arisen until palatalization had run its course (since any *ski- existing at the time of palatalization should have undergone it; see above), and (b) it is very likely (though unfortunately not demonstrable) that palatalization FOLLOWED the loss of *y in *əyV-sequences, given that palatalization was a relatively late change. It would then follow that the laryngeal in these words was still consonantal when intervocalic *y was lost. But we must keep in mind (a) that the loss of intervocalic *y is itself doubtful, and (b) that my reconstruction of almost every step in the prehistory of PT *skiyā- is less than certain; therefore the inferences just drawn can hardly be more than working hypotheses.

Notes.

1. Henry Hoenigswald points out that the change *ḱi- > *i- is not susceptible of strict proof, since we have no examples of PIE *i- in Tocharian with which to compare this example of *ḱi-; in effect, we cannot completely exclude the possibility that the *y- of PT *yə- is the reflex of PIE *ḱ-. It is very likely, though, that the de-

velopment I have posited did occur, given that PIE *i and *e merged in PT and given that PIE word-initial *e gave PT *yə- (see **50**).

2. A connection of TB *skiyo* with the Germanic family of OE *scūwa* 'shadow' is impossible (pace Ringe 1987a:130 fn. 33 (b) and Adams 1988:46 fn. 34); OE *scūwa*, etc. clearly reflect PIE *skewX- ~ *skuX-, and no such sequence can underlie the first syllable of *skiyo* (see **12** and **14**).

3. Gk. σκαιοῖς occurs only in Nikandros' *Theriaka* (line 660, at the beginning of the line); the scholion glosses the word as σκιεροῖς, ἀνηλίοις, καὶ σκιὰν ἀποτελοῦσι (Crugnola (ed.) 1971:246). Editors generally emend to σκοιοῖς, following a suggestion of J. G. Schneider. But that conjecture apparently rests on a comparison with Hesykhios' glosses σκοιά and σκοιόν; and while the former, at least, is glossed as σκοτεινά, the wide range of meanings given for each of the two words indicates that Hesykhios (or his source) had no clear idea what they meant, which makes the glosses more than usually unreliable (see M. Schmidt (ed.) 1862 s.vv.). It seems better to retain σκαιοῖς—the only reading with manuscript support —in Nikandros.

4. The evidence for the identity of the root-internal laryngeal in *sḱexi- is conflicting. Gk. σκαιοῖς 'shady' (see note 3) points to *x; so does OCS *sěnĭ* 'shadow, shade', since a PBS preform *šainis can reflect *sḱexi-, while "*šēnis", the other possible PBS preform, seems to be irreconcilable with a PIE ancestor containing any sequence *-eXi-. OE *scima*, OS *skimo*, MHG *scheme*, all 'shadow', can reflect *sḱxi-. On the other hand, the Germanic family of Goth. *skeinan* 'to shine', *skeirs* 'clear', OE *scīma* 'light, radiance', ON *skí* 'jugglery', etc. (all of which contain PG *ī), as well as OCS *sijati, sinǫti* 'to shine' and Latvian *seja* 'face', etc., cannot reflect *sḱexi- but could reflect *sḱeḱi- or *sḱei-. I have chosen to regard these latter forms as reflexes of a different root (possibly post-PIE), since they seem to denote light rather than shadow. Only Latvian (dial.) *sejs* 'shadow' (Endzelins 1939: 113-4) exhibits the semantics of the first group and the sound structure of the second; I do not know enough about Latvian to suggest an explanation. (Greek σκηνή, Doric σκᾶνᾶ 'tent' and its close kin should be excluded, since they cannot reflect a PIE root ending in *-i-; the OCS rhyme-words *těnĭ, stěnĭ* 'shadow' are so beset with problems of their own that they can offer no assistance (see Walde and Pokorny 1927:536 with bibliography).) Other solutions are possible (cf. e.g. Mayrhofer 1990 s.v. *chāyā-*, who proposes *sḱeḱi- for 'shadow').

8. *ṚXC (not including *iXC and *uXC).

A laryngeal preceded by a syllabic liquid or (probably) a syllabic nasal and followed by a nonsyllabic was lost (Schindler 1967b:239-42; cf. also Winter 1965a: 204-6, K. Schmidt 1982:363-4). The following examples seem certain:

PIE *pr̥Xwós 'first' (Skt. *pūrvas*, cf. Lith. *pìrmas*) > *pr̥wós > PT *pərwḗ, the derivational base of TB *parwe, yparwe* 'at first', *pärweṣṣe* 'first', TA *pärwat*

'eldest';

PIE *g^{w}r̥xwón- 'millstone' (cf. Lith. *gìrnos* 'hand-mill' and with full-grade root Skt. *grā́van-*) > *g^{w}r̥wón- > PT *k^{w}ərwḗn- > TB *kärweñe* 'stone' (Van Windekens 1960:39-40);

PIE *pl̥x́nós 'full' (Skt. *pūrṇás*, Lith. *pìlnas*) > *pl̥nós > PT *pəllḗ, the derivational base of TB *pällent* (obl.) 'full moon' (Winter 1965a:205-6).

A fourth example is reasonably likely:

PIE *ǵn̥x́yétor '(s)he is being born' (OIr. *-gainethar* and with innovative ending and accent Skt. *jā́yate*) > *gn̥yétor > *gənyétur (see **36**) > PT subj. *kəñ̃ñətər 'it will happen' (accent problematic, cf. Marggraf 1970:18-22) > TB *k(a)ntär* (see Ringe 1991b:139; Hackstein 1993b:172-4 argues persuasively that this form is a subjunctive to pres. 3pl. *knaskentär*, etc., which because of its accent cannot be a causative).

However, we cannot exclude the possibility that TB *k(a)ntär* reflects PT *kəñ̃ətər ←< *génetur < PIE aor. subj. *ǵénx́etor '(s)he will be born' (with analogical depalatalization of the initial consonant, see **55**; so Hackstein 1993b:178-80); and I can find no other plausible examples of the sound change under discussion that involve a syllabic nasal.

Syllabic resonants eventually gave PT *əR (see **29**), which at the PT stage was clearly a diphonemic sequence of vowel plus resonant. But laryngeals between original NONsyllabic resonants and consonants were never lost (see **14**); apparently, then, the loss of laryngeals after syllabic resonants occurred while syllabic resonants were still unitary phonological entities (though they might already have been *[əR] phonetically). It is difficult to determine exactly when syllabic resonants became diphonemic */əR/, but we do have a *terminus ante quem*—or rather a pair of *termini:* when the fall of final nasals eliminated the consonantal portion of word-final *-ən, *ə thereby became an independent phoneme if it was not one already (see **32**); and when *ə became common in many phonotactic positions in the loss of distinctive vowel length (see **50**), *ə thereby became an independent phoneme if it was not one already. (The problem is that we cannot be completely sure which of those changes happened first; see **29**, note 1, and **33**.) It should follow that laryngeals following syllabic resonants were dropped before the fall of final nasals or before the loss of distinctive vowel length—whichever occurred first. (A sound change /əRX/ > /əR/, where /X/ is the reflex of a laryngeal, is of course not impossible, but it seems much less likely.)

Note that if loss of laryngeals did not take place after syllabic nasals, the chronology just proposed is NOT thereby called into question: when *ə became a phonemically distinct segment (as a result of any change), phonetic *[ər] and *[əl] would automatically have been reanalyzed as sequences of two segments.

Notes.

1. Of the examples adduced in support of a change PIE *RX > PT *Ra, PT *kna- 'know' (TA *knā-*), *aknát^{s}a 'ignorant' (TB *aknātsa*, TA *āknats*) can reflect full-grade *ǵnō- < PIE *ǵnex^{w}- (Winter 1965a:191 fn. 6, Normier 1980:254; see **3**); TB *krāmär* 'burden' probably reflects *g^{w}rō-m(V)r- with *g^{w}rō- < o-grade *g^{w}rox- (see **3**; the ablaut grade of *krāmär* was questioned already by Schindler 1972:149). Other examples rest on unconvincing etymologies. I also reject the etymologies which Adams 1988:32 adduces in support of a sound change "*RX > *Rə".

2. K. Schmidt 1988 makes the interesting suggestion that the PIE sequence *ǫx gave PT *əṅk. Unfortunately I find it difficult to accept the etymologies that Schmidt adduces in support of his proposal. His derivation of PT *kətk- 'go past, transgress, elapse' from PIE *d^{h}eg^{wh}- 'go past, miss (a mark)', perhaps the most important piece of evidence (K. Schmidt 1988:472-6), is especially difficult for phonological reasons: one must assume a development PIE (pres.) *d^{h}g^{wh}-ǫx- > *tk-əṅk- → PT *kt-əṅk-, with a metathesis for which there is no clear parallel, and he does not explain the complete absence of labialization in the first velar of the PT form —which is surprising if the word reflects a PIE lexeme containing a labiovelar (see **A14**, **A15**, **B28**, and Ringe 1991b:138-44). I continue to prefer the explanation of Tocharian verb roots in *-tk-* advanced by Jasanoff 1975:111 and Melchert 1977, viz. that they reflect original present stems in *-sḱé/ó- made to roots ending in apicals, the sequence *-Tsḱ- yielding PT *-tk- (see further **27** and **31** for the sound changes involved). However, if more convincing evidence for K. Schmidt's hypothesis can be advanced, his proposed sound change should be accepted, as there seem to be no counterexamples (note that *ǵǫx́yétor contains *x́, and that TB *k(a)ntär* might not reflect PIE *ǵǫx́yétor in any case).

3. It would be thinkable to derive the alternative PT subj. *kənétər 'will happen' (TB *knetär*, TA *knatr-*) rather than TB *k(a)ntär* from PIE *ǵǫx́yétor (see **23** and **51** for PT *é < *əyé/ó). But PT *kənétər could also have arisen analogically long after the phonological developments affecting laryngeals, given the existence of several semantically related verbs with the same type of subjunctive (cf. TB *ksentär* 'they will be extinguished'; TB *cmetär*, TA *cmatär* '(s)he will be born'; TB *nketär*, TA *nkatär* 'it will disappear'), whereas there is no such analogical source for TB *k(a)ntär*.

9. The sequence *ix before consonants and word-finally.

Preconsonantal and word-final *ix became *ya ~ *ia (cf. Winter 1965a:190). The alternation between the monosyllabic and disyllabic reflexes may originally have been conditioned by Sievers' Law (see **4**), but analogical changes have obscured their distribution (see Ringe 1991b:154-5), and even sound changes have contributed to the confusion (see **27** and **65**).

The clearest examples of the reflex *ya include an isolated lexeme and several examples of the feminine suffix that reflects PIE fem. *-ix:

PIE *d^{h}ixg^{w}- 'stab' (Lat. *fīgere*, OLat. *fivere* 'to fix (a long object) in, to fasten (with nails, etc.)'; Lith. *dýgti* 'to sprout', *dygùs* 'pointed, sharp') > *t^{h}yag^{w}- >*t^{s}ag^{w}- (see **34**) > PT *t^{s}ak^{w}-(a-) > TB /t^{s}aka-/ 'bite (of snakes), put out (the eyes), cause pain', e.g. in ptc. *tsatsākau* '(with his eyes) put out' (Ringe 1991a:71; see also note 1 below);

PIE *pántix fem. 'all' (Gk. πᾶσα) > *pántya > PT *pónt^{s}a (see **34**) > TA obl. *ponts-āṃ;*

pre-PT *(wə)lant-ya 'queen' > PT *lant^{s}a (see **34**) > TB *lāntsa*, TA *lānts* (cf. TB, TA *lānt-* 'king', nom. sg. TB *walo*, TA *wäl*);

pre-PT *arkwən-ya fem. 'white' > PT *arkwəññə (see **48**) > TB *arkwaññə*, TA *ārkiṃ* (see **A10** and **A11**; cf. masc. TB *ārkwi*, TA *ārki*, see **6**);

pre-PT *t^{s}ën-ya fem. 'blue' > PT *t^{s}ëññə (see **48**) > TB *tseññə* (cf. masc. *tseṃ;* but TA *tseṃ*, fem. pl. *tseññāñ* is probably a loan from TB).

TB feminines in *-ntsa* (TA *-ṃts*) of adjectives in *-nt-* also reflect *-ya. Feminines of the type TB *klyomñə*, TA *klyomiṃ* 'noble' (masc. TB *klyomo*, TA *klyom*) likewise seem to belong here; but it is difficult to account for the single *ñ* and syncope in the TB forms, and it is perhaps equally likely that TB feminines in *-m-ñə* (at least) are late analogical creations.

The most straightforward examples of the reflex *ia all involve the feminine suffix:

pre-PT *ladr-ia fem. 'beloved' > PT *lar^{y}iya (see **27**) > TB *lariya;* the masc. is TB *lāre* < PT *laré < PIE *ladrós (cf. Lycian *lada* 'wife'; Winter 1965a:191);

PT *tuc-iya fem. 'yellow' > TB obl. *tuciya-i* (masc. TB *tute* < PT *tutë);

PT *yol^{y}-iya fem. 'evil' > TB obl. *yolyiya-i* (masc. TB *yolo* < PT *yolo).

There are also examples of *ia > *iya preceded by *Cr that have been obscured by a sound change, liquid metathesis (see **65**):

PIE *k^{w}rix- 'buy' (Gk. aor. 3sg. ἐπρίατο '(s)he bought', Skt. ptc. *krītás* 'bought') > *k^{w}ria- > *k^{w}r^{y}iya- > PT *k^{w}ər^{y}ya- > TB /kərya-/, e.g. in pret. 1pl. *käryämte* 'we bought' (K. Schmidt 1982:364-5); post-PIE derived noun *k^{w}rix-w$_{r}$ > *k^{w}riawər > *k^{w}r^{y}iyor > PT *k^{w}ər^{y}yor 'trade' (Þórhallsdóttir 1988:193-4; see **64** for the contraction) > TB *karyor*, TA *kuryar;*

PIE *tríx neut. 'three' (Gk. τρία, Skt. *trī*) > *tria > *tr^{y}iya > PT *tər^{y}ya fem. 'three' > TB *tarya*, TA *tary > *tərəy > *trəy > *tri* (see **A8**, **A16**, and **A20**);

PIE *tríx (d)ḱómt 'three tens' (cf. Gk. τριάκοντα with innovative neut. pl. ending) > *triakā > *tr^{y}iyaka (see **32** and **40**) > PT *tər^{y}yaka 'thirty' > TB *täryāka* (Schindler 1967b:240; the *a* of TA *taryāk* does not correspond);

pre-PT *rətr^{y}-iya fem. 'red' > PT *rətər^{y}ya > TB *rtarya*, TA gen. sg. *rtäry-e;* the masc. is TB *ratre*, TA *rtär* < PT *rətré < PIE *x̌rud^{h}rós (see **5**).

Feminines of other PT adjectives in *-Cré follow the same pattern. It seems clear that

*larʸiya 'beloved' (and presumably *swarʸiya 'sweet', of which no reflex is attested) escaped metathesis, and so preserved the disyllabicity of its feminine suffix, only because *d had disappeared before consonants by the time that metathesis occurred (see **27** and **65**).

From the first few examples cited it is clear that the repartition of *ya and *ia was fixed before the change of *t(ʰ)y to *tˢ (see **34**); the pattern of the feminines to PT adjectives in *-rə́ shows that *ia had been generalized after *Cr before the loss of preconsonantal *d (see **27**). The change of PIE *ix to *ya ~ *ia must therefore predate those two changes.

Notes.

1. So far as I can determine, TB /tˢaka-/ never means 'bite' in the usual sense of the word; when not expressing the abstract concept 'cause pain', it is always used of injuries inflicted with a stabbing motion. That is one good reason not to posit a connection with Gk. δάκνειν 'to bite'; the other is that δάκνειν probably reflects the zero grade of a PIE root *denḱ- (see Pokorny 1959 s.v.; the future δήξεσθαι can have analogical ablaut).

2. It is at least thinkable that pre-PT *kʷrʸiya- 'buy' reflects PIE full-grade *kʷreyx-; but it is also possible that *kʷreyx- would have given *kʷreya- > *kʷrea- with subsequent vowel contraction (see **22**). For alternative analyses of Gk. ἐπρίατο see Beekes 1969:247 (*é-kʷrix-e-to) and Rix 1976b:215 (analogical on 3pl. ἐπρίαντο < *é-kʷrix-ento; *-ento is not expected but perhaps could have arisen by analogy).

3. Adams 1988:31, 33 points out that the *-a- of PT pret. *kʷərʸya- 'buy' could reflect the usual preterite suffix, and that the *-a of fem. *-(i)ya and of *tərʸya 'three' could be analogical on forms with PT *-a from PIE *-ex. He also warns (p.c.) that even PT *tˢakʷ-(a-) 'stab', reflecting root-internal *-ya-, might reflect a full-grade *dʰyōgʷ- < *dʰyoxgʷ- or *dʰyexʷgʷ- (which is unattested elsewhere but cannot be completely excluded; the laryngeal need not be *x). Thus a large percentage of the examples cited above can be accounted for by changes other than the sound change posited. But note that PT *kʷərʸyor 'trade' clearly contains a reflex of pre-PT *kʷria-; if the latter is a specifically preterite stem, we must suppose that this noun was formed to the preterite of 'buy' rather than to its root. That might not seem surprising, given that nouns of this type are productively formed to preterite participles in Tocharian; but the vowel in the suffix of TA *kuryar* shows that this word is an older, fossilized formation, which one would rather expect to be formed to the root. In this case, then, the balance of evidence suggests that we should recognize a sound change PT *ix > pre-PT *ya ~ *ia; and it is simpler to explain the other cases by that sound change as well.

10. The sequence *ixʷC.

Whether *ixʷ also became *ya is not clear. There are two Tocharian words that might exhibit direct reflexes of PIE *ixʷ, but they might also reflect analogical *yō (as if < PIE *yexʷ):

PIE *gʷixʷ- 'live', pres. 3sg. *gʷíxʷweti (Skt. *jīvati*, Lat. *vīvit*) > *gʷyaw-, *gʷyawet ~ *gʷyaweti > PT *śaw-, *śawʸə ~ *śawʸəṣə > TB /śaw-/, *śai-ṃ*, TA *śo-*, *śo-ṣ* (Winter 1965a:192, Normier 1980:254)? —or rather secondary *gʷyōw-, *gʷyṓweti (as in Gk. ζώει, Schindler 1972:149) > PT *śaw-, *śawʸə ~ *śawʸəṣə, etc. (Winter, op. cit. p. 197)?

PIE *prótixʷkʷom 'face' (Skt. *prátīkam* 'surface, face') > *prótyakʷ- > PT *prə́tˢakʷ-a- 'chest' > TB *pratsāko*, TA *pratsak* (Normier 1980:254)? —or rather *prótyōkʷom (with secondary Wackernagel lengthening as in Gk. πρόσωπον 'face', Adams 1984:400) > PT *prə́tˢakʷ-a-, etc.?

There seem to be no other potential examples.

11. Other *iX sequences.

There are several Tocharian words in which an original sequence *iX seems to have given a result different from the above. The clearest case, but also the least informative, is the numeral 'twenty':

PIE *wíḱmtiḱ 'twenty' (Lat. *vīgintī*) > *wíḱmti (Doric Gk. ϝῖκατι) > *wíḱəmti > *wíḱəmt (*wíḱənt?) > PT *wʸíkən (see **33**) > TA *wiki*, TB *yikən* > *ikäṃ*.

The Tocharian words appear to reflect a preform in which the laryngeal was lost in sandhi within PIE (see **2** (f)); they cannot possibly reflect a form in PIE *-ṃt or *-ṃts, since those sequences would at first have become *-əmt and *-əmts respectively (see **29**), and the final consonant clusters would then have been lost without a trace in PT (see **32**, pace Hilmarsson 1989:121-5 and the earlier scholars whom he cites). For further discussion of the ending of this word see especially **33** and **A10**.

In at least two cases a PIE sequence *iX is reflected in PT as *i; since these PT *i can have developed from *ī by the loss of vowel length (see **50**), and since PIE *iX became *ī in many branches of IE, a development *iX > *ī > PT *i is highly plausible (see note 1). In one case the laryngeal was clearly *ś:

PIE optative suffix (zero-grade) *-iś- (e.g. in Lat. 1pl. *sīmus* 'we would be'; cf. full-grade *-yéś- ~ *-iéś- in 3sg. OLat. *siet*, Gk. εἴη '(s)he would be') > *-ī- > PT *-i(-), e.g. in PT 3sg. act. *yamʸi, mp. *yamʸitər '(s)he would do' > TB *yāmi, yamītär*, TA *yāmi-ṣ, yāmitär* (Winter 1965a:201, K. Schmidt 1982:364).

It has been suggested repeatedly that PT opt. *-i(-) might reflect PIE thematic *-oy- as well as (or even instead of) athematic *-iś- (see Van Windekens 1982:229-30 with references). In fact TB *-i(-)* could reflect PIE *-oy- via PT *-e(-): PIE *-oy- became PT *-e when it was word-final or had become word-final (see **35**), PT *e became TB

i (see **B3**), and at any point the vowel could have spread by analogy from the (endingless) 3sg. active to other optative forms. But TA *-i(-)* cannot reflect PT **ę* (which became TA *e*, see **A8** and **A12**), and thus cannot reflect PIE **oy* (see **35** and the discussion below in this section). It therefore seems better to reconstruct **-i-* as the PT optative suffix, and to conclude that it probably reflects PIE **-iX́-*, while recognizing that the TB forms are ambiguous. The other case of PT **i* from PIE **iX* is an isolated word:

PIE **wiXrós* 'young (man), warrior' (Skt. *vīrás* 'hero', Lith. *výras* 'man') > **wīrós* > PT **wʸirə́* > TA *wir* 'young'.

The laryngeal in this word apparently was not **x* (see **9**), but we cannot say with certainty whether it was **x́* or **x^{w}* (since the examples of **ix^{w}* in **10** are doubtful). It is even conceivable that the word contained **ī* of non-laryngeal origin already in PIE, though that seems less likely.

The most difficult cases of **iX* in Tocharian are duals, at least some of which might be expected to reflect PIE neut. nom./acc. dual **-iX́*.

TB exhibits numerous duals in *-i*, and in purely phonological terms their ending could reflect PT **-i* < **-ī* < PIE **-iX́*. However, we cannot simply accept TB dual *-i* as a reflex of PIE word-final **-iX́*, for the following reasons. Jörundur Hilmarsson's exhaustive work on Tocharian duals has established that there is no clear distributional or functional difference between TB thematic adjective duals in *-i* and those in *-ane* (Hilmarsson 1989:54-5), and he has also observed that all TB dual NOUNS in *-i* occur in paradigms with plurals in *-a* (op. cit. pp. 59-60). As Hilmarsson notes (locc. citt.), these facts strongly imply that TB dual *-i* reflects PIE thematic neut. dual **-oyX́*, and that duals were freely formed in TB by replacing the noun plural suffix *-a* with *-i* (at some stage in the history of the language). Further corroboration of these conclusions is provided by the isolated u-stem dual TB *keni, kenine*, TA *kanweṃ* knees' < PT **kënüwʸę(-në)*: the correspondence TB *i* : TA *e* clearly reflects PT **ę* < PIE **-oyX́* (see **35** and **B3**), and it is reasonable to suppose that the PT dual **kënüwʸę* was formed by analogy to a plural **kënuwa* (see **12**). Hilmarsson argues that TB *pwāri-ne* dual loc. 'in the fires' should nevertheless be taken to reflect a PIE form in **-iX́*, because the other TB dual nouns in *-i* (excepting *keni*, which Hilmarsson treats separately) are Buddhist technical terms, whereas *pwāri* is not; but such a semantic argument is hardly cogent, and it would be imprudent to accept *pwāri* as an old athematic dual rather than a form built by analogy to pl. *pwāra* or its immediate ancestor.

The TA duals in *-i(-)*, namely the noun *pratri* 'brothers', the participles *yetuntin* 'adorned' and *la[lä]ṅkuntiṃ* 'hung', and the demonstratives *tim* 'those', *tiṃ* 'these', and *tine* 'of these', are another matter. Since there are no clear cases of TA *i* reflecting PIE **oy* (pace Winter 1962a:131, Hilmarsson 1989:38-9; see note 2 and **35** with note 1), we might see in TA dual *-i* a reflex of PT **-i* < **-ī* < PIE neut. dual **-iX́*. But whereas such a hypothesis seems reasonable for the athematic dual *pṛ̀ atri*

(though see note 3), we certainly do not expect to find reflexes of PIE **-iX́* in the dual of a demonstrative that reflects PIE thematic **to-* (though see note 4). To be sure, we must posit some analogical change in the history of the demonstratives in any case, since the sequence *ti-* exhibits a nonpalatalized consonant before a front vowel (see **46**); but though it is possible that a PT athematic dual ending **-i* < **-ī* < PIE **-iX́* has spread to these pronouns by analogy, it is also possible that they have acquired their *-i-* from some other analogical source which is not now discoverable. Caution seems advisable in interpreting all these forms historically.

The most baffling of the duals in *-i* are TB *antapi*, TA masc. *āmpi* 'both', which appear to reflect a PT form **antpí* or **antpʸí*. For phonological reasons it seems impossible that such a PT form could reflect PIE neut. **xn̥tbʰóyX́* (see note 2 and **35** with note 1), let alone PIE masc. **xn̥tbʰóX́*, which is apparently reflected in TA fem. *āmpuk* (Hilmarsson 1989:57-8; see also **3**). On the contrary, if TA fem. *āmpuk*, which (like any nonsingular feminine) is also used in concord with neuter nouns, reflects the generalization of the PIE masculine form (Hilmarsson, loc. cit.), one would not expect masc. *āmpi* to reflect the PIE neuter. (Hilmarsson 1989:56-7 notes that *āmpi* is used once with *kanweṃ* 'knees', which one would expect to be neuter; but even if this single instance is not an error, it does not resolve the paradox just stated.) Moreover, though PT **antpʸí* (if we should reconstruct such a form) COULD exhibit an analogical ending that ultimately reflects PIE athematic neut. dual **-iX́*, the analogical spread of an athematic ending to a thematic nominal seems fairly unlikely (though see note 4). It seems better not to adduce these forms of 'both' as evidence for any regular sound change.

A number of TB duals seem to reflect PT forms in **-ə* with palatalization of the preceding consonant; examples include the following (Hilmarsson 1989:78-80, 114-5):

TB *kreñc* 'good' (cf. masc. obl. sg. *krent*);
TB *(p)er(n)eñc* 'worthy' (cf. masc. obl. sg. *pernent*);
TB *rsoñc* 'spans' (sg. *raso*, pl. *rsonta*);
TB *pakeñc* 'parts, shares' (sg. *pāke*, pl. *pakenta*);
TB *piltāṣ* 'leaves' (sg. *pilta*, pl. *piltāsa;* Winter 1962a:112-3);
TB *weweño(ṣ)* ptc. 'called' (doubtful, see Hilmarsson 1989:79-80);
TB *eś* 'eyes' in the phrase *eś lmau* 'blind' (Winter 1962a:115, 129), extended in TB *eśane*, TA *aśäṃ* < PT **ëśə-në*.

A similar pre-PT form probably underlies the dual of another body-part term:

TA *klośäṃ* dual 'ears' < PT **klVwśə-në* ← **klVwśə*;

the TB cognate *klautsne* has depalatalized the root-final consonant by analogy with the singular (TB *klautso*, TA *[k]los*, **klots* < PT **klVwt^{s}o*). It is not clear what the immediate preform of (pre-)PT **-ʸə* was. Possibilities include PIE masc./fem. nom./acc. dual **-e* or **-ḱe* (Klingenschmitt 1975:162 fn. 21, Hilmarsson 1989:68-9 with references; the latter suggests this as the etymon of PT **-ʸə* specifically in adjec-

tives, pp. 78-80) and pre-PT *-ye < PIE neut. nom./acc. dual *-iǵ (as in Greek ὄσσε, Forssman 1969:44-7; suggested for Tocharian by Winter 1962b:30-1 and Hilmarsson 1989:21-4 and passim, though see also note 1), the latter entailing an unusual Tocharian sound change *-iǵ > *-ye that would be a significant innovation shared only with Greek. A third possibility that has not previously been considered (so far as I know) is pre-PT *-i < PIE *-i < *-iǵ, reflecting the PIE loss of word-final laryngeals after syllabics when the word occurred in pausa (see **2** (f)). This last is the only alternative that can be made to work for PT *wʸíkən 'twenty' (see above). It is true that in 'twenty' we must assume that the *-i was apocopated long before the PT stage (like the *-i of primary active verb endings, see **33**), while in the duals it survived and became PT *-ʸə; but one would expect the ending to survive where it was still functional, i.e. in nouns and adjectives rather than in the (fossilized) numeral. Since any of these preforms would fit the facts, we must regard duals of this type as etymologically ambiguous; it would not be methodologically sound to adduce them as evidence for sound changes.

To be sure, Werner Winter (1962b:30-1, 33) has created a weak presumption in favor of a development *-iǵ > *-ye > PT *-yə ~ *-Cʸə (see **48**); his argument can be summarized (and to some extent developed) as follows. TB *paiyye*, TA *pe* 'foot', apparently reflecting PT *pëye or *pëyë, is unlikely to reflect post-PIE thematic *pod-yo-. There are no clear parallels in other languages for a formation in *-yo- to an o-grade root, nor should any formation with that suffix be a noun (one expects an adjective); moreover, TB *śwer[pp]ewä* 'four-footed' and similar compounds < PT *-pëwə < *-pod-wn̥t- (Winter 1962b:29; forms at Hilmarsson 1989:93, and cf. Þórhallsdóttir 1988:196-8 on the suffix) strongly suggest that 'foot' was a root-noun until late in the pre-PT period (Hilmarsson 1989:14-5). In fact, it is not even clear that TB *-aiyy-* can reflect PT *-ëy- (cf. Hilmarsson 1989:13; but see **27 contra** his solution, and cf. **viii**). Much less problematic is the suggestion that the singular (perhaps *pëy(ə)ye?) has been backformed to a (pre-)PT dual *pə́yə, which underlies the recharacterized dual *pə́yə-në (> TB *paine*, TA *peṃ*) and also the TB adjective *paiñe* (Winter 1962b:30). This relatively archaic dual can easily reflect pre-PT *pód-ye < *pód-iǵ (see **27** on the loss of *d). Since 'foot' was clearly masculine in PIE, the neuter dual ending must be analogical; but that is not particularly surprising, especially since TB *paiyye* MIGHT be neuter (Hilmarsson 1989:12-3, who also notes that TA *pe* is clearly masculine). But though this is a plausible hypothesis, it is exceedingly hard to verify; we cannot exclude the possibility that there is some other source (not now discoverable) for the *y of (pre-)PT *pə́yə, and in any case it would be dangerous to base arguments for a sound change on a form which has obviously undergone substantial analogical remodelling. Moreover, we must bear in mind that if an ending beginning with *-y- had been added to stems ending in *-t-, the latter should have become PT *-tˢ- (see **34**), not *-c- (as in all the attested examples), unless the ending was introduced after the affrication of *t(ʰ)y had run its course.

In summary, it is very likely that PIE nonfinal *iǵ contracted to *ī and eventually became PT *i, but the fate of word-final *-iǵ is not clear at all. To the extent that it had not already become *-i in PIE, it might have become *-ī (whence PT *-i, e.g. in TA *pratri* 'brothers') or *-ye (whence PT *-yə after vowels, e.g. in *pə́yə 'feet', and *-Cʸə after consonants, e.g. in TB *rsoñc* 'two spans', with reduction of *-cc- (see **48**) after *-ā-); since every piece of potential evidence can be explained in other ways, we are not able to draw any firm conclusions.

According to the hypothesis developed here, the contraction of nonfinal *iǵ to *ī preceded the loss of vowel length (see **50**); other developments are much too uncertain to support chronological inferences.

Notes.

1. Hilmarsson 1989:21-4 argues that PIE tautosyllabic *iǵ gave (pre-)PT *yə, which he believes was phonemically distinct from *ʸə in postconsonantal position; later *yə will have become *i or *ʸə, depending on its environment. I doubt Hilmarsson's hypothesis because a contrast between postconsonantal *ʸə and *yə (phonetically *[ʸyə]) is not likely (though of course not impossible). Moreover, the only advantage that Hilmarsson seems to derive from positing *yə < PIE *iǵ is that he is able to take the endings of TB *pwāri* and TB *rsoñc*, etc. back to the same (pre-)PT protoform. But the discussion in this section shows that there are plausible alternatives for both those cases: *pwāri* is very likely to be a late analogical creation, while the PT *-ʸə of TB *rsoñc*, etc. can have developed in any of several different ways. Thus the very rationale for Hilmarsson's hypothesis would seem to be illusory. I hasten to add that I have no PROOF for my own suggestion *iǵ > *ī > *i, but it does strike me as far more plausible than Hilmarsson's.

2. Winter 1962a:131 and Hilmarsson 1989:38-9 suggest that PIE *oy gave a PT diphthong (presumably *ëy, whence TB *ey ~ ai*, TA *e*) when stressed, but PT *i (> TB, TA *i*) when unstressed. That seems unlikely, if only because both languages exhibit *i* in too many syllables that should have borne the stress (TB *antapi*, TA masc. *ām̥pi* 'both' if < PIE neut. *xn̥tbʰóyǵ, TA dual demonstrative *ti-* if < PIE neut. dual *tóyǵ, TB *wi* 'two' if < PIE neut. *duóyǵ, TB masc. pl. adjectives in *-ri* < post-PIE *-róy, etc.). Arguments for a development TB *i*, TA *e* < PT *ę < word-final *-oy will be advanced in **35**.

3. TA *pratri* is likely to be a relatively archaic form (pace Hilmarsson 1989: 81), since it preserves PT *t unaltered by analogy, whereas the other forms of the paradigm have generalized *c* from the nom. sg. But it is not clear that *pratri* must be a dual; Winter's suggestion that it is actually a plural (Winter 1962a:124) seems worth considering, especially since *-i* is a fairly common TA plural ending.

4. Though the spread of athematic endings to thematic nominals is unlikely on general grounds, the argument must not be pushed too far; it is clear that extensive analogical changes have occurred in the Tocharian nominal system, and we ought not to rule out any analogical change a priori. In fact the (late) spread of the athematic

plural endings *-ñə, *-nta, etc. to thematic nouns in Tocharian is well attested (see Krause and Thomas 1960:124, 128, 152). The LEAST acceptable procedure (methodologically speaking) would be to assume that a PT ending is most likely to reflect the corresponding PIE ending by sound change alone, since that would amount to an act of faith that there has been relatively little analogical change in Tocharian nominal inflection—a proposition that is easily refuted.

5. It seems rash to suggest that TB *ṣim* 'roof' is cognate with Skt. *sīmán-* 'parting (of the hair); boundary, limit' because the two words are so dissimilar semantically (pace Van Windekens 1976 s.v. B *ṣim*); in particular, note that the general meaning 'boundary, limit' is quotable only from later Sanskrit (mostly from lexica). The formal fit between the words seems good at first glance, but even in that respect caution is advisable. The Vedic Sanskrit word is masculine (cf. acc. sg. *sīmā́nam* AV 9.8.13), but the TB word exhibits no final vowel, unlike the old masculine n-stems *okso* 'ox', *kau$_u$rṣe* 'bull', etc.; moreover, the plural of the TB word is not known, so that we cannot be certain of its stem-class.

12. *uX before consonants and word-finally.

At least some *uX appear in PT as *u; probably *uX > *ū, which gave PT *u in the general loss of vowel length (see **50**). The clearest examples are the following:

PIE *sux- 'pour' (Hitt. *suhha-*) > post-PIE *sū- 'rain' (Gk. ὗειν, Alb. noun *shi*) > PT *su- > TA *su-* in pres. 3pl. *swiñc*, ptc. *sūmāṃ* (on TB /suwa-/ 'rain' see note 1 below);

PIE *suX- 'beget, bear (a child)' (Skt. pres. 3sg. *sū́te*) > *sū- > PT *su- in TB *s$_ą$suwa* 'sons' (Krause 1956:196), originally neut. pl. *'issue' (Winter 1985: 260).

The PT root of the latter cannot have been *suwa- (pace Winter, loc. cit.), since in that case the TB form would end in *-auwa* (see note 2).

It is probable that PIE word-final *-ux also became *-ū > PT *-u, though the evidence is less direct. Consider the u-stem plural TB *akrūna*, TA *ākrunt* 'tears'. The etymology of the stem is not doubtful (cf. TA sg. *ākär* < PT *ákrə < post-PIE *áḱru ← PIE *dáḱru (Gk. δάκρυ, etc.); see Ringe 1991a:104-5), but the formation of the plural is unusual. To be sure, TA *ākrunt* was clearly extended from *ākru, and that form could reflect PT *ákruwa, a u-stem plural of the usual type; but if the PT plural was in fact *ákruwa, it is very difficult to see why it has not survived as *"akruwa"* in TB (cf. *ostuwa* 'houses', etc.). It seems less objectionable to interpret both TA *ākrunt* and TB *akrūna* as extensions of a PT pl. *ákru, whose history must have been approximately as follows:

PIE pl. *dáḱru-x 'tears' (cf. Gk. δάκρυα with analogical -α) → *áḱrux (cf. Skt. *áśrūṇi* with analogical *-ṇi*) > *ákrū > PT *ákru >→ TB *akrūna*, TA *ākrunt* (so Adams 1988:19, 32).

The numerous PT u-stem plurals in *-uwa do not constitute counterevidence to such a hypothesis, since their *-a can easily reflect thematic *-a (< PIE *-e-x) introduced into the u-stems by analogy (Adams 1988:32; see **41** on the development of word-final *-ex).

Other examples of PT *u < *ū < PIE *uX are less certain; cf. Mayrhofer 1986b:171 for discussion of the problems involved in evaluating (post-)PIE *ū.

According to the hypothesis developed here, the contraction of *uX to *ū, like that of *iX to *ī, preceded the loss of vowel length (see **50**).

Notes.

1. TB /suwa-/ 'rain' can have acquired its root-final /a/ by analogy, as have many other Tocharian verb roots; it seems much less likely that the TA verb has secondarily lost an original *-a- (pace Winter 1965a:193). Hitt. *sēhur* 'urine' is not related; cf. Eichner 1972:69-70 on the derivation and semantics of that word.

2. TB verb roots in /-uwa-/ make preterite participles in *-o$_u$ ~ -au*, fem. pl. *-auwa;* note the following clear examples:

TB fem. pl. *lypauwa*, masc. pl. *lwoṣ* '(having) sent', root /luwa-/ ~ /l^{y}uwa-/ < PT *luwa- ~ *l^{y}uwa- 'send' (cf. TB pres. 3pl. *lyewentär*, subj. 3sg. *lāwaṃ*, TA subj. 1sg. *lawam*) ←< PIE *lewX- ~ *luX- 'undo a rope, release' (Gk. λῦειν 'to release', Skt. pres. 3sg. *lunā́ti* '(s)he cuts off, (s)he mows', etc.; Van Windekens 1941:54);

TB fem. pl. *tswauwa* 'fitted together', root /t^{s}uwa-/ < PT *t^{s}uwa- 'fit (intrans.)' (cf. TB pres. 3sg. *tswetär*, TA pres. or subj. 3sg. *tswātär*) ←< PIE *dewx- ~ *dux- 'fit together' (Goth. *taujan* 'to make', Gk. δύνασθαι 'to be able'; Krause 1961a:265-6).

Note that the *-a- of these PT roots can have arisen in the full-grade forms *lewX-, *dewx- by the sound change discussed in **14** and have spread to the zero-grade forms subsequently; see **13** for further discussion. Further probable examples include:

TB masc. pl. *[t]woṣ* 'having kindled', root /tuwa-/ (or /twa-/?) 'kindle' < PT *tuwa- (or *twa-?; cf. TB pres. 3sg. *twāṣṣäṃ*, TA opt. 3sg. *twāsiṣ*);

TB fem. pl. *ywauwa* 'ripe', of which the root can only be /yuwa-/ 'ripen (intrans.)' (though all other forms are causatives in which /-a-/ is dropped by a regular derivational rule, e.g. caus. pres. 3sg. *yuwäṣṣäṃ;* there are no cognates).

It is clear that TB *s$_ą$suwa* *'issue' does not fit into this class; instead it belongs with a root that lacks /-a-/:

TB vbl. noun *kekuwer* 'libation', implying pret. ptc. fem. pl. **kekuwa*, root /ku-/ 'pour' < PT *ku- (cf. TB pres. 3sg. *kuṣän-ne*, TA ipf. 3 sg. *kuṣā-ṃ*, both with suffixed 3sg. pronoun) ←< PIE *ǵ^{h}ew- ~ *ǵ^{h}u- 'pour' (Gk. pres. 3sg. χεῖ < *χέϝει, Skt. pres. 3sg. *juhóti* 'he pours a libation', etc.; Couvreur 1947:78).

Note that 'eat' belongs to both classes:

TB pret. ptc. *ś[e]śu* 'having eaten', vbl. noun *śeśuwer* '(a) meal', subj. 1sg. *śū* 'I shall eat' (PK NS 58b2; Pinault 1994:136-8, 165-82) reflect a root /śu-/ < PT *śu- (*/śəw-/), but pres. 3sg. TB *śūwaṃ*, TA *śwāṣ*, inf. TB, TA *śwātsi*, etc. reflect PT *śuwa- (*/śəwa-/) ←< PIE *gyew(X)- ~ *gyu(X)- 'chew' (?; Farsi *jāvīdan* 'to chew' with *gy-, but Lith. *žiáunos* 'jaw' with *ǵy-; OCS *žĭvati* 'to chew', Russian *ževát'*, 1sg. *žujú*, etc. are ambiguous; the Balto-Slavic forms appear to be set, but that could be a secondary development).

This appears to be an original aniṭ root which has acquired root-final *-a- by analogy within the history of Tocharian; but even if the history of the word was more complex, it seems rash to posit a PT root *suwa- for TB *ṣᵦsuwa* on the basis of so isolated a parallel, given the clear countercases listed at the beginning of this note.

13. On the possible development of *uX to *ua (~ *wa).

One might expect at least some *uX (*ux?) to have become *ua or *wa in some nonfinal environments, but it is remarkably difficult to demonstrate that such a development occurred. The difficulties involved can be illustrated by consideration of a few typical examples.

'Eyebrow', of which only the dual is attested in Tocharian, is one of the most plausible examples of a putative change *uX > *ua:

PIE *xʷbʰruX- 'eyebrow' (see 5) > *pʰru(w)a- > PT *pərwa- (see 65), dual *pərwa-në > TB *pärwāne*, TA *pärwāṃ* (Winter 1965a:192)?

But because the PT *-a- is stem-final, we cannot completely exclude the possibility that it reflects a stem-vowel (*ā ?; see 41) that has been added to the old root noun by analogy (Schindler 1967b:241). Moreover, even if the root noun survived as such, it is reasonably likely that the final vowel of PT *pərwa- conceals an old dual ending (probably masc./fem. *-(x́)e; see Winter 1962a:123, Hilmarsson 1989:73-4); in that case it would have to be the result of vowel contraction, and that makes PT *pərwa- difficult to use as evidence for the regular outcome of PIE *uX.

A number of class V presents are also promising examples of the change *uX > *ua; two TB verbs are notably plausible:

PIE zero-grade *mluX- 'speak' (vel sim.; Skt. mediopassive pres. 3sg. *brūté*) > *blu(w)a- (see 61) > PT *pəlwa- (see 65) > TB /pəlwa-/ 'lament', pres. /pəlwá-/ (/-á-/ always underlyingly accented in the present, Marggraf 1970:23), e.g. in 3sg. *palwaṃ*, ptc. *pälwāmane* (K. Schmidt 1982:365)?

PIE zero-grade *ǵʰuX- 'call, invoke' (Skt. pres. 1sg. *huvé*, 1pl. *hūmáhe*) > *kʰua- > PT *kuwa- (or *kwa-?) > TB pres. /k(u)wá-/ 'call, invite', e.g. in 3sg. *kwātär* (K. Schmidt 1982:365, cf. Van Windekens 1949:301; see also note 1 below)?

But it must not be forgotten that the first of these roots, at least, also appeared as full-grade *mlewX-, cf. active pres. 3sg. Skt. *brávīti*, Av. *mraoiti* '(s)he says' < PIE *mléwX-ti. (On the ablaut of *ǵʰuX- see note 2.) In such full-grade forms with consonant-initial suffixes or endings the root-final laryngeal would have become *a

by regular sound change (see 14); that *-a- could then have been introduced into the zero-grade forms by the most trivial sort of paradigmatic levelling (cf. 12, note 2, for other similar examples). Moreover, root-final *-a- has spread widely from verb to verb in Tocharian. A particular cause for unease about the two roots cited above is the fact that TB present /suwa-/ 'rain', which belongs to the same class (class V of Krause and Thomas 1960), clearly owes its /-a-/ to analogy, the cognate TA *su-* (without *-a-) reflecting PIE *sux- 'pour' by regular sound change (see 12 with note 1); further, various TB forms suggest that PT *śu- ~ *śuwa- 'eat' < PIE *gyew(X)- ~ *gyu(X)- 'chew', yet another present of this class, originally lacked *-a-, acquiring it within PT by analogy (see 12, note 2). For both these reasons present stems of class V, and (probably) the whole class of PT roots ending in *-uwa-, fail to provide cogent evidence for a sound change *uX > *ua.

Other examples are even less probative. TB /suwa-/ in *suwo* 'pig', adj. *swāññe* (Winter 1965a:192) is triply uncertain: there is no TA cognate, so that its /-a-/ is not certainly PT; even if it is PT, it could be an ā-stem extension (cf. 'eyebrow' above); and finally, it is not even clear whether the *ū of post-PIE *sū- 'pig' represents PIE *uX or *ū (Mayrhofer 1986b:171). The first vowel of PT *soyə́ 'son' (TB *soy*, TA *se*) has been claimed to represent pre-PT *wa < PIE *uX (Winter 1985: 261, Hilmarsson 1986:341-2), but many other analyses are possible; for a full discussion see 25.

PT u-stem neuter plurals in *-uwa almost certainly reflect the analogical addition of *-a to an older ending *-u < *-ū < PIE *-u-x; see 12.

Thus there is no clear and unambiguous evidence for a sound change *uX > *ua (~ *wa) in Tocharian. To be sure, the first few forms discussed above COULD be examples of such a change, and we cannot completely exclude it as a possibility, but that is by no means enough to justify its inclusion in a general chronology of Tocharian sound changes.

Notes.

1. The number of syllables in the TB present stem /k(u)wá-/ is uncertain because the underlying /u/, if it exists at all, always occurs unstressed in an open syllable and so is syncopated (see B23). We would have evidence for the /u/ if there were any forms in which it acquired the accent by the regular retraction rule (see B7) and so appeared on the surface. A similar stem in which that does happen is TB pres. /śuwá-/ 'eat': cf. mp. 3sg. /śuwátər/ → *śwātär*, act. 2sg. /śuwátə/ → *śwāt*, etc., but act. 3sg. /śuwán/ → *śūwaṃ* (see 12, note 2). But retraction occurs only when the accented syllable is underlyingly final; thus in the mediopassive stem /k(u)wá-/, whose endings are always syllabic, retraction can never occur. (See also Marggraf 1970:15-8.) Since the TB present is the only representative of this root in Tocharian, our uncertainty about the number of its syllables automatically projects itself back into PT (unless evidence of some other sort can be adduced). Such diffi-

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culties regarding *(i)yV-* and *(u)wV-*sequences are pervasive in Tocharian; for further discussion of this problem in general see Ringe 1991b.

2. I have not been able to find clear cases of full-grade **ǵʰewX-* 'call, invoke' followed by a consonant; in fact, apparent reflexes of **ǵʰewX-* in general are uncommon and at least partly of secondary origin. Skt. pres. 3sg. *hávate* '(s)he invokes', etc., must originally have been the subjunctive of *huvé*, etc., with a full-grade root derivable by a productive process (George Cardona, p.c.); OCS pres. 3sg. *zovetŭ* '(s)he calls', etc., can have arisen in a similar fashion. It is perhaps worth asking whether PIIr. **ʒʰwā-* (> Skt. *hvā-*, Av. *zbā-*) reflects a PIE full-grade **ǵʰweX-*. If it does, PT **kwa-* can have arisen by a somewhat different analogical process, e.g. **ǵʰwex- ~ *ǵʰux- > *gʰwā- ~ *gʰū- → *gʰwā- ~ *gʰwa-*, the latter surviving as PT **kwa-*. (As George Cardona (p.c.) observes, pres. 3sg. Skt. *hváyati*, Av. *zbaiieiti* < PIIr. **ʒʰw-áya-ti* presupposes a PIIr. root **ʒʰwā-*, from which such a present could have been formed by productive rule; there is no other way to explain the absence of any reflex of a laryngeal in that present stem.)

14. Laryngeals between nonsyllabics; word-final **CX.*

So far as we can tell, all laryngeals between nonsyllabics became **a* (see Winter 1965a:190, Normier 1980:254, K. Schmidt 1982:367, and especially Klingenschmitt 1975:161-2, fn. 21). Clear examples of **x́* and **x* can be adduced:

PIE mediopassive ptc. ending **-mx́nos* (Gk. *-μενος*, Av. *-mnō*; Klingenschmitt 1975:161-3) > **-manos* > PT **-manë* > TB *-mane*, TA *-māṃ*;

PIE **xenx́-* > **anx́-* 'breathe' (Skt. pres. 3sg. *ániti*; cf. Gk. *ἄνεμος* 'wind') > PT **ana-sk-* > TB /anask-/ 'breathe in' (Couvreur 1949:33-4; cf. Klingenschmitt 1975:162 fn. 21);

PIE zero-grade **dʰé-dʰx́-* pres. 'be putting' (Gk. *τιθε-* with analogical *ι* in the reduplicating syllable, Skt. *dadh(i)-*; Lane 1959:163-4) > **dé-tʰa-* (see also **19** and **20**) → **té-tʰa-* (see **21**) > **tɔ́-tʰa-* (see **46** and **50**) → **tɔ́-tʰa-* (see **55**) > PT **tɔ́-ta-* 'put' >→ TB /tɔttá-/ (see ix) in subj. 3sg. *tattaṃ*, pret. ptc. *tättāw*;

PIE **pxtḗr* 'father' (see **3**) > PT **pacér* > TB *pācer*, TA *pācar*;

PIE **dʰugxtḗr* 'daughter' (Skt. *duhitā́*, Gk. *θυγάτηρ*) > PT **tɔkacér* > TB *tkācer*, TA *ckācar*;

PIE **px-sḱé- ~ *px-sḱó-* pres. 'protect, herd (animals)' > PT **paṣṣə- ~ *paskē-* in mp. TB 3sg. *pāṣtär*, 3pl. *paskenträ*, TA 3sg. *pāṣtär* (cf. 3sg. Lat. *pāscit*, OCS *pasetŭ* '(s)he pastures (animals)', with **ā* as if < full-grade **ex*; but a PIE pres. in **-sḱé/ó-* ought to have exhibited zero grade in the root, and in any case PIE **ex* > **ā* would not give PT **a* (see **42**)).

The root-final **-a-* of several PT roots clearly reflects a PIE laryngeal by the same sound change; in a couple of cases the laryngeal is clearly **x*, but often its identity cannot be determined. There are at least four clear examples:

PIE **kedx-* (or **ḱedx-*) 'strew, spread' (Gk. aor. *σκεδάσαι*, Hom. pres. 3sg. *κίδνται* 'it is spread' and *σκίδνται* 'it is dispersed') >→ PT **kəta- ~ *śɔta-* 'strew, sow' (see **27** and **57** on the reflex of **d*) in TB pres. *kaṇam* 'it strews', pret. 2sg. *śtasta* 'you sowed' (w. dial.), ptc. *ktau* 'sown', TA abs. *ktoräṣ* 'having sown' (Van Windekens 1963:464-5);

PIE **stɱbʰX- ~ *stembʰX-* 'prop, support' (Skt. pres. 3sg. *stabhnāti*, ptc. *stabhitás*) > PT **stɔma- ~ *śɔma-* 'stand' in inf. TB *stamatsi*, pret. ptc. TB *stmau*, TA *ṣtmo*; note especially PIE aor. inj. 3sg. **stémbʰXt* (Skt. *stambhīt*) > pret. 3sg. TB *śama, ścmā-c*, TA *śäm, śmā-ṃ* (etymology in Van Windekens 1976 s.v. A *ṣtäm-* etc.; see also Jasanoff 1983:55-61 and Ringe 1991a:91);

PIE **mewsX- ~ *musX-* 'take away' (Skt. pres. 3sg. *muṣṇā́ti*, ptc. *muṣitás* 'steal') >→ PT **musa-* 'lift' in pres. 3sg. mp. TB, TA *musnāträ*, pret. ptc. TB *musau*, TA *muso* (Van Windekens 1976 s.v. AB *mus-*);

PIE **demx- ~ *dɱx-* 'build' (Gk. *δέμειν*, adj. *νεόδμητος*, Doric *νεόδμᾱτος* 'new-built') >→ PT **tˢəma-* 'grow' in TB 3pl. pres. *tsmentär*, subj. *tsmäntär*, TA pret. ptc. *tsmo* (Winter 1962b:26-7; cf. already Pedersen 1944:21 fn. 1).

Less certain examples include the following:

PIE **webʰX- ~ *ubʰX- ~ *wobʰX-* 'weave' (Skt. pres. inj. 2sg. *ubhnās* 'you bound'; Gk. pres. 3sg. *ὑφαίνει* '(s)he weaves' < **ubʰɱX-yé-*) >→ **wəpa- ~ *wëpa-* → PT **wəpa- ~ *wapa-* (see **66**) in TB inf. *wāpatsi*, pret. ptc. *(wa)wāpau*, TA pres. 3pl. *wpanträ* (?) (etymology in Couvreur 1947:9); but it is also possible that this root was originally aniṭ, cf. Skt. pres. inj. 2sg. *sā́m unap* 'you tied up';

PIE **ḱemx- ~ *ḱɱx- ~ *ḱomx-* 'work hard' (Skt. aor. 3sg. *śśamiṣṭa* 'he has been busy', Gk. pres. *κάμνειν* 'work, be tired', noun *κάματος* 'toil') >→ **kəma- ~ *këma-*, the latter → PT **kama-* nonpres. stem 'carry, bring' (see **66**) in TA subj. 3pl. mp. *kāmanträ*, TB pret. ptc. *kakāmau*; but other etymologies can be suggested for this PT root (see Van Windekens 1976 s.v. AB *kām-*).

For examples involving the sequence **-ewX-* see **12**, note 2, and **13**.

It is very difficult to find clear examples of word-final postconsonantal **-x*, because most instances occurred in feminines or collectives (later neuter plurals), and the **-a* of PT feminines and fem./neut. plural forms can reflect PIE thematic **-ex* just as well as PIE **-x* (see **41**).

It is at least clear that final **x́* was dropped in the thematic dual ending **-oyx́* (see **35**); but it is not clear whether that change was a special Tocharian sound change, or a PIE sandhi development, or part of a more general rule dropping laryngeals which were separated from **o* by a resonant. (Such a rule clearly operated in pre-Greek; see Meillet 1922:68-70 and Beekes 1969:74-6, 238-42. Apparent counterexamples in Tocharian (like PT **kama-*, cited immediately above) could reflect analogical reintroduction of the laryngeal or its reflex.)

That **xʷ* became **a* in the same environment(s) is overwhelmingly likely, but I cannot find any examples.

This "vocalization" of laryngeals to *a created new ablaut series of the form *ē ~ *a ~ *ō, *ā ~ *a ~ *ō, and *ō ~ *a ~ *ō, precisely as in Latin, and there is no reason to doubt that these ablaut alternations could spread by analogy. That seems to be the explanation of the initial *a of PT *aks- 'announce, inform', if that root is a sigmatic extension of PIE zero-grade *ǵǵ- 'say' (see **5**, note 1). For the further history of these ablaut series see **53**.

Since laryngeals were clearly consonants (see **1**, note 1), their vocalization must in the first instance have amounted to the insertion of epenthetic vowels NEXT TO the laryngeal, and the laryngeals must subsequently have been lost; that is, the development must have been roughly *CXC > *CəXC ~ *CXəC > *CəC > *CaC (etc., depending on the language). See Hoenigswald 1988:205-8 for further discussion of this process. But these were not the only *ə's that developed in Tocharian, since PIE syllabic resonants were resolved into *[əR] (see **29**) and the *[ə] of those resonant sequences became phonemic */ə/ upon the loss of final consonants (see **32**) or the general loss of vowel length (see **50**). (On the chronology of these changes see the discussion in **8** ad fin., **29**, note 1, and **33**; for yet another, minor source of PT *ə see 31.) It is striking that the *ə's of different origins failed to merge. Since the */ə/ that resulted from PIE syllabic resonants underwent no further changes before the PT stage, the simplest hypothesis that will account for the failure of laryngeal *ə to merge with resonant *ə is that laryngeal *ə had already become *a before syllabic resonants were resolved into *[əR]; it seems much less likely that two different *ə-vowels persisted for any length of time, though of course that is not completely impossible.

Other chronological inferences cannot be drawn because *a underwent no further changes until after the PT period.

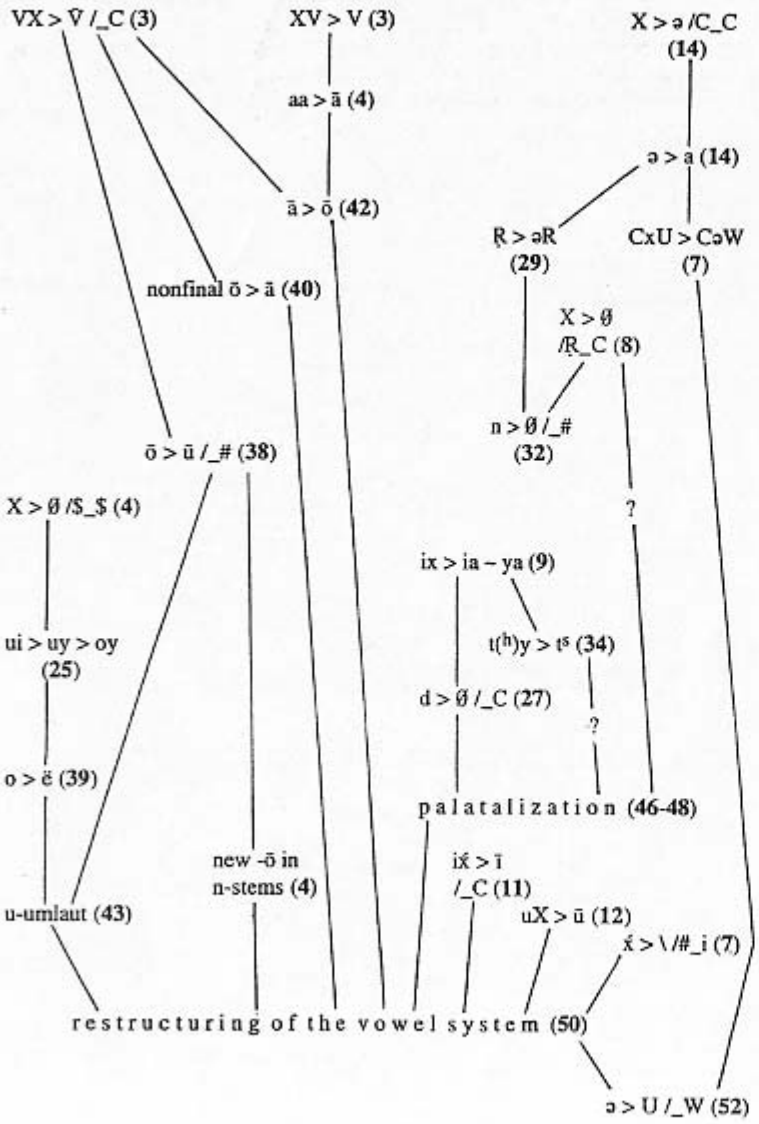
Notes.

1. TB *āñme*, obl. stem /añmə-/, TA *āñcäm* 'self' have nothing to do with PIE *xénx́mos (vel sim.) 'breath', pace Winter 1965a:201; see Klingenschmitt 1975:155, K. Schmidt 1982:363. The PT stem can only have been *añcmə-, whereas PIE *xénx́mos should have given PT "*añəmë" or the like even if the medial laryngeal had become *e (> PT *yə, see **46** and **50**; but see above for the evidence that it actually became *a). For further discussion of this word see **68** and **B5**.

2. I reject the contention of Adams 1988:33 that laryngeals between nonsyllabics can disappear in Tocharian, as well as his suggestion that pre-PT *a of any source can be reflected by PT *ə (Adams 1988:18, 33); the etymologies on which those proposals rest are doubtful at best.

3. The etymology of PT *kama- 'carry, bring' suggested above is my own.

15. The discoverable chronological relations between the changes discussed in this chapter and other sound changes are diagrammed on the following page; the time axis is top-to-bottom, and only linked changes exhibit discoverable chronological relations. (See the following chapters for the relative chronology of changes not discussed above.) I use the symbol V for nonhigh vowels (only) and $ for syllabic segments.



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Chapter 3. Early changes of stops.

This chapter discusses a number of changes which seem to have affected stop consonants relatively early in the history of Tocharian. These include the merger of PIE palatals and velars (**16**) and several changes affecting the PIE voiced aspirates.

16. Merger of palatals and velars.

PIE palatal and velar stops merged as velars (cf. Krause and Thomas 1960: 64-6). Examples are numerous; the following are typical.

• PIE *ǩ:

PIE *ǩuṓ 'dog' (Skt. *śvā́* (2 syll. in RV), Gk. κύων; see **26**) > PT *kú > TB, TA *ku;*

PIE *ǩṃtóm 'one hundred' (Skt. *śatám,* etc.) > PT *kənté > TB *kante,* TA *känt;*

PIE *ǩléwos 'fame' (Skt. *śrávas,* Gk. κλέος) > *klʸə́wë > PT *-kəlʸwë (see **65**) in *ñemәkəlʸwë '(name and) fame' > TB *ñemkällywe,* TA *ñomklyu;*

PIE *sǩxiéx- 'shadow' (see **7**) > PT *skiyá- > TB *skiyo,* obl. *skiyai* (Couvreur 1950:128);

PIE *déǩṃt 'ten' (Skt. *dáśa,* etc.) > PT *śə́kə > TB *śak,* TA *śäk;*

PIE *wíǩṃtix 'twenty' (see **11**) > PT *wʸíkən > TA *wiki,* TB *yikən > ikäṃ;*

PIE *tríx (d)ǩómt 'three tens' (see **9**) > *trʸiakā > PT *tərʸyaka 'thirty' > TB *täryāka* (Schindler 1967b:240);

PIE *xéǩos 'sharp point' (Lat. *acus,* Goth. *ahs,* both 'ear (of grain)') > PT *ákë 'end' > TB *āke,* TA *āk* (Van Windekens 1966:256);

PIE pl. *dáǩru-x 'tears' (see **12**) → *ákrux > PT *ákru >→ TB *akrūna,* TA *ākruṃt;*

PIE *oǩtṓ(w) 'eight' (Skt. *aṣṭáu,* Gk. ὀκτώ, Goth. *ahtau*) > *ǫktú → PT *ǫktə́ on the analogy of *şəptə́ 'seven' and *ñúwə 'nine' (Penney 1976:89 fn. 50; cf. Ringe 1987a:107) > TB *okt,* TA *okät;*

PIE *swéǩs 'six' (Gk. ἕξ, Cretan ϝέξ) → *séǩs (cf. Lat. *sex;* see **A14**) > PT *şə́k > TA *şäk;*

PIE pres. *pi-né-ǩ- ~ *pi-n-ǩ- 'decorate (with a sharp instrument)' (→ *pinǩé/ó- in Skt. 3sg. *piṃśáti* '(s)he cuts, (s)he decorates') >→ PT *piṅk- in 3sg. *piṅkə '(s)he paints' > TB *piṅkä-ṃ;*

PIE pres. 3pl. *px-skó-ntor 'they are protecting (their own herds)' (see **14**) > PT *paskéntər 'they keep' > TB *paskenträ.*

• PIE *k:

PIE *kaw- 'strike' (OE *hēawan* 'to hew', Lith. *káuti* 'to beat, to forge', OCS *kovati* 'to forge') > PT *kaw- 'kill', e.g. in pres. ptc. *kawṣënta 'killing' > TB *kauṣenta* 'bane', TA *koṣant* 'killing';

PIE *klep- 'steal' (Gk. κλέπτειν, Goth. *hlifan;* OPruss. *auklipts* 'hidden') > *klʸəp- > PT *kəlʸp- (see **65**), e.g. in TB inf. *kälypītsi* (Van Windekens 1960:39);

PIE *lewk- ~ *luk- 'shine' (Lat. *lūcet,* Skt. *rócate* 'shines') >→ PT *lʸuk- ~ *luk-, e.g. in TB *lyuketrä* 'it is shining', TA ptc. *luksamāṃ* 'shining';

PIE *seyk- ~ *sik- 'reach by walking' or the like (Lith. *atsiekti* 'to reach (with the hand)', Gk. aor. ικέσθαι 'to arrive') >→ PT *ṣik- ~ *sik-, e.g. in TB *ṣiko* 'step' (noun), pres. 3sg. *siknaṃ* '(s)he steps' (etymology first in Van Windekens 1941:109).

• PIE *ǵ:

PIE *ǵónu 'knee' (Gk. γόνυ, Skt. *jā́nu*) – post-PIE *ǵónw- (cf. Hom. Gk. pl. γοῦνα) >→ *gënu- in PT dual *kënüwʸ-ę(në) 'two knees' > TA *kanweṃ*, TB *keni, kenine* (see Winter 1962a:117-9 on the endings and **43**, n. 1 on the failure of u-umlaut to occur in this word);

PIE *ǵómbʰos 'row of teeth' (see 3) > PT *kḗmë 'tooth' > TB *keme*, TA *kam;*

PIE *ǵn̥ǵyétor '(s)he is being born' (or subj. *ǵénǵetor '(s)he will be born'; see **8**) > PT subj. *kəñ̃ñətər (or >→ *kəñ̃ətər) 'it will happen' > TB *k(a)ntär;*

PIE *ǵnex^{w}- 'recognize, know' (see 3) > PT *kna- > TA *knā-*, e.g. in pres. ptc. *knānmāṃ* 'knowing'; PT *aknátˢa 'ignorant' > TB *aknātsa*, TA *āknats;*

PIE *ǵéǵomǵnos pres. ptc. mp. 'being driven' (Gk. ἀγόμενος 'being led'; cf. Av. 3sg. act. *azaiti*) > PT *akëmanë 'being led' > TB *akemane*, TA *ākmāṃ;*

PIE *ǵmelǵ- ~ *ǵm̥ǵ- ~ *ǵmolǵ- 'milk' (see **5**) > PT *məlk- ~ *mëlk- in TB *malkwer*, TA *malke*, both 'milk' (noun).

• PIE *g:

PIE *bʰágos 'share' (Skt. *bhágas* 'good fortune') > PT *pákë 'part' > TB *pāke*, TA *pāk* (Van Windekens 1941:87);

PIE *dʰugxtḗr 'daughter' (see **14**) > PT *təkacér > TB *tkācer*, TA *ckāar;*

PIE *bʰleg- ~ *bʰl̥g- 'burn, flare' (Gk. φλέγειν; Lat. *fulgēre* 'to flash'; cf. Skt. *bhárgas* 'splendor' with secondary full-grade root) > PT *pəlk- in TB intrans. 3sg. *pälketär*, TA trans. inf. *pälkässi;*

PIE *mosgos 'knot' (Lith. *mázgas*) > PT *mëskë 'bond, link' > TB *meske*, TA *masäk* (Van Windekens 1949:301-2);

PIE *xweg- 'increase' (Gk. ἀέξειν; cf. Skt. *ugrás* 'strong') → *xewg- (Skt. *ójas* 'strength') > PT *awk-s-, e.g. in pret. ptc. *awkṣuwə 'grown' > TB *aukṣu*, TA *okṣu.*

• PIE *ǵʰ:

PIE *ǵʰew- ~ *ǵʰu- 'pour' (Gk. pres. 3sg. χεῖ < *χέϝει; cf. Av. *zaoθrå* 'libations') >→ PT *ku-, e.g. in TB *kuṣän-* '(s)he is pouring', TA *kuṣā-* '(s)he was pouring' (Couvreur 1947:78);

PIE *ǵʰod-mVr- 'dung' (Hitt. *kammar-s-* 'defecate'; cf. Skt. *hadati* '(s)he defecates', Av. dual *zadaŋha* 'buttocks') > PT *kënmër- (or *kënmʸer-, Calvert Watkins (p.c.)) > TB *kenmer* (K. Schmidt 1980:409);

PIE *dʰǵʰǵʰōm acc. 'earth' (Hitt. *tēkan;* see note 1) → *dʰgʰómm̥ >→ *dʰgʰónən (cf. Gk. χθόνα; see **30**) > PT *tkḗnə > TB *keṃ*, TA *tkaṃ* (nom. and obl.);

PIE *bʰn̥ǵʰu- 'arm' (Gk. πῆχυς 'forearm', Skt. *bāhús* 'arm') > PT *pəkᵊ- in TB obl. *pokai*, TA *poke;*

PIE *weǵʰ-nó- 'cart-road' or the like (cf. OIr. *fén*, OE *wægn*, both 'wagon'; Skt. *váhnis* 'conveyer', *vahanam* 'act of conveying') > PT *wʸəknḗ 'way' > TB *yakne*, TA *wkäṃ;*

PIE *bʰr̥ǵʰrós 'lofty, tall' (Arm. *barjr;* cf. Hitt. *parkus*, Skt. *bṛhánt-*, Av. *bərəzant-* 'high') > PT *pərkrḗ 'long' > TB *pärkare*, TA *pärkär.*

• PIE *gʰ:

PIE *x^{w}nogʰ- 'fingernail, claw' (see 5) > *nëkʰ- → *nëkʰu- (see **43**, n. 1) >→ PT pl. *mëkuwa 'fingernails' > TB *mekwa*, TA *maku* (Krause 1951b:203, 1956:196; on the velar in this word see Szemerényi 1964:239-40, 240 fn. 4; on the PT sequence *-kuw- see Ringe 1991b:143-6);

PIE *gʰr̥ḗwr̥ 'horn' (Arm. *elǰiwr*) > *kʰrḗwər > PT *krʸor 'crescent' in TB obl. *krorīyai*, TA *kror* (Hilmarsson 1985).

It is difficult to determine when this typical "centum"-type change occurred; it need not have been in the post-PIE dialectal period, in spite of the fact that many other branches of IE share it, since it can have occurred again and again independently (Ringe 1991a:76-8). However, PIE palatals and velars behave identically when palatalized in Tocharian (see **46** through **48**); note the following pair of words:

PIE *neǩ- 'perish' (Skt. pres. *náśyati* '(s)he perishes'; cf. Gk. νεκρός 'corpse'), aor. opt. *nǩ̆-iǩ- >→ PT *naś-i- in 3sg. mp. *nəśitər 'it may perish' > TB *nśī[t](rä), näśītär*, TA *nśäär;*

PIE aor. subj. *lewk-e- 'shine' (Skt. pres. 3sg. *rócate*) > PT subj. *lʸuś-ə- in TB inf. *lyuśsi* 'to enlighten'.

This strongly suggests that PIE palatals and velars had merged in Tocharian before palatalization occurred; otherwise we would have to adopt the phonetically implausi-

ble hypothesis that pre-PT distinguished palatals, velars, palatalized palatals, and palatalized velars for at least a short period of time.

It should also be emphasized that PIE sequences of palatal + *w (or, presumably, velar + *w) did NOT merge with labiovelars in PT or TB (Ringe 1991b:139-43, pace Hilmarsson 1993a:177); note the following examples:

PIE *éḱwos 'horse' (Skt. *áśvas*, Lat. *equos*) > PT *yśkwë > TB *yakwe*, TA *yuk*, but

PIE *tékʷos '(act of) running' (Skt. *takti* '(s)he hurries'; Welsh *godeb* 'refuge' < *wo-tepo- (cf. ancient British name *Voteporīx*) < *upo-tekʷo-) > PT *cśkʷë 'river' > TB *cake* (Van Windekens 1976:249); and

PIE *ḱwónm̥ acc. 'dog' (Skt. *śvánam*) > PT obl. *kwéna > TB *kweṃ*, TA *koṃ*, but

PIE *kʷólos 'turning, hub' (Gk. πόλος 'axis, pivot') > PT *kʷëlë 'navel' > TB *kele* (root-etymology in Van Windekens 1949:301).

A phonemic distinction between *Kw and *Kʷ must also have existed at some prehistoric period in the history of Oscan, in which PIE *gʷ > *b*, but 'tongue' is (acc.) *fangvam*. (For details of the history of the Oscan word see **18.**) For further discussion of the Tocharian data see **45**, **55**, **59**, **A14**, **A15**, and **B28**.

Notes.

1. On the ablaut of PIE *dʰégʰōm see Schindler 1967a. That the acc. did not end in *-omm̥ in PIE is demonstrated by OIr. *don* acc. 'place' < PC *dom < *dōm < *dʰgʰōm (> Skt. *kṣā́m*, Av. *ząm;* Cowgill, p.c. 1978), analogically remodelled from PIE *dʰégʰōm; the expected *dʰgʰómm̥ would have given PC *donan (medial *n as in Greek and Tocharian, see **30**) > Prim.Ir. *donen (Cowgill 1975:49-50) > OIr. *"doin"*. PIE acc. *dʰégʰōm is < pre-PIE *dʰégʰomm; this is comparable to the development *-Vwm > PIE *-V̄m (cf. Szemerényi 1956:196-8, Stang 1965). As Sara Kimball points out (p.c.), the identity of nom. sg. and acc. sg. is presumably the reason why 'earth' became neuter in Hittite.

17. Loss of *bʰ (and other voiced aspirates?) after nasals.

The voiced aspirate *bʰ was lost when immediately preceded by *m (Van Windekens 1976:463). There are two certain examples:

PIE *ǵómbʰos 'row of teeth' (see **3**) > PT *kḗmë 'tooth' > TB *keme*, TA *kam;*

PIE *stembʰX- ~ *stm̥bʰX- 'prop, make firm' (see **14**) > PT *ścəma- ~ *stəma- 'stand', e.g. in pret. *ścəma '(s)he stood' > TB *śama, ścmā-c*, TA *śäm;* pret. ptc. *stəmówə > TB *stmau*, TA *ṣtmo* (Van Windekens, loc. cit.).

The phonetic process by which *bʰ was lost is difficult to reconstruct in detail; there are at least two reasonably plausible ways in which it could have happened. Since the "voiced aspirates" of PIE were probably breathy-voiced (with breathy voice

continuing into a following sonorant), it is likely that nasals preceding them were also phonetically breathy-voiced. A change such as *[mbVV] > *[mVV] (where underlined sounds are breathy-voiced and V indicates a length of vocalic articulation, however short) could therefore be produced by slippage in timing—the velic being kept open too long or the stop closure being released too fast; loss of distinctive breathy voicing in the nasal (i.e., *[mVV] > *[mV]) would then be very likely to occur, since phonemic breathy-voiced nasals are crosslinguistically rare, articulatorily complex, and presumably unstable. On the other hand, if nasals were not phonetically breathy-voiced before breathy-voiced stops, a change *[mbVV] > *[mbV] would be a plausible assimilation in voicing of *bʰ to preceding *m, and slippage in timing could then produce *mb > *m. In this case the second change would necessarily affect not only new *mb, but also those inherited from PIE; in theory, then, this second hypothesis should be testable. Unfortunately sequences of a nasal followed by a plain voiced stop were infrequent in PIE, and *mb must have been especially rare (since *b was rare in any position); I have been unable to find an example that survives in Tocharian.

It is possible that *dʰ was likewise lost when immediately preceded by *n; the following might be an example:

PIE *ḱlewdʰ- ~ *ḱludʰ- 'arrive' (see **5**) → post-PIE nasal-infixed pres. *ḱlunédʰ-, zero-grade *ḱlundʰ- > PT subj. *lən- 'go out', e.g. in TB inf. *lantsi;* the TB sk-pres. (3sg. *lnaṣṣäṃ*, etc.) is built on the older subj. (On the etymology of the root cf. Cowgill apud Winter 1962b:22 with fn. 3.)

This hypothesis explains neatly why the present and subjunctive of TB /lət-/ 'go out' usually exhibit only a single *-n-;* note also the syncope of the preceding vowel in the present stem, which shows that that syllable was open (and the following consonant therefore single) when syncope of /ə/ occurred in TB (see **B23**). Unfortunately several forms made to the subjunctive stem of TB /lət-/ exhibit a geminate nasal; these include opt. 3sg. *laṃññi, läññi-ñ*, etc. (beside *läñi*, 2sg. *lyñit*, etc.; see Krause 1952: 282) and the recently discovered subj. 1sg. *lannu* (PK AS 17Da2; Pinault 1994:127-35). These latter forms are most easily explained as the result of a late assimilation *-nt-n- > *-nn-* (Pinault, loc. cit.) or *-t-n- > *-nn-* (Olav Hackstein, p.c.); but such a hypothesis cannot easily account for the single *-n-* of the forms noted above. Thus the prehistory of these TB forms remains problematic, and it is not clear whether *ndʰ participated in the sound change discussed here. (See also notes 1 and 2 below.)

If the *dʰ of *ndʰ was lost, PT *antpú 'both' < PIE *xn̥tbʰóx́ (see **3**) should probably be reckoned an exception to the sound change, since it is likely that the original *t of the word became *dʰ (or *d?) between a voiced nasal and a breathy-voiced stop (cf. Jasanoff 1976:125-6). But it is reasonable to suppose that the apical in 'both' was "protected" from loss by the following stop, i.e. that the phonetic loss of aspirates occurred only before vowels, or at any rate only before sonorants.

It is even harder to determine whether the dorsal voiced aspirates *ǵʰ/*gʰ and *gʷʰ were lost after a homorganic nasal. Unfortunately the development of PIE *nǵʰ/*ngʰ and *ngʷʰ is a matter of considerable interest, since if the loss of aspirates affected those clusters the respective outcomes would have been PT *ṅ and *ṅʷ, which would necessarily have been independent phonemes. Lamentably, there are no probative cases; indeed, the only reasonable etymologies that have any bearing on the question are the following.

PT *təṅk- 'hinder' (e.g. in inf. TB *taṅktsi*, TA *täṅkässi*) < post-PIE *tengʰ- 'heavy' (Lith. *tingùs* 'sluggish', ON *þungr* 'heavy'; Duchesne-Guillemin 1940:179)? But the semantics are anything but compelling. The Tocharian verb can be < *dʰengʰ- 'cover' (Lith. *deñgti*, cf. ON *dyngja* 'subterranean workroom'; Krause and Thomas 1960:66-7), though only if *ngʰ > *ng or *ṅ BEFORE Grassmann's Law occurred (see **19**).

PT *trəṅk- ~ *trëṅk- 'cling' (e.g. in pres. 3sg. TB *treṅkasträ*, TA *träṅkäṣtär*) < PIE *dʰrengʰ- 'make fast, fix' (Av. *drənjaiieiti* '(s)he strengthens, (s)he studies', *dražimnō* 'holding', Kellens 1984:121-2, 140-1; etymology proposed by Duchesne-Guillemin 1940:144)? But again the semantics are not compelling, and Grassmann's Law causes the same complications. (See also note 3.)

PT *məṅk-a- 'fail, be defeated' (e.g. in TB pres. 3sg. *mäṅketrä*, TA abstract *mäṅkälune*) < PIE *mengʰ- (OHG *mengen, mangolōn* 'to lack')? But these forms might just as well reflect PIE *menk- (cf. Lith. *meñkas* 'little'; also Lat. *mancus* 'crippled'? (Alan Nussbaum, p.c.)), with Verner's Law in Germanic. (See Van Windekens 1976:289.)

PT *ləṅk- 'hang' (e.g. in pres. ptc. mp. *ləṅkəmanë > TB *läṅkamane*, TA *läṅkmāṃ* and *läṅimāṃ*) < PIE *leng(ʰ)- 'swing' (Lith. *lingúoti* 'to swing'; Van Windekens 1941:55)? There are no clear cognates outside of Baltic (hence the uncertainty about the identity of the stop), but in this case the semantics are reasonably good.

If the cluster in the last word was *ngʰ, it follows that dorsal voiced aspirates were not dropped after nasals; if it was *ng, EITHER voiced aspirates did not become "plain" voiced stops before being dropped, OR dorsal aspirates were not dropped (whatever the process was). Finally, there is one example whose etymology is certain:

PIE *ǵlŋgʷʰ- 'light (= not heavy)' (see 5) > PT *ləṅ(k)ʷ- > TB *laṅtse* 561a1, fem. *läṅktsa* 407a7, nom. pl. masc. *läṅkᵤci* 245a3, obl. sg. *laṅwce* H149 add.8b6 (Van Windekens 1941:54).

As the quoted forms show, there seems to be no phonemic contrast between TB /ṅk(ʷ)/ and /ṅ(ʷ)/ before /tˢ/ or /c/; therefore we cannot determine what the situation was in PT, and this one certain case does not help us to decide whether dorsal voiced aspirates were lost after nasals!

It is reasonable to suppose that the phonetic process leading to the loss of aspirates after nasals began before the general devoicing of aspirates (see **20**), since it is not very likely that voiceless aspirates would be lost after nasals, nor that voiced aspirates remained breathy-voiced after nasals when they had already been devoiced elsewhere (though of course neither development would be completely impossible). Note that if voiced aspirates immediately following nasals became "plain" voiced stops before disappearing, the devoicing of aspirates would have bled that change; in that case aspirate devoicing MUST have occurred later.

We need more information to answer definitively most of the questions raised in this section. For further discussion see also **18**.

Notes.

1. The details of the derivation of TB /lən-/ are my own proposal. TA pres. *länt-s-* 'go out' (e.g. 3pl. *läntseñc*) can have acquired its *-t-* by analogy with pret. *ləṭ- < PIE aor. *ǵlud^{h}- (preserved in TB *lateṃ* 'they went out'), or conceivably by epenthesis of *t* between *n* and *s* (Craig Melchert, p.c.), if the sequence *-ns- had been created or restored after the TA change of *ns to *ys (see **A10**); TA subj. *läñc-* (e.g. 3pl. *läñceñc*) has also generalized root-final palatalization, as has pret. *läc-* (1sg. *lcā*, 3pl. *lcär*; contrast the TB 3pl. cited above).

2. I can find no solid counterexamples to the proposed sound change *ndⁿ > *n; the derivation of PT *wənta- 'wrap' (e.g. in pret. ptc. *wəntówə > TB *wäntau*, TA *wänto*) from PIE *wendʰ- 'wind, plait' (Schneider 1939:249, Van Windekens 1976:556), while semantically acceptable, is not compelling.

3. PT *trəṅk- ~ *trëṅk- 'cling' is less likely to be cognate with Skt. pres. *dṛṃhati* '(s)he strengthens' (Duchesne-Guillemin 1940:144) because the nasal in the latter is clearly a present-stem infix; cf. Skt. ptc. *dṛḍhás* 'strengthened', iptv. *dṛ́hya* 'be strong, stand fast', noun *dhṛ́ṣṭis* 'tongs', and especially Av. *darəzaiieiti* '(s)he fetters', which seems to show that the root is *dʰerǵʰ- (Kellens 1984:136).

18. PT *kəntwó, *kəntwá- 'tongue'.

The Tocharian word for 'tongue' poses a special problem. The PIE form seems to have been *dŋǵʰwéx- ~ *dŋǵʰux- (Peters 1991a). In Tocharian some sort of metathesis occurred; the end result was PT *kəntwó, *kəntwá- > TB *kantwo*, /kəntwá-/ (pl. *käntwäñ*) and TA *käntu*, pl. *käntwäñ* (see **41** and **42** on the development of the stem vowel). There are at least two different ways in which the metathesis could have occurred.

Perhaps the most straightforward metathesis would have been *dŋǵʰwéx- → *ǵʰŋdwéx- (possibly at a date much later than these reconstructions suggest). If that is what happened, it must have taken place AFTER *d had been lost before nonsyllabics (see **27**), since otherwise *d would have been dropped from its new position before *w; in addition, we can say either that the metathesis occurred before the loss of postnasal aspirates or that dorsal aspirates were not lost (see **17** ad fin.), since otherwise *ǵʰ could not have survived to become word-initial. One might object that the

surviving *d of *ǵʰn̥dwéx- (vel sim.) ought to have given PT *tˢ (see 57 and 62); but at least one other example, PT pres. *kətná- 'strew', shows that *d failed to become an affricate before consonants (see 27 and 57), and it is reasonable to suppose that *w behaved like a consonant in that regard.

A plausible alternative is the metathesis *dn̥ǵʰwéx- → *ǵn̥dʰwéx-. A comparable metathesis of phonological features seems to be attested in Oscan (cf. acc. *fangvam* 'tongue' < *dʰn̥ǵwā́m ← *dn̥ǵʰwā́m ←< PIE *dn̥ǵʰwéxm). If *dʰ was lost when preceded by *n (see 17) or *n̥ (see below), that loss must have occurred before any metathesis to *ǵn̥dʰwéx- (vel sim.), since otherwise *dʰ should have been lost from its new postnasal position—and dorsal aspirates CANNOT have been affected by the same change (see 17 ad fin.): that is, the only scenario that will give the right result seems to be the following:

1) earlier forms (including changes through **16**)

*lundʰ- pres. 'come' *lŋ̥gʷʰ- 'light' *dn̥gʰwā́- 'tongue'

2) loss of postnasal *bʰ, *dʰ (but not of dorsal aspirates)

*lun- pres. 'come' *lŋ̥gʷʰ- 'light' *dn̥gʰwā́- 'tongue'

3) metathesis

*lun- pres. 'come' *lŋ̥gʷʰ- 'light' *gn̥dʰwā́- 'tongue'.

(*gʰ would survive at stage (2) because only anterior aspirates were lost, and the *dʰ resulting from (3) would escape loss because (2) had already run its course.) To be sure, there are other thinkable possibilities. For example, we might suggest that postnasal voiced aspirates were lost only before syllabic vowels, thus not before *w (cf. the case of 'both' in 17?); or that voiced aspirates were lost only after nonsyllabic nasals, thus not after *n̥ (in which case the loss of *bʰ in zero-grade *stn̥bʰX- (see 17) must have been analogical). But none of these alternatives seems phonetically plausible.

More complex scenarios can of course be devised. For example, there might have been an original metathesis of features to *dʰn̥ǵwéx-, as in Oscan (see above), then a metathesis of segments to *ǵn̥dʰwéx- after the loss of voiced aspirates following nasals had run its course. Also, it should be remembered that this word has been subject to tabu deformation throughout much of the IE family (cf. Hilmarsson 1982: 353, Hock 1986:303-5) and could have been deformed very early in the history of Tocharian in some way which is not now recoverable.

The first scenario outlined above is by far the simplest, and for that reason I shall adopt it as a working hypothesis. However, it should be emphasized that chronological arguments based only on the simplicity of the posited changes are very weak; therefore no further inferences should be drawn from the results of such argumentation.

Notes.

1. I cannot credit the hypotheses of Hilmarsson 1982 and Winter 1982 regarding the origin of PIE 'tongue'; tabu deformation seems sufficient to account for the phonological irregularities of this word without invoking pre-PIE compounding.

19. Grassmann's Law.

The first of two aspirates in a root was deaspirated; i.e., Grassmann's Law operated in Tocharian (Winter 1962b:24-5). This change is recoverable only because prevocalic *d eventually gave PT *ᵗs instead of falling together with the other apical stops in *t (ibid. pp. 25-8; see 57 and 62). Winter adduces three examples, all with analogical depalatalization of the root-initial consonant (ibid. pp. 22-3; see 55); two of them seem certain:

PIE *dʰeyǵʰ- ~ *dʰiǵʰ- 'form (out of clay)' (Lat. *fingere*, etc.) > *deygʰ- ~ *digʰ- >→ PT *tˢik-a-, e.g. in TB gerundive *tsikale* 'should be made'; PT ablauting pret. ptc. *tˢatˢáykawə > TA *tsātseku* (with remodelled ending), TB fem. pl. *(tsa)tsaikau(wa);*

PIE *dʰegʷʰ- 'burn' (pres. 3sg. Skt. *dáhati*, etc.) > *degʷʰ- >→ *tˢəkʷ- → PT *tˢɔk- (see **59** and **A14**), e.g. in pres. 3sg. mp. TB *tsakṣträ*, TA *tsäknäṣtär*, both 'it burns (intr.)'.

The third example is at least plausible:

PIE *dʰewgʰ- ~ *dʰugʰ- 'produce' (Skt. pres. 3sg. *dógdhi* '(s)he milks, (s)he obtains (milk) from', mid. *duhé* 'it gives (milk)', Gk. τεύχειν 'make, fashion') > *dewgʰ- ~ *dugʰ- >→ PT *tˢuk-(a-) '(cause to) drink' (Winter 1962b:19), in TB /tˢuk-/ 'cause to drink', e.g. in gerundive *tsukäle;* TA nonpres. stem *tsukā-* 'drink', e.g. in pret. ptc. *tsuko* (etymology first in Duchesne-Guillemin 1940:144). However, there is an alternative etymology for this verb which is equally plausible (see note 1).

Since deaspiration of *dʰ resulted in *d, this change must have occurred before the devoicing of aspirates (**20**).

Notes.

1. It is just as likely that PT *tˢuk-(a-) reflects PIE *dewk- ~ *duk- 'pull, draw' (Lat. *dūcere* 'lead', Goth. *tiuhan* 'pull'; Lane 1938:27, cf. Winter 1962b:18); in that case the PT meaning was probably 'drink' (nonpres. stem), and the restriction of TB /tˢuk-/ to causative function is secondary.

20. Devoicing of aspirates.

It appears that all remaining aspirates were devoiced. This can be demonstrated for *dʰ; for the other aspirates it can only be inferred.

If the affrication and assibilation of dentals discussed in **34** were phonetically natural changes, devoicing of *dʰ must have preceded them for the following reason.

The reflexes of PIE *ty and *d^hy were affricated to *t^s, while *dy was not (cf. **27**), and word-final postvocalic *-ti and *-d^hi were both assibilated to *-si (Jasanoff 1987: 108-12; no examples of *-di occur). If *d^h had already been devoiced to *t^h when affrication and assibilation occurred, the latter changes affected only voiceless dentals, which is entirely natural; however, if *d^h had not been devoiced, it is difficult (at best) to propose a phonetically natural scenario that will account for the observed pattern of changes.

In addition, assibilation must have occurred before the general palatalization of consonants in Tocharian (see **46** through **48**), since the *-si that resulted from assibilation underwent palatalization. (Whether *t^s also underwent palatalization is much less clear; see the discussion in **35** and **46**.) Palatalization in turn occurred before the general loss of voicing distinctions in obstruents (see **62**). Thus the devoicing of aspirates is firmly anchored in the relative chronology of Tocharian sound changes, and it clearly preceded the general devoicing of obstruents, probably by many centuries.

The clear examples of aspirate devoicing are the two which involve subsequent affrication or assibilation:

PIE *d^hixg^w- 'stab' (see **9**) > *t^hyag^w- > *t^sag^w- (see **34**) > PT *t^sak^w-(a-) > TB /t^saka-/ 'bite (of snakes), put out (the eyes)', e.g. in subj. 3sg. *tsākaṃ* 'it will bite';

PIE *ǵid^hí iptv. 2sg. 'go' (Skt. *ihí*, Gk. ἴθι, Hitt. *it*; cf. **7**) > *it^hí > *isí (see **34**) > *yəṣś (note the regular palatalization of *s) → *pə-yəṣś > PT *piyəṣś > TA *piṣ*, (?) TB *paṣ* (Jasanoff, loc. cit.; see **B15**).

From the principle that sound change is normally regular it follows that other *d^h were also devoiced, and it would be very strange if other aspirates were not devoiced at the same time—though strictly speaking the latter cannot be demonstrated, since all obstruents were devoiced at a much later stage in the development of the language. Presumably obstruents in contact with aspirates were devoiced at the same time the aspirates were, though that also cannot be demonstrated.

21. Adjustment of reduplicating syllables.

If sound change proceeded without morphological adjustments, Grassmann's Law (**19**) and aspirate devoicing (**20**) must have made the reduplication of root-initial aspirates relatively opaque, as follows:

*b^hV-b^h... > *bV-b^h... > *bV-p^h...,

*d^hV-d^h... > *dV-d^h... > *dV-t^h..., etc.

Even if this curious pattern of reduplication had persisted, the eventual loss of voicing and aspiration distinctions in obstruents (see **62** and **63**) would have eliminated it among the labials and dorsals. However, the apical stops would have continued to diverge: reduplicating *d would have been affricated to *d^z (see **57**), then devoiced to *t^s (see **62**), while root-initial *t^h would merely have been deaspirated to *t (see **63**).

But at some point the consonants of reduplicating syllables were adjusted to bring them into closer conformity with root-initial consonants. Such an adjustment could conceivably have occurred very late, replacing *t^sV-t..., for example, with *tV-t... . But given that most reduplicating consonants remained identical with their root-initial reduplicands (e.g. *tV-t..., *dV-d..., *nV-n..., etc.), and given the existence of a phonological rule dissimilating aspirates (i.e. Grassmann's Law), it seems likeliest that a change *bV-p^h... → *pV-p^h..., *dV-t^h... → *tV-t^h..., etc. occurred simultaneously with or not long after the devoicing of aspirates.

We can thus reconstruct as follows the development of the lone surviving example of aspirate reduplication with an indisputable PIE pedigree:

PIE zero-grade *d^hǵ-d^hǵ- pres. 'be putting' (see **14**) > *dé-d^ha- (see **14** and **19**) > *dé-t^ha- (see **20**) → *té-t^ha- > *tʸé-t^ha- (see **46**) > *tʸǵ-t^ha- (see **50**) → *tǵ-t^ha- (depalatalization, see **55**) > PT *tǵ-ta- 'put' >→ TB /təttá-/ in subj. 3sg. *tattaṃ*, pret. ptc. *tättā*$_u$.

(See Lane 1959:163-4 for the reduplication, though the generally accepted etymology should be preferred to Lane's connection with PIE *dex^w- 'give', as PIE prevocalic *d could not give PT *t. On the *tt* of the TB forms see **ix** above and Van Windekens 1976 s.v. A *tā*- etc.)

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Chapter 4. PIE *y and *d, and related matters.

The problems treated in this chapter are especially intractable, and some of the solutions advanced are tentative. After reviewing the available evidence regarding the fate of intervocalic *y (**22**), I suggest that at least some intervocalic *y were lost (**23**); I also suggest, following Warren Cowgill, that PIE final *s became *y in monosyllables (**24**). Both suggestions are more than usually speculative. I propose a simple explanation for the shape of TB *soy*, TA *se* 'son', a perennial problem of Tocharian linguistics (**25**). The remainder of the chapter (**26** through **28**) discusses the loss of *d before consonants and its interaction with other sound changes.

22. Intervocalic *y.

At least three examples show that PIE initial *y, as well as *y that became initial upon the loss of a preceding laryngeal, survived as such in Tocharian:

PIE *yes- ~ *yos- 'boil' (Gk. ζεῖν, Skt. pres. *yásyati* 'it boils') >→ PT *yəs-, *yas-a- in TB pret. ptc. pl. *yayāsaṣ* 'agitated', TA pres. *y[sä]ṣ* 'it boils' (Schneider 1940:198);

PIE *yúX nom. pl. 'you' (*yṷ́?; Skt. *yūyám*, Goth. *jūs*) and *wos obl. pl. enclitic 'you' (Skt. *vas;* Lat. *vōs* with analogical long vowel), conflated in *yos >→ PT *yəsə nom./obl. pl. 'you' (see **24** and **32** on the ending) > TB *yes*, TA *yas;*

PIE *Xyewd^{h}- ~ *Xyud^{h}- 'be excited' (see **5**) + pres. *-sḱé/ó- >→ *yutsk- > PT *yutk-a- 'be worried' > TA *yutkā-* in pres. 2sg. *mar yutkatār* 'do not worry', etc. (Jasanoff 1975:111, Melchert 1977:123–4; cf. Schneider 1941:47).

Postconsonantal *y survived until the palatalization of consonants (see **48**); preconsonantal and word-final *y formed diphthongs with preceding vowels, and are best treated as part of the Tocharian vowel system (see **35**, **53** and **71**). What happened to intervocalic *y is less certain.

Both languages exhibit numerous examples of intervocalic *y, and it is clear that many of those examples existed already in PT; however, most PT intervocalic *y can have arisen secondarily. Some occur after reduplicating syllables, where they would almost certainly have been restored by analogy if they were ever lost; a typical example is

PT *yayátawə pret. ptc. 'able' > TB *yayātau*, >→ TA *yāytu* (ending remodelled).

Other *y became intervocalic through prefixation, which can have occurred within the

PT period (and after the loss of original intervocalic *y, if any such loss occurred—see below); cf. e.g.

PIE *ǵidʰí iptv. 2sg. 'go' (see **20**) > *yəṣṣó → *pə-yəṣṣó > PT *piyəṣṣó > TA *piṣ*, (?) TB *paṣ* (Jasanoff 1987:108-9; see **B15**).

Still other examples can have arisen by analogy with related forms exhibiting preconsonantal *y; thus TB *āyor* 'gift', whatever the date of its creation, can owe its *y* to analogy with the present and subjunctive stems of 'give' (pres. 3sg. *aiṣṣūṃ* ←< PT *ayṣṣə, cf. TA *eṣ* < PT *ayṣṣəṣə; subj. 2sg. *ait* < PT *aytə, cf. TA *et*). Some intervocalic *y arose by the loss of *d in the consonant cluster *dy (see **27**); thus, if original intervocalic *y was lost (see below), that loss apparently occurred before the loss of preconsonantal *d. Many examples of PT intervocalic *y are of unknown origin; a typical example is the following:

PIE *dʰux- 'smoke' (Hitt. *tuhhuwais*, Skt. *dhūmás*) > *tʰu-V... (see **4**) > PT *t(u)wëyë 'dust' > TB *tweye*, TA *twe* (cf. Lane 1938:33).

The root etymology seems clear, but the suffix that contains the *y cannot be identified. (Note that TB also has *y* < PT *wʸ, e.g. in opt. stem *wāyoy-* 'would lead' = TA *wāwi-* (Winter 1965b:203-4); see **B14**.) But there are a few PT intervocalic *y that might have been inherited from PIE.

PT possessed a disyllabic adjective-forming suffix *-iyë (see **4**) which reflects PIE *-iXo- and probably also PIE *-io-. It is clear that the *-y- of this suffix, which arose automatically between *i and the following vowel (see **52**), was never lost; but it does not follow that no other intervocalic *y were lost, since one would expect *y to survive when immediately preceded by *i even if it was lost between all other vowels (as in Germanic). PT *skiyá- 'shadow' is perhaps a similar example, depending on the exact chronology of the changes which affected it—a chronology which unfortunately is not determinable (see **7** for further discussion).

An obvious place to look for less trivial examples of surviving intervocalic *y is the nom. pl. of i-stems, which should have developed as follows:

PIE nom. pl. *-eyes > *-ʸəyə (see **32** and **50**) > PT *-ʸiyə > TB, TA *-i*.

The change of *-əy- to *-iy- occurred quite late in the prehistory of Tocharian (see **52**); therefore, if the development just sketched actually occurred, intervocalic *y after at least some non-*i vowels survived virtually throughout the development of Tocharian. However, considerable caution is usually needed in interpreting the nominal endings of Tocharian, and this case is no exception. The relevant facts seem to be the following.

A large number of nominals do have nom. pl. forms in *-i* in TB, but the TB ending is etymologically ambiguous. It can reflect PT *-ę < PIE *-oy, the pronominal nom. pl. ending which spread to other o-stem nominals (see **35**, **50**, and **B3**); thus it is not surprising to find that thematic nouns (class V-1) have nom. pls. in *-i* in TB. It might also reflect PT *-ʸüwʸə < PIE u-stem *-ewes (see **46**, **50**, and **B14**); for example, consider the following paradigm:

TB *lyak* 'thief', pl. nom. *lyśi*, obl. *lykaṃ* < PT *lʸəkə, pl. nom. *lʸəśüwʸə, (post-PT) obl. *lʸəkənə.

It seems very likely that this is the regular reflex of a u-stem, with PT nom. sg. *-ə < *-us, nom. pl. *-ʸüwʸə < *-ewes, obl. pl. *-ənə < *-u- + *-nəns ← acc. pl. *-uns (Cowgill, p.c. 1980; see **32**, n. 1), whatever the etymology of the root may be—though in that case TA nom. pl. *lyśi* can only be analogical (see note 1).

On the other hand, though TA nom. pl. *-i* is much less common, it is much easier to interpret historically. PIE *-oy > PT *-ę > TA *-e* (see **35**, **50**, and **A12**), and PIE *-ewes > PT *-ʸüwʸə > TA *-u*, provided no analogical changes intervened; thus the only plausible source for TA nom. pl. *-i* is PIE i-stem *-eyes, and it is possible that the development posited above, involving the survival of intervocalic *y, does underly the TA ending. Pointing in the same direction are the etymology and inflection of TB **maśce* 'fist':

PIE *musti- 'fist' (Skt. *muṣṭís*) > PT *məścə- in TB nom. sg. **maśce* (*mäśce* 142a3, *maśśe* 152b1), dat. *mašc-äś* (334a2), loc. *maś-ne* (334a4), nom. pl. probably **mäści* (Pisani 1965:316).

Though the nom. pl. of this inherited i-stem is not attested, it almost certainly ended in *-i*, since the inflection of **maśce* is otherwise parallel to that of TB *āśce* 'head', nom. pl. *aści* (H149.14a3; see Krause and Thomas 1960:131, and cf. note 2 below); and THESE TB *-i*, at least, should reflect PT *-ʸiyə, ultimately < PIE *-eyes.

Unfortunately there is a further consideration which undermines these examples. It is not clear that PT nom. pl. *-ʸiyə reflects PIE *-eyes by sound change ALONE; it is possible that the ending was first remodelled to *-ies (Ringe 1991a:90 fn. 80; cf. Ionic Greek πόλιες 'cities', OCS *pǫtĭje* 'paths'), which can then have become PT *-ʸiyə by sound change (see **4**). Therefore the endings in question are NOT unobjectionable examples of the retention of PIE intervocalic *y in Tocharian.

An isolated TB verb form might offer further support for the hypothesis that PIE *-eye- became PT *-ʸiyə(-) by sound change. The TB infinitive *śerītsi* 'to hunt' presupposes a subjunctive stem *śeri-*, which is clearly derived from an inherited noun:

PIE *ḱḗruos 'stag-hunter' (see **4**) > PT *śeruwë 'hunter' > TB *śerwe*, obl. *śeruweṃ* 255a7, TA *śaru* (Jasanoff apud Nussbaum 1986:8).

If the morphological process deriving verbs from nouns is also inherited, we might expect the TB verb stem to reflect a PIE or post-PIE denominative present:

(post-)PIE *ḱḗrue-yé- 'be a stag-hunter' (cf. Skt. ptc. *devayán* 'serving the gods' ← *devás* 'god', acc. *amitrayántam* 'inimical' ← *amítras* 'enemy'; Gk. φιλεῖν 'be friendly to' ← φίλος 'friend') > PT *śerüwʸiyə- > TB *śeriyí- > *śerī-*, *śeri-*.

Unfortunately no morphologically parallel forms can be cited. The class of TB subjunctives in *-i-* comprises only six stems (Krause 1952:128-30; K. Schmidt 1975: 291-2), and no corresponding TA class is attested. Of the five remaining stems, *aklyī-* 'learn' and *lalyi-* 'exert oneself, be tired' might conceivably be denominative

from *akalye* 'doctrine, study' and *lalyiye* 'effort'; but note that some forms of these verbs (such as the pret. participles *ākāu* '(having) learned' and *lalālu* 'tired') exhibit root-final consonants WITHOUT palatalization—unlike the nouns—and that suggests strongly that the nouns are derived from the verbs, not the other way around. (Cf. also K. Schmidt 1975:292 fn. 18.) Two of the remaining subjunctive stems in *-i-* could conceivably reflect PIE simple thematic presents:

?PIE pres. *klep-e- 'steal' (OLat. *clepere*, Goth. *hlifan;* cf. **16**) >→ PT subj. *kəlʸpʸ-iyə- in TB inf. *kälypītsi* (cf. Van Windekens 1960:39);

?PIE pres. *xwes-e- 'spend the night' (Skt. 3sg. *vásati;* Goth. *wisan* 'to be'; see 7) >→ PT *wəṣ-iyə- in TB inf. *wṣītsi* 'to stay, to rest'.

We might suggest that TB *kälypītsi* actually reflects a PIE present *klep-ye-, possibly preserved in Gk. κλέπτειν; alternatively, we might see in the TB stem a reflex of PT thematic *kəlʸpʸ-ə-, suggesting that the TB stem vowel *-i-* is nothing more than the reflex of PT *ə after a palatalized labial (see **B11**). But neither of these solutions will help to explain the last example, and we must admit that the prehistory of this class of TB subjunctives remains obscure. It follows that TB *śerītsi* 'to hunt' should be treated with reserve. (See also note 3 for discussion of some other alternatives.)

Yet another example of the PIE sequence *eye occurred in the nom. pl. masc. of 'three' (an aberrant i-stem):

PIE *tréyes 'three' (Skt. *tráyas*, Gk. τρεῖς, etc.) >→ PT *trḗy(ə)? *trʸéy(ə)?; in either case, > TB *trey ~ trai*, TA *tre*.

The *y of the PT form is usually considered the direct reflex of the PIE intervocalic *y; but in that case the first PT vowel is a problem, since it cannot reflect PIE *e. Several scholars have suggested a development

PIE *tréyes → *tróyes > PT *trḗyə;

the *o of the pre-PT form is said to be due to the influence of the derived o-stem *troyo- (OCS *trojĭ;* so Van Windekens 1962b:511-2, Penney 1976:81) or of PIE *kʷetwóres 'four' (Skt. *catvāras*, Gk. (Doric) τέτορες; so Normier 1980:254 fn. 6). Neither hypothesis is easy to believe. One would not expect a derived o-stem to have influenced the vocalism of the basic numeral, especially since the feminine form PT *tərʸya < PIE neut. *tríx (see **9**) shows no such influence. Analogy with 'four' is no better. Though it is not unreasonable to suppose that one basic numeral has influenced another (especially one that was adjacent in counting), alteration of only the vowel of 'three' is rather surprising; a more drastic remodelling, making 'three' resemble 'four' much more closely, would actually be easier to credit. To be sure, the introduction of *o into 'three' would make sense if the ablaut system were still functioning in these numerals more or less as it had in PIE—in effect, one ablaut vowel would be substituted for another; but in that case it should still have been clear that the stem of 'three' was *tri-, the sequence *-ey-es should still have been recognizable as an i-stem nom. pl. ending, and the combined influence of the entire class of

i-stems with nom. pls. in *-ey-es (see above) might be expected to have inhibited the change in 'three'.

Prompted by these difficulties, Warren Cowgill (p.c. 1980) has suggested another alternative. He argues that PIE intervocalic *y might have been lost in Tocharian, at least in some instances (between identical vowels?); the development of 'three' might then have been as follows:

PIE *tréyes > *trées > *trḗs (cf. Lat. *trēs*) > PT *trʸéy (see **24** and **50**).

This hypothesis requires a change of word-final *s to *y in monosyllables; though such a change is surprising, and though the unambiguous evidence for it is slender, I suspect that it is correct (see **24**). However, other problems beset Cowgill's hypothesis. In the first place, the TB form *trey ~ trai* exhibits a type of variation which is not attested in forms reflecting PT word-final *-ëy (cf. the examples in **35**) or presumably *-ey, but which might be characteristic of forms reflecting PT word-final DISYLLABIC sequences of vocalics, including *-ëyə and *-eyə (see **viii**, **35**, and **48**, note 2). A similar conclusion is suggested by two compounds of 'three' attested in a TB bilingual:

treyameskeṃ 148a1 and b1, glossing *siddhaṃ trisaṃndhi* 'threefold power';

treyasaim 148a2, glossing *trayāśraya* 'having three refuges'.

The initial two syllables of these compounds clearly reflect underlying /treyə́-/, and in spite of the improbability of *tróyes the most straightforward development that would give such a form is

TB /treyə́/ < PT *trḗyə (see **B6**) < *tróyes ← PIE *tréyes.

In short, I am not able to reconstruct the development of PIE *tréyes in Tocharian in a way that is both plausible and consistent with the facts; consequently I feel obliged to treat this example with reserve. Still, it seems clear that the available evidence tends to favor the hypothesis that PIE intervocalic *y was preserved in the PT word for 'three'.

Intervocalic *y must have occurred in at least some forms of 'son' (TB *soy*, TA *se*) at some stages of its prehistory, but the complex inflection of that stem would have permitted so many analogical changes that any intervocalic *y in the PT form need not directly reflect an intervocalic *y of much earlier periods. See **25** for further discussion.

For the possible development of intervocalic *y in acc. sg. *-oyṃ and the like see the discussion of word-final *oy in **35**.

I conclude that PIE intervocalic *y could conceivably have survived into PT in the nom. pl. of i-stems (PIE *-eyes) and in denominative presents (suffix *-eyé-), and is reasonably likely to have survived the masc. of 'three' (*tréyes). None of those examples is probative. Clear examples of the loss of intervocalic *y are also lacking (but see **23**).

Notes.

1. There is evidence that many TA nom. pls. in *-u* (< PT neut. *-uwa and masc. *-yüwʸə) have been remodelled by analogy. For the neuters see Krause and Thomas 1960:119-20, and note especially *kurtsru ~ kursärwā* 'miles', *cmolu ~ cmoläntu* 'births', etc.; cf. also the discussion of *ākrunt* 'tears' in **12** above. Particularly striking is TA 'tusks', nom. pl. *āṅkarū ~ āṅkari*, obl. pl. *āṅkaräs* (no sg. attested; TB only sg. *āṅkär*), which is clearly a masculine noun (cf. nom. pl. *ṣokyo ā(r)ky(aṃ)ś āṅkari* 'very white tusks' 213a6) and suggests most strongly that TA nom. pl. *lyśi* 'thieves' could be an analogical replacement for *lyśu < PT u-stem *lʸəśüwʸə (> TB *lyśi*, see above).

2. I cannot credit Van Windekens' derivation of TB *āśce* 'head' from post-PIE *aḱ-s-ti- (Van Windekens 1976:171) because it is not reconcilable with a clearly regular sound change, the insertion of *ə between a labial or dorsal stop and *st (see **31**). However, it seems clear that the TB word can only be an old i-stem. Can it reflect PIE *xest-i- 'bone'? (Cf. Welsh *asgwrn* 'bone', o-grade *xost-éy- in Gk. ὀστέον, and an i-stem extension of uncertain ablaut in Hitt. *hastai* and perhaps in Skt. *ásthi;* see Hoffmann apud Eichner 1972:72, Melchert 1984b:111.)

3. From a strictly phonological point of view it is possible that TB subjunctive *-i-* actually reflects PT *ę (see **35**); but the only plausible source of such a PT suffix would be PIE thematic optative *-oy- (cf. Lane 1959:166), and we would then be faced with the problem of explaining how the optative gave rise to a subjunctive in just this one class of verbs—a problem which Van Windekens 1982:224, for example, certainly has NOT solved. Is it possible that PT subj. *śerüwʸiyə- ← thematic *śeruwē was originally a present of the type reflected in Lat. *servīre* 'serve' ← thematic *servos* 'slave' (ultimately reflecting the PIE heavy Sievers alternant *-ié/ó-)?

23. The source of pre-PT *ō̆.

In spite of the uncertainties discussed in the preceding section, there is one phenomenon of Tocharian vocalism which is perhaps best explained by a loss of intervocalic *y. The pre-PT vowel system included a vowel which I represent as *ō̆. In most environments this vowel eventually merged with *ē to give PT *e (see **51** and **A5**); but when the preceding syllable contained *a, the sequence *a . . . ō̆ underwent sound changes which eventually resulted in PT *o . . . o (see **49**). Those are the sound changes responsible for the split between present stem classes III and IV in Tocharian. They clearly did not affect pre-PT *ĕ < PIE *o or pre-PT *ē < PIE *ē (Ringe 1987a:114-8, 1991a:83-91; see **49**), which is why we must posit *ō̆ (or the like) as a distinct element of the pre-PT vowel system.

The lexical occurrence of pre-PT *ō̆ was highly restricted; so far as can be determined, it occurred only in the noun-forming suffix *-ō̆lmĕ and as the stem suffix of class III/IV presents and perhaps of class III subjunctives (or of the forms ancestral to those PT verb categories; see **49**). It is therefore likely that *ō̆ reflects a relatively uncommon sequence of earlier sounds. Moreover, Jay Jasanoff has pointed out that present class III/IV contains at least eight stems cognate with ē-stative presents of other IE languages (Jasanoff 1978:28; on the subjunctives of class III see note 1 below). In light of those distributional facts, Warren Cowgill (p.c. 1980) suggested that the vowel in question somehow reflects post-PIE stative *-ḱ-yé- or *-ḱ-yó- ← PIE *-éḱ-, with vocalization of the laryngeal, loss of *y, and contraction of the resulting vowel sequence. I have elaborated that suggestion into a hypothesis regarding the origin of pre-PT *ō̆, which I shall briefly recapitulate here; for further details the reader should consult Ringe 1991a:83-91.

The PIE stative suffix *-éḱ- formed only present stems and did not ablaut. But most descendants of PIE began to build complete verb conjugations, containing two or more inflected stems, at an early stage of their development; moreover, verbal adjectives in *-tó- and *-nó-, verbal nouns in *-tí- and *-tu-, etc., were attracted into those paradigms as participles and infinitives in various branches of IE. Such developments made it necessary to provide stative presents with aorists and/or perfects, participles, and the like. It appears that in some languages these processes began when oxytone suffixes could still induce zero grade of the preceding morpheme; in pre-Proto-Germanic, for example, participles in *-ḱ-tó- were formed to stative presents in *-éḱ-, and clear reflexes of those participles survive in various Germanic languages (Bammesberger 1969:534-5 with fnn. 11 and 13 and references). I posit such processes not only for Germanic, but also for Balto-Slavic and Tocharian. Subsequent to these morphological innovations, laryngeals were eliminated by sound change; see **3** through **14** for the relevant changes in Tocharian. After interconsonantal laryngeals had been vocalized, but before they had become *a (see **14**), the original stative presents were remodelled according to the following proportion:

ptc. *-tó- : pres. *-yé/ó- : : ptc. *-ə-tó- : X;

X = *-ə-yé/ó-, replacing the original present suffix *-ē̆-.

This change, too, occurred in Germanic, Balto-Slavic, and Tocharian; moreover, in all three branches it counterfeeds, and therefore must POSTDATE, sound changes affecting inherited sequences *-XyV-. In Germanic and Balto-Slavic inherited laryngeals had already been dropped before *y (Jasanoff 1978:65-6, 100); hence the stative present suffix in those branches, with vocalized *ə reintroduced before *y, exhibits unique phonological reflexes—which nevertheless clearly contain the PIE present-forming suffix *-yé/ó-. In Tocharian, too, the new stative suffix fails to behave like inherited *-XyV- / *-XiV- (on which see **7** and the possible example *ǵn̥yétor 'is born' in **8**); instead, *y in the new sequence *əyé/ó apparently was lost, and the vocalized laryngeal contracted with the following vowel, evidently at some time before such laryngeals became *a (since we would expect a contraction involving *a to result in a long ā-vowel). The process can be stated schematically as follows, using examples that have stative cognates elsewhere:

PIE *$b^hr\acute{g}^h$-éx́- 'be high' (Hitt. *parkēss-* 'become tall', Oettinger 1979:242-4 with fn. 8; on the sigmatic suffix see Watkins 1962:76-7, 1971:71-2) → *$b^hr\acute{g}^h$-éx́-, ptc. *$b^hr\acute{g}^h$-x́-tó-, > *$b^hr\acute{g}^h\bar{e}$-, ptc. *$b^hr\acute{g}^h$ətó- → *$b^hr\acute{g}^h$əyé/ó-, ptc. *$b^hr\acute{g}^h$ətó-; pres. *$b^hr\acute{g}^h$əyé/ó- > > *bərk$^h\tilde{o}$- > PT *pərké-, 3sg. *pərkétər > TA *pärkatär* 'it rises';

PIE *b^hlg-éx́- 'burn, flare' (Lat. *fulgēre* 'to flash'; see **16** and note 3 below) → *b^hlg-éx́-, ptc. *b^hlg-x́-tó- > *b^hlgē-, ptc. *b^hlgətó- → *b^hlgəyé/ó-, ptc. *b^hlgətó-; pres. *b^hlgəyé/ó- > > *p^həlgõ- > PT *pəlké-, 3sg. *pəlkétər > TB *pälketär-ne* 'his . . . burns'.

The innovative participles *$b^hr\acute{g}^h$ətó-, *b^hlgətó- ought to appear in PT as *pərkaté, *pəlkaté (see **14** and numerous sections of succeeding chapters), but such participles do not survive in Tocharian; on the other hand, the PT set roots *pərka-, *pəlka- have clearly been abstracted from such formations, and their root-final laryngeal actually reflects the induced zero-grade *-x́- of the PIE stative suffix.

I have not seen any other hypothesis regarding these phenomena that in my opinion accounts for the facts as completely and coherently as the account just given. Nevertheless, it must be admitted that much in the preceding paragraph is pure speculation. Particularly worrisome is the uncertainty surrounding the loss of intervocalic *y (see **22**); note also that we cannot say whether pre-PT *õ reflects earlier *əyé or *əyó (surely not both?), nor make any plausible suggestions about the phonetics of the contraction posited. I continue to prefer my hypothesis, but I also prefer not to base further conclusions on it, least of all regarding the chronology of sound changes in Tocharian.

The range of hypotheses advanced to account for the suffix of class III/IV presents is unusually wide; see Adams 1978b:280 with bibliography, 1988:70-2 with bibliography, Jasanoff 1978:24-55 with bibliography p. 27, Van Windekens 1982: 53-61 with bibliography pp. 53-4, 57-8, Hilmarsson 1984a:110, 1986:17 (and passim) for some alternatives.

Notes.

1. The PT class III subjunctive suffix *-é- is not necessarily of the same origin as the class III/IV present suffix *-é- ~ *-ó-. Note especially that the distribution of the two suffixes is completely different: presents in *-é- ~ *-ó- are formed to PT roots ending in *-a- and exhibiting any medial vowel, but subjunctives in *-é- are formed to roots that exhibit medial *ə and do not end in *-a-. If the class III subjunctive suffix does reflect pre-PT *-əyé/ó-, it must be the result of an analogical spread of very limited scope.

2. The origin of the pre-PT nominal suffix *-õlmë is unknown. However, note that three of the four examples are clearly formed to set roots: the root of TB *syelme* 'sweat' is PT *siya- (see **27** and **28**), the root of TB *wpelme* 'web' is PT *wəpa- ~ *wapa- 'weave'; and the root of TB *onolme* 'living being' is pre-PT *ana- 'breathe' (Jasanoff 1978:32; see **14**). Apparently, then, the first vowel of *-õlmë can reflect a contraction of vocalized *ə (the reflex of interconsonantal laryngeals) with a following vowel, as posited above for the class III/IV present suffix. (The fourth example of *-õlmë is TB *yśelme*, TA *yśaläm* (pl. *yśalmañ*) 'desire' < PT *yəśelmë; the root etymology of the word is not recoverable.)

3. As Olav Hackstein (p.c.) reminds me, Lat. *fulgēre* might actually be an innovation: it is striking that all the examples of the third-conjugation variant *fulgere* are attested in pre-Classical documents (though that does not completely exclude the possibility that the difference reflects dialect variation rather than historical change, as the case of 3pl. *-nt ~ -nunt* shows). Several of the ē-stative presents cited as likely cognates for these Tocharian presents in Jasanoff 1978:28 show clear or probable innovations of various kinds, but the number of examples is large enough (for a class of Tocharian verbs!) to suggest some ultimate connection.

24. Final *s in monosyllables.

I have noted in **22** the suggestion of Warren Cowgill that PIE word-final *s became PT *y in monosyllables. Whether the masculine form of 'three' is a good example of such a sound change is very doubtful (see **22**), but there are two clearer examples:

PIE *téxes nom. pl. fem. 'those' (see **4**) > *tắs = acc. pl. *tắs (Skt. *tắs;* see **3**, note 3) > *tắy > *tõy (see **42**) > PT *tóy > TB *toy* nom./obl. fem. 'these';

PIE *g^wnéxs > *g^wnắs 'woman's' (Skt. *gnắs*, OIr. *mná*) > *g^wnắy > *g^wnõy > *k^wnóy → PT *śnóy 'wife's' (cf. nom. *śəná) > TB *śnoy*, whence by analogy also PT *lant^{s}oy 'queen's' > TB *läntsoy*, TA *läntse*.

Though the phonetics of this change are somewhat surprising, a parallel can be cited: cf. Italian *puoi*, Rumanian *poi* 'then, next' < *pɔs < Lat. *post* 'after'.

PT *śnóy is a less than certain example of this change, because its *-y could be an added ending (Winter 1981:938); cf. gen. sg. TB *pätri*, TA *päcri* 'father's', and especially TB *täy* fem. 'of this'. However, the *-y* of TB pl. *toy* is most unlikely to be the result of analogy. No other TB feminine nominal, except the old dual *antapi* 'both' and the other demonstrative forms derived from *toy* by the suffixation of particles, has both nom. pl. and obl. pl. in *-i* or *-y*. In fact, the only other feminine nominals with such an ending even in the nom. pl. are about a dozen nouns (see note 1), all belonging to subclasses which are either small and unproductive or contain mostly masculines. Nor can the *-y* of obl. pl. *toy* be ascribed to the influence of the masculine, since the corresponding masc. form is obl. pl. *cem* (vs. nom. pl. *cey ~ cai*); in fact, the unexpected appearance of *cey-* in masc. obl. pl. *ceyna* 'these (here)' and its derived gen. pl. *ceynaṃts* is most easily explained by invoking the analogical influence of fem. *toyna, toynaṃts*. (On the corresponding TA forms see note 2.)

For these reasons I tentatively accept Cowgill's suggestion that PIE final *s became *y in monosyllables. If his analysis of 'three' were correct, the change must have followed the contraction of vowels that resulted from the loss of intervocalic *y. Unless the loss of final *-s (see **32**) somehow failed to apply in monosyllables, the

change *-s > *-y must have preceded the general loss of word-final consonants, which did not affect semivowels but did affect *-s.

Notes.

1. So far as I have been able to discover, the following TB fem. nouns have nom. pls. in *-i:*

Class V-1:

yente 'wind', pl. nom. *yenti*, obl. *yentem* (TA *want* fem., no pl. attested);

askwace 'kuśa-grass', pl. nom. *askwaśi* (Thomas 1964:165);

(?) *pekwe* 'ring', pl. nom. *pekwi*, obl. *pekwem* (the latter certainly masc. in 133b4; Thomas 1964:212 suggests that the word is sometimes fem.);

the use of compounds in *-ñäkte* 'god', which belongs to this class, as fem. (Thomas 1964:194) is surely secondary; cf. the derived fem. simplex *ñäkteñña.*

Class V-2:

ekṣalye 'udaya', obl. *ekṣaly*, pl. nom. *ekṣalyi*, obl. *ekṣalyän-* (TA *opṣäly* fem., pl. *opṣlyäntu, -antu* secondary);

kektseñe 'body' (declension like the preceding; TA *kapśañi* fem., pl. *kapśiñ-ñäñ*, is not quite identical in formation);

kwrāṣe 'skeleton', pl. obl. *kwrāṣäṃ;*

āśce 'head', obl. *āś, aśca-*, pl. nom. *aścī*, obl. *āstäṃ* (see 22 with note 2);

klokaśce 'pore', pl. nom. *klokaśśi*, obl. *klokastäṃn-* (TA abl. pl. *klyokäśśā-säṣ*, gender?);

plāce 'speech', obl. *plāc*, pl. obl. *plātäṃ* (TA *plāc* fem., pl. *plātän-*);

probably **maśce*, obl. *maśc-* 'fist' (see 22).

Class V-3:

āp 'river, water', pl. obl. *āpäṃ* (TA abl. sg. *āpäṣ* 45b2, loc. sg. *āpaṃ* 226a3, the latter clearly fem.);

probably *keṃ* 'earth' (no pl. attested; TA *tkaṃ*, pl. nom. *tkani, tkañi*, obl. *tkaṃs-*).

In addition, several nouns of unknown gender belonging to the latter two subclasses (e.g. V-2 *kärweñe* 'stone' and V-3 ke_u 'cow') will probably turn out to be feminine if and when we ever acquire decisive evidence. The latter two subclasses are completely unproductive in TB; of the fem. nouns belonging to V-1 at least one (*yente* 'wind') is inherited from (post-)PIE and can be considered a relic. Masc. nouns of subclass V-1 vastly outnumber all fem. nouns of class V combined. In short, these fem. nouns provide no basis for the spread of a fem. nom. pl. ending *-i* or *-y*, let alone an obl. pl. ending of such a shape.

2. Unlike TB, TA has no demonstratives without enclitic particles appended. If the particles are removed from the attested fem. pl. forms, we have fem. pl. nom. *to-*, obl. *tos-;* the latter has clearly been derived from the former by the addition of the productive obl. pl. ending *-s*. One would therefore expect TA *to-* to correspond phonologically to TB *toy*, but it does not. If the *o* of TA *to-* represents an older diphthong, it can only be a w-diphthong; if it corresponds to the *o* of TB *toy*, it can only have arisen by u-umlaut of pre-PT **ë* (see **43**) < PIE **o* (see **39**), which is clearly out of the question in a monosyllabic ā-stem. The same puzzling correspondence appears in TB *koyṃ*, TA *ko* 'mouth' (in which the correspondence TB /n/ : TA Ø is a further conundrum). I cannot explain these TA forms; but since TB *toy* is relatively easy to explain, I think I am justified in considering TA *to-* a purely TA problem. (The suggestion of Van Windekens 1976, s.v. A *to-* etc., that TA *to-* corresponds to TB $tā_u$ fem. obl. sg. 'that' is attractive; however, note that the u-particle seen in the TB form does not otherwise appear in TA, which uses *-m* instead.)

25. 'Son'.

The shape of the Tocharian word for 'son', TB *soy*, gen. *seyi*, pl. $s_{\text{Ø}}suwa$, TA *se, sey-*, gen. *seyo*, pl. nom. *sewāñ*, obl. *sewās*, poses an involved tangle of problems.

I agree with Hilmarsson (1984b:36) and the earlier scholars cited by him that TA pl. *sewāñ, -ās* contains an earlier pl. **sew*, which reflects PT **sVywʸ-* and/or **sVyw-* (cf. Gk. gen. sg. υἱος < **suywos*, stem **suyw-* < PIE **suXiw-´*; see Beekes 1973:239-40, Peters 1980:253 fn. 210). It follows immediately that the *y* of any form of this word, whether intervocalic or not, cannot be adduced as evidence against the loss of intervocalic **y* in Tocharian (see **22** and **23**), since it can have been reintroduced from position before **w* into position between vowels at virtually any time before the PT stage.

The vowels of the attested forms are much less easy to explain. Hilmarsson 1984b:29-35 has ably demolished most earlier hypotheses; one might add that the suggestion of a phonetic dissimilation of **uyu* to **oyu* (Klingenschmitt 1975:151 fn. 5) is equally unconvincing. (A problem with all these early hypotheses is that they operate with an inherited short **u* in the direct cases; in fact these must at first have contained a sequence **ūyu*, see **12** and below.) Hilmarsson's erstwhile suggestion of a lexical blend with PIE **swoyos* 'one's own' (loc. cit. pp. 35-6) was hard to believe, and he has withdrawn it (Hilmarsson 1986:341). Winter's analysis of TB pl. $s_{\text{Ø}}suwa$ as the neut. pl. of a fossilized preterite participle (Winter 1985:260-1) is obviously correct, but it seems clear that the underlying verb was PT **su-* < **sū-* < **suX-*, not **suwa-* < **swa-* < **suX-* (see **12**); in addition, though Winter's derivation of TB *soy* from PT **swáyə* (ibid. p. 261) is plausible enough (granted his sound changes involving laryngeals, which differ somewhat from mine, and his suggestion that PT **-ayə* > TB *-oy*, which is not unreasonable), his proposed derivation TA *se* < **soy* < PT **swáy* (loc. cit.) is not acceptable, since PT **wa* did not become pre-TA **o* after **s*: cf. TA *swār* = TB *swāre* < PT **swaré* < PIE **swadrós* (see **3** and **27**). TA *por* 'fire' < **pwár* < PT **puwár* (*/pəwár/, see **52**; TB *puwar*), which Winter cites as a parallel, owes its *o* to the fact that it contained a sequence of a LABIAL plus **wa* (see **A22**).

One might consider accounting for the *y* of *soy by the sound change discussed in **24** (Cowgill, p.c. 1980); the development of the nom. sg. would then have been as follows:

PIE *suXyús > *sūyús > *sūús > *sṹs (see **22**) > *sṹy (see **24**) > *súy (by the loss of vowel length, see **50**) > PT *sóy (or *sǫ́y) > TB *soy*, TA *se*.

The change of *uy to *oy (or *ǫy) is without parallel, but that is not surprising; if Cowgill's hypothesis is correct, 'son' probably contained the only example of the sequence *uy in the language after the general loss of vowel length. Moreover, lowering of *u before *y is a phonetically natural dissimilation (also attested, for example, in Middle English). This accounts for both the *y* and the vowels of most of the forms very neatly; but unfortunately it cannot account for the *e* of TB gen. sg. *seyi*. (The haplologies posited by Hilmarsson (1984b:36) and Winter (1985:262) to account for this form—restatable in my terms roughly as pre-PT dat. sg. *sVyéwʸəy > *sVyéyi → *séyi—are unconvincing.)

Let us approach the problem from a different angle, beginning with the TB forms. The *e* ~ *o* alternation of nom./obl. *soy*, gen. *seyi* can only reflect pre-PT *ë, with u-umlaut in the first form (see **43**) and without it in the second (see **39**). Since the appearance of pre-PT *ë in this word is unexpected, it is reasonable to suppose that it arose in a phonological environment that was unusual (perhaps unique). In addition, since *ë normally reflects an earlier short vowel (viz. PIE *o), the root-vowel of 'son' must have been short in that environment. There is only one environment that meets those conditions, namely the oblique stem *suyw- < *suiw- < PIE *suXiw- (see above; cf. the rarity of the diphthong ʊɪ in Greek). Moreover, while *ë is not phonetically similar to *u (so far as we can determine), its ancestor *o is very similar (both are back nonlow rounded vowels). I therefore posit Cowgill's change of tautosyllabic *uy to *oy, but BEFORE the unrounding of *o to *ë, and I suggest the following development for 'son':

a) PIE *suXiwós gen. sg. 'son's' > *suiwós (see **4**) > *suywós (cf. Gk. υἱος with shift of accent) > *soywós;

b) at some point the new stem *suyw- or *soyw- (or a later reflex) was generalized to all oblique and plural case forms;

c) the nom. sg. and acc. sg. likewise became *soyús and *soyúm (or their reflexes) respectively, and this occurred after the loss of intervocalic *y (if any) had run its course;

d) at some time after (b) had taken place, gen. sg. *soywós (or its reflex) was replaced by *soyówes (or its reflex) on the analogy of other u-stems.

The paradigm then developed as follows:

nom. sg. *soyús > *sëyús > *sǫyús (see **43**) > PT *sǫyś > TB *soy*, TA *se;*

so also acc. sg. *soyúm (final *m lost like final *s, see **32**);

gen. sg. *soyówes > *sëyéwes > PT *sëyéwʸə > TA *sayo → *seyo* (*e* by analogy with nom./obl. sg. *se*);

nom. pl. *soywes > *sëywes > PT *sëywʸə > TA *sew → *sew-āñ*, obl. *-ās*.

The TB gen. sg. must reflect the PIE dat. sg., but the details are more involved. One might propose the following development:

*soywéy > *sëywéy > *sëywʸéy > PT *sëywʸí > TB *seyi??*

But there is no reason to believe that PT *ywʸ would be simplified to a single *y* in TB; thus if the preform were *soywéy we might expect to find TB *"saiyyi"* or the like. This difficulty can be avoided if we instead posit the following:

analogical dat. sg. *soyéwey (cf. the gen. sg.) > *sëyéwey > *sëyéwʸəy > PT *sëyúwʸi > TB *seyi* (with the accent on the second syllable).

So far as I can see, this set of hypotheses solves the problems simply and neatly. The (unimpressive) implications for the chronology of Tocharian sound changes can be read directly from the schemata immediately above.

26. PT *wú 'two'.

PIE 'two' was disyllabic *duóx́ (Cowgill 1985:20), but it must have become monosyllabic *dwṓ in pre-Tocharian before preconsonantal *d was lost, since the initial *d of 'two' was in fact lost (see **27**). As a first approximation we might posit the following development:

PIE *duóx́ 'two' (see **3**) > *dwṓ > *wṓ (see **27**) > *wṹ (see **38**) > PT *wú > TA masc. *wu* (Winter 1962b:29).

It seems clear that the change of *u to *w did not affect all *CuV (see **4** and **9**), but only such sequences in which the consonant was word-initial . Presumably it also occurred in

PIE *ḱuṓ 'dog' (see **16**) > *kwṓ > *kwṹ > *kṹ > PT *kú > TB, TA *ku;*

this nom. sg. likewise seems to have been disyllabic in PIE (Hamp 1980:36, citing Paul Kiparsky in fn. 3; see also note 1 below), and one would expect the same change to have affected it, though the later (and trivial) loss of *w between a consonant and *ū has obliterated its effects. PT *kwṹnə obl. 'dog' (> TB *kweṃ*, TA *koṃ;* see **A14** and **B28**) could reflect the same change; but it appears that in words longer than two syllables initial *CiV-, *CuV- had become *CyV-, *CwV- already in PIE (cf. Lindeman 1965:105 on the distribution of forms).

But note that this development did not affect post-PIE *pxuṓr 'fire', which survived into PT as *puwár (see **7**). The might be because the laryngeal had remained consonantal until the change of *CuV- to *CwV- (where *C is exactly one consonant) had run its course, or because the post-PIE form was actually *p_exwṓr—alternatives which seem reasonably likely on independent grounds (see the discussion in **7**). But it is also possible that the development under discussion was not a regular sound change, but simply a levelling of *-w- from longer inflectional forms of these lexemes, which should have exhibited PIE *-w- (see above), into shorter ones (see also note 1 below). Of course that is much more plausible for 'dog' than for 'two'.

Presumably word-initial *CiV was subject to the same change, but Tocharian examples are hard to find. The least problematic is a relic verb form:

PIE opt. 3sg. *ǩs-iéǩ-t 'let him/her be' (OLat. *siet*, Gk. εἴη, etc.) > *siĕt > *syĕt > *syé (see **32**) > *ṣé (see **48** and **50**) + *-i (see **11** and **32**) → PT ipf. *ṣéy (*ṣéi, two syllables?) > TB *ṣey*, TA *ṣe-ṣ* (cf. Pedersen 1941:206-8).

But the fact that the corresponding form of 'go', which ought to reflect PIE disyllabic *ǩi-yéǩ-t, is not PT *yiyéy (*yiyéi?) but *yéy (*yéi?; > TB *yey*, TA *ye-ṣ*) invites caution.

If this was a regular sound change and the PIE opt. (PT ipf.) of 'be' is an example of it, it appears that word-initial preconsonantal laryngeals were lost (see **5**) before *CiV- > *CyV- (at least on the supposition that the latter change operated only if *C was exactly one consonant, as seems likely).

Notes.

1. Melchert 1989c:100 fn. 5 notes that the immediate preform of Hitt. *LÚkuwas* 'dog-man' necessarily began with *kw-, since a sequence *kuw- would have given "*kum-*" by regular sound change. However, Hitt. *da-* 'two-' < *do- < *dwo- < PIE *duo- apparently shows that the sound change suggested here for Tocharian (and by Cowgill 1985:13-4 for Germanic) occurred also at an earlier stage of Hittite. (Alternatively the prefix *dwo-, replacing inherited *dwi-, might owe its *-w- either to *dwi- or to the fact that any form containing a putative prefix *duo- necessarily contained more than two syllables; and the *kwő that underlies *LÚkuwas* might owe its *-w- to analogy with longer forms in the same paradigm. Melchert loc. cit. also notes the possibility of later analogical change in the Hittite word.)

27. Loss of preconsonantal *d.

PIE *d was lost before consonants, including semivowels (Winter 1962b: 29-32, Schindler 1966). Examples include the following:

PIE *duóǩ masc. 'two' (see 3) > *dwő > *wő > *wů > PT *wú > TA masc. *wu* (Winter 1962b:29);

PIE *dwey- 'be afraid' (Hom. Gk. δείδω 'I'm afraid' < *dédwoya; cf. Arm. *erkiwł* 'fear' [noun]) > *wey- >→ *wəy- (with analogical loss of palatalization) > PT *wi- in TB caus. *wīyäskeṃ* 'they frighten' (?; Thomas 1964:241), TA ptc. *wiyo* 'afraid' (Schindler 1966:236-7);

PIE *dwitós 'second' (extended in Skt. *dvitíya-*, Av. *bitiia-*) > *witós > *utĕ (see **28**) > PT *wətĕ > TB *wate*, TA *wät* (Cowgill, p.c. 1980);

PIE *swadrós 'sweet' (see **3**) > *swarós > PT *swarĕ > TB *swāre*, TA *swār* (Winter 1962b:29);

PIE *udriós 'watery' (see **4**) > PT *wərʸiyĕ in TB *wrīyeṣṣe*, TA obl. *wriṃ* (Winter 1962b:30, 1965a:202 fn. 20);

PIE *ladrós 'beloved' (see **9**) > *larós > PT *larĕ > TB *lāre* (Winter 1965a: 191);

PIE pres. *swid-yé- 'be sweating' (Skt. 3sg. *svídyati*) > *swiyé- > *suyé- (see **28**) > *səyś- >→ PT *siy-á- (see **52**) > TB /s(i)ya-/ 'sweat', e.g. in derived noun *syälñe* 'sweating' (Ringe 1987a:117, pace Winter 1962b:31; cf. Van Windekens 1961:383-4 for the loss of *d before *y in this word).

PT *pëy- 'foot' and *-pëwə '-footed' must also reflect this change, but their history is much less straightforward; see the discussion in **11**.

If there was a general loss of intervocalic *y (see **22** and **23**), the loss of preconsonantal *d must have occurred later, since the loss of *d gave rise to new intervocalic *y which were not lost; that *dy was assimilated to *yy (as Hilmarsson 1989: 13 suggests) seems unlikely, since the syncope of *ə in TB /s(i)ya-/ 'sweat' shows that its immediate preform contained nongeminate *y, and geminates were not normally simplified in TB. The history of PIE *dwitós 'second' makes it clear that this loss of *d occurred before *wi became *u (see **28**); that of PIE *duóǩ 'two' shows that it occurred after the change of *CuV- to *CwV- (see **26**). In addition, the contrast of TA *wu* 'two', with *w preserved, and TB, TA *ku* 'dog' < *kwő < PIE *ḱuó, with *w lost, at least suggests that *d was lost in 'two' before postconsonantal *wū > *ū in 'dog' (see **38**); otherwise we would have to suppose that *w was lost between *k and *ū but not between *d and *ū, which is implausible (though of course not impossible).

There are three words in which preconsonantal *d does not appear to have been lost:

TB *kenmer* 'dung' < PT *kënmër- (or *kënmʸer-) < PIE *ǵʰod-mVr- (see **16**; K. Schmidt 1980:409);

TB *katnaṃ* 'it strews' ←< PT *kətná, 3sg. pres. of *kəta- ~ *śəta- 'strew, sow' < PIE *kedx- (or *ḱedx-) 'strew, spread' (see **14**; Van Windekens 1963:464-5);

TB ptc. *nätkau* 'prompted', root /nətka-/ < PT *nətk-a- < *nət-sk- ←< PIE *nud- 'push' (cf. Skt. pres. iptv. 2sg. *nudásva*) + pres. *-sḱé/ó- (Jasanoff 1975: 111, Melchert 1977:123-4).

In these forms PIE preconsonantal *d seems to have survived as an apical stop, which has evidently become an apical nasal before the *-m-* of 'dung'; but this apparent survival is easily explained as an analogical reintroduction of root-final *d from related forms at some time subsequent to the loss of preconsonantal *d by sound change. In the two verbs such an explanation is very plausible indeed; all verb forms are vulnerable to analogical pressure from the rest of their paradigms throughout their existence, and analogical change is likely to affect ancient inherited forms (like the nasal-infixed present of 'strew'; cf. Hom. Gk. κίδνανται 'it is spread') no less than relatively recent innovations (like the entire paradigm of TB /nətka-/, in which a seṭ root has been constructed from a *-sḱé/ó-present which is itself an innovation). In

fact, if reintroduced *d subsequently became *n before nasals (as in 'dung'), the root-final stop was reintroduced into the nasal-infixed present of 'strew' not once but twice. It is less obvious that the preform of TB *kenmer* should owe its *d to analogy, since no related words survive in Tocharian; but it is certainly possible that the PIE verb *ǵʰed- 'defecate' survived in pre-PT long enough to effect the reintroduction of *d into its derivative.

For *kenmer* and /nətka-/ there are also other possibilities. Inherited *d might already have become *n before nasals by the time that preconsonantal *d was lost; in that case the *-n-* of *kenmer* could reflect an early conditioned sound change. Similarly, *d might have been devoiced to *t before *-sk- in *nut-sk- before the general loss of preconsonantal *d. Finally, we must reckon with the possibility that the reflex of PIE *-sḱé/ó- had not yet been added to the reflex of *nud- at the time when preconsonantal *d was lost, so that the *d of *nud- was not then preconsonantal. I can find no evidence that would justify a choice between these alternatives.

PT *kəntwá- 'tongue' (TB *kantwo, käntwā-*, TA *käntu*) is also a potential counterexample to the loss of preconsonantal *d, since it can have contained a sequence *dw at some stage of its development; for further discussion see **18.**

28. Labiovelars (including *w) and *i.

*wi became *u (Cowgill, p.c. 1980) and *Kʷi became *Ku (i.e. any labiovelar plus *i became the corresponding velar plus *u). Examples include the following:

PIE *wisó- 'poison' (Skt. *viṣám*) > *usḗ- > PT *wəsḗ > TB *wase*, TA *wäs* (etymology in Pisani 1942:252);

PIE *dwitós 'second' (see **27**) > *witós > *utḗ- > PT *wətḗ > TB *wate*, TA *wät* (Cowgill, p.c. 1980);

PIE *swidyé- 'be sweating' (see **27**) > *swiyé- > *suyé- > *səyó- >→ PT *siy-á- (see **52**) > TB /s(i)ya-/ 'sweat' (Ringe 1987a:117);

PIE *kʷi- 'who, what' (Hitt. *kuis, kuit*, Lat. *quis, quid*, etc.) > *ku- > PT *kʷə- (see **50**) in nom. *kʷəsḗ, obl. *kʷəcḗ (orig. compounds with the demonstrative 'this') > TB *kuse, kuce*, TA *kus, kuc.*

This sound change must have occurred before the general palatalization of consonants by following front vowels (see **45** through **47**).

It is at least thinkable that the lack of palatalization in the above examples results not from the change posited, but from a simple phonetic change of *i to *[i̯] after *w and *Kʷ, which would render it incapable of palatalizing preceding consonants (cf. Jasanoff 1978:31, Normier 1980:256 with fn. 19, Hilmarsson 1986:48); but in that case the absence of any reflex of *w in 'sweat' is difficult to explain. The advantage of the hypothesis presented here is that it posits a single nonpalatal reflex for the entire sequence *wi.

Chapter 5. Syllabic resonants, consonant clusters, and Auslautgesetze.

The connections between the changes discussed in this chapter are partly thematic and partly chronological. Most can be shown to have preceded either palatalization (Chapter 7) or the general restructuring of the vowel system (Chapter 8).

29. Syllabic resonants.

PIE syllabic resonants came to be realized phonetically as sequences of *ə plus resonant; schematically, *Ṛ > *[əR]. (It is clear that there was no intermediate stage *uR because preceding velars were not labialized in the general restructuring of the vowel system, pace Adams 1984:397-8, 1988:16-7; see Ringe 1991a:81-3 and **50.**) This development must have occurred after the *ə that arose by vocalization of laryngeals had already become *a (see **14**); otherwise the new *ə arising from syllabic resonants would also have become *a. Since word-final *[-əN] that reflect PIE *Ṇ eventually lost their nasal component (see **32**), the loss of word-final nasals presumably occurred after syllabic resonants had undergone the change discussed here.

If *Ṛ became *[əR] before any other new *ə had arisen in the language, the *[ə] of *[əR] is not likely to have been an independent phoneme at first, because of its very limited distribution. However, these *[ə] must have become phonemic either in the general loss of vowel length, which did introduce many new *ə (see **50**), or else upon the loss of word-final nasals, by which the consonantal part of final *əN-sequences was dropped (see **32**), leaving examples of word-final *-ə. Unfortunately it is not clear which of those two changes occurred first (see note 1). (It seems most unlikely that *ə-epenthesis could have caused *ə in general to become phonemic, since the *ə that it created were also very limited in distribution; see **31.**)

Examples of the development of PIE syllabic resonants in Tocharian are numerous:

PIE *ḱṃtóm 'hundred' (see **16**) > PT *kəntḗ > TB *kante*, TA *känt;*

PIE *wíḱṃtiḱ 'twenty' (see **11**) > *wíkəmti > PT *wʸíkən > TB *ikäṃ*, TA *wiki;*

PIE *déḱṃt 'ten' (see **16**) > *dékəmt > PT *śśkə > TB *śak*, TA *śäk;*

PIE *septṃ 'seven' (Skt. *saptá*, Lat. *septem*) > *septṇ (see **30**) > PT *ṣəptə > TB *ṣukt*, TA *ṣpät;*

PIE *ḱwónṃ acc. 'dog' (see **16**) > *kwónən (see **30**) > PT obl. *kwḗnə > TB *kweṃ*, TA *koṃ;*

PIE *ǵnéwn̥ 'nine' (see 5) > *néwən > *ñə́wə > PT *ñúwə > TB, TA *ñu;*

PIE *dn̥ǵʰwéx- 'tongue' (see 18) >→ PT *kəntwá- > TB *kantwo, käntwā-*, TA *käntu;*

PIE *ǵln̥gʷʰ- 'light' (see 5) > PT *ləń(k)ʷ- (see 17) in TB *lańktse* (Van Windekens 1941:54);

PIE *bʰr̥ǵʰrós 'lofty, tall' (see 16) > PT *pərkrḗ 'long' > TB *pärkare*, TA *pärkär;*

PIE *wr̥sḗn 'male' (Skt. *vṛ́ṣā, vṛ́ṣan-*) in *gʷow(ə)-wərsēn 'bull' > PT *ku̯ə̆w(u)-wərṣe (or *-wərʸṣe?; see 47) > TB *kaurṣe, kau$_u$rṣa-*, TA *kayurṣ* (cf. Schneider 1940:195-6);

PIE *mr̥s- 'forget' (Skt. pres. 3sg. *mṛ́ṣyate*) >→ *mərs- in PT pret. ptc. *mərsówə > TB *märsau*, TA *märso* (Van Windekens 1941:62);

PIE *snéǵwr̥ or *snéwr̥ 'sinew' (Av. *snāuuarə*, Skt. *snāvan-;* thematized in Gk. νεῦρον) > *snéwər > *ṣñéwər > PT *ṣñór (Þórhallsdóttir 1988:199) > TB *ṣñor;*

PIE *bʰl̥g-éǵ- pres. 'burn, flare' (see 16 and 23) >→ *pʰəlgə̄- > PT *pəlké-, 3sg. *pəlkétər > TB *pälketär-ne* 'his . . . burns';

PIE pres. *tl̥-né-x- 'be lifting' > *tl̥-nā́- (Lat. *tollit* 'lifts, removes', OIr. *tlenaid* 'steals') >→ PT pres. *təllá- 'bear, endure' > TB /təllá-/ in 3pl. *tallaṃ, tällän-[n]e.*

Note also the examples in which the syllabic resonant was originally followed by a laryngeal:

PIE *pr̥Xwós 'first' (see 8) > *pr̥wós > PT *pərwḗ in TB *parwe, yparwe* 'at first', *pärweṣṣe* 'first', TA *pärwat* 'eldest';

PIE *gʷr̥ǵwón- 'millstone' (see 8) > *gʷr̥wón- > PT *kʷərwḗn- in TB *kärweñe* 'stone' (Van Windekens 1960:39-40);

PIE *pl̥ǵnós 'full' (see 8) > *pl̥nós > PT *pəllḗ in TB *pällent* (obl.) 'full moon' (Winter 1965a:205-6);

possibly PIE *ǵn̥ǵyétor '(s)he is being born' (see 8) > *gn̥yétor > *gənyétur (see 36) > PT *kəññətər 'it is happening' > TB *k(a)ntär* (but see the discussion in 8).

It appears that in roots of the shape *ReC- the zero-grade *Rꞏ̣C- > *əRC- was remodelled to *RəC- by analogy with full-grade forms; a likely example is the following:

PIE *neḱ- 'perish' (see 16), aor. opt. *n̥ḱ-iǵ- > *ənkī- (see 11) → *nəkī- > PT *nəśi- in 3sg. mp. *nəśitər 'it may perish' > TB *nśī[t](rä), näśitär*, TA *nśitär.*

Presumably this remodelling occurred after *ə had become phonemic (whenever that happened); at any rate the metathesis should then have been easier, since *ə would have been an independent entity for the purposes of analogical manipulation. In roots of the shape *CReC- no such remodelling seems to have occurred; cf. the following:

PIE *preḱ- 'ask' (Lat. *precēs* 'entreaty, prayers'), mp. aor. *pr̥ḱ- >→ PT *pərksa- in TB 3pl. *parksante-ne* 'they asked him', TA 3sg. *pärksät* (on TA *präksät, -änt*, etc. see A21).

Notes.

1. It is not possible to determine whether *Ṛ became *əR, phonetically or phonemically, before the general restructuring of the vowel system (see 50), in which *ə became far more widespread in the language. We can show that the change of *Ṛ to *əR must have preceded the loss of word-final NASALS, and that the loss of originally word-final apical OBSTRUENTS must have preceded both the loss of nasals and the restructuring of the vowel system; but the relative chronology of vowel restructuring and nasal loss is not determinable. For a more detailed discussion of these involved chronological relations see 33.

2. Whether the change of *Ṛ to *əR occurred before or after the changes of *m to *n word-finally and before apicals (see 30) cannot be determined, since *m > *n would probably have entailed *m̥ > *n̥ if syllabic nasals were still such phonetically at the time, and the ultimate outcome would have been the same in any case. For the same reason the relative chronology of *Ṛ to *əR and the loss of voiced aspirates after nasals (see 17) is indeterminable.

3. TB *walkwe* is claimed to mean 'wolf' (< PT *wólkʷə̄ < PIE *wl̥kʷos), but in fact its meaning is unknown (K. Schmidt 1984:149) and its *kw* cannot reflect PT or PIE *kʷ (see 16 and B28).

30. *m word-finally and before apicals.

Word-final *m became *n. Since these new *-n, like all final consonants, were eventually dropped (see 32), the only evidence for this sound change is a final *-n < *-m that spread analogically into intervocalic position:

PIE loc. *dʰǵʰém 'on earth, on the ground' (Hitt. *dagān* with analogical o-grade of the stem; Skt. *kṣámi* with added *-i) > *dʰǵʰén; by analogy with the loc., *dʰǵʰom- 'earth' (see 16 with note 1) → *dʰǵʰon- in acc. *dʰǵʰónən (see 29) > PT *tkḗnə (see 32) > TB *keṃ*, TA *tkaṃ* (see also note 1 below).

On the other hand, at least one Tocharian word might contain a medial *-m-* that was introduced from word-final position by analogy before final *m became *n, namely TB *ñumka*, TA *nmuk* 'ninety'. The TA cognate has evidently been remodelled on the analogy of *oktuk* 'eighty' (see 38, and cf. also TA *ṣäptuk* 'seventy'), but the TB word seems to reflect PT *ñu(wə)məka (or *ñu(wə)mka?; cf. PT *ñúwə 'nine', see 5). It is difficult to see how this form could have acquired *-m- if not by analogy with a pre-PT *néwəm or the like, with analogical *-m as in Lat. *novem*, before the change of word-final *m to *n. Unfortunately the rest of the available evidence offers no positive support for this hypothesis. The analogical source of *-m was presumably *septə́m 'seven' or *dékəmt 'ten' (see 29), which likewise lost their final consonants in PT, so that we must seek corroborative evidence in forms with derivational suffixes. But the latter show NO examples of *-m-. For the reasons noted in the next paragraph we do not expect to find *-m- in PT *ṣəptəntḗ 'seventh' (TB *ṣuktante*, TA *ṣäptänt*), *ñuwəntḗ 'ninth' (TB *ñunte*), *śəkəntḗ 'tenth' (TB

śkante, TA *śkänt*); but why is there no *-m- in PT *şəptəṅka 'seventy' (TB *ṣuktaṅka*, whence also *oktaṅka* 'eighty' by analogy)? Under the circumstances the *-m-* of TB *ñumka* is a puzzle which should be treated with reserve. (See also note 2.)

*m also became *n when followed by an apical obstruent. Note the following examples:

PIE *ḱṃtóm 'hundred' (see **16** and **29**) > PT *kəntĕ > TB *kante*, TA *känt;*

PIE *ǒmsos 'shoulder' (see **3**) > PT *ánsĕ (see **40**) > TB *āntse*, TA *es*.

In at least one case we cannot tell whether an inherited *m became *n when it was still followed by *t or only after it became word-final:

PIE *wíḱṃtiḱ 'twenty' (see **11**) > *wíkəmti > *wíkənti > *wíkənt > *wíkən (see **33**)? —or rather > *wíkəmti > *wíkəmt (see **33**) > *wíkəm > *wíkən? In either case, *wíkən > PT *wʸíkən > TB *ikäṃ*, TA *wiki*.

The change of final *m to *n must have occurred before final nasals were lost (see **32**). If *m had also become *n before apicals by the time that the nasal segment in final (*-mt >) *-nt was lost, the loss of final *t, *s, *n (including older *m), *nt (including older *mt), and *nts could be stated simply and elegantly as a loss of final apicals except *r and *l. But any suggestion that that MUST have been what happened, on the grounds that the sound change one must posit is thereby simpler, is unconvincing; a loss of final nonliquid apicals and *m—i.e., of apical obstruents and all nasals word-finally—is probably just as natural as a loss of final nonliquid apicals.

It is also not clear whether syllabic resonants had become *əR by the time either of these changes of *m to *n occurred (see **29**, note 2).

Notes.

1. It is conceivable that the *n of PT *tkĕnə arose in the nom. sg. *dʰéǵʰōm (Schindler 1967a:195), if that form survived long enough in pre-Tocharian; the remainder of the development would be as posited above.

2. That PIE final *m became *n only in monosyllables (Schindler 1967a: 196) seems unlikely. The *-m-* of TA *ālamwäc* 'one another' need not reflect PIE acc. sg. *-m (pace Winter 1980:545), but can be a demonstrative particle (as in *säm* 'that').

3. TB *mīsa* 'meat' (plurale tantum) seems to reflect PT *mʸənsa, which one might expect to reflect PIE collective *mēms-e-x (cf. sg. Goth. *mimz*, Skt. *māṃsám* —but also root-noun *mā́s*, see below); in any case its root is cognate, and so it must be a further example of the change discussed here (see **B11** and **B12**). But the *ə of *mʸəns- cannot have developed from the *ē of PIE *mēms- by regular sound change: Tocharian did not undergo Osthoff's Law, so that *ē cannot have been shortened to *e > PT *ə; cf. TB *yente*, TA *want* 'wind' < PT *wʸentĕ (see **50**) < post-PIE *xwēntós (see **5**). (TA inst. *wäntyo* (21a6, 384b3) beside *want-*, *waṃt-* 17x is the result of scribal error, Thomas 1977:113 fn. 6; the other similar forms listed by Poucha 1955 s.v. *want* do not seem to be forms of 'wind'.) Skt. *mā́s* shows that the

PIE word was originally a root noun; the TB form suggests that its ablaut was acrostatic, and that we should reconstruct PIE *mḗms- ~ *méms-.

31. Initial and medial three-consonant clusters with internal *s.

Word-final clusters of this type were subject to loss of one or more of their component consonants; they will be discussed in **32**. I here treat word-initial and intervocalic *CsC clusters.

On the reduction of *ḱsḱ to *sḱ, which seems to have occurred already in PIE, see **2** (g).

There seem to be no Tocharian words that certainly reflect the PIE apical-plus-apical clusters *[tst], etc. (on which see **2** (b)). A probable example is the following:

PIE *udstVro- 'entrails' vel sim. (Gk. ὑστέρα 'womb', ὕστρος· γαστήρ Hesykhios; cf. Skt. *udáram* 'belly') >→ *ustrio- > *wəstrʸiyĕ > PT *wəstərʸyĕ > TB *wästarye* 'liver (?)' (Van Windekens 1976:565; see Hilmarsson 1993b:216-7).

The apparent development to *st, known also from Greek, Iranian, etc., is not surprising. If the change of apical stop plus *sk to *tk (see below) was a sound change potentially affecting all clusters of apical stop plus *s plus stop, then the old apical-plus-apical clusters must have become *st (etc.) before *Tsk > *tk; but if *k was crucial to the environment of the latter change, no chronological ordering can be inferred.

There are at least two words in which *ə was inserted after the first consonant of a *CsC cluster:

PIE *sweḱstós 'sixth' (see **16**) >→ *sekstós (cf. Lat. *sextus*, see **A14**) > PT *şəkəstĕ > TB *şkaste*, TA *şkäşt;*

PIE *psténos 'breast' (Skt. *stánas*, Av. *fštāna-*, Arm. *stin*) > (pre-)PT *pəśćənĕ; PT dual *pəśćənĕ-nĕ (?; see note 1) > *pəśćə-nĕ by haplology, whence TB *päścane*, TA *päśśäṃ* (Duchesne-Guillemin 1940:169).

I can find no analogical source for these epenthetic vowels; consequently I propose that they are the result of a sound change affecting clusters of the shape *Kst, where *K is a dorsal or labial stop (Ringe 1990:192-4). If that is correct, the epenthetic *ə in a considerable number of Tocharian active s-preterite 2sg. forms can also be the result of sound change; typical is the following:

post-PIE *nḗḱs 'you destroyed' (root *neḱ-, see **16**; originally analyzable as */nḗḱ-s-s/, but eventually reanalyzed as exhibiting a zero ending) >→ *nḗksta (*-ta ← pf. 2sg. *-ta < PIE *-txe, necessarily added BEFORE the general loss of final *s) > PT *ñékəsta >→ TB *nekasta* (initial consonant analogically depalatalized, Ringe 1990:185-9).

Presumably these *[ə] were at first automatic surface-level phenomena occurring in a highly restricted environment; they should have become phonemic only when *ə began to appear in an environment in which it could not be analyzed as subphonemic—

either when word-final *-ən (< *-n̥ and *-m̥) became *-ə by the loss of final nasals (see **50**), (see **29** and **32**), or else in the general restructuring of the vowel system (see **50**), whichever happened first (see **30**, note 1). It is even possible that *ə-epenthesis did not occur until after *ə had become phonemic by one of those two changes; the epenthesis is difficult to date because it interacts with so few other changes.

The change just discussed is closely parallel to one type of epenthesis in Hittite; see Melchert 1984b:108-9, 134-5, 1994 §6.1.6.2.3.

In clusters of the shape *Tsk, where *T is an apical stop, interconsonantal *s was lost; at least that is the most plausible explanation for the origin of Tocharian verb roots in *-tk-* (Jasanoff 1975:111, Melchert 1977). There are at least three good examples with PIE etymologies:

PIE *Xyewd^{h}- ~ *Xyud^{h}- 'be excited' (see **5**) + pres. *-sḱé/ó- >⟶ *yutsk- (cf. **53** on the ablaut) > PT *yutk-a- 'be worried' > TA *yutkā-* in pres. 2sg. *mar yutkatār* 'do not worry', etc. (Jasanoff 1975:111, Melchert 1977:102-3; cf. Schneider 1941:47);

PIE *leyt- ~ *lit- 'go away' (Goth. *galeiþan* 'go', also in PT *lita- ~ *layta- 'fall down') + pres. *-sḱé/ó- >⟶ *litsk- (cf. **53** on the ablaut) > PT *litk-a- 'withdraw', e.g. in ptc. *litkówə 'detached, without passion' > TA *litko* (Melchert 1977: 110-1; cf. Lane 1938:23);

PIE *nud- 'push' (see **27**) + pres. *-sḱé/ó- >⟶ *nətsk- > PT *nətk-a-, e.g. in ptc. *nətkówə > TB *nätkau* 'prompted' (Jasanoff 1975:111, Melchert 1977:123-4).

The relative chronology of this change, like that of the epenthesis just discussed, is not recoverable.

It appears that nasals were lost in clusters of the shape *NsC. This sound change is directly exemplified by at least one word:

PIE zero-grade *mn̥- 'stay' (cf. Gk. μένειν, etc.) + *-sḱé/ó- > *mənské/ó- (see **29**) >⟶ *məsk-a- 'be (in a place)', pres. 3sg. *məskṓtur (see **23** and **36**) > PT *məskétər (see **51**) > TB *mäsketär*, TA *mäskatär*.

Indirect evidence also suggests that such a change occurred. Virtually no *NsC clusters are reconstructable for PT (see note 2). Moreover, the PIE negative prefix *n̥-, which often appears in PT as *ën- (see **44**), equally often lacks its expected nasal consonant; the following examples are typical:

TB *etaṅkätte*, TA *ätäṅkät* 'unchecked' < PT *ë-tsṅkətë;

TB *ekamätte* 'future' (← *'not (yet) come') < PT *ë-k^{w}ómətë;

TB *eṣpirtatte* 'unturned' < PT *ë-ṣp^{y}órtwattë.

Though examples to roots beginning in *sC clusters are rare—as one would expect, since such roots are uncommon—I believe that Jay Jasanoff (p.c. 1989) is right in suggesting that the negative prefix lost its nasal in such forms by regular sound change and that the form of the prefix without the nasal has spread to other roots by analogy (pace Hilmarsson 1991:193-9).

PT *məska- shows that the loss of nasals before *sC clusters must have followed the phonetic resolution of syllabic resonants into *[əR] sequences (see **29**). Otherwise the relative chronology of the change is obscure; but in any case it seems unlikely that the tiny handful of independent surface *[ə] created by this change were responsible for the reanalysis of *[əR] as */əR/.

The loss of nasals before *sC is virtually identical with an Ancient Greek sound change; see Lejeune 1972:138-9.

From the following examples it appears that *rsC and *lsC clusters were not altered:

PT pret. 3sg. *pəlskatë '(s)he thought' (TB *pälskäte*, TA *pälskāt*) < pre-PT *pl̥ska-; cf. PT full-grade subj. 3sg. *pläska >⟶ TB *plāska-m̥;*

PT pres. 3sg. *kərsnáṣə ~ *kərsná (see **68**) '(s)he is cutting it off/up' (TB *karsna-m̥*, TA *kärṣnāṣ*) < pre-PT *kr̥st-nási ~ *kr̥st-ná (see **33**, **34**, and **41**); cf. PT full-grade iptv. 2sg. *pə-krásta 'cut it off!' > TB *pkrāsta.*

I have argued (in Ringe 1990:194-7) that *s was lost in *CsR clusters (where *C is a stop). Unfortunately the only straightforward examples are 1pl. forms of the active s-preterite, whose original ending *-m̥e (with *m̥ by Sievers' Law) might be expected to have been replaced by the more usual *-me:

post-PIE s-aor. *nḗḱsme 'we destroyed' >⟶ *nḗksme > PT *ñékm^{y}ə >⟶ TB *nekam* (see **B5** and **B6**; cf. *plyeṅkam* 'we sold', in which the loss of *s can also be by sound change, and *kawam* 'we killed', in which it must be analogical).

There are no counterexamples, because no actually occurring *-CsR-* clusters can be shown to predate PT, but there are also no better examples. This change, like all those discussed in this section, is difficult to date.

Notes.

1. The (pre-)PT dual meaning 'breasts' might have been *pəśćə́në-në, as suggested above; but *pəśćə́nə-në also seems possible, to judge from TB *antsane* 'two shoulders' < PT *ánsə-në (singular TB *äntse*, TA *es* < TB *ánsë, clearly thematic; see **3** and **30**). I do not know how to explain the replacement of the thematic vowel *ë with *ə; the suggestion of Hilmarsson 1989:9-12 that (post-)PIE *-ō ultimately gave short *u > PT *ə is not convincing (see **38** for several clear counterexamples).

2. From TB *eṃṣke* 'up to, until, while' and TA *eṣäk* 'over' one could reconstruct a PT form *ënṣkë (either vowel, or both, could also be *e) with an internal sequence of nasal plus sibilant plus *k. But since the PT sibilant has been palatalized (see **46** and **56**), while the *k has not, it is more likely that the PT form was trisyllabic *ënṣəkë (again, the initial and/or the final vowel might be *e), with an internal *ə reflecting a pre-PT short *i or *e (see **50**) that had palatalized the sibilant. Alternatively, this word might have been borrowed into PT as a disyllable after the sound change by which nasals were lost before sibilant-plus-*k clusters.

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32. Loss of final consonants.

Most final consonants and clusters of consonants were lost. There are good examples of the loss of *t, *d, *s, *n (including *-n < *-m), *nt, *mt (if it had not already merged with *nt; see **30**), and *nts:

(post-)PIE aor. inj. *ǵlud^{h}ét '(s)he arrived' (see **5**) > PT *ləcə́ '(s)he went out' > TB *lac*, TA *läc* (Cowgill apud Winter 1962b:22 with fn. 3);

PIE opt. 3sg. *-yéǵt > *-yét → *-īt (cf. OLat. *siet* → Lat. *sit*) > *-ī > PT *-i, e.g. in *yam^{y}i '(s)he would make' > TB *yāmi*, TA *yāmi-ṣ*;

PIE opt. 3sg. *ǵs-iéǵ-t 'let him/her be' (see **26**) > *siĕt > *syét > *syé > *ṣé (see **48** and **50**) + *-i (see immediately above) → PT ipf. *ṣéy (*ṣéi, two syllables?) > TB *ṣey*, TA *ṣe-ṣ* (cf. Pedersen 1941:206-8);

PIE *tód neut. 'that' (Skt. *tát*, Gk. τό, Goth. *þata*) > PT *tḗ (predicative) 'this' > TB *te*;

PIE *ḱléwos 'fame' (neut. s-stem; see **16**) > PT *-kəl^{y}wë in *ñemək əl^{y}wë '(name and) fame' > TB *ñemkälywe*, TA *ñomklyu*;

PIE *tékʷos '(act of) running' (neut. s-stem, Van Windekens 1976:249; see **16**) > PT *cə́kʷë 'river' > TB *cake*;

PIE *kʷetwóres masc. 'four' (Skt. *catvāras*, Attic Gk. τέτταρες, Doric τέτορες) > PT *śətwḗr^{y}ə > TB *śtwer*, TA *śtwar*;

PIE *pḗntes nom. pl. masc. 'all' (cf. Gk. πάντες with ă by Osthoff's Law) > PT *póñcə > TB *poñc*, TA *poñś*;

PIE *wr̥sḗn 'male' (see **29**) in *gʷow(ə)-wərsēn 'bull' > PT *kʷëw(u)-wərṣe (or *-wər^{y}ṣe?; see **47**) > TB *kaurṣe*, *kau$_{u}$rṣa-*, TA *kayurṣ* (cf. Schneider 1940: 195-6);

PIE *ǵnéwn̥ 'nine' (see **5**) > *néwən > *ñə́wə > PT *ñúwə > TB, TA *ñu*;

PIE *ǵnéǵʷmn̥ 'name' (see **3**) > *nḗmən > PT *ñémə > TB *ñem*, TA *ñom*;

PIE *ḱm̥tóm 'hundred' (see **16**) > *kəntḗn (see **30**) > PT *kəntḗ > TB *kante*, TA *känt*;

PIE *septḿ̥ 'seven' (see **29**) > *septə́n (see **30**) > PT *ṣəptə́ > TB *ṣukt*, TA *ṣpät*;

PIE *ḱwónm̥ acc. 'dog' (see **16**) > *kwónən (see **30**) > PT obl. *kwḗnə > TB *kweṃ*, TA *koṃ*;

PIE *éḱwos, acc. *-om 'horse' (see **16**) > PT *yə́kwë > TB *yakwe*, TA *yuk*;

PIE *ǵrud^{h}rós, acc. and neut. *-óm 'red' (see **5**) > PT *rətrḗ > TB *ratre*, TA *rtär*;

PIE *déḱm̥t 'ten' (see **16**) > *dékəmt > PT *ṣə́kə > TB *śak*, TA *śäk*;

PIE *tríx (d)ḱóm̥t 'three tens' (see **9**) > *triakōmt > PT *tər^{y}yaka 'thirty' > TB *täryāka* (Schindler 1967b:240);

PIE thematic secondary 3pl. *-ont (in e.g. Hom. Gk. ἦλυθον 'they came') > *-ën(t) in pret. 3pl. *-Vr̥-ën(t) (Cowgill, p.c. 1980; see Ringe 1990:200) > PT a-pret. *-arë, e.g. in *takarë 'they were' > TB *takāre*, TA *tākar* (see also note 2);

PIE masc. *pánts, neut. *pánt 'all' (Gk. masc. *πάντς > πᾶς, neut. *πάν in adv. πάμπαν 'completely') > PT *pó > TB *po*;

PIE masc. *-wents, neut. *-wn̥t 'having' (cf. Gk. masc. χαρίεις 'graceful', Skt. neut. *námasvat* 'worthy of respect') → *-wn̥ts, *-wn̥t (Þórhallsdóttir 1988:195-7) > PT *-wə, e.g. in *përnëwə 'worthy' > TB *perne$_{u}$*, TA *parno*.

Many further examples can be given, especially of PIE neuter nouns in *-os, masculine nouns in *-os, acc. *-om, adjectives in *-os, *-om, nominative plurals in *-es, accusative singulars in *-m̥, and neuter nouns in *-mn̥.

It seems unlikely that all the originally final consonants listed above were lost at the same time, though there is no evidence that bears on the question. The 3sg. forms of the Tocharian active s-preterite show that at least some word-final consonant clusters were lost in stages, beginning with the last segment:

post-PIE *nḗḱst '(s)he destroyed' (see **16**) > *nḗks → *néksa(t) (see note 3) > PT *ñéksa > TA *ñakäs*, >→ TB *neksa* (initial consonant analogically depalatalized).

Apparently the 3sg. ending *-t was lost, but the preceding consonants were not; a new ending, subsequently acquired by analogy, made what was left of the cluster intervocalic and so protected it from further loss (see below). (It is at least thinkable that *-a- was merely inserted between stem and ending, but such an analogical change seems unlikely, especially since the other members of the active paradigm exhibit no *-a-.) It is not clear whether *-t was lost in such heavy clusters simultaneously with or prior to the loss of final postvocalic *t (as in the first three examples listed above).

The *s of final *Cs clusters was also eventually lost, as the following example makes clear:

PIE *swéḱs 'six' (see **16**) → *séḱs > *sék > PT *ṣə́k > TA *ṣäk* (see also note 4).

The new final *k, however, was never lost. This example suggests, but does not prove, that postconsonantal final *-s in was lost earlier than any preceding consonant (e.g. *-ns > *-n > ∅). Again, it is not clear whether the loss of final postvocalic *s occurred at the same time.

Final *r was never lost; neither were final semivowels, nor semivowels that became final upon the loss of following consonants. Note the following examples:

PIE *pxtḗr 'father' (see **14**) > PT *pacér > TB *pācar*, TA *pācar*;

PIE mediopassive 1ary 3sg. *-tor (Lat. *-tur*, Phrygian *-tor*) > *-tur (?; see **36**) > PT *-tər, e.g. in *məskétər 'it is (in a place)' (see **31**) > TB *mäsketär*, TA *mäskatär*;

PIE *snéǵwr̥ or *snḗwr̥ 'sinew' (see **29**) > *snḗwər > *ṣñéwər > PT *ṣñə́r (Þórhallsdóttir 1988:199) > TB *ṣñor*;

PIE *pxtréy dat. sg. 'to (the) father' (Skt. *pitré*, Lat. *patrī*) > *patréy > *patrʸéy > PT *patrʸí gen. sg. 'father's' > TB *pātri*, >→ TA *pācri* (with analogical *c* from nom. sg. *pācar*);

PIE *suXiwós 'son's' (see **25**) >→ *soyóws > *sëyéws > PT *sëyéw (note loss of *s but not of *w) >→ TA *seyo* (*e* by analogy with nom. *se*).

No clear examples of PIE final *l survive in Tocharian. However, there were some final *l in PT; for example, the accent retraction in TB *camel* 'birth' (cf. pl. *cmela* /cəmél-a/) shows that its PT ancestor had no final *ə, and from TB *camel*, TA *cmol* we must therefore reconstruct PT *cəmél 'birth' (see **B7** on accent retraction in TB). This fact makes it likely that PIE final *l was preserved in Tocharian.

The loss of final postvocalic *s probably occurred after the change of final *s to *y in monosyllables, which "bleeds" it (see **24** with examples); otherwise we would have to posit a loss of final *s after vowels except in monosyllables, which seems less plausible. Loss of final *n must have followed the phonetic resolution of PIE *N̥ to *əN (see **29**); that loss, or else the general restructuring of the vowel system (see **50**; whichever occurred first), made *ə phonemic. The loss of originally final *nt, *mt must have begun before the fall of final *i (see **33** and **34**), since the originally final clusters were entirely lost, whereas *nt (and *mt?; see **30**) which became final after the loss of *-i lost only the *t, and not the preceding nasal (see **33**).

Notes.

1. I cannot believe that the obl. pl. ending TB *-ṃ*, TA *-s* reflects PIE *-ns, in view of the clear cases of the loss of final consonants and clusters cited above. The attested Tocharian endings are surely secondary: TB *-ṃ*, morphophonemically /-nə/ (Marggraf 1970:47-9; cf. Krause 1952:8) probably reflects PT *-nə < n-stem *-n-əns < PIE *-n-n̥s; TA *-s* might be expected to reflect PT *-sə < s-stem *-s-əns < PIE *-s-n̥s, though non-neuter s-stems are uncommon enough that some caution is necessary (as Jay Jasanoff reminds me).

2. The *-eṃ* of TB irregular pret. 3pl. *kameṃ* 'they came' and *lateṃ* 'they went out' does not reflect PIE *-ont; it is the reflex of the primary ending *-onti introduced analogically (as in 1sg. *latau* 'I went out').

3. It is not clear whether the new s-pret. 3sg. ending was *-at or *-a at the time of its addition to the (superficially) endingless old form; see Ringe 1990:192 with footnotes for further discussion.

4. TB *ṣkas* has clearly been abstracted from the ordinal *ṣkaste*, pace Ringe 1987b:258-9, 263. (See also **B5**).

33. Loss of final *i.

In some circumstances final *i after *t were lost; subsequently the *t were also lost, though nasals preceding the *t were not (in contrast to the development of originally final *nt and *mt, see **32**). The conditions under which *-i was apocopated cannot now be recovered, but it seems clear that the change was conditioned, since doublets are reconstructable for the PT 3sg. and 3pl. primary active endings. (See also note 1.)

This sequence of changes affected at least the 3sg. and 3pl. primary active endings and the numeral 'twenty':

PIE aor. subj. 3sg. *gʷémeti '(s)he will step' (Skt. *gámati* '(s)he will go', Goth. pres. *qimiþ* '(s)he is coming') > *gʷémeti ~ *gʷémet > *gʷémesi ~ *gʷéme (see **34** and **32** respectively) > PT *śśmʸəṣə ~ *śśmʸə > TA *śmäṣ*, >→ TB *śam-n* (prevocalic, in verse; cf. Jasanoff 1987:110-1 on the TA ending);

PIE *xéǵonti 'they are driving' (see **3**) > *ágonti ~ *ágont > PT *akëñcə ~ *akën 'they are leading' > TB *ākeṃ*, TA *ākañc ~ *āke (see **A10** and **A12**) >→ *ākeñc ~ *āke* (cf. Jasanoff 1987:111 with fn. 44); for the (unattested) shorter form cf. TA *cämpe* 'they are able' < PT *cəmpën (> TB *campeṃ*);

PIE athematic 3pl. *-énti > *-énti ~ *-én and *-n̥ti > *-ənti ~ *-ən; one or both > PT *-əñcə ~ *-ən > TB *-äṃ* (e.g. in *piṅkäṃ* 'they fashion'), TA *-äñc ~ *-än > *-äñc ~ *-i (see **A10**) >→ *-iñc ~ -i* (e.g. in *träṅkiñc ~ träṅki* 'they say');

PIE *wíḱm̥tiḱ 'twenty' (see **11** and **29**) > *wíḱəmti > *wíḱəmt (*wíḱənt?) > *wíḱən > PT *wʸíkən > TB *ikäṃ*, TA *wikäy (see **A10**) > *wiki*.

(In TB the 3pl. ending *-ṃ* appears to have taken over the functions of the 3sg. as well (Krause 1951a:160-1), or else some sort of particle has been added to the endingless 3sg. form; see the discussion in Van Windekens 1982:264-6 with bibliography.)

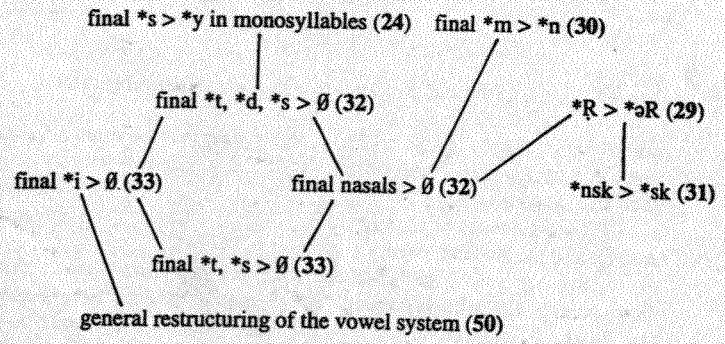
The complete absence of any *s or *ṣ in the PT 2sg. primary active ending is most easily accounted for if the same changes affected PIE *-si:

PIE *gʷíxʷwesi 'you live' (Skt. *jīvasi;* see **10**) >→ *gʷyáwes or *gʷyṓwes > *gʷyáwe or *gʷyṓwe + *tu (reduced 2sg. pron.) > PT *śawʸətə > TB *śait*, TA *śot*.

(The PT ending *-tə cannot reflect PIE pf. 2sg. *-txe, since the latter gave PT *-ta > TB *-ta;* for an example see **31**.)

The loss of final *i must have occurred after the loss of original consonant clusters had begun, since those *-nt and *-mt that became final upon the loss of *-i lost their *-t but not the preceding nasal, whereas originally final *-nt and *-mt were lost *in toto* (see **32**). It is not clear whether the loss of final *i occurred before the change of postvocalic final *-t(ʰ)i to *-si (see **34**), a change which affected only those forms in which the *-i was NOT lost; it is not even clear whether *-i was conditionally apocopated before palatalization had occurred (see **46** and **47**). However, it is highly probable that the apocope occurred before *i and *e merged in *ə during the general restructuring of the vowel system (see **50**), since there are no forms that show apocope of PIE final *e before the PT period.

The simplest chronology of changes that will account for the data presented thus far in this chapter is the following:



Note that two separate losses of final *t must be posited. Two losses of final *s probably occurred as well; it is not inconceivable that the loss of all final *s occurred together with the second loss of *t, but in that case any nasals preceding final *s must also have been lost at the same time (since they do not survive in PT, whereas nasals which became word-final by the second loss of final *t do). Other possible chronologies are still more complex and correspondingly less likely.

Notes.

1. The factors that conditioned the apocope of *-i are largely unrecoverable (though the survival of *-i in the reflex of PIE iptv. 2sg. *ǵid^{h}í 'go!' (see **34**) can plausibly be ascribed to the fact that it was accented). However, we can at least suggest a factor that might have given rise to doublets in the 3sg. and 3pl. primary active endings. Tocharian possesses suffixed object pronouns (Krause and Thomas 1960: 162-3), and though the forms of those pronouns that can be reconstructed for PT (3sg. *-në, 1sg. *-ñə, etc.) do not seem to be inherited from PIE, they could have replaced earlier suffixed or enclitic forms that were inherited. Such suffixes or clitics would almost certainly have protected the *-i of the verb endings from apocope (so Warren Cowgill, p.c. 1980). The fact that the longer TA 3pl. endings end in *-ñc*, whereas the nom. pl. masc. of TA nt-stems normally ends in *-ṃś ~ -ñś* < *-ñc < PT *-ñcə (as Penney 1991 observes), also suggests that the longer verb endings survived only before enclitics or suffixes until quite late in the history of TA (cf. already Pedersen 1944:11); see **A26** for further discussion.

2. Note that the *i* and *e* of TA 3pl. *-iñc, -eñc* cannot be explained by regular sound change; they must be due to analogy with the shorter endings *-i* and *-e*, which did arise by regular sound change. (This was seen already by Szemerényi 1960:47-9, whose view of the development of *-nti in Tocharian is correct in all essentials.) Note further that TA *-i* vs. *-iñc, -e* vs. *-eñc* CANNOT reflect PIE secondary *-nt vs. primary *-nti, because PIE final *nt was lost completely (see **33**), whereas the shorter TA endings reflect pre-TA *-Vy < *-Vn (see **A10** and **A12**).

34. Affrication of *t(^{h})y and assibilation of *-t(^{h})i.

*ty and *t^{h}y (the latter < *d^{h}y, see **20**) became *t^{s} (Winter 1962b:20-2). Examples are relatively numerous:

PIE *d^{h}ixg^{w}- 'stab' (see **9**) > *t^{h}yag^{w}- (see **20**) > *t^{s}ag^{w}- > PT *t^{s}ak^{w}-(a-) > TB /t^{s}aka-/ 'bite (of snakes), put out (the eyes)', e.g. in ptc. *tsatsākau* '(with his eyes) put out';

PIE *pántix fem. 'all' (see **9**) > *pántya > PT *pónt^{s}a in TA obl. *ponts-āṃ* (Winter 1962b:20; see also **A3**);

pre-PT *(wə)lant-ya 'queen' (see **9**) > PT *lant^{s}a > TB *lāntsa*, TA *lānts* (Winter 1962b:20);

PIE *prótix^{w}k^{w}om > *prótyak^{w}om or → *prótyōk^{w}om 'face' (see **10**); either one > PT *prét^{s}ak^{w}-a- 'chest' > TB *pratsāko*, TA *pratsak;*

PIE *poty-, obl. stem of *pótis 'master, husband' (cf. Skt. *pátis*, dat. sg. *pátye;* Gk. πόσις 'husband') > PT *pët^{s}- 'husband' > TB *petso*, TA *pats* (Winter 1962b:21-2).

The PT inf. ending *-t^{s}i (TB, TA *-tsi*) probably also reflects this change, but its preform is unclear. As Jay Jasanoff points out (p.c. 1989), the only securely reconstructable PIE infinitive ending is *-d^{h}yōy (cf. Skt. *śayádhyai* 'to lie', Av. *ǰaidiiāi* 'to be slain'; also Umbrian *pihafi, pihafei* 'to be expiated', with *-f(e)i* /-fyē/ < *-fyoy < *-d^{h}yōy, Rix 1976a:327-30); we should therefore consider seriously the possibility that PT *-t^{s}i is a reflex of that ending. Unfortunately we do not know what happened to PIE word-final *-ōy in Tocharian. If no conditioned sound changes affected it, it should have become PT *-ay (see **40**), which we do not find in PT *-t^{s}i. If final *-ōy was shortened to *-oy relatively early in the history of the language, it should have become PT *-ę (see **35**), which would become *-i* in TB but *-e* in TA. If final *-ōy was shortened only after original *-oy had been monophthongized (see **35**), the development would presumably have been *-ōy > *-oy > *-ëy (see **39**), which still does not fit the facts. Apparently PT *-t^{s}i can be connected with PIE *-d^{h}yōy only by positing an ad hoc sound change or some sort of analogical replacement of the final vowel. Without clearer evidence I am unwilling to posit either of those developments.

The alternative is to see in PT inf. *-t^{s}i a reflex of some case-form of the PIE suffix *-ti- which was used to form deverbal nouns. The following development might be suggested:

PIE dat. sg. *-téy-ey (e.g. in Skt. *matáye* 'for thought') → *-ty-ey > *-t^{s}ey > *-t^{s}^{y}əy > PT inf. *-t^{s}i (*-t^{s}^{y}i?) > TB, TA *-tsi*.

The PT reflex of pre-PT palatalized *t^{sy} is not certainly known (unfortunately this seems to be the best example). That it should be different from that of pre-PT *d^{y} seems mildly surprising but by no means impossible (note that *d > PT *t^{s}, but *d^{y} > PT *ś; see **46**, **57**, and **58**). Somewhat more surprising is the analogical zero grade of the suffix *-ty-; but since PIE nouns in *-ti- seem to have exhibited protero-

kinetic inflection (as indicated by accent doublets such as Skt. ***mátis*** ~ ***matís*** 'thought'), paradigmatic levelling in favor of an accented full-grade root and an unaccented zero-grade suffix does not seem especially implausible. But the above suggestion remains more than usually uncertain, and caution is advisable.

Postvocalic *ti and *t^hi became *si (apparently only in word final position; Jasanoff 1987:108-12). Verb endings provide the only clear examples of this change:

PIE *ǩid^{h}ǐ iptv. 2sg. 'go' (see **20**) > *it^{h}ǐ > *isí > *yəṣə́ → *pə-yəṣə́ > PT *piyəṣə́ > TA *piṣ*, (?) TB *paṣ* (Jasanoff 1987:108-9; see **B15**);

PIE aor. subj. 3sg. *g^{w}émeti '(s)he will step' (see **33**) > *g^{w}émeti ~ *g^{w}émet > *g^{w}émesi ~ *g^{w}éme (see **32** on the latter) > PT *śəmʸəṣə ~ *śəmʸə > TA *śmäṣ*, >→ TB *śam-n* (prevocalic, in verse; cf. Jasanoff 1987:110-1).

The TA 3pl. forms in *-ñc* (see **33** with note 1) show that this change did not occur after *n.

The regular palatalization of *s in the two examples just cited shows that the change of *-t(^{h})i to *-si preceded the general Tocharian palatalization of consonants (see **46**). If the two changes discussed in this section were part of the same phenomenon (as seems likely on general grounds—cf. the similar changes that occurred in South Greek, Risch 1955:66-7, 70), they presumably occurred together, and the affrication of *t(^{h})y bled the general palatalization of consonants before *y (see **48**). However, cogent proof of this last would require a demonstration that after the change of *t(^{h})y to *t^s new *t + *y arose and underwent the more general palatalization; and I know of no such examples.

Notes.

1. An alternative explanation of TA 3sg. *-ṣ* treats it as a late addition, perhaps a particle, parallel to TB 3sg. *-ṃ* (see Van Windekens 1982:264-6 with bibliography). Least likely of all is the explanation of Krause 1951a:155-60, who proposes PIE 2sg. *-si as the etymon.

2. It is at least thinkable that TA ablative *-ṣ* reflects the *-ti of Hitt. *-(a)z*, Luv. *-ati*, etc. (Jasanoff 1987:109-10); but that strikes me as very unlikely, because the other Tocharian secondary case endings seem to reflect older postpositions (see Krause and Thomas 1960:68-9), and most cannot even be reconstructed for PT (note that TB has ablative *-meṃ*).

35. Word-final *oy.

There is a regular sound correspondence TB *i* : TA *e* from which a PT vowel *ę (distinct from PT *i, *e, *ë, etc.) can be reconstructed. Several examples of this PT vowel occur in loanwords and in suffixes of obscure etymology; the following are typical:

TB *saṃtkinau*, TA *sāṃtkenu* 'physician' ←< PT *santkęnawə (or *-owə; suffix remodelled in TA, as in pret. participles), cf. TB *sāṃtke*, TA *sāntäk* 'medicine' < PT *santkë, borrowed from a Prakrit language (Van Windekens 1976:639) and ultimately reflecting Skt. *śāntaka-*;

TB *ṣotri*, TA *ṣotre* 'sign' < PT *ṣǫtrę (etymology?);

TB *kälymiye*, TA *kälyme* 'direction, region' < PT *kəlʸmęye; root PT *kəlʸ- 'stand' < PIE zero-grade *ǩli- 'lean' (see **65**), e.g. in verbal adj. *ǩlitós (Skt. *śritás* 'inclined'; cf. also Gk. κλίμα 'inclination', Schneider 1940:204);

TB *yṣiye*, TA *wṣe* 'night' < PT *wʸəṣęye; root PT *wəs- 'rest, stay' ←< PIE *xwes- 'stay the night' (see **7** and **22**);

TB *lymine*, TA *lymeṃ* 'two lips' < PT *lʸəmę-në (etymology? cf. Lane 1945: 24 and Van Windekens 1976 s.v. AB *lym-* for suggestions; PT *-ę- is probably part of the stem, not part of the dual ending).

(See also the examples and discussion in **B3**. I reconstruct the nom. sg. ending of 'direction' and 'night' as *-ye rather than *-yë in the belief that it reflects some PIE syllable(s) exhibiting nom. sg. vṛddhi *-ē-, such as *-ēn and/or *-ēs; cf. Marggraf 1975:201-2.)

However, there are three classes of forms in which PT *ę appears to reflect earlier word-final *oy. I shall discuss these in descending order of probability.

The vast majority of nonneuter TB nominals with stems in *-e* have nom. plurals in *-i* (Krause and Thomas 1960:128-30, 144-50). Since these nouns—when etymologizable—mostly reflect PIE o-stems (with *-e* < PT *-ë < PIE nom. sg. *-os, acc. sg. *-om, see **32** and **39**), and since TB nom. pl. *-i* cannot reflect PIE nom. pl. *-ōs, it is reasonable to suppose that it reflects the PIE pronominal masc. pl. *-oy, which can have replaced original *-ōs by analogy (as in Latin and Greek; thus TB *yakwi* ≈ Lat. *equī* ≈ Gk. ἵπποι 'horses'). The corresponding TA plurals have largely been remodelled—a majority of the cognate nouns, for example, have nom. plurals in *-añ*, which is cognate with TB *-eñ* < PT *-ëñə and *-eñə—but TA ordinal numerals, gerundives, and adjectives in *-r* (= TB *-re* < PT *-ré < PIE *-rós) have nom. plurals in *-e*, which can correspond to TB *-i* (see above). The most straightforward way to account for these facts is to reconstruct PT o-stem nom. pl. *-ę < post-PIE *-oy.

It seems clear that nom. pl. *-oy was monophthongized to a front vowel before palatalization took place (see **46**), since the o-stem nom. pl. ending has palatalized a preceding consonant in a few relic forms. Since (phonetic) palatalization occurred before the general loss of vowel length (see **50**), the monophthongization took place in a vowel system that still distinguished long from short vowels. It is very likely that monophthongization in such a system produced a long vowel, and that the development of the o-stem nom. pl. ending was therefore as follows:

PIE nom. pl. masc. *tritós 'third ones' → *tritóy (cf. Gk. τρίτοι) > *tritę́ > *trʸitʸę́ > *trʸəcę́ > PT *trʸicę (?; see **65**) > TB *trici*, TA *trice;*

PIE nom. pl. *k^{w}ékʷlōs 'wheels' (OE *hwēolas*) → *k^{w}ékʷloy (Gk. κύκλοι 'circles') > *k^{w}ékʷlē > *k^{wy}ékʷlʸē > *k^{wy}ókʷlʸę → PT *k^{w}ókʷlʸę 'chariots' (see **55**) > TB *kokalyi.*

For the most part the palatalization has been eliminated by paradigmatic levelling (see **55** and Krause and Thomas 1960:128-30); a typical example is the following:

PIE nom. pl. *éḱwōs 'horses' (Skt. *áśvās*) → *éḱwoy (see above) > *ékwē > *ékʸwʸē >→ PT *yókwę > TB *yakwi;* cf. nom. sg. *éḱwos > PT *yókwë > TB *yakwe,* TA *yuk* (see **16**).

Note that PT final *ę contrasts with *-i, *-e, and *-ë; cf. the following:

PIE *pxtréy dat. sg. 'to (the) father' (see **32**) > PT *patrʸí gen. sg. 'father's' > TB *pātri,* >→ TA *pācri* (with analogical *c* from nom. sg. *pācar*);

PIE *wr̥sḗn 'male' (see **29**) in *g^{w}ow(ə)-wərsēn 'bull' > PT *k^{w}ëw(u)-wərṣe (or *-wərʸṣe?; see **47**) > TB *kaurṣe, kau$_{u}$rṣa-,* TA *kayurṣ* (cf. Schneider 1940: 195-6);

PIE *ḱrud^{h}rós 'red' (see **5**) > PT *rətrḗ > TB *ratre,* TA *rtär.*

(See also note 1.)

A second large group of TB forms in *-i* are duals of thematic adjectives and of nouns with plurals in *-a* (Hilmarsson 1989:53, 59-60); such a distribution strongly suggests that TB *-i* reflects PIE thematic neuter dual *-oyḱ (Skt. *-e,* OCS *-ě;* Winter 1962a:123, Hilmarsson 1989:53). TA cognates for these forms are lacking, but an isolated dual noun shows the expected sound correspondence:

PIE *ǵónu 'knee' (see **16**) ~ post-PIE *ǵónw- >→ *gënu- in PT dual *kënüwʸ-ę(në) 'two knees' (see Winter 1962a:117-9 on the endings) > TB *keni, kenine,* TA *kanweṃ.*

Two other TA duals also belong here, if their *-e-* is not part of the stem:

TA *śanweṃ* 'two jaws' < PT *śen(ü)wʸę-në < *ǵēnu-?; PIE lexeme *genu- 'jaw' (Gk. γένυς 'jaw', OIr. *giun* 'mouth');

TA *śalpeṃ* 'two soles (of the feet)' (etymology?).

Apparently the final *ḱ of PIE *-oyḱ was lost very early, whether in pausa (cf. **2** (f)), or by a specific sound change dropping *ḱ in this sequence (cf. the discussion of the thematic optative in Mayrhofer 1986b:131), or by a more general loss of *X when separated from *o by a resonant and not adjacent to a syllabic (as in at least some other IE languages, notably Greek; cf. Schindler 1975a:55-6 with fn. 15, Beekes 1969:74-6 with bibliography). In those Tocharian forms not made to o-stems this ending must have been introduced analogically (cf. Winter 1962a:123), in part by a productive TB rule forming duals in *-i* from plurals in *-a* (Hilmarsson 1989:59); that fact helps to account for the lack of palatalization of the preceding consonant in most of these forms.

PT *ę also occurs as the stem vowel of a class of derived nouns with a highly characteristic ablaut pattern:

TB *reki,* TA *rake* 'word' < PT *rëkę < *rok- (cf. OCS *rekǫ* 'I say');

TB *leki,* TA *lake* 'bed, couch' < PT *lëkę < *log^{h}-; root PT *lək- ~ *lʸək- 'lie' (e.g. in TB (w. dial.) pres. ptc. *lykemāne* 'lying') < PIE *leg^{h}- (Gk. λέκτο '(s)he lay', Goth. *ligan* 'be lying down');

TB *peri,* TA *pare* 'debt' < PT *përęę (see note 2);

TB *telki,* TA *talke* 'sacrifice' < PT *tëlkę.

Many other examples survive only in TA, a few only in TB; typical are the following:

TA *lame* 'place' < PT *lëmę, root *ləma- 'sit' (e.g. in pret. ptc. TB ***lmau,*** TA *lmo*);

TA *tampe* 'strength, power' < PT *tëmpę, root *təmp- ~ *cəmp- 'be able' (e.g. in pres. 3sg. TB *campäṃ,* TA *cämpäs;* *c- has been generalized in the verb);

TB *meṅki* 'lack' < PT *mëṅkę, root *məṅka- 'lose, be beaten' (e.g. in TB pret. ptc. *mäṅkau,* TA abstr. *mäṅkālune*); TA uses the thematic noun *maṅk* 'lack, fault' < PT *mëṅkë.

This type of stem apparently reflects PIE holokinetic stems in *-oy- ~ *-y-; cf. Skt. *sákhā,* acc. *sákhāyam,* dat. *sákhye* 'companion, friend' ←< PIE *sók^{w}xō, *sók^{w}xoyṃ, *sok^{w}xiéy (thematized in Lat. *socius* 'ally'), Gk. πειθώ 'persuasion', etc. (This was suggested already by Pedersen 1925:39-40 fn. 2.) The root vocalism of these Tocharian words can only have been (post-)PIE *o (see **39**), but the shape of the suffix calls for some discussion.

In the nom. pl. and neut. nom.-acc. dual endings discussed above, the diphthong *oy was (or became) word-final, and it seems likely that only word-final *oy was monophthongized to *ę (see below) Word-final *-oy might also have arisen in nouns of the type *sók^{w}xō in at least three different ways:

a) possibly nom. sg. *-ō was replaced by analogical *-ōy, which was then shortened to *-oy by regular sound change; or

b) nom. sg. *-ō was analogically replaced by *-oy-s, on the model of acc. sg. *-oy-ṃ, nom. pl. *-oy-es, etc., and *-oys > *-oy by the regular loss of word-final *s (see **32**); or

c) conceivably acc. sg. *-oyṃ, which we might expect to have become *-oyən > *-oyə by sound change (see **29**, **30**, and **32**; unless intervocalic *y was lost, see **22**), was remodelled to *-oym, which by regular sound change became *-oyn > *-oy.

The third hypothesis seems least likely because the model for an acc. sg. *-oym is far from clear; the first is perhaps problematic because long vowels in *$\bar{V}$R sequences were not usually shortened in Tocharian (cf. the examples in **50**). However, any of these hypotheses can account for the shape of the PT nominal suffix *-ę. Note that under the second and third hypotheses the loss of final *s and final *n respectively must have preceded the change of *-oy to *-ę̄, if that monophthongization was really restricted to word-final position (see below).

But it is not completely clear that the monophthongization of *oy was so restricted in scope. We should examine the evidence for the development of PIE *oy in

other positions in order to determine whether any nonfinal *oy might also have become *ę̄.

It seems reasonably clear that PIE *oy in initial syllables did not monophthongize to *ę̄; cf. the following examples:

PIE *moywos 'little' vel sim. (ON *mjór* 'slender, delicate') > PT *mëywë > TB *maiwe* 'young' (Lane 1938:24);

PIE *óywos 'individual, alone' (Av. *aēuuō* 'one', Gk. οἶος 'alone') > PT *(-)ə́ywë- in TB *-aiwe-nta* 'individual units' (only in compounds, used to form plurals on duals and plurals; see Krause 1954:6 fn. 1, Winter 1962a:115-7).

Apparently monosyllables behaved like initial rather than final syllables:

PIE neut. nom./acc. dual *tóyǵ 'those two' (Skt. *té*) > PT *tə́y > TB *tai* (all genders?; masc. and neut. attested).

If that is true, analogical change must be invoked to account for the vowel of 'two':

PIE *duóyǵ neut. 'two' (Vedic Skt. *dvé* (2 syll. in RV), OCS *dŭvě;* cf. **26**) > *dwóy > *wə́y (see **27**) → *wə̨́ > PT *wə̨́ > TB *wi*, TA fem. *we* 'two' (Winter 1962a:131 with fn. 56, 1962b:29, Schindler 1966:236).

Note the lack of palatalization of the (PT and) TB consonant, which might indicate that the vowel was introduced into this form by analogy. Of course there are other possible explanations for this pattern of vowel reflexes (see below; cf. also note 3).

It is not clear what became of PIE *oy in medial syllables, or in final syllables closed by a consonant. The optative suffix TB, TA *-i-*, which palatalizes preceding consonants, could conceivably reflect PIE thematic *-oy-, and that would mean that *oy which was neither word-final nor in an initial syllable had become PT *i; but it could also reflect athematic *-iǵ-, which would give PT *i in any case (see **11**). I am not convinced that TB gen. dual *-aisäñ, -aisi* reflects any PIE ending containing *-oys- (pace Winter 1962a:126, Adams 1984:398), as the putative cognates are not compelling. TB nom. pl. *alyaik* 'others' could reflect the regular outcome of medial *oy (so Van Windekens 1976:30, 160) if the final particle had been added to the word early enough, but it is also possible that the word owes its (pre-particle) ending to analogy with *cey ~ cai* 'those' (on which see note 3). There seems to be no other evidence.

However, considerations of general phonetic plausibility at least suggest a solution to this dilemma. It seems clear that the phonemic PIE accent survived in PT (cf. the discussion in Ringe 1987b) and eventually became a stress accent (see **viii**, **71**, and **B30**). Given such an accent system, it is difficult to see why initial syllables (or final syllables, for that matter) would exhibit a development of *oy different from that seen in other environments. On the other hand, absolute word-final position might have been an unusual environment, even when the diphthong in that position was accented. To be sure, we must then explain why final *oy behaves differently in monosyllables and in polysyllables (see above); but note that the monosyllabic demonstrative in which *oy became PT *ëy must often have occurred preposed

to nouns, with which it can have formed phonological "words", so that its *oy need not have been word-final for the purposes of this sound change. That raises the possibility that *oy became *ę̄ in neut. *wə̨́ 'two' by regular sound change, and that its nonpalatalized *w is due to analogy with masc. *wú (see **26**).

I therefore tentatively suggest that the monophthongization of *oy to *ę̄ occurred only in absolute word-final position. This change preceded the palatalization of consonants (see **46**), since the new front vowel *ę̄ did palatalize preceding consonants (cf. the examples cited above).

It might be objected that the apparent TA reflex *-e* need not be the result of sound change alone. That is, PIE *-oy might actually have become PT *-i > TB, TA *-i;* subsequently nom. pl. and neut. dual *-ëy (preserved in the demonstrative pronouns) or its TA reflex *-e* can have spread to the TA forms in question by analogy (Jay Jasanoff, p.c. 1988). This hypothesis is particularly attractive because it would enable us to explain the TA duals *āmpi* masc. 'both', *tim* 'those', *tiṃ* 'these' as regular reflexes of forms in PIE *-oyǵ (see **11**). But though the dual and nom. pl. forms discussed here can easily be explained by such a hypothesis, the deverbal nouns cannot (since their *-oy(-) is a suffix, not an ending), and for that reason I prefer the hypothesis argued for in this section.

Yet another alternative is the hypothesis of Winter (1962a:131) and Hilmarsson (1989:38-9), according to which PIE stressed *óy became PT *ə́y > TB *ey, ai*, TA *e*, while unstressed *oy > PT *i > TB, TA *i*. I find that hypothesis unlikely because it requires so many apparently unmotivated analogical changes; in particular, virtually all the supposed TA duals in *-i* < PIE *-oyǵ reflect old oxytone forms (see **11**, note 2) and so could not have developed by sound change alone under the Winter-Hilmarsson hypothesis.

Notes.

1. TB *o-stem nouns with nom. plurals in *-i* (class V-1) do occasionally have apparent TA cognates with nom. pl. *-i*. However, in those instances the other case and number endings do not correspond; for example, TA *riṣak*, pl. *riṣaki* 'rishi, sage' (TB *rṣāke*, pl. *rṣāki*) has obl. sg. *riṣakäṃ*, pl. *-äs* rather than the *-aṃ, -as* that normally match TB obl. sg./pl.*-eṃ*. These TA plurals in *-i* correspond, rather, to the TB types assigned to classes V-2 and V-3 (sg. nom. *-e* or *-Ø*, obl. *-aṃ* or *-Ø*, pl. nom. *-i*, obl. *-äṃ*), which do not reflect PIE o-stems (cf. the discussion in **22**). (The example given above is not a genuine cognate inherited from PT but a loanword borrowed independently into the two languages. Whether any real cognates show this pattern of inflection is not clear; plausible candidates can be found in Krause and Thomas 1960:129-30 passim.)

2. TB *peri*, TA *pare* < PT *përęˇ 'debt' is usually held to be an Iranian loanword (see Van Windekens 1976:635-6 with references). However, since its formation is parallel to that of PT *lëkę 'bed' < (post-)PIE *lógʰ-oy-, there seems to be no reason why it should not reflect a (post-)PIE preform *bʰór-oy-; even the semantic

relationships of the two words to their respective roots might be roughly parallel (*'thing lain in' : *'thing carried, burden' → 'debt'). Is it possible that a native word meaning 'burden' was specialized to mean 'debt' under the influence of a similar-sounding Iranian word?

3. TB masc. nom. pl. *cey ~ cai* 'these' poses a number of difficult problems. The palatalized initial consonant (inherited from PT, cf. TA *ce-ṣ*) cannot directly reflect the *t- of PIE *tóy masc. nom. pl. 'those' if it is true that *-oy was not monophthongized to a front vowel in monosyllables (or in proclitics, see above); and while the same palatalized consonant occurs in most other forms of the masc. paradigm, there seems to be NO form of PIE *tó- in which *c- could have arisen by sound change in Tocharian. The diphthong is also unlikely to reflect PT *ëy < PIE *oy, since it shows a type of variation that occurs only in TB forms reflecting something other than a simple PT diphthong (see **viii** ad fin., **22**, **32**, and **48**, note 2). It therefore seems rash to cite TB *cey ~ cai* as an example of any sound change.

36. Word-final *or.

PIE word-final *or appears in PT as *-ər, with a reflex of PIE *o that is not found in other environments. The only examples are the 3sg. and 3pl. primary mediopassive endings. There are two plausible ways in which *-ər might have developed.

Possibly word-final *or became *ur, which was later reduced to *ər in the general loss of vowel length (see **50**):

PIE 1ary mp. 3sg. *-tor, 3pl. *-ntor (Hitt. *-ttar-i, -ntar-i,* Lat. *-tur, -ntur,* Phrygian 3sg. *-tor*) > *-tur, *-ntur > PT *-tər, *-ntər > TB, TA *-tär, -ntär.*

If that is what happened, the change of *-or to *-ur probably also preceded the more general shift of *o to *ë, which did occur in final syllables (since an unrounding of *o to *ë EXCEPT before final *r seems very strangely constrained). It need not have followed any other change, but it would perhaps have been most natural after the loss of final obstruents and nasals, when *or, *ol, *ow, and perhaps *oy would have been the only remaining word-final sequences of *oC (cf. the Latin change of *o to *u* before all final consonants and clusters).

Alternatively, *-or might have undergone the general unrounding of *o to *ë (see **39**) and then have been affected by a subsequent change of final *ër to *ər, as follows:

PIE 1ary mp. 3sg. *-tor, 3pl. *-ntor > *-tër, *-ntër > PT *-tər, *-ntər > TB, TA *-tär, -ntär.*

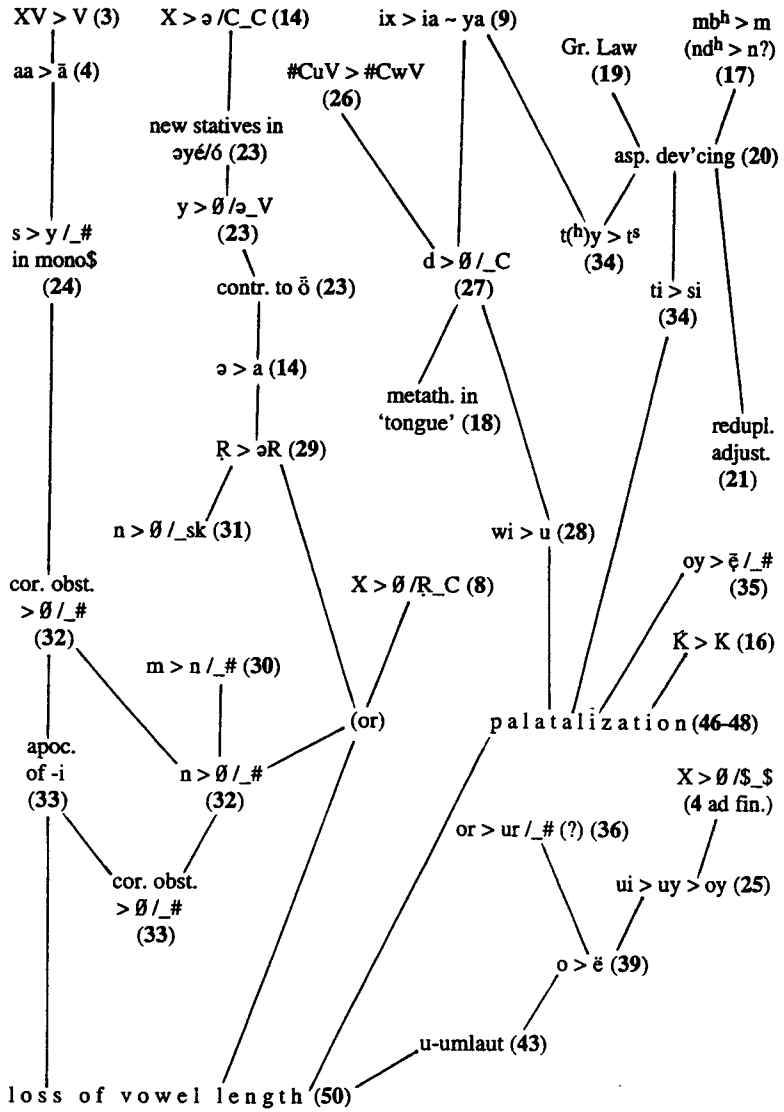
I can find no principled way to make a decision between these two scenarios; both seem plausible phonetically.

In any case, PT *-ër < *-or in TB *malkwer* 'milk', *kenmer* 'dung', etc. (see note 1) can have been introduced into final position by analogy after the sound change noted here; for the process by which *-or- could have arisen medially in neuter r/n-stem paradigms see Þórhallsdóttir 1988:192-3.

Notes.

1. Though PIE *-mēr > PT *-mʸer would also give TB *-mer* in *kenmer* etc., PIE *-wēr (as in Hitt. *hasduēr* 'twigs') would give PT *-wʸer > TB *"-yer"* by regular sound change (see **46** and **B14**); therefore PIE *-wēr cannot be the source of TB *-wer* unless the *w* was analogically depalatalized (Þórhallsdóttir 1988:207 fn. 12).

37. The discoverable chronological relations between the sound changes discussed in chapters 3 through 5 (and a few related changes) are diagrammed on the following page. Note that many of the changes discussed in **31** cannot be ordered chronologically.



Chapter 6. Early shifts of back vowels.

It is difficult to say much about the relative chronology of the changes discussed in this chapter. I collect them here because they all involve back vowels and all seem to have preceded the general restructuring of the vowel system (on which see Chapter 8).

38. Word-final *ō.

In absolute word-final position *ō normally became *ū (Penney 1976:79, Normier 1980:255 fn. 14; cf. already Pedersen 1941:229). Note the following examples:

PIE *duóx 'two' (see **3**) > *duṓ > *dwṓ > *wṓ (see **27**) > *wṹ > PT *wú > TA masc. *wu* (Winter 1962b:29);

PIE *ḱuṓ 'dog' (see **16**) > *kwṓ > *kwṹ > *kṹ > PT *kú > TB, TA *ku;*

PIE *xn̥tb^hóx 'both' (see **3**) > *xn̥tb^hṓ >→ *antp^hṹ > PT *antpú > TA fem. *āmpu-k;*

PIE subj. and them. pres. 1sg. *-ox (see **3**) > *-ō > *-ū > PT *-u > TB subj. I (and probably pres. I) 1sg. *-u*, e.g. in *āyu* 'I will give', *yāmu* 'I will do' (Pedersen 1941:141; see note 1);

PIE *oḱtṓ(w) 'eight' (see **16**) > *oktṹ > *ëktṹ (see **39**) > *o̯ktṹ (u-umlaut, see **43**) > *o̯ktú → PT *o̯ktə́ on the analogy of *ṣəptə́ 'seven' and *ñúwə 'nine' (Penney 1976:89 fn. 50; cf. Ringe 1987a:107) > TB *okt*, TA *okät;* pre-PT *-u is preserved in TA *oktuk* 'eighty' (see note 2).

It is possible that the *-ō of the PIE sequence *-oXō escaped raising to *-ū, though the details of that development are unclear; see **4** for further discussion.

Note the loss of *w in the development of PT *kú 'dog'. Postconsonantal *w was not normally lost in PT (cf. PT obl. *kwə́nə < PIE *ḱwónm̥, see **16**; cf. also **47**, **A14**, and **B28**), so we must posit a special development for this case. The likeliest suggestion is that *w was lost because it was preceded by a consonant and followed by *ū; such a change is overwhelmingly likely because [w] is difficult to hear in such a position. If that is what happened, this loss of *w must have followed the raising of final *ō to *ū but probably was not long delayed after the vowel change had occurred. Since the *w of 'two' survived in PT, its *d must have been dropped (see **27**) before the loss of *w between a consonant and *ū occurred; and if *Cwū-sequences did not survive for long, the latest possible date for the loss of *d before consonants is roughly the period when word-final *ō was becoming *ū.

The development of the duals 'two' and 'both' and of the 1sg. ending *-ox show that the raising of word-final *ō followed the contraction of vowels with tautosyllabic laryngeals (see **3**), which is not surprising. On the other hand, the chronology of this raising of final *ō relative to the unrounding of nonfinal *ō (see **40**) is not determinable. We could conceivably argue that the change *-ō > *-ū is likely to have preceded the unrounding of *ō to *ē on the grounds that the latter change was much more general (so that the more specific change bled the more general change); but though such a scenario is simple and elegant, we have no real evidence that that is what happened. Particularly disturbing is the fact that the "general" unrounding of *ō was apparently never general enough to affect the reflex of PIE *-oX̯ō (or possibly *-ōn; see **4**). Conceivably there were always some final *-ō in Tocharian until vowel length was lost altogether.

On the other hand, the raising of final *ō to *ū must have preceded u-umlaut, since it triggered that change (see **43**); it must also have preceded the general loss of vowel length, by which *ū became PT *u (see **50**).

Notes.

1. TB primary active 1sg. *-u* actually appears only in athematic categories; the corresponding thematic ending is *-e$_u$* ~ *-au* < *-e-* + *-u*, the thematic vowel *-e-* reflecting PT *ë < PIE *o. Nevertheless the hypothesis that *-u* ultimately reflects PIE thematic *-ox seems more plausible than the suggestion of a connection with Luvian 1sg. *-wi*, which has no other cognates outside of Anatolian. A transfer of endings from thematic to athematic stems is scarcely surprising in a language first attested in the 6th c. A.D. For further discussion and references (and yet another assessment of the evidence!) see Van Windekens 1982:261.

2. It is also possible that *ǫktú was replaced by *ǫktán or *ǫktó before the restructuring of the vowel system (in which *ū became *u). Note that this numeral behaves in Tocharian as though it ended in *-ō, not *-ōw; whether that is the result of a specific sound change *-ōw > *-ō will remain unclear so long as the problems regarding the ending of PIE 'eight' remain unsolved.

3. The history of nom. sg. pret. participles and adjectives in TB, TA *-u* was complex, and their PT *-u- probably does not reflect PIE *ō; see Þórhallsdóttir 1988: 188-90, 196-8 for further discussion.

39. Unrounding of *o.

Inherited short *o, probably including the reflex of PIE *x^{w}e (see **3**), was unrounded in pre-PT. The precise phonetic nature of the new unrounded vowel is not recoverable, though it must have been some sort of nonfront unround mid vowel (cf. Jasanoff 1978:33 with fnn. 18 and 19). I shall write it as *ë. There are dozens of examples, of which the following are typical:

PIE *poty-, obl. stem of *pótis 'master, husband' (see **34**) > PT *pët^s- 'husband' > TB *petso*, TA *pats* (Winter 1962b:21-2);

PIE *wók^{w}ɱ acc. 'voice' (Gk. ὄπα; cf. Lat. denom. *vocāre* 'to call') > PT *wék^{w}ə > TB *wek*, TA *wak* (nom. and obl.);

PIE *ǵómb^{h}os 'row of teeth' (see **3**) > PT *kḗmë 'tooth' > TB ***keme***, TA *kam;*

PIE *mosgos 'knot' (see **16**) > PT *mëskë 'bond, link' > TB ***meske***, TA *masäk* (Van Windekens 1949:301-2);

PIE *d^{h}égʰōm acc. 'earth' (see **16** with note 1) → *d^{h}ǵ^{h}ómɱ >⟶ *d^{h}g^{h}ónən (see **30**) > PT *tkénə > TB *keṃ*, TA *tkaṃ* (nom. and obl.);

PIE *ḱwónɱ acc. 'dog' (see **16** ad fin.) > PT obl. *kwḗnə > TB *kweṃ*, TA *koṃ;*

PIE *k^{w}etwóres masc. 'four' (see **32**) > PT *śətwḗr^{y}ə > TB *śtwer*, TA *śtwar;*

PIE *swésorɱ acc. 'sister' (Skt. *svásāram*, etc.) > PT *ṣw^{y}ásërə > TA *ṣar*, TB *ṣəsérə (see **B6**) > *ṣer;*

PIE *(ǵ)rg^{w}ónt- 'dark' (see **6**) > PT *ërk^{w}ënt- 'black' in TB obl. sg. masc. *erkeṃt*, TA nom. pl. masc. *arkaś* (Krause and Thomas 1960:57, 66);

PIE *tód neut. 'that' (see **32**) > PT *tḗ (predicative) > TB *te;*

PIE *pxsḱóntor 'they are protecting (their own herds)' (see **14** and **16**) > PT *paskḗntər 'they keep' (see also **36**) > TB *paskenträ;*

PIE *xégonti 'they are driving' (see **3** and **33**) > PT *akëñcə ~ *akën 'they are leading' > TB *ākeṃ*, TA *ākañc ~ *āke >⟶ *ākeñc* (cf. Jasanoff 1987:111 with fn. 44);

PIE *xégomǵnos ptc. 'being driven' (see **16**) > PT *akëmanë 'being led' > TB *akemane*, TA *ākmāṃ* (cf. **A3**, **A13**, and **A20**);

PIE *ḱɱtóm 'hundred' (see **16**) > PT *kəntḗ > TB *kante*, TA *känt* (on the TA loss of the final vowel in this and similar examples see **A8**);

PIE *xpélos '(a) wound' (see **5**) > PT *p^{y}ólë > TB *pīle*, TA *päl* (Van Windekens 1949:301, 1966:256);

PIE *éḱwos, acc. *éḱwom 'horse' (see **16** ad fin.) > PT *yákwë > TB *yakwe*, TA *yuk;*

PIE *ǵrud^{h}rós, acc. and neut. *ǵrud^{h}róm 'red' (see **5**) > PT *rətrḗ > TB *ratre*, TA *rtär;*

PIE *x^{w}ok^w- (*x^{w}ek^w-?) 'eye' > *ok^w- (Lat. *oculus*, Gk. dual ὄσσε, etc.) >⟶ PT *ëk^{w}ə > TB *ek*, TA *ak;*

PIE *x^{w}er- 'rise' (see **3**) > *or- > PT *ër- 'evoke' (orig. causative *'make rise') in pres. 3sg. *ërṣəṣə ~ *ërṣə (see **33** and **34** with note 1) > TB *erṣä-ṃ*, TA *aräṣ.*

Those PT *ë that were not umlauted (see **43**, **66**, **67**, and **B1**) merged completely with PT *e in TB *e* (see **B2**). PT *ë probably remained unchanged in TA

(where it is spelled *a*); most, but not all, PT *e and *o merged with it (see **A5** and **A6**). The cases in which PT *ë and *e underwent different developments in one language or the other show that they had not merged in the PT period; however, the widespread merger of the two vowels in both attested languages sometimes makes it difficult to determine whether *ë or *e should be reconstructed in particular PT words.

It is difficult to date the unrounding of old *o. On the interaction of unrounding and u-umlaut see **43**.

Notes.

1. It is likely that there was a period during which pre-PT had no short *o. Such a circumstance might account for the shape of the TB word for 'fish'. The attested forms are nom.(/obl.) sg. *läks* (w. dialect; would be c./e. **laks*), nom. pl. *läkṣi*, obl. pl. *laksäṃ* (Krause 1961b:83-4). Since its discovery this word has been held to reflect PIE *loḱs- 'salmon' (Lith. *lašìs*, OE *leax*, etc.), or possibly an ablaut alternant of the same, but in fact the only PIE vowel that could regularly underlie the nonpalatalizing /ə/ of the root syllable is *u (pace Krause, loc. cit. pp. 85-6, 89; see **50** below). The endings are best interpreted as u-stem endings (Cowgill, p. c. 1980, again pace Krause, loc. cit. pp. 84-5): PIE nom. sg. *-us, acc. sg. *-um > PT *-ə > TB nom.(/obl.) Ø (= /-ə/); PIE nom. pl. *-ewes > PT *-ʏüwʏə > TB *-ʏiyə > *-ʏi*; PIE acc. pl. *-uns > PT obl. pl. *-ə (?; the recessive accent of the TB form apparently demands a monosyllabic ending in PT and for some time thereafter) + n-stem *-nə > TB *-äṃ*. Though analogical changes (which were extensive in Tocharian nominal inflection) can have altered the endings, the fact that this noun belongs to an unproductive inflectional class (Krause and Thomas 1960:131-2) at least suggests that any such changes did not occur recently. It is reasonable to suppose a pre-PT form *luks-, possibly even *luksus; and the most likely explanation for such a form is that it was borrowed from a language in which the word was *loks-, possibly *loksos, during the period when pre-PT had no *o and thus had to substitute some other vowel (in this case, perhaps the only short round vowel that it possessed; but see **43**). Since the unrounding of PIE *o can be a very early change, it is not implausible to suggest that the borrowing occurred when the pre-Tocharians were still in eastern Europe and in contact with non-Iranian IE languages; but the source language for the borrowing cannot be identified. Of course this is not the only scenario possible; consequently the shape of 'fish' in TB cannot be called probative evidence for a very early unrounding of PIE *o.

2. That the *-o* of Baktrian loanwords appears as *-ë in PT need not mean that the Tocharian unrounding of PIE *o occurred in the first century A.D. or later (pace Winter 1971:221 and Ringe 1987a:27 fn. 27), since the Tocharian ending might have been assigned according to a rule of morphological equivalence by speakers that knew both languages well. (See also Schwartz 1974:409-10.)

40. Unrounding of *ō.

Except when word-final (see **38**), inherited *ō, including the reflexes of PIE *ex^{w} and *oX (see **3**), appears in PT as *a (Pedersen 1941:226, etc.). Note the following examples:

PIE *ṓmsos 'shoulder' (see **3**) > PT *ánsë > TB *āntse*, TA *āys > *es* (see **A10**);

PIE *péxwōr collective 'fire' (see **7**) → *pxuór > PT *puwár > TB *puwar*, TA *pwār > *por*;

PIE *tríx (d)ḱṓmt 'three tens' (see **9**) > PT *tərʏyaka 'thirty' > TB *täryāka* (Schindler 1967b:240);

PIE *ǵnex^{w}- 'recognize, know' (see **3**) > *gnō- > PT *kna- > TA *knā-*, e.g. in pres. ptc. *knānmāṃ* 'knowing'; PT *aknát^{s}a 'ignorant' (see **31**, **44**, and **66**) > TB *aknātsa*, TA *āknats*;

PIE *g^{w}rox-mVr- 'heavy load' (see **3**) > *g^{w}rōmVr- > PT *k^{w}ramər > TB *krāmär* 'burden' (cf. Schindler 1972:149);

PIE *d^{h}oXnéx 'grain' > *d^{h}ōnā́ (Skt. pl. *dhānā́s* coll. 'grain', Lith *dúona* 'bread') > PT *taná- > TB *tāno*, pl. *tanāñ*.

Since the (post-)PIE starting point of this development was clearly a long vowel, and since vowel length seems to have been lost in a general restructuring of the vowel system not long before the PT period (see **50**), I suggest that the immediate ancestor of this PT *a was *ā. We must then explain how (post-)PIE *ō became *ā. That is not likely to have been a simple development, since (post-)PIE *ā conversely became *ō (whence PT *o, see **42**); the two vowels are most unlikely to have been affected by an "exchange rule" (a type of historical development whose existence has never been firmly established), and they must somehow have developed along phonetic paths that did not cross. Various solutions to this problem are possible, including those that posit dialect differences and/or synchronic variation; but the simplest solution posits three changes as follows.

(1) Since inherited *o was unrounded to *ë, which (whatever its exact phonetic realization) remained distinct from *a, it is reasonable to suggest also that nonfinal *ō was unrounded to "*ē̈" at the same time, and that *ē̈ remained distinct from *ā or its reflex. (It is not clear why final *ō escaped this unrounding, though it evidently did so (see **38**); presumably it was already somewhat different phonetically before the unrounding occurred, though it need not already have become *ū.)

(2) Inherited *ā was rounded and possibly raised to *ō. This change need not have followed (1); all that is necessary is that the new *ō's have remained distinct from the inherited *ō's at all times. But from that it does follow that rounding of inherited *ā must at least have begun before (3) occurred.

(3) The new long vowel *ē̈ was lowered to *ā. The general loss of vowel length (see **50**) eventually followed.

I will tentatively adopt the above chronology as a working hypothesis; but it should be remembered that the sequence of changes I posit has by no means been demonstrated.

41. *ā in final syllables.

In at least some final syllables (post-)PIE *ā appears in PT as *a. It is extremely difficult to specify the exact conditions under which this occurred, because all our examples belong to paradigms that can have undergone extensive analogical changes (cf. Marggraf 1975:198-9).

It seems likely that *ā in absolute word-final position eventually gave PT *a by regular sound changes, and that this occurred even in monosyllables; at least that is the most straightforward way to account for the shape of the following demonstrative:

PIE *séx nom. sg. fem. 'that' > *sá́ (Skt. *sá́*, Gk. ἥ, Goth. *so*) > PT *sá > TB *sā* nom. sg. fem. 'this' (so Winter 1981:939); or is the PT form a reflex of the PIE sandhi variant *[sá] with loss of the laryngeal in pausa? (so Peters 1991a:242; see **2** (f) above).

This fits well with the fact that many TB nom. sg. fem. forms (especially of adjectives) and most nom./acc. pl. neut. forms end in *-a;* though some of each can reflect PIE *-x (see **14**)—and feminines in *-ya* certainly do reflect PIE *-ix (see **9**)—the sheer number of forms in *-a* < PT *-a suggests that others reflect *-ā < PIE *-ex. This conclusion is supported especially by the correlation nom. sg. masc. *-e* : fem. *-a* in several types of TB adjectives (e.g. *-ṣṣe* : *-ṣṣa, -tstse* : *-tstsa, -lye* : *-lya*) and in diminutives (*-śke* : *-śka*); it is hard to believe that these pairs do not reflect PIE masc. *-os : fem. *-ex > *-ā. (Unfortunately this is not the only possible explanation; see note 1 below.)

The fate of post-PIE *-ām (see **3**, note 3) in Tocharian is unclear. TB *tā*, the obl. sg. of *sā* fem. 'this', might reflect post-PIE *tā́m (Skt. *tā́m*, Gk. τήν, Goth. *þo*), but its ending also might have been introduced from the nom. sg. by approximate analogy with masc. nom. sg. *se*, obl. sg. *ce* (the principle apparently being that in each nom./obl. pair the initial consonant is different but the vowel the same; it seems less likely that the this form simply lacked *-m, pace Winter 1981:939). On the other hand, TB obl. *śano* 'wife' and a few similar obl. sg. forms (which could be analogical on *śano*, cf. Marggraf 1975:200) might reflect post-PIE *-ām by regular sound change, since after all the group is isolated and the formation unproductive; but we cannot exclude the possibility that their *-o* has been introduced analogically from the plural (in this case *śnona* 'wives'; Marggraf 1975:202-3), whose *o* can reflect post-PIE *ā provided that the latter survived as such in medial syllables anywhere in the paradigm. There seems to be no principled way to choose between these hypotheses.

PT *tóy fem. 'those' < *tā́s < PIE *téxes (see **24**) shows that the *ā of post-PIE *-ās underwent rounding (see **42**) in monosyllables. Peters 1991a adduces putative cases of PT *-o < post-PIE *-ās in polysyllables; though not all his examples are equally plausible, it seems extremely likely that PT *kɔntwó (see **18**) does ultimately reflect nom. sg. *dn̥ǵʰwā́s < PIE *dn̥ǵʰwéx-s. As counterevidence one might adduce the fact that in Tocharian the PIE neuter gender has merged morphologically with the feminine in the plural; very many TB fem. pl. nom./obl. forms end in *-a* < PT *-a, and one might argue that this is difficult to explain except on the hypothesis that post-PIE (fem.) ā-stem nom./acc. pl. *-ās had become *-a in PT, thereby becoming homophonous with the corresponding neuter ending. But in fact such an argument is not probative. Precisely the same morphological merger has occurred in Rumanian, in spite of the fact that Latin neut. pl. nom./acc. *-a* and fem. nom. pl. *-ae* (which are the relevant surviving endings) never merged phonologically in that language. (See note 2 for further details and examples.) Evidently such a morphological development does not presuppose any phonological merger of endings; consequently we cannot adduce PT fem. pl. forms in *-a as evidence for a sound change *-ās > *-a in pre-PT.

2sg. active verb forms in *-ās and 3sg. forms in *-āt are another potential source of PT *-a; but again it is impossible to show that such a development occurred by regular sound change. Tocharian a-presents and a-subjunctives (class V) offer no evidence at all, because they are unsuffixed athematic formations to roots in PT *-a- (Cowgill 1967:179, 180 fn. 1; Winter apud Cowgill loc. cit.) whose *-a- ultimately reflects PIE root-final laryngeals (cf. the discussion in **14** above); they have nothing to do with the ā-optative of Italic and Celtic (pace Marggraf 1975:199 and others), nor with PIE presents in *-ex- (pace Adams 1988:65-7). If the endings of the class I preterite reflect an earlier ā-preterite (as Jasanoff 1983:62-70 argues), then it is likely that TB 3sg. *-a* < PT *-a reflects earlier *-āt (not necessarily inherited from PIE). But at least some such preterites reflect PIE root-aorists to roots in *-X- (cf. the discussion in Jasanoff 1983:55-61); in at least those cases we can have PT *-a < *-at (see **32**) < PIE *-X-t (see **14**), and we cannot be sure that that ending has not spread from such forms to all class I preterite 3sgs., even if some members of this class were originally ā-preterites.

TB class VI present 3sg.*-(a)naṃ* is in a sense an inverse case. The ending must represent PT *-(ə)na (the *-ṃ* of the TB form is an innovation), and *-(ə)na should ultimately reflect *-nā́ti < PIE *-né-x-ti (i.e. the infix *-né-, the final *x of the root (see below), and the 3sg. primary active ending), so the PIE pedigree of the ending is clear; moreover, TB primary 3sg. forms evidently reflect PT forms in which the final *-i of PIE 3sg. *-ti had been dropped (see **33**), so that we might expect *-(ə)na to reflect pre-Tocharian *-nā́t < *-nā́ti < PIE *-né-x-ti. What is not clear is whether the *a of the PT ending developed from post-PIE *ā by regular sound changes. A plausible alternative hypothesis can be constructed as follows. The earliest

reconstructable shapes of nasal infix plus root-final laryngeal are the following:

active sg.	*-néx́-	:	other	*-nx́- ~ *-n̥x́-
"	*-néx-	:	"	*-nx- ~ *-n̥x-
"	*-nex^{w}-	:	"	*-nx^{w}- ~ *-n̥x^{w}-

By the sound changes that eliminated laryngeals (see **3**, **8**, and **14**) these sequences should have developed into:

active sg.	*-nḗ-	:	other	*-na- ~ *-n̥- (3pl. *-nenti < *-nx́énti)
"	*-nā́-	:	"	*-na- ~ *-n̥- (3pl. *-nanti < *-nxénti)
"	*-nṓ-	:	"	*-na- ~ *-n̥- (3pl. *-nonti < *-nx^{w}énti)

Those same sound changes, which obliterated the boundary between root and infix and eliminated laryngeals from the phonological system of the language, should also have caused the sequences just tabulated to be reinterpreted as suffixes. In addition, the post-laryngeal system of ablaut would eventually have been restructured; probably the only one of the above pairs that survived was *-nā́- : *-na-, which participated in the relatively common ablaut alternation *-ā- : *-a-. (A parallel development is observable in Greek, Germanic, and Celtic. One would expect the alternant *-n̥- to have disappeared outright; what happened to the long-vowel alternants other than *-nā́- is unclear.) But it does not follow that this nasal suffix continued to exhibit an alternation between long and short vowels. OIr. conjunct pres. 3sg. *·ben* 'strikes', *·cren* 'buys', etc. show that in at least some Celtic languages the short vowel was generalized (since PC *-āt should have given OIr. *"-á"*), and the same development can have occurred in Tocharian. It follows that the class VI presents offer no evidence for sound changes affecting word-final *-ās and *-āt.

Though TB *po* 'all' does reflect PIE nom. sg. masc. *pā́nts, neut. *pā́nt, with *ā in a final syllable, its *o* can be analogical on the oblique stem *pont-* (= TA *pont-* < PT *pont- < PIE *pā́nt-); also, since the form is monosyllabic one might expect it to exhibit the same development as TB *toy* < *tā́s (see above) in any case. On other possible cases of (post-)PIE *ā before final consonant clusters see the notes below.

In sum, the most we can say is that post-PIE *ā in absolute word-final position probably developed into PT *a, that word-final *-ās probably developed into PT *-o and *-oy (the latter in monosyllables; see **24**), and that the phonological history of other *-āC(C) is unclear.

If post-PIE word-final *ā developed into to PT *a by regular sound changes alone, the crucial change was probably a shortening of *-ā to *-a, since inherited short *a underwent no changes before the PT period. If that is what happened, the shortening must have occurred before *ā was rounded to *ō (see **42**). I will adopt that scenario as a working hypothesis.

Notes.

1. Jay Jasanoff (p.c.) points out that even if post-PIE final *-ā had given *-ō (> PT *-o), examples in the nom. sg. fem. and nom./acc. pl. neut. could gradually

have been eliminated by analogy in favor of *-a (< *-x, including *-ya < *-ix). Once *-a had become established in the nom. sg. fem. forms of ALL adjectives, it could then have spread to the demonstrative pronoun as well; consequently even PT *sá is NOT an absolutely certain example of PT *-a < PIE *-ex.

2. Latin neuter nouns developed into a class of Rumanian nouns that take masculine concord in the singular but feminine concord in the plural, exactly like PIE neuter nouns in Tocharian; however, the fem. pl. and neut. pl. endings did not merge phonologically. The normal feminine development is exemplified by Lat. (nom.) fem. *casa*, pl. *casae* 'hut' > Rum. fem. *casă*, pl. *case* 'house'. By contrast we find Lat. (nom./acc.) neut. *ōvom*, pl. *ōva* 'egg' > Rum. *ou* masc., pl. *ouă* fem. 'egg', with no change of endings but change of gender (a unique relic in the modern language), and further Lat. (nom./acc.) neut. *fīlum*, pl. *fīla* 'thread' >→ Rum. *fir* masc., pl. *fire* fem. 'thread', in which the change of gender has eventually resulted in a change of endings as well (the usual type in the modern language). Modern Italian preserves substantial traces of a similar system, with no change of endings; typical examples are *uovo* masc., pl. *uova* fem. 'egg', *labbro* masc., pl. *labbra* fem. 'lip', etc. (Contrast fem. *casa*, pl. *case* 'house'.) Apparently this is so natural a way for an IE language to reduce the complexity of its gender system that it need not be triggered or even assisted by phonological developments.

3. Whether a 3pl. *-ānt can ever have existed is unclear; if it is not completely impossible, it must have developed like 3sg. *-āt, by sound change or analogy or both.

4. The (late or post-)PIE ā-stem acc. pl. seems to have been *-ās, not *-āns (cf. Skt. *-ās*, Goth. *-os;* see **3**, note 3); this robs us of our only potential case of *-āns.

42. Rounding of *ā.

Inherited *ā (including the reflexes of PIE *ex and *exe) in nonfinal syllables clearly appears in PT as *o (Marggraf 1975:199; Normier 1980:254; Winter 1981: 938). Note the following examples:

PIE *b^{h}réxtēr 'brother' (see **3**) > *b^{h}rā́tēr > PT *prócer > TB *procer*, TA *pracar;*

PIE *b^{h}āǵ^{h}u- 'arm' (see **16**) > PT *pok- in TB obl. *pokai*, TA *poke;*

PIE *wā́stu 'settlement' (see **3**) > PT *wóstə 'house' > TB *ost*, TA *waṣt;*

PIE fem. suffix *-e-x- (i.e., thematic *-e- plus fem. *-x-; Skt. *-ā-*, etc.) > *-ā- > PT *-o- in fem. adj. pl. *-o-na, e.g. in *astróna 'pure' > TA *āṣtraṃ*, >→ TB *astarona* (with epenthesis and accent shift by analogy with the masc.; see **B5** and **B6**);

PIE *pā́nt- 'all' (see **9** and **32**) > PT *pont- > TB, TA *pont-*.

The same reflex appears in at least one monosyllable:

PIE *téxes fem. 'those' (see **24**) > *tā́s > PT *tóy > TB *toy* fem. 'these'.

(For probable examples of PT *o < *ā in final syllables see also **41**.)

For the reasons adduced in **40** it is likely that the immediate ancestor of this PT *o was *ō; it therefore appears that we must recognize a general rounding of PIE *ā to *ō. As usual, the precise phonetic outcome of this change is not determinable, though there is some likelihood that its eventual PT reflex *o was lower than the *ǫ that developed by u-umlaut (see **43**). On the relative chronology of the unrounding of inherited *ō and the rounding of inherited *ā see **40** ad fin.

Notes.

1. PT *macér 'mother' (> TB *mācer*, TA *mācar*) can be analogical on *pacér 'father' (Marggraf, loc. cit.) and need not have developed from *mātḗr < PIE *mextḗr by sound change alone.

43. U-umlaut.

In most circumstances inherited short *o became the unround vowel *ë (see **39**); however, when followed in the next syllable by *u or *ū (including *ū < PIE *ō) it remained or became a short o-vowel. This sound change is generally called u-umlaut (Normier 1980:255; cf. already Pedersen 1941:220-1). The new o-vowel did not merge with other o's in PT. I will write it as *ǫ, following Normier; that it was actually closer than other o-vowels (as this graphy suggests) seems likely on general grounds but cannot be proved. There are two clear examples:

PIE *dóru, *drέw- 'tree, wood' (Skt. *dā́ru*, gen. sg. *drós*; Gk. δόρυ 'spear (-shaft)') > *dḗru, *réw- (see **27**) → *ḗru (Schindler, p. c. 1985) > *ǫ́ru > PT *ǫ́rə 'wood' > TB, TA *or* (etymology first in Schneider 1940:203);

PIE *oḱtṓ(w) 'eight' (see **16**) > *ëktṓ > *ǫktṓ > *ǫktú → PT *ǫktə́ > TB *okt*, TA *okät* (cf. TA *oktuk* 'eighty').

I have argued that TB *soy*, gen. sg. *seyi* 'son' also exhibits the effects of u-umlaut; see **25**.

In the etymologies just given I suggest that *o was unrounded to *ë in all environments, and that *ë was subsequently rounded (and perhaps raised) to *ǫ by u-umlaut. In that scenario the individual sound changes are phonetically as simple as possible. Unfortunately no real proof can be based on considerations of simplicity; we cannot exclude the possibility that inherited *o was never unrounded in the u-umlaut environment. In that case "unrounding of *o" (discussed in **39**) and "u-umlaut" were two aspects of the same complex sound change. (TB 'fish' MIGHT provide indirect evidence that unrounding and u-umlaut were two separate changes, but is hardly probative; see **39**, note 1, for discussion.)

However u-umlaut occurred, it must have taken place after the raising of final *ō to *ū (see **38**), which created one of the umlauting environments, and before the general loss of vowel length (see **50**), in which short *u was unrounded and merged with *ə.

Notes.

1. Apparent counterexamples to this sound change include PT *mëkuwa pl. 'fingernails' ←< PIE *xʷnogʰ- 'fingernail, claw' + *-u- (Krause 1951b:203, 1956: 196; see **5**) and PT dual *kënüwʸe(në) 'two knees' ←< PIE *ǵónu 'knee' (see **16**). In the latter case the PT root vowel must reflect the vowel of prevocalic *ǵonw-, in which u-umlaut would not have occurred. In the case of 'fingernails' we might suggest that the stem-vowel *-u- was added after u-umlaut had run its course, since some IE languages show forms without *-u- or *-w- (e.g. OE *nægl* 'nail'); but the appearance of *-w- also in Lat. *unguis* and Gk. ὄνυξ, ὄνυχ- (if the latter is < *onukʷʰ- < *onokʷʰ- < *xʷnogʰ-w-) suggests that it was added very early, and if that is true the explanation advanced for the failure of u-umlaut to occur in 'knees' must be extended to include 'fingernails' as well.

44. Lowering of word-initial *ə.

Initial *ə, which arose from PIE syllabic resonants (see **29**), became *ë (cf. Hilmarsson 1984a:116). It is reasonable to suppose that *ə was a (relatively) high vowel (cf. Jasanoff 1978:33), and that this sound change involved lowering *ə in word-initial position. The only indisputable example is the following:

PIE *n̥- 'un-' (Gk. ἀ(ν)-, Goth. *un-*, etc.) > *ən- > *ën- >→ (pre-)PT *ë(n)-, e.g. in

PT *ëṅkl^{y}éwṣəttë 'unheard of' > TB *eṅklyauṣätte* and

pre-PT *ëknátˢa > PT *aknátˢa (by a-umlaut, see **66**) 'unknowing, ignorant' > TB *aknātsa*, TA *āknats* (etymology first in Lane 1938:36-8; on the loss of *-n- see **31**).

Also plausible is the following:

PIE *n̥ḱwós 'perishable, mortal' (verbal adj. to *neḱ- 'perish'; see **16**) > *ənkwḗ > PT *ëṅkwḗ 'man' > TB *eṅkwe*, TA *oṅk* (Campanile 1969:203-4).

A further possible example is

PIE *(ǵ)rg^{w}ónt- 'dark' (see **6**) > *ərg^{w}ḗnt- > *ërg^{w}ḗnt- > PT *ërk^{w}ḗnt- 'black' > TB *erkent-*, TA *arkant-* (Krause and Thomas 1960:57, 66).

This is an allophonic split (of *ə) followed by or concomitant with a merger (of one allophone of *ə with *ë); the merger could not have occurred until *o was unrounded to *ë (see **39**).

Notes.

1. The relative chronology of this change and u-umlaut are not determinable, since no single form indisputably exhibits the effects of both. It is possible that TB *orkamo*, TA *orkäm* 'dark' is such a form (PT *ǫrk^{w}əmo, related to *ërk^{w}ḗnt-, with *ǫ . . . ə < *ë . . . u?). However, in that case one would expect the TA form to end in *-um* rather than *-äm* (see **A14**). It seems at least as likely that the TA form was

borrowed from TB, and in that case it is possible that o-umlaut (see **67**) is responsible for the initial *o-*.

2. The development posited here seems more natural than Adams' suggestion that word-initial *R̥ became *oR (Adams 1988:16-7), which then underwent the regular change of *o to *ë. The (related?) suggestion that syllabic resonants became *uR in the first instance in non-initial position is untenable; see **29** with bibliography.

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Chapter 7. Palatalization.

Among the most pervasive morphophonemic features of both Tocharian languages is a system of alternations between two groups of consonants. Generally speaking, one group contains the palatals *c, ś, ñ, ly, y* and the retracted sibilant *ṣ*, while the other group contains all other consonants (see Krause and Thomas 1960: 61-4 for details). A similar system can be reconstructed for PT. Even on general grounds it is very likely that this alternation resulted from a phonetic process of palatalization, by which consonants were palatalized before front vocalics but not elsewhere; and in fact many examples of Tocharian palatals and *ṣ* do reflect consonants that were followed by front vowels or *y in PIE. But both palatalized and nonpalatalized consonants have spread by analogy in Tocharian, especially in the verb system, so that their original distribution (and hence the original distribution of vowels, e.g. in ablaut) is not always clear.

In this chapter I will discuss the sound change that gave rise to the alternation of palatalized and nonpalatalized consonants in Tocharian. The system of consonants immediately before palatalization occurred is examined in **45**; the palatalization of single consonants by front vowels will be exemplified in **46**, of consonant clusters by front vowels in **47**, and of single consonants and clusters by *y in **48**. Some analogical changes that affected the distribution of the alternants will be discussed in Chapter 9.

45. The pre-PT consonant system before palatalization.

As a result of the loss of laryngeals (see **3** through **14**) and of early changes of consonants (see **16** through **34**), pre-PT had the following system of consonant phonemes:

p	t	k	k^w	y	w
b	d	g	g^w		
p^h	t^h	k^h	k^{wh}		
	t^s				
	s				
m	n	ṅ ?	ṅ^w ?	(Whether the velar and labiovelar nasals were	
	l			phonemic depends on the fate of *$ǵ^h$, *g^h and	
	r			*g^{wh} after nasals; see **17**.)	

There was certainly a contrast between labiovelars (reflecting PIE labiovelars) and sequences of velar plus *w (reflecting the PIE *Kw- and *Ḱw-clusters); see **16**, **A15**, and **B28** for further discussion.

After the shift of *wi to *u and of *K^{w}i to *Ku (see **28**) and the assibilation of *t(^{h}) (see **34**), and almost certainly after the merger of PIE palatals and velars (see **16**), all consonants except *y were phonetically palatalized before front vocalics (*y, *i, *e, *ī, *ē, e- and ē-diphthongs, and the front vowel *ę that resulted from PIE final *oy, on which see **35**).

46. Palatalization of single consonants by front vowels.

In this section I cite forms that exemplify the palatalization of single consonants before front vowels, together with contrasting forms in which palatalization has not occurred. Since palatalization remained a productive morphological marker in Tocharian, many instances of PT palatalized consonants do not necessarily reflect PIE consonants followed by front vocalics; for the most part I shall cite only examples with a secure PIE pedigree. (For *d, however, I have been obliged to cite as nonpalatalized examples several verb roots whose initial consonants have been depalatalized by analogy.) Note that I indicate phonetic palatalization by a superscript "y" following the consonant.

• *p (< PIE *p), palatalized:

PIE *pénk^{w}e 'five' (Skt. *páñca*, Gk. πέντε) > *p^{y}éṅk^{wy}e > PT *p^{y}śñśə > TB *piś*, >→ TA *päñ* (cf. Martinet 1974:130);

PIE *penk^{w}tós 'fifth' (Gk. πέμπτος, Lat. *quīntus*) > *peṅk^{w}tḗ > *p^{y}eṅk^{w}tḗ > PT *p^{y}əṅk^{w}tḗ > TB *piṅkte*, TA *pänt;*

PIE *xpélos '(a) wound' (see **5**) > *pélë > *p^{y}élë > PT *p^{y}ślë > TB *pīle*, TA *päl* (Van Windekens 1949:301, 1966:256).

Nonpalatalized examples are common; typical are the following:

PIE *pl̥x́nós 'full' (see **8**) > *pəlnḗ > PT *pəllḗ in TB obl. *pällent* 'full moon' (Winter 1965a:205-6);

PIE *pr̥Xwós 'first' (see **8**) > PT *pərwḗ in TB *parwe, yparwe* 'at first', *pärweṣṣe* 'first', TA *pärwat* 'eldest';

PIE *pxtḗr 'father' (see **3**) > *patḗr > *pat^{y}ḗr > PT *pacér > TB *pācer*, TA *pācar;*

PIE *poty- 'master, husband' (see **34**) > PT *pët^{s}- 'husband' > TB *petso*, TA *pats* (Winter 1962b:21-2).

• *t (< PIE *t), palatalized:

PIE *ték^{w}os '(act of) running' (see **16**) > *ték^{w}ë > *t^{y}ék^{w}ë > PT *cə́k^{w}ë 'river' > TB *cake* (Van Windekens 1976:249);

PIE *pxtḗr 'father' (see **3**) > *patḗr > *pat^{y}ḗr > PT *pacér > TB *pācer*, TA *pācar* (so also other kinship terms; see **14** and **42**);

PIE nom. pl. masc. *tritós 'third ones' (see **35**) → *tritóy > *tritḗ > *tr^{y}it^{y}ḗ > *tr^{y}əcḗ > PT *tr^{y}icḗ (?; see **65**) > TB *trici*, TA *trice.*

Nonpalatalized examples are very common; the following are typical:

PIE *túX 'thou' (see **4**) → *tuXóm > PT *t(u)wḗ > TB *twe*, TA *tu;*

PIE *tl̥néx- pres. 'be lifting' (see **29**) > *tl̥nā́- >→ PT *təllá- 'bear, endure' > TB 3pl. *talla-ṃ;*

PIE *tód neut. 'that' (see **32**) > PT *tḗ (predicative) > TB *te;*

PIE *dwitós 'second' (see **27**) > *utḗ > PT *wətḗ > TB *wate*, TA *wät* (Cowgill, p.c. 1980);

PIE 1ary mp. 3sg. *-tor (see **36**) > PT *-tər > TB, TA *-tär.*

• *k (< PIE *ḱ and *k), palatalized:

PIE *ḱēruos 'stag-hunter' (see **22**) > *kēruwë > *k^{y}ēruwë > PT *śeruwë 'hunter' > TB *śerwe*, obl. *śeruweṃ* 255a7, TA *śaru* (Jasanoff apud Nussbaum 1986:8);

PIE aor. subj. *léwk-e- 'shine' (Skt. 3sg. *rócate;* cf. **16**) > *l^{y}ewk^{y}e- > PT trans. subj. *l^{y}uśə- in TB inf. *lyuśśi;*

PIE aor. *kedx- (or *ḱedx-) 'strew, spread' (see **14**, and note that the PIE nasal-infixed present of this verb implies the existence of a root aorist) > *keda- > *k^{y}eda- >→ PT pret. *śəta- (see **57**) > TB /śəta-/ in 2sg. *śtasta*, 3pl. *śtare* (western dialect; Van Windekens 1963:464-5).

Nonpalatalized examples are conveniently assembled in **16**.

• *k^{w} (< PIE *k^{w}), palatalized:

PIE *k^{w}etwóres masc. 'four' (see **32**) > *k^{w}etwḗre > *k^{wy}etwḗr^{y}e > PT *śətwḗr^{y}ə > TB *śtwer*, TA *śtwar;*

PIE *x^{w}k^{w}íx́ 'two eyes' (Hom. Gk. ὄσσε, Forssman 1969:44-7) >→ *ok^{w}íx́ (OCS *oči*) > *ok^{w}í? or → *ok^{w}é? (see **11**); in either case > *ëk^{wy}V > PT *ëśə > TB *eś* (Winter 1962a:115, 129).

Nonpalatalized examples are fairly common; note the following:

PIE *k^{w}rix- 'buy' (see **9**) > *k^{w}r^{y}iya- > PT *k^{w}ər^{y}ya- > TB /kərya-/ in pret. 1pl. *käryāmte* 'we bought'; post-PIE derived noun *k^{w}rix-wr̥ 'trade' > *k^{w}riawər > *k^{w}r^{y}iyor > PT *k^{w}ər^{y}yor > TB *karyor*, TA *kuryar* (see K. Schmidt 1982:364-5, Þórhallsdóttir 1988:193-4);

PIE *k^{w}ólos 'turning, hub' (see **16**) > PT *k^{w}élë 'navel' > TB *kele* (cf. Van Windekens 1949:301);

PIE *prótix^{w}k^{w}om 'face' (→ *prótyōk^{w}om?; see **10**) > PT *prët^{s}ak^{w}-a- 'chest' > TB *pratsāko*, TA *pratsak;*

PIE *ték^{w}os '(act of) running' (see **16**) > *ték^{w}ë > *t^{y}ék^{w}ë > PT *cə́k^{w}ë 'river' > TB *cake* (Van Windekens 1976:249);

PIE *wók^{w}m̥ acc. 'voice' (see **39**) > PT *wḗk^{w}ə (nom. and obl.) > TB *wek*, TA *wak;*

PIE *xʷokʷ- (*xʷekʷ-?) 'eye' (see **39**) > *okʷ- >→ PT *ëkʷə > TB *ek*, TA *ak;*

PIE *penkʷtós 'fifth' (see under *p above) > *peṅkʷtḗ > *pʸeṅkʷtḗ > PT *pʸəṅkʷtḗ > TB *piṅkte*, TA *pänt.*

• PIE *b was very rare, and there are no indisputable palatalized examples. The only clear nonpalatalized example that I can find is

PIE *dʰubrós 'deep, concave' (cf. Lith. *dubùs* 'concave', Goth. *diups* 'deep') > *tʰubrḗ > PT *təprḗ 'high' > TB *tapre*, TA *tpär* (Krause 1958:54).

At least two further examples must have arisen by Grassmann's Law (see **19**):

PIE *bʰāǵʰu- 'arm' (see **16**) > *bāgʰu- > *bōkʰu- (see **20**) > PT *pok- in TB obl. *pokai*, TA *poke;*

PIE *bʰrǵʰrós 'lofty, tall' (see **16**) > *bərgʰrós > *bərkʰrḗ (see **20**) > PT *pərkrḗ 'long' > TB *pärkare*, TA *pärkär.*

• *d (< PIE *d), palatalized:

PIE *dékm̥t 'ten' (see **16**) > *dékə > *dʸékə > PT *śákə > TB *śak*, TA *śäk.*

Nonpalatalized examples:

PIE *demx- ~ *dm̥x- 'build' (see **14**) > *dema- ~ *dəm- >→ PT *tˢəma- 'grow' in TB 3pl. pres. *tsmentär*, subj. *tsmäntär*, TA pret. ptc. *tsmo* (Winter 1962b: 26-7; cf. Pedersen 1944:21 fn. 1);

PIE *dewx- ~ *dux- 'fit together' (see **12**, note 1) > *dewa- ~ *dū- >→ PT *tˢuwa- 'fit (intrans.)' in TB pres. 3sg. *tswetär*, TA pres. or subj. 3sg. *tswātär* (Krause 1961a:265-6);

PIE *der- ~ *dr̥- 'split' (Gk. δέρειν 'flay', Skt. 3sg. intens. *dárdarti* '(s)he splits') > *der- ~ *dər- >→ PT *tˢər-a- 'be separated' in TB pres. 1sg. *tsremar*, TA pret. ptc. *tsro.*

At least two further examples must have arisen by Grassmann's Law (see **19**):

PIE *dʰeyǵʰ- 'form (out of clay)' (see **19**) > *deygʰ- > *deykʰ- (see **20**) >→ PT *tˢik-a- in TB gerundive *tsikale* 'should be made'; ablauting pret. ptc. *tˢatˢáykawə > TA *tsätseku* (with remodelled ending), TB fem. pl. *(tsa)tsaikau(wa);*

PIE *dʰegʷʰ- 'burn' (see **19**) > *degʷʰ- > *dekʷʰ- (see **20**) >→ *tˢəkʷ- → PT *tˢək- (see **59** and **A14**) in pres. 3sg. mp. TB *tsakṣträ*, TA *tsäknäṣtär.*

• *g (< PIE *ǵ and *g), palatalized:

PIE *xéǵeti 'is driving' (see **16** and **33**) > *ágesi ~ *áge > *ágʸesʸi ~ *ágʸe > PT *áśəṣə ~ *áśə 'is leading' > TB *āśä-ṃ;* mp. *xéǵetor (Lat. *agitur*) > *ágʸetur (see **36**) > PT *áśətər > TA *āśträ;*

PIE *ǵenu- 'jaw' (see **35**), possibly lengthened-grade *ǵēnu- in PT dual *śen(ü)wʸç-në > TA *śanweṃ.*

At least one further example must have arisen by Grassmann's Law (see **19**):

PIE *gʰebʰal- or *ǵʰebʰal- 'head' (Gk. κεφαλή, OHG *gebal*) > *gebʰal- > *gʸepʰal- > PT *śəpal- > TA *śpāl*, also in TB *śpālmeṃ* 'excellent' (lit. 'from the head').

Nonpalatalized examples are conveniently assembled in **16**.

• *gʷ (< PIE *gʷ), palatalized:

PIE *gʷḗn 'woman' (OIr. *bé*, Jasanoff 1989b) → *gʷenā́ (Gk. γυνή, OCS *žena*) > *gʷená > *gʷʸená > PT *śəná > TB *śana*, TA *śäṃ;*

PIE aor. subj. 3sg. *gʷémeti '(s)he will step' (see **33**) > *gʷémesi ~ *gʷéme > *gʷʸémʸesʸi ~ *gʷʸémʸe > PT *śśəmʸəṣə ~ *śśəmʸə > TA *śmäṣ*, >→ TB *śam-n* (prevocalic, in verse).

Nonpalatalized examples are reasonably common:

PIE zero-grade *gʷm̥- 'step, walk' (e.g. in deverbative noun *gʷémtis ~ *gʷm̥téy- >→ *gʷm̥tis > Skt. *gátis* 'going', Gk. βάσις 'step, base', Goth. *ga-qumþs* 'gathering') > *gʷəm- > PT *kʷəm- > TB /kəm-/, TA *kum- ~ km-*, e.g. in pres. 3sg. PT *kʷəmnəṣṣəṣə ~ *kʷəmnəṣṣə > TA *kumnäṣ*, TB *känmaṣṣä-ṃ;*

PIE *gʷr̥xwón- 'millstone' (see **8**) > *gʷərwḗn- > PT *kʷərwḗn- in TB *kärweñe* 'stone' (Van Windekens 1960:39-40);

PIE *gʷroxmVr- 'heavy load' (see **3**) > *gʷrōmVr- > PT *kʷramər > TB *krāmär* 'burden' (cf. Schindler 1972:149);

PIE *(ǵ)r̥gʷónt- 'dark' (see **6**) > *ərgʷḗnt- > PT *ërkʷḗnt- 'black' in TB obl. sg. masc. *erkeṃt*, TA nom. pl. masc. *arkaś* (Krause and Thomas 1960:57, 66);

PIE *dʰixgʷ- 'stab' (see **9**) > *tʰyagʷ- > PT *tˢakʷ-(a-) > TB /tˢaka-/ 'bite (of snakes)', etc., e.g. in ptc. *tsatsākau* '(with his eyes) put out'.

• *pʰ (< PIE *bʰ), palatalized:

I can find no clear examples. One would expect to find palatalization in the present of 'carry':

PIE mid. *bʰéretor '(s)he is carrying (for him/herself)' (cf. Gk. φέρεται, Lat. *fertur*, etc.) > *pʰéretor > *pʰʸérʸetur > PT *pʸárʸətər > TA *pärtär??*

From the TA forms we cannot tell whether the initial consonant of this root was palatalized in PT. But TB (act.) pres. 3sg. *paräṃ*, etc.—not *"pir-"*—reveal no trace of palatalization (see **B11**). It seems likely that the initial consonant of this stem was depalatalized before the PT period, as is usual in Tocharian simple thematic presents (see **55**).

Conversely, TB *pilta*, TA *pält* 'leaf' < PT *pʸəlta does show palatalization, but the attempt to connect it with OE *blæd* 'leaf', *blēd* 'shoot, flower', which reflect *bʰlVdʰ- (Petersen 1939:78), involves positing impossible ablaut alternations. (Even if the connection could be upheld, Grassmann's Law would have applied (see **19**), giving pre-PT *bl-.)

Nonpalatalized examples are fairly common; note the following:

PIE *bʰágos 'share' (see **16**) > *pʰágë > PT *pákë 'part' > TB *pāke*, TA *pāk* Van Windekens 1941:87);

PIE *bʰlg- 'burn, flare' (see **16**) > *pʰəlg- > PT *pəlk- in TB intrans. 3sg. *älketär*, TA trans. inf. *pälkässi;*

PIE *bʰréxtēr 'brother' (see **3**) > *bʰrā́tēr > *pʰrṓtʸēr > PT *prócer > TB *procer*, TA *pracar;*

PIE *xʷbʰruX- 'eyebrow' (see **5**) >→ *pʰrua- (see **13**) > PT *pərwa- (see **5**) > in dual *pərwa-në > TB *pärwāne*, TA *pärwāṃ;*

PIE *webʰX- ~ *ubʰX- ~ *wobʰX- 'weave' (see **14**) > *wʸəpʰa- ~ *wəpʰa- , *wëpʰa- >→ PT *wəpa- ~ *wapa- in TB inf. *wāpatsi*, pret. ptc. *(wa)wāpau*, TA pres. 3pl. *wpanträ* (?) (Couvreur 1947:9);

PIE *gʰebʰal- or *ǵʰebʰal- 'head' (see under *g above) > *gebʰal- > *gʸepʰal- > PT *śəpal- > TA *śpāl*, also in TB *śpālmeṃ* 'excellent' (lit. 'from the head').

• *tʰ (< PIE *dʰ), palatalized:

(post-)PIE aor. inj. *ḱludʰét '(s)he arrived' (see **5**) > *lutʰé > *lutʰʸé > PT *lcó '(s)he went out' > TB *lac*, TA *läc* (Cowgill apud Winter 1962b:22 with fn. 3);

PIE *dʰeḱ- 'put' (aor. Gk. ἔθηκε, Skt. *ádhāt*, etc.) in post-PIE s-aor. *dʰeḱ-s- > *tʰēs- > *tʰʸēs- > PT pret. *ces- in 3pl. *césrə > TA *casär* (but the initial of TB *tesar* has been depalatalized).

Nonpalatalized examples are fairly common:

PIE *dʰugxtḗr 'daughter' (see **14**) > *tʰugatʸḗr > PT *təkacér > TB *tkācer*, TA *ckācar* (with distant assimilation of coronals in the latter);

PIE *dʰoXnéx 'grain' (see **40**) > *dʰōnā́ > *tʰānā́ > PT *taná- > TB *tāno*, pl. *tānā;*

PIE *dʰubrós 'deep, concave' (see above) > *tʰubrḗ > PT *təprḗ 'high' > TB *tpre*, TA *tpär* (Krause 1958:54);

PIE *dʰux- 'smoke' (see **22**) > *tʰu-V... > PT *t(u)wëyë 'dust' > TB *tweye*, TA *twe* (cf. Lane 1938:33);

PIE *ḱrudʰrós 'red' (see **5**) > *rutʰrḗ > PT *rətrḗ > TB *ratre*, TA *rtär;*

PIE *médʰu neut. 'sweet; honey, mead' (Skt. *mádhu*, OE *meodu* 'mead', etc.) > *métʰu > PT *mʸótə 'honey' > TB *mit*.

• *kʰ (< PIE *ǵʰ and *gʰ), palatalized:

PIE *ǵʰew- 'pour' (see **16**) in post-PIE s-aor. *ǵʰēw-s- > *kʰēws- > *kʰʸēws- > PT *śews- in 3sg. *śéwsa > TA *śosā-ṃ* 'he poured (water) for him' Couvreur 1947:78);

PIE aor. subj. *légʰeti '(s)he will lie down' (cf. pres. *légʰ-ye-ti in OCS *ležetŭ*, OE inf. *licgan;* Hom. Gk. aor. 3sg. λέκτο with derived noun λέχος 'bed') > *lékʰesi ~ *lékʰe > *lʸékʰʸesʸi ~ *lʸékʰʸe > PT pres. *lʸəśəṣə ~ *lʸəśə '(s)he lies' > TB *lyaśä-ṃ*.

Nonpalatalized examples are conveniently assembled in **16**.

• *kʷʰ (< PIE *gʷʰ), palatalized:

PIE *gʷʰermos 'heat' or 'hot' (Gk. θερμός 'hot'; cf. Skt. *gharmás* 'heat', OLat. *formus* 'warm') > *kʷʰermë > *kʷʰʸermë > PT *śərmë apparently in TA *śärme* 'heat (of summer)' (but TA *-e* cannot reflect PT *-ë; loanword from TB, in which the word happens not to be attested?).

Nonpalatalized examples:

PIE zero-grade *gʷʰn̥- ~ *gʷʰn- 'smite' (e.g. in pres. 3sg. *gʷʰnénti > Hitt. *kunanzi*, Skt. *ghnánti*) > *kʷʰ(ə)n- > PT *kʷ(ə)n- in TA *kᵤñäś* 'quarrel, strife' (Van Windekens 1941:48);

PIE *ḱlṇgʷʰ- 'light' (see **5**) > *ləṅkʷʰ- (or *ləṅʷ-?; see **17**) > PT *ləṅ(k)ʷ- > TB *laṅkatse, laṅtse*, obl. *laṅwce*, pl. *läṅkᵤci* (Van Windekens 1941:54).

See **59** and **A14** on the analogical replacement of labiovelars by velars in the Tocharian reflexes of PIE *pekʷ- 'cook' and *dʰegʷʰ- 'burn', a process in which palatalization played an important part.

• There are no clear examples of palatalized *tˢ < *t(ʰ)y (< (post-)PIE *ty, *dʰy; see **34**). It is at least thinkable that the affrication of *t(ʰ)y was actually part of the general palatalization of consonants, though it seems more likely (on general grounds) that it was part of the same process as the assibilation of postvocalic final *-t(ʰ)i to *-si (see **34**). In any case the nonpalatal : palatal alternation *tˢ ~ *ś (which is clearly preserved in TA) could reflect pre-PT *d ~ *dʸ alone (see above); see **57** and **58** for further discussion.

• *ṣ (< PIE *s and < PIE postvocalic *t, *dʰ before final *i (see **34**)), palatalized:

PIE *septḿ 'seven' (see **29**) > *septá > *sʸeptá > PT *ṣəptá > TB *ṣukt*, TA *ṣpät;*

PIE *swéḱs 'six' (see **16**) → *séḱs (see **A14**) > *sʸék > PT *ṣák > TA *ṣäk;* similarly PIE *sweḱstós (see **31**) → *seḱstós > *sʸekəstḗ > PT *ṣəkəstḗ > TB *ṣkaste*, TA *ṣkäṣt;*

PIE *sélpos, *sélpes- 'ointment' (Gk. ἔλπος 'oil, fat' (Hesykhios)) > *sʸélpë, *sʸélʸpʸ- (see **47**) >→ PT *ṣálʸpʸë 'ointment, fat' > TB *ṣalype*, TA *ṣälyp;*

PIE desiderative pres. 3sg. *-se-ti (e.g. in *wéyd-se-ti '(s)he wants to see' > Lat. *vīsit* '(s)he goes to see') > *-sesi ~ *-se > *-sʸesʸi ~ *-sʸe > PT *-ṣəṣə ~ *-ṣə > TA *-(ä)ṣ*, TB *-ṣä-ṃ*, e.g. in TA *äräṣ*, TB *erṣä-ṃ* 'it evokes';

PIE aor. subj. 3sg. *gʷémeti '(s)he will step' (see **33**) > *gʷémesi ~ *gʷéme > *gʷʸémʸesʸi ~ *gʷʸémʸe > PT *śəmʸəṣə ~ *śəmʸə > TA *śmäṣ*, TB *śam-n* (prevocalic, in verse; cf. Jasanoff 1987:110-1);

PIE *ḱidʰí iptv. 2sg. 'go' (see **34**) > *iṭʰí > *isí > *isʸí > *yəṣə́ >→ PT *piyəṣə́ > TA *piṣ*, (?) TB *paṣ* (Jasanoff 1987:108-9; see **B15**).

Nonpalatalized examples are fairly common; note the following:

PIE *bʰágos 'share' (see **16**) > *pʰágë > PT *pákë 'part' > TB *pāke*, TA *pāk* (Van Windekens 1941:87);

PIE *bʰlg- 'burn, flare' (see **16**) > *pʰəlg- > PT *pəlk- in TB intrans. 3sg. *pälketär*, TA trans. inf. *pälkässi;*

PIE *bʰréxtēr 'brother' (see **3**) > *bʰrā́tēr > *pʰrṓtʸēr > PT *prócer > TB *procer*, TA *pracar;*

PIE *xʷbʰruX- 'eyebrow' (see **5**) >→ *pʰrua- (see **13**) > PT *pərwa- (see **65**) > in dual *pərwa-në > TB *pärwāne*, TA *pärwāṃ;*

PIE *webʰX- ~ *ubʰX- ~ *wobʰX- 'weave' (see **14**) > *wʸəpʰa- ~ *wəpʰa- ~ *wëpʰa- >→ PT *wəpa- ~ *wapa- in TB inf. *wāpatsi*, pret. ptc. *(wa)wāpau*, TA pres. 3pl. *wpanträ* (?) (Couvreur 1947:9);

PIE *gʰebʰal- or *ǵʰebʰal- 'head' (see under *g above) > *gebʰal- > *gʸepʰal- > PT *śəpal- > TA *śpāl*, also in TB *śpālmeṃ* 'excellent' (lit. 'from the head').

• *tʰ (< PIE *dʰ), palatalized:

(post-)PIE aor. inj. *ǵludʰét '(s)he arrived' (see **5**) > *lutʰé > *lutʰʸé > PT *lacó '(s)he went out' > TB *lac*, TA *läc* (Cowgill apud Winter 1962b:22 with fn. 3);

PIE *dʰeǵ- 'put' (aor. Gk. ἔθηκε, Skt. *ádhāt*, etc.) in post-PIE s-aor. *dʰeǵ-s- > *tʰēs- > *tʰʸēs- > PT pret. *ces- in 3pl. *césrə > TA *casär* (but the initial of TB *tesar* has been depalatalized).

Nonpalatalized examples are fairly common:

PIE *dʰugxtḗr 'daughter' (see **14**) > *tʰugatʸḗr > PT *təkacér > TB *tkācer*, TA *ckācar* (with distant assimilation of coronals in the latter);

PIE *dʰoXnéx 'grain' (see **40**) > *dʰōnā́ > *tʰāná > PT *taná- > TB *tāno*, pl. *tnāṃ;*

PIE *dʰubrós 'deep, concave' (see above) > *tʰubrḗ > PT *təprḗ 'high' > TB *tapre*, TA *tpär* (Krause 1958:54);

PIE *dʰux- 'smoke' (see **22**) > *tʰu-V... > PT *t(u)wëyë 'dust' > TB *tweye*, TA *twe* (cf. Lane 1938:33);

PIE *ǵrudʰrós 'red' (see **5**) > *rutʰrḗ > PT *rətrḗ > TB *ratre*, TA *rtär;*

PIE *médʰu neut. 'sweet; honey, mead' (Skt. *mádhu*, OE *meodu* 'mead', etc.) > *métʰu > PT *mʸə́tə 'honey' > TB *mit.*

• *kʰ (< PIE *ǵʰ and *gʰ), palatalized:

PIE *ǵʰew- 'pour' (see **16**) in post-PIE s-aor. *ǵʰēw-s- > *kʰēws- > *kʰʸēws- > PT *śews- in 3sg. *śéwsa > TA *śosā-ṃ* 'he poured (water) for him' (Couvreur 1947:78);

PIE aor. subj. *légʰeti '(s)he will lie down' (cf. pres. *légʰ-ye-ti in OCS *leţetŭ*, OE inf. *licgan;* Hom. Gk. aor. 3sg. λέκτο with derived noun λέχος 'bed') > *lékʰesi ~ *lékʰe > *lʸékʰʸesʸi ~ *lʸékʰʸe > PT pres. *lʸəśəṣə ~ *lʸəśə '(s)he lies' > TB *lyaśä-ṃ.*

Nonpalatalized examples are conveniently assembled in **16**.

• *kʷʰ (< PIE *gʷʰ), palatalized:

PIE *gʷʰermos 'heat' or 'hot' (Gk. θερμός 'hot'; cf. Skt. *gharmás* 'heat', OLat. *formus* 'warm') > *kʷʰermë > *kʷʰʸermë > PT *śərmë apparently in TA *śärme* 'heat (of summer)' (but TA *-e* cannot reflect PT *-ë; loanword from TB, in which the word happens not to be attested?).

Nonpalatalized examples:

PIE zero-grade *gʷʰn̥- ~ *gʷʰn- 'smite' (e.g. in pres. 3sg. *gʷʰnénti > Hitt. *kunanzi*, Skt. *ghnánti*) > *kʷʰ(ə)n- > PT *kʷ(ə)n- in TA *kᵤñaś* 'quarrel, strife' (Van Windekens 1941:48);

PIE *ǵl̥ng^wh- 'light' (see **5**) > *ləńkʷʰ- (or *ləṅʷ-?; see **17**) > PT *ləṅ(k)ʷ- > TB *laṅktse, laṅtse*, obl. *laṅwce*, pl. *läṅkᵤci* (Van Windekens 1941:54).

See **59** and **A14** on the analogical replacement of labiovelars by velars in the Tocharian reflexes of PIE *pekʷ- 'cook' and *dʰegʷʰ- 'burn', a process in which palatalization played an important part.

• There are no clear examples of palatalized *tˢ < *t(ʰ)y (< (post-)PIE *ty, *dʰy; see **34**). It is at least thinkable that the affrication of *t(ʰ)y was actually part of the general palatalization of consonants, though it seems more likely (on general grounds) that it was part of the same process as the assibilation of postvocalic final *-t(ʰ)i to *-si (see **34**). In any case the nonpalatal : palatal alternation *tˢ ~ *ś (which is clearly preserved in TA) could reflect pre-PT *d ~ *dʸ alone (see above); see **57** and **58** for further discussion.

• *s (< PIE *s and < PIE postvocalic *t, *dʰ before final *i (see **34**)), palatalized:

PIE *septḿ 'seven' (see **29**) > *septó > *sʸeptó > PT *ṣəptó > TB *ṣukt*, TA *ṣpät;*

PIE *swéḱs 'six' (see **16**) → *séḱs (see **A14**) > *sʸék > PT *ṣák > TA *ṣäk;* similarly PIE *sweḱstós (see **31**) → *seḱstós > *sʸekəstḗ > PT *ṣəkəstḗ > TB *ṣkaste*, TA *ṣkäṣt;*

PIE *sélpos, *sélpes- 'ointment' (Gk. ἔλπος 'oil, fat' (Hesykhios)) > *sʸélpë, *sʸélpʸ- (see **47**) >→ PT *ṣálpʸë 'ointment, fat' > TB *ṣalype*, TA *ṣälyp;*

PIE desiderative pres. 3sg. *-se-ti (e.g. in *wéyd-se-ti '(s)he wants to see' > Lat. *vīsit* '(s)he goes to see') > *-sesi ~ *-se > *-sʸesʸi ~ *-sʸe > PT *-ṣəṣə ~ *-ṣə > TA *-(ä)ṣ*, TB *-ṣä-ṃ*, e.g. in TA *aräṣ*, TB *erṣä-ṃ* 'it evokes';

PIE aor. subj. 3sg. *gʷʸémeti '(s)he will step' (see **33**) > *gʷémesi ~ *gʷéme > *gʷʸémʸesʸi ~ *gʷʸémʸe > PT *ṣə́mʸəṣə ~ *ṣə́mʸə > TA *śmäṣ*, TB *śam-n* (prevocalic, in verse; cf. Jasanoff 1987:110-1);

PIE *ǵidʰí iptv. 2sg. 'go' (see **34**) > *itʰí > *isí > *isʸí > *yəṣə́ >→ PT *piyəṣə́ > TA *piṣ*, (?) TB *paṣ* (Jasanoff 1987:108-9; see **B15**).

Nonpalatalized examples are very common; cf. the following:

PIE *séx nom. sg. fem. 'that' (see **41**) > *sắ > PT *sá > TB *sā* nom. sg. fem. 'this';

PIE *sal- 'salt' (Gk. ἅλς, Lat. *sal*) > PT *sal- in TB *salyiye*, TA *sāle;*

PIE *sux- 'pour' (see **12**) > PT *su- 'rain' > TA *su-* in pres. ptc. *sūmāṃ;* >→ TB /suwa-/ in pres. ptc. *swāmane;*

PIE *swadrós 'sweet' (see **3**) > PT *swaŕé > TB *swāre*, TA *swār* (Winter 1962b:29);

PIE *wisó- 'poison' (see **28**) > *usé́ > PT *wəsé́ > TB *wase*, TA *wäs* (Pisani 1942:252);

PIE *mewsX- ~ *musX- 'take away' (see **14**) >→ PT *musa- 'lift', e.g. in pret. ptc. *musówə > TB *musau*, TA *muso* (Van Windekens 1976: 307);

PIE *mosgos 'knot' (see **16**) > *mësgë > TB *mëskë 'bond' > TB *meske*, TA *masäk* (Van Windekens 1949:301-2);

PIE *ṓmsos 'shoulder' (see **3**) > *ắnsë > PT *ánsë > TB *āntse*, TA *es.*

• *m (< PIE *m), palatalized:

PIE *méd^{h}u neut. 'sweet; honey, mead' (see above) > *mét^{h}u > *m^{y}ét^{h}u > PT *m^{y}ə́tə 'honey' > TB *mit* (cf. Martinet 1974:130);

PIE *me$\acute{x}$nes- 'moon' (see **3**) > *mēnes- > *m^{y}ēn^{y}es- >→ PT *m^{y}eñə-, nom. sg. *m^{y}eñe > TB *meñe*, TA *mañ* (see **A5** on the palatalization);

PIE *mems- 'meat' (?; see **30**, note 3) > PT *m^{y}ənsa (collective, formally pl.) > TB *mīsa.*

I find no examples of palatalized *m reflecting PIE *m̥ (see **29** and under *g^{w} above).

Nonpalatalized examples of *m are common:

PIE *mosgos 'knot' (see **16**) > *mësgë > TB *mëskë 'bond' > TB *meske*, TA *masäk* (Van Windekens 1949:301-2);

PIE acc. *mustím 'fist' (see **22**) > *mus^{y}t^{y}í > PT *məśćə́ > TB obl. *maś(c)-*, cf. nom. sg. **maśce* (*māṣce* 142a3, *maśśe* 152b1; Pisani 1965:316);

PIE zero-grade *mn̥- 'stay' (see **31**) + *-sḱé/ó- > *mənské/ó- >→ PT *məsk-a- 'be (in a place)', pres. 3sg. *məskétər > TB *mäsketär*, TA *mäskatär;*

PIE *xégom$\acute{x}$nos pres. ptc. mp. 'being driven' (see **16**) > *ágëmanë > PT *akëmanë 'being led' > TB *akemane*, TA *ākmāṃ;*

PIE *ǵómb^{h}os 'row of teeth' (see **3**) > PT *kḗmë 'tooth' > TB *keme*, TA *kam;*

PIE *$\acute{x}$nḗx^{w}mn̥ 'name' (see **3**) > *nḗmən > *n^{y}ḗmə > PT *ñémə > TB *ñem*, TA *ñom;*

PIE *g^{wh}ermos 'heat' or 'hot' (see above) > *k^{wh}ermë > *k^{wh}y$^{}$ermë > PT *śərmë apparently in TA *śärme* 'heat (of summer)' (loan from TB?).

• *n (< PIE *n), palatalized:

PIE *néwos 'new' (Skt. *návas;* Gk. νέος 'young') > *néwë > *n^{y}éwë > *ñə́wë > PT *ñúwë > TB *ñuwe*, TA *ñu* (Van Windekens 1941:77);

PIE *$\acute{x}$néwn̥ 'nine' (see **5**) > *néwən > *n^{y}éwə > *ñə́wə > PT *ñúwə > TB, TA *ñu;*

PIE *$\acute{x}$nḗx^{w}mn̥ 'name' (see **3**) > *nḗmən > *n^{y}ḗmə > PT *ñémə > TB *ñem*, TA *ñom;*

post-PIE aor. *nēḱs- 'destroy' (see **31**) > *n^{y}ēḱs- > PT *ñeks- in pret. 3sg. *ñéksa > TA *ñakäs;* >→ TB *neksa* (initial consonant analogically depalatalized, Ringe 1990:185-9);

PIE *me$\acute{x}$nes- 'moon' (see **3**) > *mēnes- > *m^{y}ēn^{y}es- >→ PT *m^{y}eñə-, nom. sg. *m^{y}eñe > TB *meñe*, TA *mañ.*

I find no examples of palatalized *n reflecting PIE *n̥ (see **29**), with the possible exception of an example palatalized by following *y (see **48**).

Nonpalatalized examples of *n are very common:

PIE *nud- 'push' (see **31**) + pres. *-sḱé/ó- >→ *nətsk- > PT *nətk-a-, e.g. in pret. ptc. *nətkówə > TB *nätkau* 'prompted' (Jasanoff 1975:111, Melchert 1977: 123-4);

PIE *xenḱ- 'breathe' (see **14**) > *ana- → PT *ana-sk- > TB /anask-/ 'breathe in', e.g. in pres. 3sg. *anāṣṣäṃ* (Couvreur 1949:33-4);

PIE *ǵnex^{w}- 'recognize, know' (see **3**) > *gnō- > PT *kna- > TA *knā-*, e.g. in pres. ptc. *knānmāṃ* 'knowing'; PT *aknáts$^{}$a 'ignorant' > TB *aknātsa*, TA *āknats;*

PIE *weǵ^{h}-nó- 'cart-road' vel sim. (see **16**) > *w^{y}ek^{h}nḗ > PT *w^{y}əknḗ 'way' > TB *yakne*, TA *wkäṃ;*

PIE 1ary mp. 3pl. *-ntor (see **36**) > PT *-ntər > TB, TA *-ntär;*

PIE *pắntix fem. 'all' (see **9**) > *pántya > *pṓnt^{s}a > PT *pónt^{s}a in TA obl. *ponts-āṃ;*

PIE *ḱn̥tóm 'hundred' (see **16** and **29**) > PT *kəntḗ > TB *kante*, TA *känt;*

PIE *wíḱn̥tiḱ 'twenty' (see **11** and **29**) > *wíkəmti > *w^{y}íkən > PT *w^{y}íkən > TB *yíkən > *ikäṃ*, TA *wiki.*

Even if the dorsal nasals were phonemic at this stage, there are no clearly old examples of such nasals palatalized (except in clusters; see **47**).

• *l (< PIE *l), palatalized:

PIE *léymon- ~ *limn-´ (loc. *limén) 'lake' (Gk. λειμών 'meadow', λιμήν 'harbor', λίμνη 'pool, (marshy) lake') → *límn̥ > *límə > *l^{y}ímə > PT*l^{y}ə́mə > TB *lyam*, TA *lyäm* (Duchesne-Guillemin 1940:144);

PIE aor. subj. *lég^{h}eti '(s)he will lie down' (see under *k^{h} above) > *lék^{h}esi ~ *lék^{h}e > *l^{y}ék^{h}y$^{}$esy$^{}$i ~ *l^{y}ék^{h}y$^{}$e > PT pres. *l^{y}ə́śəṣə ~ *l^{y}ə́śə '(s)he lies' > TB *lyaśä-ṃ;*

PIE aor. subj. *léwk-e- 'shine' (see under *k above) > *l^{y}ewk^{y}e- > PT trans. subj. *l^{y}uśə- in TB inf. *lyuśśi.*

I find no examples of palatalized *l reflecting PIE *l̥ (see **29**).

Nonpalatalized examples of *l are fairly common:

(post-)PIE *ǵludʰét '(s)he arrived' (see **5**) > PT *ləcə́ '(s)he went out' > TB *lac*, TA *läc* (Cowgill apud Winter 1962b:22 with fn. 3);

PIE *ladrós 'beloved' (see **9**) > PT *larə́ > TB *lāre* (Winter 1965a:191);

PIE *xpélos '(a) wound' (see **5**) > PT *pʸə́lə > TB *pīle*, TA *päl* (Van Windekens 1949:301, 1966:256);

PIE *gʰebʰal- or *ǵʰebʰal- 'head' (see under *g above) > *gebʰal- > *gʸepʰal- > PT *ʂəpal- > TA *ʂpāl*, also in TB *ʂpālmeṃ* 'excellent' (lit. 'from the head');

PIE *bʰl̥g- 'burn, flare' (see **16**) > *pʰəlg- > PT *pəlk- in TB intrans. 3sg. *pälketär*, TA trans. inf. *pälkässi*.

Positive evidence for the palatalization of *r (< PIE *r) is meager at best, since PT *ʸr (if it existed) was depalatalized in the development of TA and TB, usually without leaving any trace of its palatalization (see **A19** and **B13**). The case of 'four' is typical:

PIE *kʷetwóres masc. 'four' (see **32**) > *kʷʸetwə́rʸə > PT *ʂətwə́rʸə > TB *śtwer*, TA *ʂtwar*.

We have assumed that *r did undergo palatalization because all other consonants (except *y, which was already palatal, and perhaps *tˢ) clearly did so, and because it seems unlikeliest that palatalization AS A SOUND CHANGE affected all consonants in the language. See **47** and **65** for an example in which the palatalization of *r might have left a PT reflex in the development of a following vowel. Nonpalatalized examples of *r are very common:

PIE *ǵrudʰrós 'red' (see **5**) > *rutʰrə́ > PT *rətrə́ > TB *ratre*, TA *rtär*;

PIE *wiXrós 'young (man), warrior' (see **11**) > *wʸīrə́ > PT *wʸirə́ > TA *wir* 'young';

PIE *dóru, *drew- 'tree, wood' (see **43**) > *də́ru, *rew- → *ə́ru (Schindler, n. c. 1985) > *ǫ́ru > PT *ǫ́rə 'wood' > TB, TA *or* (etymology first in Schneider 1940:203);

PIE *bʰréxtēr 'brother' (see **3**) > *pʰrə́tʸə̄r > PT *prócer > TB *procer*, TA *procar*;

PIE *pr̥Xwós 'first' (see **8**) > *pr̥wós > PT *pərwə́ > TB *parwe, y-parwe* 'at first', *pärwe-ṣṣe* 'first', TA *pärwa-t* 'eldest';

PIE *snéǵʷr̥ or *snə́wr̥ 'sinew' (see **32**) > *sʸnʸə́wər > *ṣñéwər > PT *ṣñǫ́r (Þórhallsdóttir 1988:199) > TB *ṣñor*.

*w (< PIE *w; see also **26**), palatalized:

PIE *weǵʰ-nó- 'cart-road' or the like (see **16**) > *wekʰnə́ > *wʸekʰnə́ > PT *wʸəknə́ 'way' > TB *yakne*, TA *wkäṃ*;

post-PIE *xwēntós 'wind' (see **5**) > *wʸēntə́ > PT *wʸentə́ > TB *yente*, TA *want*;

PIE *wíḱmtiḱ 'twenty' (see **11**) > *wíkəmti > *wʸíkən > PT *wʸíkən > TB *yíkən > *ikäṃ*, TA *wiki*;

PIE *gʷíxʷweti 'is alive' (see **10**) > *gʷʸyáwʸesʸi ~ *gʷʸyáwʸe (or else >→ *gʷʸyǫ́wʸesʸi ~ *gʷʸyǫ́wʸe) > PT *ʂáwʸəṣə ~ *ʂáwʸə > TA *śoṣ*, TB *śai-ṃ*.

Nonpalatalized examples are fairly common:

PIE *wástu 'settlement' (see **3**) > PT *wóstə 'house' > TB *ost*, TA *waṣt*;

PIE *wókʷm̥ acc. 'voice' (see **39**) > PT *wə́kʷə > TB *wek*, TA *wak* (nom. and obl.);

PIE *wr̥sə́n 'male' (see **29**) in *gʷow(ə)-wərsən 'bull' > PT *kʷëw(u)-wərṣe (or *-wərʸṣe?; see **47**) > TB *kaurṣe, kau$_u$rṣa-*, TA *kayurṣ* (cf. Schneider 1940: 195-6);

PIE *moywos 'little' vel sim. (see **35**) > PT *mëywë > TB *maiwe* 'young' (Lane 1938:24);

PIE *néwos 'new' (see under *n above) > *néwë > *nʸéwë > *ñə́wë > PT *ñúwë > TB *ñuwe*, TA *ñu* (Van Windekens 1941:77);

PIE *snéǵʷr̥ or *snə́wr̥ 'sinew' (see **32**) > *sʸnʸə́wər > *ṣñéwər > PT *ṣñǫ́r (Þórhallsdóttir 1988:199) > TB *ṣñor*;

PIE *ḱwónm̥ acc. 'dog' (see **16**) > *kwónən > PT obl. *kwə́nə > TB *kweṃ*, TA *koṃ*;

PIE *kʷetwóres masc. 'four' (see **32**) > *kʷʸetwə́rʸe > PT *ʂətwə́rʸə > TB *śtwer*, TA *ʂtwar*.

47. Palatalization of consonant clusters by front vowels.

In clusters of a stop followed by a nasal or liquid, the sonorant was palatalized by a following front vowel, but the preceding stop remained unaffected. Note the following examples:

PIE *ǵnexʷ- 'recognize, know' (see **3**) in post-PIE s-aor. *ǵnēxʷ-s- (cf. Hitt. *ganeszi* '(s)he recognizes') > *gnēs- > *gnʸēs- > PT *kñes- in TA pret. 2sg. *kñasäṣt* 'you have become acquainted' (see Mayrhofer 1986b:141-2 and Jasanoff 1988b:228-32, both with references; the morphological and semantic analysis of this form is elucidated in Hackstein 1993a:153-6);

PIE *ḱléwos 'fame' (see **16**) > *kléwë > *klʸéwë > *klʸǫ́wë > *-kəlʸwë (see **65**; destressed as second part of a compound) in PT *ñémə-kəlʸwë 'fame' (*ñémə 'name') > TB *ñemkälywe*, TA *ñomklyu*;

PIE *klep- 'steal' (see **16**) > *klʸep- > *klʸəp- > PT *kəlʸp- (see **65**) in TB inf. *kälypītsi* (Van Windekens 1960:39);

PIE zero-grade *ḱli- 'lean' (see **35**) in nominal deriv. *ḱli-m... > *klim- > *klʸim- > *klʸəm- > PT *kəlʸm- (see **65**) in *kəlʸmeye 'direction' > TB *kälymiye*, TA *kälyme* (Schneider 1940:204);

I find no examples of palatalized *l reflecting PIE *l̥ (see **29**).

Nonpalatalized examples of *l are fairly common:

(post-)PIE *ǵludʰét '(s)he arrived' (see **5**) > PT *ləcə́ '(s)he went out' > TB *lac*, TA *läc* (Cowgill apud Winter 1962b:22 with fn. 3);

PIE *ladrós 'beloved' (see **9**) > PT *larə́ > TB *lāre* (Winter 1965a:191);

PIE *xpélos '(a) wound' (see **5**) > PT *pʸə́lë > TB *pīle*, TA *päl* (Van Windekens 1949:301, 1966:256);

PIE *gʰebʰal- or *ǵʰebʰal- 'head' (see under *g above) > *gebʰal- > *gʸepʰal- > PT *ʂəpal- > TA *śpāl*, also in TB *śpālmeṃ* 'excellent' (lit. 'from the head');

PIE *bʰl̥g- 'burn, flare' (see **16**) > *pʰəlg- > PT *pəlk- in TB intrans. 3sg. *pälketär*, TA trans. inf. *pälkässi*.

Positive evidence for the palatalization of *r (< PIE *r) is meager at best, since PT *rʸ (if it existed) was depalatalized in the development of TA and TB, usually without leaving any trace of its palatalization (see **A19** and **B13**). The case of 'four' is typical:

PIE *kʷetwóres masc. 'four' (see **32**) > *kʷʸetwə́rʸe > PT *ʂətwə́rʸə > TB *śtwer*, TA *śtwar*.

I have assumed that *r did undergo palatalization because all other consonants (except *y, which was already palatal, and perhaps *tˢ) clearly did so, and because it seems likeliest that palatalization AS A SOUND CHANGE affected all consonants in the language. See **47** and **65** for an example in which the palatalization of *r might have left a PT reflex in the development of a following vowel. Nonpalatalized examples of *r are very common:

PIE *ǵrudʰrós 'red' (see **5**) > *rutʰrə́ > PT *rətrə́ > TB *ratre*, TA *rtär*;

PIE *wiXrós 'young (man), warrior' (see **11**) > *wʸirə́ > PT *wʸirə́ > TA *wir* 'young';

PIE *dóru, *dréw- 'tree, wood' (see **43**) > *də́ru, *réw- → *ə́ru (Schindler, p. c. 1985) > *ǫ́ru > PT *ǫ́rə 'wood' > TB, TA *or* (etymology first in Schneider 1940:203);

PIE *bʰréxtēr 'brother' (see **3**) > *pʰrə́tʸə̄r > PT *prócer > TB *procer*, TA *procar*;

PIE *pr̥Xwós 'first' (see **8**) > *pr̥wós > PT *pərwə́ > TB *parwe, y-parwe* 'at first', *pärwe-ṣṣe* 'first', TA *pärwa-t* 'eldest';

PIE *snéǵʷr̥ or *snə́wr̥ 'sinew' (see **32**) > *sʸnʸə́wər > *ṣñéwər > PT *ṣñǫ́r (Þórhallsdóttir 1988:199) > TB *ṣñor*.

*w (< PIE *w; see also **26**), palatalized:

PIE *weǵʰ-nó- 'cart-road' or the like (see **16**) > *wekʰnə́ > *wʸekʰnə́ > PT *wʸəknə́ 'way' > TB *yakne*, TA *wkäṃ*;

post-PIE *xwēntós 'wind' (see **5**) > *wʸēntə́ > PT *wʸentə́ > TB *yente*, TA *want*;

PIE *wíḱm̥tiḱ 'twenty' (see **11**) > *wíḱəmti > *wʸíḱən > PT *wʸíkən > TB *yíkən > *ikäṃ*, TA *wiki*;

PIE *gʷíxʷweti 'is alive' (see **10**) > *gʷʸyáwʸesʸi ~ *gʷʸyáwʸe (or else >→ *gʷʸyə́wʸesʸi ~ *gʷʸyə́wʸe) > PT *ʂáwʸəṣə ~ *ʂáwʸə > TA *śoṣ*, TB *śai-ṃ*.

Nonpalatalized examples are fairly common:

PIE *wə́stu 'settlement' (see **3**) > PT *wóstə 'house' > TB *ost*, TA *waṣt*;

PIE *wókʷm̥ acc. 'voice' (see **39**) > PT *wə́kʷə > TB *wek*, TA *wak* (nom. and obl.);

PIE *wr̥sə́n 'male' (see **29**) in *gʷow(ə)-wərsēn 'bull' > PT *kʷə́w(u)-wərṣe (or *-wərʸṣe?; see **47**) > TB *kaurṣe, kauᵤrṣa-*, TA *kayurṣ* (cf. Schneider 1940: 195-6);

PIE *moywos 'little' vel sim. (see **35**) > PT *məywə́ > TB *maiwe* 'young' (Lane 1938:24);

PIE *néwos 'new' (see under *n above) > *néwə́ > *nʸéwə́ > *ñə́wə́ > PT *ñúwə́ > TB *ñuwe*, TA *ñu* (Van Windekens 1941:77);

PIE *snéǵʷr̥ or *snə́wr̥ 'sinew' (see **32**) > *sʸnʸə́wər > *ṣñéwər > PT *ṣñǫ́r (Þórhallsdóttir 1988:199) > TB *ṣñor;*

PIE *ḱwónm̥ acc. 'dog' (see **16**) > *kwónən > PT obl. *kwə́nə > TB *kweṃ*, TA *koṃ;*

PIE *kʷetwóres masc. 'four' (see **32**) > *kʷʸetwə́rʸe > PT *ʂətwə́rʸə > TB *śtwer*, TA *śtwar*.

47. Palatalization of consonant clusters by front vowels.

In clusters of a stop followed by a nasal or liquid, the sonorant was palatalized by a following front vowel, but the preceding stop remained unaffected. Note the following examples:

PIE *ǵnexʷ- 'recognize, know' (see **3**) in post-PIE s-aor. *ǵnēxʷ-s- (cf. Hitt. *ganeszi* '(s)he recognizes') > *gnēs- > *gnʸēs- > PT *kñes- in TA pret. 2sg. *kñasäṣt* 'you have become acquainted' (see Mayrhofer 1986b:141-2 and Jasanoff 1988b:228-32, both with references; the morphological and semantic analysis of this form is elucidated in Hackstein 1993a:153-6);

PIE *ḱléwos 'fame' (see **16**) > *kléwə́ > *klʸéwə́ > *klʸə́wə́ > *-kəlʸwə́ (see **65**; destressed as second part of a compound) in PT *ñémə-kəlʸwə́ 'fame' (*ñémə 'name') > TB *ñemkälywe*, TA *ñomklyu;*

PIE *klep- 'steal' (see **16**) > *klʸep- > *klʸəp- > PT *kəlʸp- (see **65**) in TB inf. *kälypītsi* (Van Windekens 1960:39);

PIE zero-grade *ḱli- 'lean' (see **35**) in nominal deriv. *ḱli-m... > *klim- > *klʸim- > *klʸəm- > PT *kəlʸm- (see **65**) in *kəlʸmeye 'direction' > TB *kälymiye*, TA *kälyme* (Schneider 1940:204);

PIE *k^{w}ék^{w}lōs nom. pl. 'wheels' (see **35**) → *k^{w}ék^{w}loy > *k^{w}ék^{w}lḗ > *k^{wy}ék^{w}lyḗ > *k^{wy}ók^{w}lyę → PT *k^{w}ók^{w}lyę 'chariots' (see **55**) > TB *kokalyi.*

An unusual example, in which palatalization of *r might have affected the development of a following *ə already in PT, is the following:

PIE *tritós 'third' (Gk. τρίτος; see the discussion of Szemerényi 1960:67-114, esp. the tables pp. 92-4) > *tritḗ > *tr^{y}itḗ > *tr^{y}ətḗ (see **50**) > PT *tr^{y}itḗ (?) > TB *trite,* TA *trit* (cf. Martinet 1974:130).

However, that is not the only possible explanation for the *i of the PT form; see **65** for further discussion.

Usually palatalization of *r was subsequently lost without a trace (cf. **46**), as in the following examples:

PIE *g^{h}rḗwr̥ 'horn' (see **16**) > *k^{h}rḗwər > *k^{h}r^{y}éwər > *kr^{y}éwər > PT *kr^{y}ór 'crescent' in TB obl. *krorīyai,* TA *kror* (Hilmarsson 1985);

PIE *preḱ- 'ask' (see **29**) in post-PIE s-aor. *prēḱ-s- > *prēks- > *pr^{y}ēks- > PT act. *pr^{y}eks-, e.g. in 3sg. *pr^{y}éksa > TB *preksa,* TA *prakäs;*

PIE dat. sg. *pxtréy 'to (the) father' (see **32**) > *patréy > *patr^{y}éy > *patr^{y}óy > PT *patr^{y}í gen. sg. 'father's' > TB *pātri* (TA *pācri* has *c* by analogy with nom. sg. *pācar*);

PIE *tríx neut. 'three' (see **9**) > *tria > *tr^{y}iya > PT *tər^{y}ya (see **65**) > TB *tarya,* TA *tri;*

PIE *k^{w}rix- 'buy' (see **9**) > *k^{w}ria- > in *k^{w}riawər 'trade' > *k^{w}r^{y}iyawər *k^{w}r^{y}iyor (see **64**) > PT *k^{w}ər^{y}yor (see **65**) > TB *karyor,* TA *kuryar.*

It appears that in clusters of *s plus resonant both consonants were palatalized. There is at least one certain example of *sn:

PIE *snéx^{w}r̥ or *snḗw^{r}̥ 'sinew' (see **32**) > *snḗwər > *s^{y}n^{y}éwər > *ṣñéwər > PT *ṣñór (Þórhallsdóttir 1988:199) > TB *ṣñor.*

The only apparent example of palatalized *sm is beset with etymological difficulties, but at least the outcome of this sound change seems clear:

PIE *smirós (?) 'greasy' (exact cognates lacking; cf. Goth. *gasmeitan* 'to grease, to rub (something wet onto a surface)' and related words with *d-extension; Gk. σμῆν 'wipe' is still more distantly related) > *s^{y}m^{y}irḗ > PT *ṣm^{y}ərḗ > TB *ṣmare* 'greasy, slippery, smooth'? Or does the TB word somehow reflect PIE *smeru- 'grease, fat' (OE *smeoru,* OIr. *smiur*), as proposed by Duchesne-Guillemin 1940:167? In either case, the fact that the PT sequence *m^{y}ə appears as TB *ma* in this word—and not as *mi* (see **B11**)—is a serious problem.

I can find no examples of (old) *sl or *sr. In *sw both consonants were clearly palatalized; on the fate of the resulting *w^{y} see **A14**, **A20**, and **B14**. The following three examples seem certain:

PIE *swésorm̥ acc. 'sister' (see **39**) > *swésərə > *s^{y}w^{y}ésərə > PT nom./acc. *ṣw^{y}ósərə > TA *ṣar,* TB *ṣəsérə > *ṣer;*

PIE *swépnos 'sleep' (Skt. *svápnas,* OE *swefn*) > *swépnë > *s^{y}w^{y}épnë >PT *ṣw^{y}ópnë > TB *ṣəpóne > *ṣpane,* TA *ṣpäṃ* (in addition to the sections cited immediately above, see **B5** and **B6**);

PIE *swérmn̥ 'speech, pronouncement' (cf. Lat. *sermō* 'speech', influenced by *serere* 'string together', and Goth. *swaran* 'swear') > *swérmn̥ > *s^{y}w^{y}érmn̥ > PT *ṣw^{y}órmə 'cause' > TB *ṣarm* (pl. *ṣärmana*), TA *ṣurm* (Pedersen 1941:62 fn. 1; possibly the semantic development involved an intermediate stage 'justification, reason').

It seems clear that 'six' and its derivatives did not begin with *sw when palatalization occurred, because the TA reflex does not exhibit a rounded vowel (see **A14** and note 1 below):

PIE *swéḱs 'six' (see **16**) → *séḱs > *sék > *s^{y}ék > PT *ṣók > TA *ṣäk* (and not *"ṣuk"*); so also PIE *sweḱstós (see **31**) → *seḱstós > *sekəstḗ > *s^{y}ekəstḗ > PT *ṣəkəstḗ > TB *ṣkaste* (whence by analogy *ṣkas* 'six'), TA *ṣkäṣt.*

Whether the Tocharian forms of the reflexive pronoun reflect PIE initial *sw is not clear:

PIE *swé 'self' (Gk. ἑ 'himself, herself' (often with preceding hiatus in Homer and later poetry), Pamphylian ϝhε) > *s^{y}w^{y}é > PT *ṣw^{y}ə-ñə '(one's) own' > TB *ṣañ,* TA *ṣñ-i?* But PIE enclitic *se (cf. acc. Lat. *sē,* Goth. *sik*) > PT *ṣə- would also account for the attested forms.

The evidence for other *Cw clusters is much poorer. A possible example of secondary initial *nw exhibits palatalization of both consonants:

PIE *nu 'now' (particle with attenuated meaning; cf. Hitt. *nu,* Gk. νυ) → *nu-V... (where *V was a short front vowel) > *nw-V... (?; see **26**) > *n^{y}w^{y}-V... in PT *ñw^{y}əkë > TB *ñake?* This is the only explanation I have been able to devise for the *ñ- of the TB form, but I wish to emphasize that it rests on pure speculation.

Other possible examples of palatalized *Cw are even more uncertain:

TA *cu* obl. sg. 'you' < PT *cw^{y}ó (see **A8** and **A16**) < *t^{y}w^{y}é < PIE acc. sg. *twé (Gk. σέ)? But it seems more likely that *cu* owes its *u* to analogy with nom. sg. *tu* (TB *twe*) < PT *t(u)wḗ < *tuX-óm ← PIE *túX (see **4**; so Krause and Thomas 1960:162), in which case this oblique pronoun might originally have been pre-TA *ce < PT *cę (cf. the following example).

TB *ci* obl. sg. 'you' < PIE *tw...? But other hypotheses are just as attractive; for example, TB *ci* might reflect PT *cę < *t^{y}ḗ < PIE gen./dat. sg. (enclitic) *toy (Skt. *te,* Hom. Gk. τοι; see **35**). The fact that some PT gen. sg. endings reflect PIE dat. sg. endings does not tell against the derivation of an oblique pronoun from a dative, since pronouns might have developed differently for syntactic or pragmatic reasons (cf. Lane 1976:134). On TA enclitic *-ci* see note 2 below.

TB enclitic *-c* obl. sg. 'you' < PT *cw^{y}ə < PIE acc. sg. *twé? But PT *cə < PIE enclitic *te (cf. Lat. *tē,* Goth. *þik*) is at least as likely a source (cf. the case of *swé and *se above).

TB *śerwe* = TA *śaru* 'hunter' < PT *śeruwë < *ǵʰwēr-u-, derivative of PIE *ǵʰwḗr 'wild animal' (Gk. θήρ, Lith. *žvėrìs;* Belardi 1954:110)?? But the derivation from PIE *kʷēruos given in **4** (etc.) seems far more likely.

It is not completely clear whether both components of *RC clusters were palatalized in the first instance; at a much later period (after syncope of *ə in both daughter languages), laterals and nasals showed a strong tendency to assimilate in place of articulation to following coronals, palatalized or not (see **A26** and **B25**), while *r was eventually depalatalized (see **A19** and **B13**), and those changes have eliminated most of the potential evidence. However, note the following example in which an original *l was followed by a labial:

TB *ṣalype* = TA *ṣälyp* 'ointment, fat' apparently < PT *ṣəlʸpʸë < *sʸelʸpʸV- (see **46**).

In order to understand the palatalization of the cluster *lp we must determine the original stem-class of this word. Of the nominal cognates, Gk. ἔλπος 'oil, fat' (Hesykhios) reflects a neuter s-stem *sélpos; Albanian *gjalpë* 'butter' seems to reflect an o-stem neuter *selpom (which in turn could have replaced an earlier s-stem). TB pl. *ṣälypenta* exhibits the (analogical) plural ending which is usual for old s-stem neuters; the (likewise analogical) ending of TA obl. pl. *ṣälypas* is characteristic of old masculine o-stems, but considerable analogical interchange between the two classes has occurred (cf. Krause and Thomas 1960:124, §167 Anm. 2; 130, §180.2(e)). It appears that a neuter s-stem *sélpos can best account for all these data. In that case the *lp cluster was presumably palatalized in the oblique stem *sélpes- and spread thence to the nom./acc. *sélpos whose *-os is directly ancestral to the PT ending *-ë. (A suffix *-is-, as apparently in Skt. *sarpís* 'ghee', seems less likely.) I therefore posit the following development:

PIE *sélpos, *sélpes- 'ointment' > *sélpë, *sélpes- > *sʸélpë, *sʸélʸpʸes- >→ PT *ṣólʸpʸë > TB *ṣalype*, TA *ṣälyp*.

Of course it is possible that the product of palatalization was in the first instance *-lpʸ- (in which only the *p exhibited palatalization), and that *l later acquired palatalization by assimilation to the *pʸ; but in the absence of any intervening sound change that interacted with palatalization we cannot demonstrate that.

It seems reasonable to suggest that both components of at least some other *RC clusters were palatalized by the original sound change (though we cannot prove that subsequent assimilation played no part in their development). The following examples strike me as plausible:

PIE *pántes nom. pl. masc. 'all' (see **32**) > *pónte > *pónʸtʸe > PT *póñcə > TB *poñc*, TA *poñś;*

PIE *pénkʷe 'five' (see **45** under *p) > *pʸéńʸkʷʸe > PT *pʸóñśə > TB *piś* (see **B11** and **B12**), >→ TA *päñ* (cf. Martinet 1974:130);

PIE *xn̥ḱ-iḱ- aor. opt. 'would bring' (?; see **6**, note 1) > *ənkī- > *ëńʸkʸī- > PT *ëñśi- in TB 3sg. *eñcīträ* 'would grasp' (surviving *ñś > TB *ñc* just as *ns > *nts*, see **B24**).

On the other hand, I would prefer not to venture an opinion about whether the *r of the following example was ever palatalized:

PIE *wr̥sḗn 'male' (see **29**) in *gʷow(ə)-wərsēn 'bull' > *gʷow(ə)-wərsʸēn (*-rʸsʸ- ?) > PT *kʷëw(u)-wərṣe (*-rʸṣ- ?) > TB *kaurṣe, kau$_u$rṣa-*, TA *kayurṣ* (cf. Schneider 1940:195-6).

It appears that clusters of *s plus stop were wholly palatalized; again the instances in which the stop is a labial are most persuasive, since after syncope of *ə in both daughter languages sibilants tended to assimilate in place of articulation to following palatalized coronals, and instances of *ś* immediately preceding *c*, for example, could in principle be explained as a result of those later changes. Examples are fairly numerous; the following are typical:

PIE *spey-n- 'wooden pin' (Lat. *spīna* 'thorn'; cf. OHG *spenala* '(hair)pin' < *spi-n-) > *sʸpʸeyn- > *ṣpʸəyn- > PT *ṣpʸin- > TA *ṣpiṃ* 'nail, peg';

PIE *spey-k-, likewise 'wooden pin' (Arm. *p'k'in* 'arrow, javelin' < *spik-, OE *spāca*, OHG *speihha* 'spoke' < *spoyk-) > *sʸpʸeyk- > *ṣpʸəyk- > PT *ṣpʸik- > TB *ṣpīkiye* 'crutch' (Van Windekens 1941:125);

PIE *xster- 'star' (see **5**) > *ster- > *sʸtʸer- > PT *ścər- in pl. *ścərʸeñə > TB *ściriñ*, TA *śreñ;*

PIE *ster- 'hard' (Gk. στερεός) > *sʸtʸer- > PT *ścər-ḗ > TB *ścire;*

PIE aor. inj. 3sg. *stémbʰXt '(s)he propped' (see **14**) > *sʸtʸéma > PT pret. 3sg. *ścə́ma '(s)he stood' > TB *śama, ścmā-c*, TA *śäm, śmā-ṃ* (etymology in Van Windekens 1976:463-4);

PIE acc. *mustím 'fist' (see **22**) > *musʸtʸí > PT *məścə́ > TB obl. *maś(c)-*, cf. nom. sg. **maśce* (*mäṣce* 142a3, *maśśe* 152b1; Pisani 1965:316);

PIE *psténos 'breast' (see **31**) > *pəsʸtʸénë > (pre-)PT *pəścə́në; PT dual *pəścə́në-në (?) > *pəścə́në > TB *päścane*, TA *päśśäṃ* (Duchesne-Guillemin 1940: 169);

PIE pres. 3sg. *-sḱé-ti (Hitt. *-ske-zzi*, Skt. *-ccha-ti*, Lat. *-sc-it*) > *-skesi ~ *-ske > *-sʸkʸesʸi ~ *-sʸkʸe > PT pres. class IX, X, XI 3sg. *-ṣṣəṣə ~ *-ṣṣə > TA *-ṣəṣ > *-ṣ*, TB *-ṣṣä-ṃ*, e.g. in PT *ayṣṣəṣə ~ *ayṣṣə '(s)he gives' > TA *āyṣəṣ > *eṣ*, TB *aiṣṣä-ṃ*.

Notes.

1. 'Six' almost certainly replaced *sw- with *s- under the influence of *septm̥ 'seven' (cf. Lat. *sex*, Goth. *saíhs*, etc.). The explanation of TB *ṣkas* adopted here is much more plausible than that of Ringe 1987b:263, which should be rejected.

2. The vowel of TA *-ci* is presumably of the same origin as that of 1sg. *-ñi;* I suspect that they are secondary accretions, and that the *-ə of TB *-ñ, -c* was inherited from PT. G. Schmidt 1978:77-8 and Jasanoff 1989a:126 suggest that the TA forms

in *-i*, like the TB independent pronouns in *-i*, reflect PIE enclitic gen./dat. *moy, *toy (cf. already Krause and Thomas 1960:162); I do not think that is possible, since PIE *-oy does not seem to have become TA *-i* (see **35**).

3. In the discussion of TB *ṣalype*, TA *ṣälyp* I have omitted the Germanic forms (OE *sealf*, OHG *salba*, etc., all 'salve'), since they clearly reflect *solpéx, and also various other derivatives of *selp- which seemed to cast no light on the problem of what might have followed the *p in pre-Tocharian.

4. In light of the palatalization of *-lp- in PT *ṣólʸpʸë, I now see that palatalization of *-nm- to PT *-ñmʸ- in preforms of 'name' is possible; my remark in Ringe 1990:224 (at the bottom of the page) is incorrect. However, I am still convinced that PT *ñémə 'name' reflects PIE *ǵnéxʷmn̥ (see 3) because its vowel behaves exactly like PT *e < PIE *ē (see especially **A5**).

48. Palatalization of consonants by *y.

Palatalization by *y gave results similar to those of palatalization by front vowels, except that an intervocalic *Cy cluster apparently developed into a geminate palatalized consonant (Hilmarsson 1986:316-24, Adams 1988:35, 44 fn. 4). Except for the first example cited below, all the noninitial examples that I have been able to find involve *Cy clusters that arose within the prehistory of Tocharian. The following examples seem certain:

PIE *ályos '(an)other' (Gk. ἄλλος, Lat. *alius*) > *ályë > PT *álʸlʸë-kə > TB *alyek ~ allek*, TA *ālak* (cf. obl. *ālakäṃ ~ ālyakäṃ;* see **A11** and **B31**);

PIE verbal adj. suffix *-lo- (e.g. in Lat. *figulus* 'potter') plus adj. suffix *-yo- → (nom. sg.) *-lyo-s > *-lyë > PT gerundive suffix *-lʸlʸë > TB *-lye ~ -lle*, TA *-l* (see **A11** and **B31**);

PIE fem. suffix *-ix (see **9**) > *-ya in pre-PT *arkwənya fem. 'white' > PT *arkwəñña > TB *arkwañña*, TA *ārkiṃ* (see **A10** and **A11**);

PIE nominal *-n- plus pres. suffix *-yé/ó- → PT denominative pres. suffix *-ññə- ~ *-ññë-, e.g. in TB ptc. *täṅwaññeñca* 'loving' (the TA examples show the effects of the change *-ñn- > *-yn-, e.g. in inf. *tuṅkiñtsi* 'to love', ptc. obl. *(t)[u]ṅkiñ-ñantäṃ;* see **A10** and cf. Krause and Thomas 1960:216-7, Winter 1977:149-50).

A further possible example is

PIE *ǵn̥xyétor '(s)he is being born' (see **8**) > *gənyétur > PT subj. *kəññətər 'it will happen' > TB *k(a)ntär*.

However, we cannot exclude the possibility that TB *k(a)ntär* reflects PT *kəñətər ←< PIE subj. *ǵénxetor (Hackstein 1993b:178-80).

In word-initial position one finds single palatalized consonants rather than geminates; this reflects either subsequent simplification or (perhaps more probably) an already existing phonotactic constraint against initial double consonants. I find two certain examples and a probable third:

PIE *gʷixʷw- 'live' (see **10**) > *gʷyaw- (or else → *gʷyōw- > *gʷyāw-) > *gʷyaw- (or *gʷyāw-) > PT *śaw- > TB /śaw-/, TA *śo-*, e.g. in pres. 3sg. PT *śáwʸəṣə ~ *śáwʸə > TA *śoṣ*, >→ TB *śai-ṃ;*

PIE *gyew(X)- ~ *gyu(X)- 'chew' (see **12**, note 1) > *gʸew(a)- ~ *gʸū- >→ PT *śu- and *śuwa- 'eat' > TB /śu(wa)-/, TA *śwā-*, e.g. in inf. PT *śuwatˢi > TB, TA *śwātsi* but TB subj. 1sg. *śū* 'I will eat' (Pinault 1994:136-8, 165-82), pret. ptc. *śeśu* 'having eaten';

PIE opt. 3sg. *ḱs-iéḱ-t 'let him/her be' (see **26**) > *siḗt > *syḗt (?) > *syḗ > *ṣé + *-i (see **11** and **32**) → PT ipf. *ṣéy (*ṣéi, two syllables?) > TB *ṣey*, TA *ṣe-ṣ* (cf. Pedersen 1941:206-8).

What makes this third example less than fully probative is the development of the corresponding form of 'go': the PIE form should have been disyllabic *ḱi-yéḱ-t, but the form reconstructable for PT is not disyllabic "*yiyéy" ("*yiyéi?") but *yéy (*yéi?; > TB *yey*, TA *ye-ṣ*); that suggests that we need to reckon with analogical changes, and not only with sound changes, in the prehistory of PT *ṣéy.

Note that the regular palatalization product of *t(ʰ)y is PT *tˢ. It is conceivable that this particular change was part of the general palatalization of consonants, but in that case it is not clear why the outcome was not PT *cc. It seems more likely that the affrication of *t(ʰ)y was historically connected with the assibilation of word-final postvocalic *-ti, which certainly preceded the general palatalization of consonants (see **34**). If the assibilation of *t(ʰ)y to *tˢ did precede the general palatalization, we might expect that *tˢ would undergo a further palatalization by following front vowels, but unfortunately there are no clear examples (see **46**).

Notes.

1. The adjective suffixes TB *-ññe*, TA *-ñi* and TB *-ṣṣe*, TA *-ṣi* apparently reflect PT *-ñiyë, *-ṣiyë < pre-PT *-n-io- and *-s-io- respectively (not *-n-yo- and *-s-yo-, pace Hilmarsson 1986:324-6); otherwise it is difficult to account for the syllabic *-i* of the TA forms. On the development of these suffixes in TB and the origin of the distinction between TB adjectives in *-CʸCʸe* and those in *-CʸiyeC* see **B23** and **B26**.

Chapter 8. Restructuring of the vowel system.

The vowel system of Tocharian was completely restructured. Much of the restructuring was effected by a complex of changes that reduced several short vowels to *ə and eliminated distinctive vowel length; that process is discussed in **50**. The other sections of this chapter discuss changes affecting individual vowels, the relation of those changes to the elimination of vowel length, and the effect of all these changes on the ablaut system of Tocharian (**53**).

49. Ö-umlaut.

In **23** I argue that the stem vowel of present classes III and IV reflects the contraction of post-PIE *-əyé- or *-əyó-. Whether or not that is the case, it is clear that the stem vowel of these present classes remained distinct from other Tocharian vowels for some time, undergoing at least one conditioned sound change that did not affect other vowels (see below). Though the phonetic nature of this vowel is not completely recoverable, certain inferences can be drawn from its behavior and its probable origin.

If we accept the hypothesis that the vowel in question was the result of contraction, we can suggest that it was a long vowel, since vowel length was distinctive in Tocharian until the general restructuring of the system, and vowels resulting from contraction are usually long in systems with distinctive length. Since the ultimate Tocharian reflexes of the contracted vowel are always mid vowels, it is reasonable to suggest that the contracted vowel had become a mid vowel by the time the vowel system was restructured. Since it triggered the rounding of an *a in a preceding syllable (see immediately below), it must have been a round vowel when that sound change occurred. When not affected by ö-umlaut it seems to have fallen together with the reflex of PIE *ē in PT *e (see **51**), and so should have been a front vowel immediately prior to that merger. However, it did not trigger palatalization (cf. the examples below), which suggests that it was not fronted until after palatalization had run its course. Thus it seems reasonable to suggest that before the vowel system was restructured the stem vowel of present classes III and IV was a long round central mid vowel; I represent it with the symbol *ō̆.

The sequence *a . . . ō̆ in successive syllables eventually became *o . . . o. The loss of length in the second vowel was presumably part of the general elimination of distinctive vowel length (see **50**); the change in vowel quality involved is the sound change commonly referred to as "double rounding" (Ringe 1987a:104), "mu-

tual rounding" (Adams 1988:21), and the like. I will call the qualitative change "ö-umlaut" in this study.

It is not clear whether ö-umlaut occurred before or after the elimination of vowel length. If it occurred before vowel length was eliminated, ö-umlaut can be represented as *a . . . ō̆ > *o . . . ō; if it occurred after vowel length was no longer distinctive the change should be written as *a . . . ö > *o . . . o. (Of course this need not have been a single change; one of the vowels might have shifted before the other did.) It is also not clear whether *ō̆ (or *ö) had been fronted before ö-umlaut occurred (see **51**). But it is clear that *ō̆ had not yet fallen together with *ē (> PT *e; see **50**), since *ē (or its reflex) does not participate in this umlaut (see below); it is also clear that *ō̆ had not merged with *ë (< PIE *o, see **39**), since *ë likewise did not participate in the umlaut (see Ringe 1987a:114-6 and below) and did not merge with the reflex of *ē until TB and TA had begun to diverge (cf. especially **A5** and **A6**).

The best known examples of ö-umlaut are the class IV presents, which differ from class III presents only in that class IV roots contained medial *a whereas class III roots did not. Note the following:

PIE *wexg- ~ *uxg- 'break' (Gk. pres. inf. ἀγνύναι, Hitt. pres. 3sg. *wāki* '(s)he bites'; on the laryngeal see Kimball 1988:245), >→ *wāg- ~ *wag- (with analogical *a, cf. **12** and **53**) in stative *wag-əyé/ó- (see **23**) > *wagō̆- > *wogō- > *wogo- (or else *wagō̆- > *wagö- > *wogo-) > PT pres. *woko- intrans. 'split, fall apart' in TB 3pl. *wokonträ-ṃ* 'they disintegrate' (etymology first in Pedersen 1941: 197);

PIE *xeḱs- or *xexʷs- 'dry' (cf. *xéḱsos or *xéxʷsos 'ashes' > Skt. *ā́sas*, Hitt. *hassas* 'hearth', collective in Lat. *āra* 'altar'; Melchert 1984a:42, 1986:2, 1994 §4.1.6.1.1) > *ās- (Lat. *ārēre* 'to be dry'), whence analogical zero-grade *as- (cf. Goth. *azgo* 'ashes') in stative *as-əyé/ó- > *asō̆- > *osō- > *oso- (or *asō̆- > *asö- > *oso-) > PT pres. *oso- intrans. 'dry out' in TB 3pl. *osontä*, TA 3sg. *asaträ* (etymology first in Pisani 1942:242; cf. also Van Windekens 1941:8).

If such class IV presents were the only good examples of ö-umlaut, we might prefer to believe that they are actually formed to full-grade roots, which would show PT *o by other sound changes (e.g. PIE *wexg- > *wāg- > *wōg- > PT *wok-, PIE *xeXs- > *ās- (?) > *ōs- > PT *os-, see **42**); such a development has been suggested by Jörundur Hilmarsson (1986:204 fn. 13; see also note 1 below). But the remaining example with an etymologically clear root shows that the first of the pair of vowels affected by ö-umlaut can only have been *a:

PIE *xenḱ- 'breathe' (see **14**) > *anə- in pre-PT *anō̆lmë > *onōlmë (or *anō̆lmë > *anölmë) > PT *onolmë '(living) creature' > TB *onolme* (Jasanoff 1978: 32; on the suffix cf. already Duchesne-Guillemin 1940:160).

The first vowel of this pre-PT word can scarcely have been *ā. PIE vṛddhi seems impossible to justify morphologically; even if we do posit it, it should have been

*xēnḱ-, which would have given pre-PT *ēnə-, not *ānə-; and there is equally no reason to posit a secondary lengthened grade with *ā. The only hypothesis that can account for this form as well as the class IV presents posits *a . . . ō̆ (or *a . . . ö, after the loss of vowel length) as the input to ö-umlaut.

Since the origin of pre-PT *ō̆ is still a matter of some uncertainty, and since even the existence of such a vowel has not been demonstrated to everyone's satisfaction, it seems worthwhile to repeat here the arguments that some such vowel must in fact be reconstructed for pre-PT.

It is easy to show that the second vowel of the PT *o . . . o sequences under discussion cannot reflect PIE *o, since pre-PT *a, no matter what its etymological source, fails to be rounded when followed in the next syllable by PIE *o (pace Adams 1978a:448, 1978b:280, Jasanoff 1978:29, 32-6):

PIE *bʰágos 'share' (see **16**) > PT *pákë 'part' > TB *pāke*, TA *pāk* (Van Windekens 1941:87);

PIE *swadrós (see **3**) > PT *swarë́ > TB *swāre*, TA *swār* (Winter 1962b:29);

PIE *xéḱos 'sharp point' (see **16**) > PT *ákë 'end' > TB *āke*, TA *āk* (Van Windekens 1966:256);

PIE *xéǵonti 'they are driving' (see **3**) > *ágën ~ *ágëntʸi > PT *ákën ~ *ákëñcə > TB *ākeṃ*, >→ TA *ākeñc;*

PIE mediopassive ptc. ending *-mḱnos (see **14**) > PT *-manë > TB *-mane*, TA *-māṃ* (Klingenschmitt 1975:161-3);

PIE pres. 3pl. *pxsḱóntor 'they are protecting (their own herds)' (see **14** and **16**) > PT *paskéntər 'they keep' > TB *paskenträ.*

The vowel in question also cannot reflect PIE *ē, not only because it fails to palatalize preceding consonants (even in nominals derived with the PT suffix *-elmë, as Van Windekens 1982:58 observes), but also because *a was not rounded when *ē followed in the next syllable:

PIE *pxtḗr 'father' (see **3**) > *patʸér > PT *pacér > TB *pācer*, TA *pācar;*

PIE *dʰugxtḗr 'daughter' (see **14**) > *tʰugatʸér > PT *təkacér > TB *tkācer*, TA *ckācar.*

Since in both these cases *a is the reflex of a laryngeal, while the vowel of the following syllable is PIE *ē (not the reflex of PIE *eḱ), one might consider claiming that "ö-umlaut" affected only full-grade *a (< PIE *a and *xe, but not *X), and/or that *ē, but not *eḱ, was involved in this sound change. But in that case one would have to claim that the rounding predated the loss of laryngeals in pre-PT, and the clear PHONOLOGICAL repartition of stems between the PT present classes III and IV argues that the sound change that caused it was relatively recent, whereas laryngeals appear to have been eliminated relatively early in the history of Tocharian.

For further arguments against alternative analyses of these data see the notes to this section.

The phonemic status of the vowels that resulted from ö-umlaut depends on when ö-umlaut occurred relative to the elimination of distinctive vowel length (a relative chronology which is not determinable, see above). If ö-umlaut occurred before vowel length was eliminated, the new long *ō in the second syllable of these sequences apparently merged with *ō < PIE *ā and/or *oXō (see **4** and **42**), since the eventual reflexes of these vowels in the attested languages are the same; in fact, in phonemic terms the change of *ȫ by ö-umlaut IS its merger with one or both of those *ō. But the new short *o in the first syllable of the umlaut sequences apparently did not become PHONETICALLY identical with the *ọ that arose by u-umlaut (see **43**), nor with any other vowel at that stage of the system's development. Because its conditioning environment (the long vowel of the following syllable) had merged with another phoneme, this new short *o can no longer have been an allophone of *a, but short *o and *ọ might have been allophones of a single phoneme, the former occurring only when the next syllable contained *ō, the latter when it contained *u or *ū. Alternatively, if *ọ was still an allophone of *ë (see **43** and **50**), then the new short *o was an independent phoneme of extremely restricted distribution; and since there was no other short o-phoneme in the language, the creation of a highly restricted short *o, in effect "patching over the gap" in the system, is not particularly surprising.

On the other hand, if ö-umlaut occurred after vowel length had been eliminated, both new *o's evidently fell together with *o < *ō < PIE *ā and *oXō; *ọ < *ë before u-vowels was already a separate phoneme, since short *u (which was part of its conditioning environment) had merged with short *e and *i in *ə as part of the elimination of vowel length (see **50**).

Notes.

1. The hypothesis of Hilmarsson 1986:204, fn. 13, can be stated more fully as follows: (a) the suffix of class IV presents is PT *o, reflecting PIE *ā; (b) the roots of most of the verbs in question contain PT *e (in my terms *ë), the usual reflex of PIE *o; (c) the *o . . . o* sequence of TB reflects o-umlaut of PT *e (i.e. *ë; see **67**); and (d) TB *oso-*, TA *asa-* < PT *oso- 'dry out' has PIE *ā in its root (cf. Lat. *ārēre* 'to be dry'). This hypothesis fails to account for the complementary distribution of present classes III and IV (the latter including only roots that contain PT medial /a/, the former only other roots; see note 3 below for further discussion). It is true that if TB *w(o)p(o)trä* 'is woven' is correctly restored in Berlin 3b5 we have at least one class IV present whose root-internal vowel appears to reflect PT *ë < PIE *o, since the PIE root was *web^{h}X- (see **14**) and neither its e-grade nor its zero grade could underlie such a form. But given the clear cases involving pre-PT *a cited above, it seems better to posit an analogical extension of class IV inflection to explain the case of 'weave': pre-PT pret. *wëpá- would have given *wapá- by a-umlaut (see **66**); subj. *wapa- could have been formed to the preterite by analogy, and pres. *wopo- could likewise have been formed to the subjunctive. Such an analogical process will also account for cases like TB *sporttotär*, TA *sparcwaträ* 'turns', which behave as though their PT ablaut was originally *ə ~ *ë (cf. TB caus. pret. ptc. *peṣpirttu* and noun *spertte* 'relation') but have not been provided with convincing etymologies. Of course it is not inconceivable that *ë . . . ȫ (or *ë . . . ö) underwent ö-umlaut as well, but there is no clear evidence that it did.

2. To roots exhibiting medial /ay/ or /aw/ TB makes class IV presents with root-internal *ai* or *au;* thus beside the usual type *osonträ*, etc., with two *o*'s (see above) we find the following:

aiwoträ 'he is devoted (to)' (root /aywa-/);
mā klaiksotar 'do not be troubled' (/klayksa-/);
laitonträ 'they fall out' (/layta-/);
klautkonträ 'they return' (/klawtka-/);
pautoträ 'he flatters' (/pawta-/).

Superficially it appears that ö-umlaut has failed to affect these diphthongs. However, TB *au* certainly can reflect PT tautosyllabic *ow, and it appears that TB *ai* reflects PT tautosyllabic nonfinal *oy; thus we need recognize no exceptions to ö-umlaut. For further discussion see **viii** and **B29**.

3. The distribution of verb roots between class III (suffix *-e-*) and class IV (suffix *-o-*) in TB is clear: verbs with medial /ə/ (including /əy/ and /əw/, i.e. *i* and *u*) belong to the former and verbs with medial /a/ (including /ay/ and /aw/) to the latter; verb roots of other shapes do not make presents of these classes. (See Krause 1952: 66-9 and Krause and Thomas 1960:200-2 for the data.) The TA situation is less straightforward. The two PT classes must at first have fallen together in TA, since PT stem vowels *e and *o both became TA *a* in most environments (see **A6**). The stem vowel *a* then underwent "weakening" to *ä* (which was later syncopated in open syllables) when the preceding and following syllables both contained "full" vowels (i.e. not *ä, i,* or *u,* the vowels that reflect PT *ə, */əy/, and */əw/ respectively; see **A13**). As one would expect, most of the TB class III presents have TA cognates that exhibit the suffix *-a-* throughout the paradigm, because the roots of those verbs do not have internal full vowels; conversely, most of the TB class IV presents have TA cognates that weaken the stem vowel before a full-voweled ending because of the full vowel in the preceding (root) syllable. But there are a few class III/IV presents for which the two languages show quite different shapes:

TB *tsmentär* 'they are growing' but TA *śamanäṟ;*

TB *tsälpetär* '(s)he is released' but TA *śalpatär,* with ptc. *(śa)lpmāṃ* exemplifying weakening;

TB *laitonträ* 'they fall out' but TA *litanträ* (and note that each language also has an etymologically and semantically related verb—cf. TB gerundive I *lyitälle* 'to be dropped', TA pres. *letse(ñc?)* 'they let fall'—with a different inflection and ablaut pattern).

Clearly there has been some remodelling, and we are entitled to doubt whether either language preserves the PT state of affairs in these three presents. The palatalization of the initial consonant in the first two TA examples is particularly intriguing, as it suggests that the following *a* represents PT *e < (post-)PIE *ē (introduced analogically at some stage in the verbs' history). On the evidence of these forms one might suggest that in PT one class or the other contained some presents with root-internal *e; and since the nominal *onolme* shows clearly that ö-umlaut involved *a (and perhaps *ë—see note 1—but surely not so different a vowel as *e < *ē), it would seem that such verbs belonged in class III in PT. On the other hand, the TA situation could be the result of later analogical changes; note that the palatalization of TB 3pl. *klyowonträ* they name' beside 3sg. *klowoträ* (!) can only be the result of analogy (so Van Windekens 1976:218 s.v. 2. A *klāw-*, etc.).

50. Loss of vowel length.

After the changes discussed in chapters 6 and 7 had occurred, pre-PT had at least the following vowels:

i	ə	u	ī	ū
		[ǫ]	ę̄	
e	ë		ē	ō
	a		ā	

(The positions of *ə and *ë in this chart are a matter of guesswork.)

There was also a second (probably lower) short *o (if ö-umlaut had already occurred, see **49**) and/or a long vowel *ō̆ (if it had not already merged with *ē, see **51**); it is NOT possible that NEITHER existed, since *ō̆ could not have merged with *ē until after ö-umlaut had occurred. If there was a short *o, it was probably an allophone of the same phoneme as the (probably higher) *ǫ; if there was no short *o, or if *o and *ǫ were not allophones of the same phoneme, *ǫ was certainly an allophone of *ë. If *ō̆ still existed, it might have patterned as the long vowel corresponding to short *ë, though it is far from clear that the phonetic quality of the two vowels was identical (to judge from their development in PT: *ō̆ cannot be shown to have merged with *ë, see **51**). The maximal vowel system at this stage was thus the following:

i	ə	u	ī		ū
		[ǫ]	ę̄		
e	ë	o	ē	ō̆	ō
	a			ā	

(Both *o and *ō̆ could have existed simultaneously only if the *a of the inherited sequence *a . . . ō̆ was rounded before the triggering vowel changed; see **49**.)

This vowel system underwent a sweeping series of changes, as follows:

a) after palatalization had run its course, the short vowels *i, *e, and *u all merged with *ə in most environments;

b) but when initial, *i and *e acquired a palatal onglide (*yə-), while *u acquired a labial onglide (*wə-);

c) *u also labialized preceding velars (*Ku > *K^{w}ə) as well as following velars when a further consonant followed (*uKC > *əK^{w}C);

d) but prevocalic *i and *u did not become *ə.

Otherwise vowel length was lost, so that

e) *ā merged with *a and *ō with *o (if the latter existed);

f) *ī, *ę̄, *ē, *ū, *ō̆ (if the last of these still existed) became *i, *ę, *e, *u, *ö respectively.

Of course these individual changes need not have occurred together; for example, labialization of velars next to *u (and perhaps also the appearance of initial onglides) could have occurred first, accompanied or followed by reduction of *i, *e, and *u to hypershort vowels, followed by merger of the latter with *ə and the shortening of long vowels (in either order, or simultaneously). But there is no actual evidence that these events occurred sequentially; moreover, the reduction of some short vowels to *ə and the shortening of all long vowels are easily regarded as two aspects of a single wholesale restructuring of the vowel system, replacing a system based on a contrast of length with one based on a contrast between "full" vowels and the reduced vowel *ə. I shall therefore treat this large and central part of the restructuring of the Tocharian vowel system as a single complex change, while recognizing that the actual events might have occupied a considerable span of time.

The following forms exemplify the changes that resulted in the elimination of vowel length and the contrast of full vowels with *ə.

• *i (< PIE *i) > *ə, *yə-:

PIE *léymon- ~ *limn-´ 'lake' (see **46**) → *límn̥ > *l^{y}ímə > PT *l^{y}ə́mə > TB *lyam*, TA *lyäm* (Duchesne-Guillemin 1940:144);

PIE zero-grade *ḱli- 'lean' (see **35**) in nominal deriv. *ḱli-m... > *klim- > *kl^{y}im- > *kl^{y}əm- > PT *kəl^{y}m- (see **65**) in *kəl^{y}mẹye 'direction' > TB *kälymiye*, TA *kälyme* (Schneider 1940:204);

PIE acc. *mustím 'fist' (see **22**) > *mus^{y}t^{y}í > *məs^{y}t^{y}ə́ > PT obl. *məścə́ > TB *maś(c)-* (Pisani 1965:316);

PIE aor. subj. 3sg. *g^{w}émeti '(s)he will step' (see **33**) > *g^{w}émeti ~ *g^{w}émet > *g^{w}émesi ~ *g^{w}éme (see **34** and **32** respectively) > PT *śə́m^{y}əṣə ~ *śə́m^{y}ə > TA *śmäṣ*, >→ TB *śam-n* (prevocalic, in verse);

PIE *tritós 'third' (see **47**) > *tr^{y}ité́ > *tr^{y}ətə́ > PT *tr^{y}ité́ (?; see **65**) > TB *trite*, TA *trit*.

Note the initial onglide in the following:

PIE *ǵidʰí iptv. 2sg. 'go' (see **20**) > *isʸí > *yəsʸɔ́ > *yəṣɔ́ → *pə-yəṣɔ́ > PT *piyəṣɔ́ > TA *piṣ*, (?) TB *paṣ* (Jasanoff 1987:108-9; see **B15**).

Contrast the survival of prevocalic *i in the following:

PIE *udriós 'watery' (see **4**) > *urʸiḗ > PT *wərʸiyḗ > TA **wri*, obl. *wriṃ*, TB *wríye → *wrīyeṣṣe* (Winter 1962b:30, 1965a:202 fn. 20);

PIE *tríx neut. 'three' (see **9**) > *tria > *trʸiya > PT *tərʸya > TB *tarya*, TA *tri*;

PIE *ladrós 'beloved' + fem. *-ix (see **9**) → *ladria > *larʸia > PT *larʸiya > TB *lariya* (cf. Winter 1965a:191).

• *e (< PIE *e) > *ə, *yə-:

PIE *déḱmt 'ten' (see **16**) > *dʸékə > *dʸɔ́kə > PT *śɔ́kə > TB *śak*, TA *śäk*;

(post-)PIE *ǵludʰét aor. inj. '(s)he arrived' (see **5**) > *lutʰʸé > *lətʰʸɔ́ > PT *ləcɔ́ '(s)he went out' > TB *lac*, TA *läc* (Cowgill apud Winter 1962b:22 with fn. 3);

PIE *médʰu 'honey, mead' (see **46**) > *mʸétʰu > PT *mʸɔ́tə 'honey' > TB *mit*;

PIE *ǵnéwn̥ 'nine' (see **5**) > *nʸéwə > *ñɔ́wə > PT *ñúwə > TB, TA *ñu*;

PIE *swépnos 'sleep' (see **47**) > *sʸwʸépnë > PT *ṣwʸɔ́pnë > TB *ṣpane*, TA *ṣpäṃ*.

Note the initial onglide in the following:

PIE *éḱwos 'horse' (see **16**) > *ékwë > PT *yɔ́kwë > TB *yakwe*, TA *yuk*.

Examples can be multipled ad libitum, since *e was the commonest PIE vowel; many further instances will be found in **46** and **47**.

• *u (< PIE *u and *wi, and < PIE *i in *K^{w}i (see **28**)) > *ə, *wə-:

PIE *dʰugxtḗr 'daughter' (see **14**) > *tʰugatʸḗr > PT *təkacér > TB *tkācer*, TA *ckācar*;

PIE *dʰubrós 'deep' (see **46**) > *tʰubrḗ > *tʰəbrḗ > PT *təprḗ 'high, tall' > TB *tapre*, TA *tpär* (Krause 1958:54);

PIE *ǵrudʰrós 'red' (see **5**) > *rutʰrḗ > *rətʰrḗ > PT *rətrḗ > TB *ratre*, TA *rär*;

PIE acc. *mustím 'fist' (see **22**) > *musʸtʸí > *məsʸtʸɔ́ > PT obl. *məścɔ́ > TB *maś(c)-* (Pisani 1965:316);

PIE *nud- 'push' (see **31**) + pres. *-sḱé/ó- >→ *nətsk- > PT *nətk-a-, e.g. in ptc. *nətkówə > TB *nätkau* 'prompted' (Jasanoff 1975:111, Melchert 1977:123-4);

(post-)PIE *ǵludʰét aor. inj. '(s)he arrived' (see **5**) > *lutʰʸé > *lətʰʸɔ́ > PT *ləcɔ́ '(s)he went out' > TB *lac*, TA *läc* (Cowgill apud Winter 1962b:22 with fn. 3);

PIE *médʰu 'honey, mead' (see **46**) > *mʸétʰu > PT *mʸɔ́tə 'honey' > TB *mit*;

PIE *dóru 'tree, wood' (see **43**) >→ *ḗru > *ǫ́ru > PT *ǫ́rə 'wood' > TB, TA *or* (u-stem, cf. TB pl. *ārwa*; etymology first in Schneider 1940: 203);

PIE *wā́stu 'settlement' (see **3**) > *wɔ́stu > PT *wɔ́stə > TB *ost*, TA *waṣt* (u-stem, cf. pl. TB *ostuwa*, TA *waṣtu*);

PIE pres. *swid-yé- 'be sweating' (see **27**) > *suyé- > *səyɔ́- >→ PT *siyá- > TB /s(i)ya-/ 'sweat', e.g. in derived noun *syālñe* 'sweating'.

Note the initial onglide in the following:

PIE *udriós 'watery' (see **4**) > *urʸiḗ > PT *wərʸiyḗ > TA **wri*, obl. *wriṃ*, TB *wríye → *wrīyeṣṣe* (Winter 1962b:30, 1965a:202 fn. 20);

PIE *udstVro- 'entrails' vel sim. (see **31**) >→ *ustrʸië- > *wəstrʸiyë > PT *wəstərʸyë > TB *wästarye* 'liver' (?) (Van Windekens 1976:565; cf. Hilmarsson 1993b:216-7);

PIE *wisó- 'poison' (see **28**) > *usḗ > PT *wəsḗ > TB *wase*, TA *wäs* (Pisani 1942:252);

PIE *dwitós 'second' (see **27**) > *witós > *utḗ > PT *wətḗ > TB *wate*, TA *wät* (Cowgill, p.c. 1980).

Note the labialization of adjacent velars in the following:

PIE zero-grade *luk- 'shining' (cf. Skt. *rucás* 'bright', *ruc-* noun 'light') > *ləkʷ- in PT *ləkʷtsë 'shining' > TB *laktse*, also in TB derivative *läktsauña* 'light, lamp', perl. *läk$_u$tsauwñaiysa* 214a2 (Krause and Thomas 1960:50);

PIE *lugrós 'mournful, sad' (← *'broken') (Gk. λυγρός; cf. Skt. *rugnás* 'shattered') >→ *luglḗ > PT *ləkʷlḗ 'pain, suffering' > TB *lakle* (see note 1);

PIE *kʷi- 'who, what' (see **28**) > *ku- >→ PT nom. *kʷə-sḗ, obl. *kʷə-cḗ > TB *k$_u$se, k$_u$ce*, TA *kus, kuc*.

One example shows both an initial onglide and labialization of a velar:

PIE *uksḗn 'bull' (see **4**) → *uksɔ́ > PT *wəkʷsɔ́ > TB *wokʷso (see **B20**) > *okso* 'ox'.

Contrast the survival of prevocalic *u in the following:

PIE *ḱēruos 'stag-hunter' (see **22**) > *kʸēruë > *kʸeruwë > PT *śeruwë 'hunter' > TB *śerwe*, TA *śaru* (Jasanoff apud Nussbaum 1986:8).

• All the new *ə's merged with those *ə's that arose independently of the restructuring of the vowel system (see **29** and **31**):

PIE *wókʷn̥ acc. 'voice' (see **39**) > PT *wḗkʷə > TB *wek*, TA *wak*;

PIE *ḱn̥tóm 'hundred' (see **16**) > PT *kəntḗ > TB *kante*, TA *känt*;

PIE *bʰl̥gʰrós 'lofty, tall' (see **29**) > *bərkʰrḗ > PT *pərkrḗ > TB *pärkare*, TA *pärkär*;

PIE *bʰl̥g-éǵ- pres. 'burn, flare' (see **16** and **23**) >→ *pʰəlgō- (see **49**) > PT *pəlké-, 3sg. *pəlkétər > TB *pälketär-ne* 'his . . . burns';

PIE *sweḱstós 'sixth' (see **16**) >→ *sekstós > *sʸekəstḗ > PT *ṣəkəstḗ > TB *ṣkaste*, TA *ṣkäṣt*;

PIE *psténos 'breast' (see **31**) > *pəsʸtʸénë > *pəśćənë; dual *pəśćənë-në (?) > PT *pəśćənë > TB *päścane*, TA *päśśäṃ* (Duschesne-Guillemin 1940:169).

Many other examples can be found in **29**.

• *ā (< *ē̆ < *ō, see **40**) > *a:

PIE *ṓmsos 'shoulder' (see **3**) > *ắnsë > PT *ánsë > TB *āntse*, TA *āys > *es;*

PIE *péxwōr coll. 'fire' (see **7**) → *pxuór > *pəwár (*puár?) > PT *puwár > TB *puwar*, TA *por;*

PIE *tríx (d)kṓmt 'three tens' (see **9**) > *trʸiyakā > PT *tərʸyaka 'thirty' > TB *täryāka* (Schindler 1967b:240);

PIE *ǵnexʷ- 'recognize' (see **3**) > *gnō- > *gnā- > PT *kna- 'know' > TA *knā-*, e.g. in pres. ptc. *knānmāṃ* 'knowing'; PT *aknátˢa 'ignorant' > TB *aknātsa*, TA *āknats;*

PIE *gʷrox-mVr- 'heavy load' (see **3**) > *gʷrōmVr- > *gʷrāmVr- > PT *kʷramər > TB *krāmär* 'burden' (cf. Schindler 1972:149);

PIE *dʰoXnéx 'grain' (see **40**) > *tʰōná > *tʰāná- > PT *taná- > TB *tāno*, pl. *tanāñ*.

• The new *a merged with already existing *a of various sources:

PIE *ályos '(an)other' (see **48**) > *ályë > PT *álʸlʸë-kə > TB *alyek ~ allek*, TA *ālak;*

PIE *bʰágos 'share' (see **16**) > *pʰágë > PT *pákë 'part' > TB *pāke*, TA *pāk* (Van Windekens 1941:87);

PIE pl. *dáǩru-x 'tears' (see **12**) → *ákrux > *ákrū > PT *ákru >→ TB *akrūna*, TA *ākrunt;*

PIE *gʰebʰal- or *ǵʰebʰal- 'head' (see **46**) > *gebʰal- > *gʸepʰal- > PT *śəpal- > TA *śpāl*, also in TB *śpālmeṃ* 'excellent';

PIE *kaw- 'strike' (see **16**) > PT *kaw- 'kill', e.g. in pres. ptc. *kawṣënta 'killing' > TB *kauṣenta* 'bane', TA *koṣant* 'killing';

PIE *ladrós 'beloved' (see **9**) > PT *laré > TB *lāre* (Winter 1965a:191);

PIE *sal- 'salt' (see **46**) > PT *sal- > TB *salyiye*, TA *sāle;*

PIE *swadrós 'sweet' (see **3**) > PT *swaré > TB *swāre*, TA *swār* (Winter 1962b:29);

PIE *xéǩos 'sharp point' (see **16**) > PT *ákë 'end' > TB *āke*, TA *āk* (Van Windekens 1966:256);

PIE *xégomńnos 'being driven' (see **16**) > *ágëmanë > PT *akëmanë 'being led' > TB *akemane*, TA *ākmāṃ* (cf. Klingenschmitt 1975:161-3);

PIE *xenǵ- 'breathe' (see **14**) > *ana- > PT *ana-sk- > TB /anask-/ 'breathe in', e.g. in pres. 3sg. *anāṣṣäṃ* (Couvreur 1949:33-4);

PIE *xweg- 'increase' (see **16**) → *xewg- > *awg- > PT *awk-s-, e.g. in pret. ptc. *awkṣuwə 'grown (up)' > TB *aukṣu*, TA *okṣu;*

PIE *séx nom. sg. fem. 'that' (see **41**) > PT *sá > TB *sā* nom. sg. fem. 'this';

PIE *pxtḗr 'father' (see **3**) > *patʸḗr > PT *pacér > TB *pācer*, TA *pācar;*

PIE *tríx neut. 'three' (see **9**) > *tria > *trʸiya > PT *tərʸya (fem.) > TB *tarya*, TA *tri.*

For further examples of PT *a reflecting earlier laryngeals see **9** and **14**.

• *ō < (mostly < *ā, see **42**) > *o:

PIE *bʰāǵʰu- 'arm' (see **16**) > *bōkʰu- > PT *pok- in TB obl. *pokai*, TA *poke* (see also **67**, **A4**, and **A5** on this and the following example);

PIE *pắntes nom. pl. masc. 'all' (see **9** and **32**) > *pṓnʸtʸe > PT *póñcə > TB *poñc*, TA *poñś;*

PIE *wắstu 'settlement' (see **3**) > *wṓstu > PT *wóstə 'house' > TB *ost*, TA *waṣt;*

PIE *bʰréxtēr 'brother' (see **3**) > *bʰrắtēr > *pʰrṓtʸēr > PT *prócer > TB *procer*, TA *pracar;*

PIE fem. suffix *-e-x- (see **42**) > *-ā- > *-ō- > PT *-o- in fem. adj. pl. *-o-na, e.g. in *astróna 'pure' > TA *āṣtraṃ*, >→ TB *astarona;*

PIE nom. sg. *dn̥ǵʰwéxs 'tongue' (probably; see **18** and **41**) >→ *kʰəndwắs > *kʰəndwṓ > PT *kəntwó > TB *kantwo*, TA *käntu;*

PIE *téxes nom. pl. fem. 'those' (see **24**) > *tắs > *tṓy > PT *tóy > TB *toy* fem. 'these'.

A few classes of words probably exhibited final *-ō < PIE *-oXō (see **4**):

PIE *uksḗn 'bull' (see **4**) → *uksṓ > PT *wəkʷsó > TB *wokʷso* (see **B20**) > *okso* 'ox';

PIE *-mō (see **4**) → *-mo(X)ō > *-mō (rather than "*-mū", see **38**) > PT *-mo, e.g. in *klʸomo 'noble' > TB *klyomo*, TA *klyom.*

On PT *o in class IV presents and related cases see **49**.

This new *o did not merge with the *o that arose by u-umlaut (see **43**), nor did any vowel merge with the *ë that reflected earlier *o (see **39**).

• *ī (< PIE *ī and some *iX (see **11**)) > *i:

PIE *wíǩn̥tiǵ 'twenty' (see **11**) > *wíkəmti > *wʸíkən > PT *wʸíkən > TB *yíkən > *ikäṃ*, TA *wiki;*

PIE *wiXrós 'young (man), warrior' (see **11**) > *wīrós > *wʸīrḗ > PT *wʸirḗ > TA *wir* 'young';

PIE opt. *-iǵ- (see **11**) > *-ī- > PT *-i-, e.g. in PT opt. 3sg. *yamʸi '(s)he would do' > TB *yāmi*, TA *yāmi-ṣ;*

PIE *xn̥ǩ-iǵ- aor. opt. 'would bring' (see **11** and **47**) > *ənkī- > *ëńʸkʸī- > PT opt. *ëñśi- in TB 3sg. *eñcīträ* 'would grasp'.

• *ę̄ < (PIE word-final *oy, see **35**) > *ę:

PIE *tritós nom. pl. masc. 'third' (see **35**) → *tritóy > *trʸityʸę́ > *trʸəcę́ > PT *trʸicę́ (?; see **65**) > TB *trici*, TA *trice;*

PIE nom. pl. *kʷékʷlōs 'wheels' (see **35**) → *kʷékʷloy > *kʷʸékʷlʸę̄ > *kʷʸákʷlʸę → PT *kʷʸákʷlʸę 'chariots' (see **55**) > TB *kokalyi;*

PIE neut. nom./acc. dual *-oyx́ (see **35**) > *-ę̄ > PT *-ę in *kënuwʸę(në) 'two knees' > TB *keni, kenine*, TA *kanweṃ;*

(post-)PIE *logʰ-oy- 'lair' (see **35**) >⟶ *lëkʰę̄ > PT *lëkę 'bed, couch' > TB *leki*, TA *lake.*

• *ē (< PIE *ē, *ēX, and *ex́ (see **3**)) > *e:

PIE *bʰréxtēr 'brother' (see **3**) > *bʰrā́tēr > *pʰrótʸēr > PT *prócer > TB *procer*, TA *pracar* (so also the nom. sg. forms of other PIE kinship terms in *-xter-);

PIE *wr̥sḗn 'male' (see **29**) > *wərsʸḗ (or *wərʸsʸḗ?; see **47**) > PT *-wərṣe (*-rʸṣ-?) in *kʷëw(u)-wər(ʸ)ṣe 'bull' > TB *kaurṣe*, TA *kayurṣ* (cf. Schneider 1940: 195-6);

PIE nom. sg. masc. *sḗm 'one' (formation as in *dʰégʰōm 'earth'; see Schindler 1967a) > *sʸḗ > PT *ṣé > TB *ṣe;*

PIE *gʰrḗwr̥ 'horn' (see **47**) > *kʰrʸéwər > *krʸéwər > PT *krʸóṛ 'crescent' in TB obl. *krorīyai*, TA *kror* (Hilmarsson 1985);

post-PIE s-aor. *prēḱ-s- 'asked' (see **29**) > *prʸēks- > PT act. *prʸeks-, e.g. in 3sg. *prʸéksa > TB *preksa*, TA *prakäs* (so also *nēḱ-s- 'destroyed', see **31** and **46** (under *n); also *ǵnēxʷ-s- 'recognized', see **3** and **47**);

PIE *ḱēruos 'stag-hunter' (see **22**) > *kʸēruë > *kʸeruë > PT *śeruwë 'hunter' > TB *śerwe*, TA *śaru* (Jasanoff apud Nussbaum 1986:8);

PIE *x́nḗxʷmn̥ 'name' (see **3**) > *nʸḗmə > PT *ñémə > TB *ñem*, TA *ñom;*

PIE *snéx́wr̥ or *snḗwr̥ 'sinew' (see **32**) > *snḗwər > *sʸnʸḗwər > *ṣñéwər > PT *ṣñǫ́r (Þórhallsdóttir 1988:199; see **64**) > TB *ṣñor;*

PIE *mex́nes- 'moon' (see **3**) > *mēnes- > *mʸēnʸes- >⟶ PT *mʸeñə-, nom. sg. *mʸeñe > TB *meñe*, TA *mañ;*

PIE opt. 3sg. *x́siéx́t 'let him/her be' (see **26**) > *syḗ > *ṣé + opt. *-i (see above) > PT ipf. *ṣéy (*ṣéi, two syllables?) > TB *ṣey*, TA *ṣe-ṣ* (cf. Pedersen 1941: 206-8);

PIE *xwex́- 'blow' > *xwē- in *xwēntós 'wind' (see **5**) > *wʸēntḗ > PT *wʸenteḗ > TB *yente*, TA *want.*

• *ū (< PIE *ū, *uX (see **12**), and word-final *ō (partly < *oX; see **38**)) > *u:

PIE *sū- 'pig' (Lat. *sūs*, Gk. ὗς; see **13**) > PT *su- in TB *suwo;*

PIE *sux- 'pour' (see **12**) > *sū- 'rain' > PT *su- > TA *su-* in pres. 3pl. *swiñc*, ptc. *sūmāṃ;*

PIE *suX- 'beget, bear (a child)' (see **12**) > *sū- > PT *su- in TB *sąsuwa* 'sons' (Krause 1956:196, Winter 1985:260);

PIE *dáḱrux pl. 'tears' (see **12**) → *áḱrux > *ákrū > PT *ákru in TB *akrūna*, TA *ākrunt;*

PIE *ḱuó 'dog' (see **16**) > *kwó > *kwú > *kú > PT *kú > TB, TA *ku;*

PIE *duóx́ 'two' (see **3**) > *duó > *dwó > *wó (see **27**) > *wú > PT *wú > TA masc. *wu* (Winter 1962b:29);

PIE *xn̥tbʰóx́ 'both' (see **3**) > *xn̥tbʰṓ >⟶ *antpʰú > PT *antpú > TA fem. *āmpu-k;*

PIE subj. and them. pres. 1sg. *-ox (see **3**) > *-ō > *-ū > PT *-u > TB subj. I (and probably pres. I) 1sg. *-u*, e.g. in *āyu* 'I will give', *yāmu* 'I will do' (Pedersen 1941:141);

PIE *oḱtṓ(w) 'eight' (see **16**) > *oktú > *ëktú > *ǫktú > *ǫktú → PT *ǫktó on the analogy of *ṣəptó 'seven' and *ñúwə 'nine' (Penney 1976:89 fn. 50; cf. Ringe 1987a:107) > TB *okt*, TA *okät;* pre-PT *-u is preserved in TA *oktuk* 'eighty'.

• On the development of *ō, the stages of which cannot be dated relative to the general loss of vowel length, see **49** and **51**.

The complex of changes outlined in this section had the following consequences for the phonemic system of Tocharian:

a) it eliminated distinctive vowel length, merging *ā with *a, *ō with *o, and *ī and *ū with prevocalic *i and *u respectively;

b) it made palatalization of consonants phonemically distinctive, since both palatalized and nonpalatalized consonants now occurred before *ə;

c) it made *ǫ a separate phoneme, splitting it from *ë or *o by merging short *u (part of the distinctive environment before which *ǫ occurred) with *ə.

After these changes had run their course the phonemic system of pre-PT must have been approximately the following:

p	t	k	kʷ	m	n	(ṅ?)	(ṅʷ?)	w
b	d	g	gʷ		l			y
pʰ	tʰ	kʰ	kʷʰ		r			
	tˢ							
	s							
pʸ	tʸ	kʸ	kʷʸ	mʸ	nʸ	(ṅʸ??)	(ṅʷʸ??)	wʸ
bʸ	dʸ	gʸ	gʷʸ		lʸ			
pʰʸ	tʰʸ	kʰʸ	kʷʰʸ		rʸ			
	tˢʸ?							
	sʸ							
i		ə	u					
ę			ǫ					
e	ö?	ë	o					
		a						

Notes.

1. I posit labialization of the velar in the development of PIE *lugrós 'sad' even though TB *lakle* 'suffering', its only attested Tocharian descendant, exhibits no labialization. I have adopted this hypothesis because (1) delabialization of PT *k^{w} before resonants is normal in TB (see **B28**), and (2) it seems likely on phonetic grounds that if velars were labialized between *u and obstruents, they were labialized between *u and any following consonant.

51. The development of pre-PT *ō.

When it did not participate in ö-umlaut (see **49**), pre-PT *ō seems to have merged with *ē, eventually giving PT *e. Unfortunately the evidence for this merger is not beyond question. The situation is as follows.

Comparison of TB *camel* and TA *cmol,* both 'birth', permits the reconstruction of a PT noun *cəmél 'birth'. The second vowel of this PT word was clearly *e, not *ë, because PT *e was rounded next to a nonpalatalized labial in TA, whereas PT *ë was not (see **A5**). It is likewise clear that PT *cəmél was formed to the class III subjunctive stem *cəmé- 'be born' (3sg. *cəmétər > TB *cmetär;* >→ TA *cmatär* with unrounding of the vowel on the analogy of *wlatär* '(s)he will die', etc.—an analogical development which the derived noun escaped), and it follows that the stem vowel of the PT class III subjunctive was *e. If we could be sure that the class III present and the class III subjunctive had the same stem vowel, it would follow that *ō, the ancestor of the class III present stem vowel, had become PT *e. Alternatively, if we could be sure that the class III subjunctive stem vowel arose by the same contraction as the class III present stem vowel, we could confidently posit *-əyé- or *-əyó- > *-ō- (as in **23**) > PT *-e- on independent grounds for the class III subjunctive.

But neither of these latter conditions is met. No form derived from any class III present shows the TA vowel rounding that would reveal PT *e rather than *ë; and while that could easily be the result of unobjectionable analogical changes, we cannot completely rule out the possibility that the PT class III present stem vowel was *ë—and thus that *ō had merged with *ë in PT. Nor are the class III present and subjunctive precisely parallel formations. To be sure, both are intransitive, both are *medium tantum* (or virtually so), neither is made to roots with medial *a, and both exhibit stem vowels which appear in TB as invariant *-e-* and in TA as invariant *-a-*, with no palatalization of a preceding consonant. But class III presents are consistently formed from PT roots that ended in *a—i.e., seṭ roots—whereas class III subjunctives are consistently formed from aniṭ roots. This distribution suggests that, if the class III present stem vowel ultimately reflects a contraction of post-PIE *-əyé- or *-əyó- (as argued in **23**), the class III subjunctive stem vowel is of a quite different origin, possibly unconnected with PIE laryngeals.

Admittedly, the similarities between the class III present and subjunctive outweigh the differences, and it is easy enough to imagine a suffix of laryngeal origin being extended to nonlaryngeal roots, especially given the small size and semantic coherence of subjunctive class III. (After all, underlying root-final *a—i.e., the bare reflex of root-final laryngeals—has itself spread from verb to verb in Tocharian.) I therefore tentatively regard the class III present and subjunctive stem vowels as probably identical, and on that basis I suggest that pre-PT *ō merged with *ē in PT *e. But it must be clearly understood that this suggestion is no more than a working hypothesis, because nothing more definite is possible without further evidence.

This sound change, like ö-umlaut, could have preceded or followed the loss of distinctive vowel length (LVL). Thus there are three possible chronologies of the changes in question:

(a) ö-umlaut	(a) ö-umlaut	(a) LVL
(b) *ō > *ē	(b) LVL	(b) ö-umlaut
(c) LVL	(c) *ö > *e (*ë?)	(c) *ö > *e (*ë?)

The only constant is that ö-umlaut must have occurred before the vowel that triggered it merged with any vowel that didn't. The evidence does not allow us to make a principled choice between the three alternative chronologies.

Clear examples of *ō occur only in class III presents and in PT nouns formed with the PT suffix *-elmë (see **23**):

PIE zero-grade *mṛs- 'forget' (see **29**) in *mṛs-əyé/ó- > *mərsō-tur > PT pres. 3sg. *mərsétər > TB *(mä)rseträ* (Van Windekens 1941:62);

PIE zero-grade *mṇ- 'stay' (see **31**) + -sḱé/ó- > *mənské/ó- >→ *məsk-a- 'be (in a place)', pres. 3sg. *məskōtur > PT *məskétər > TB *mäsketär,* TA *mäskatär;*

PIE pres. *swid-yé- 'be sweating' (see **27**) > *suyé- > *səyə- >→ PT *siyá- (> TB /s(i)ya-/); derived noun *suyōlmë 'sweat' > PT *siyelmë > TB *syelme* (it is not clear in what order the root became seṭ and the suffix *-ōlmë (or its reflex) was used to derive the noun; the seṭ root, for example, might actually be backformed to the noun);

cf. also PT *yəśelmë 'desire' (etymology obscure, cf. Duchesne-Guillemin 1940:148) > TB *yśelme,* TA pl. *yśalma-ñ;* this is the only noun in PT *-elmë that survives in TA.

52. *ə, *i, *u, and semivowels in PT.

After the restructuring of the vowel system, *ə became *u before prevocalic *w, as the following examples demonstrate:

PIE *néwos 'new' (see **46**) > *ñə́wë > PT *ñúwë > TB *ñuwe,* TA *ñu* (Van Windekens 1941:77);

PIE *ḱnéwn̥ 'nine' (see **5**) > *ñə́wə > PT *ñúwə > TB, TA *ñu.*

Pre-PT *ə also became *i before prevocalic *y, but examples indisputably reflecting PIE forms are hard to find (see the discussion in **22**); by far the best example is the verb 'sweat', whose history is more complex:

PIE pres. *swid-yé- 'be sweating' (see **27**) > *suyé- > *səyó- >→ PT *siyá- > TB /s(i)ya-/ 'sweat', e.g. in derived noun *syālñe* 'sweating' (cf. also the related noun cited in **51**).

PT imperatives provide a few further examples like the following:

PIE *ǵidʰí iptv. 2sg. 'go' (see **20**) > *isʸí > *yəsʸó > *yəṣó → *pə-yəṣó > PT *piyəṣó > TA *piṣ*, (?) TB *paṣ* (Jasanoff 1987:108-9; see **B15**);

pre-PT *pə-yərpə-sə > PT *piyərpəsə pl. 'take heed!' > TB *pirpso*.

(See also **B15**, note 1.) But we cannot be completely certain that these imperatives were not formed AFTER the sound change under discussion had occurred; if the change remained in the language as an exceptionless phonological rule, formations that entered the language afterwards could have conformed to it automatically.

The resulting sequences *uw and *iy were not phonemically distinct from inherited prevocalic *u and *i, and the subsequent history of these sounds shows that they behaved as sequences of two segments (see especially **65**). I therefore write PT *uw and *iy in all cases, regardless of etymology:

PIE *ḱēruos 'stag-hunter' (see **22**) > *kēruë > PT *śeruwë 'hunter' > TB *śerwe*, obl. *śeruweṃ* 255a7, TA *śaru* (Jasanoff apud Nussbaum 1986:8);

PIE *udriós 'watery' (see **4**) > *urʸié > PT *wərʸiyé > TA **wri*, obl. *wriṃ*, TB *wríye → *wrīyeṣṣe* (Winter 1962b:30, 1965a:202 fn. 20);

PIE *ladrós 'beloved' + fem. *-ix (see **9**) → *ladria > PT *larʸiya > TB *lariya* (Winter 1965a:191).

However, it appears that the surface *u and *i of these sequences continued to be underlyingly */ə/ into the PT period, since they functioned as */ə/ in triggering liquid metathesis (see **64** and **65**), and indeed well into the individual histories of TA and TB, since in both languages they were subject to syncope, as was *ə (see **A20** and **B23**). Thus we find the following types of alternations:

TB *ñuwe* 'new' but *ñweṃne* 'at new moon' (with syncope of *u = */ə/ < PIE *e); so also TA *ñu* 'new' but fem. pl. *ñwaṃ;*

TB *puwar* 'fire' (see **7**), pl. *pwāra* (syncope of *u = /ə/; exactly what this *u reflects historically is unclear);

TA *śaru* 'hunter' (see **22**), gen. sg. *śarwes* < PT *śeruwënsë (syncope of *u = */ə/ < PIE *u); cf. TB obl. *śeruweṃ* 255a7, but usually *śerwe*, etc.;

TB *ñäkciye* 'divine' (see **4**), dual *ñäkcyane* (syncope of *i = */ə/ < PIE *i); so also TA *ñäkci*, fem. pl. *ñäkcyāñ*.

Presumably underlying */ə/ before palatalized *wʸ was represented on the surface by fronted *[ü] (which cannot have been a distinct phoneme under any analysis). There seem to be at least two examples among the reflexes of PIE u-stem endings:

PIE u-stem nom. pl. masc./fem. *-ewes (see **22**) > *-ewʸe > *-əwʸə > PT *-üwʸə > TB *-i* (e.g. in *lyśi* 'thieves', *läkṣi* 'fish', *ylyī* 'gazelles'), TA *-u* (in *āṅkaru* 'tusks', **22** note 1);

PIE *ǵónu 'knee' (see **16**) ~ post-PIE *ǵónw- (see **35**) >→ *gënu- in PT dual *kënüwʸ-ę(në) 'two knees' (see Winter 1962a:117-9 on the endings) > TB *keni, kenine*, TA *kanweṃ*.

(See also the discussion in **22**.)

Preconsonantal and word-final *əw and *əy (mostly reflecting PIE *ew and *ey) likewise became (surface) *u and *i respectively:

PIE aor. subj. *léwk-e- 'shine' (see **16** and **46**) > *lʸewkʸe- > *lʸəwkʸə- > PT trans. subj. *lʸuśə- in TB inf. *lyuśsi;*

PIE *ḱlewdʰ- 'arrive, reach' (cf. **5** and **17**) > *lʸewt- > *lʸəwt- > PT *lʸut- in TB *lyutätär* '(s)he will set out (/depart)', TA *lyalyu(tu)* 'having dispersed [someone else's reason or common sense]' (etymology first in Van Windekens 1949:301);

PIE *spey-n- 'wooden pin' (see **47**) > *sʸpʸeyn- > *ṣpʸəyn- > PT *ṣpʸin- > TA *ṣpiṃ* 'nail, peg';

PIE *pxtréy dat. sg. 'to (the) father' (see **32**) > *patrʸéy > *patrʸéy > PT *patrʸí gen. sg. 'father's' > TB *pātri*, >→ TA *pācri*.

It seems likely that these vowels too remained underlyingly */əw/ and */əy/, since they continued to alternate with surface diphthongs in ablaut patterns. Note the following examples:

TB *lyuketrä* 'it shines', *lyuśsi* 'to illuminate', but *lyauksa* 'it illuminated' (= TA *lyokäs* < PT *lʸéwksa);

TB *piṅkäṃ*, TA *pikäṣ* '(s)he is writing', but TB *(pa)paikau*, TA *pāpeku* 'written' ←< PT *papáykawə.

These underlying */əy/, */əw/ were perhaps less easily "recoverable" for native speakers than the prevocalic examples.

53. Adjustments of the system of ablaut.

The consequences of the above sound changes for the ablaut system of (pre-)PT have been perceptively explored by Adams 1978a:446-8, on which the discussion in this section heavily depends. I shall treat first those ablaut patterns whose basic vowel was *e before the restructuring of the vowel system, then those based on other root vowels.

The following four instantiations of the most common PIE ablaut series did not develop in completely parallel fashion in Tocharian, mainly because the vowel system was restructured:

CēC ~	CeC ~	CC/CeC/(C$_ə$C?) ~	CoC ~	CōC
CēRC ~	CeRC ~	CRC ~	CoRC ~	CōRC
CēwC ~	CewC ~	CuC ~	CowC ~	CōwC
CēyC ~	CeyC ~	CiC ~	CoyC ~	CōyC

(Whether schwa secundum existed in the zero-grade forms of (some) CeC-roots in the PIE or immediate post-PIE period is not clear to me; Adams assumes its exist-

ence. The consequences of either choice are minimal—see below.) The respective (pre-)PT outcomes of these four ablaut types were as follows:

C^{y}eC ~	C^{y}əC ~	(CC/C^{y}əC→) CəC ~	CëC ~	CaC
C^{y}eRC ~	C^{y}əRC ~	CəRC ~	CëRC ~	CaRC
C^{y}ewC ~	C^{y}uC /C^{y}əwC/ ~	CəC ~	CëwC ~	CawC
C^{y}eyC ~	C^{y}iC /C^{y}əyC/ ~	C^{y}əC ~	CëyC ~	CayC

Note that the four series remained parallel EXCEPT in the zero-grade forms.

Adams saw that this must have led to the analogical restructuring of the ablaut system, specifically to the creation of new zero grades for some series in forms which still participated synchronically in ablaut alternations. Thus, if (pre-)PT *CəC did not develop from (post-)PIE *C$_{ə}$C by sound change in the zero grade of CeC-roots, a new zero grade *CəC would have been created in any case by analogy with the zero grade of CeRC-roots, namely (pre-)PT *CəRC; on the other hand, if zero-grade *CəC did already exist in CeC-roots, it was generalized at the expense of the other zero-grade root alternants in order to maintain the parallel with CeRC-roots. In CewC- and CeyC-roots the same analogical process operated, replacing the *lautgesetzlich* but structurally anomalous zero grades *CəC and *C^{y}əC with *CuC (= */CəwC/) and *CiC (= */CəyC/) respectively in those forms which still belonged to ablauting paradigms synchronically (and ONLY in such forms).

Several of Adams' examples are worth repeating here (I give them in greater detail than Adams, loc. cit.):

PIE *ǵlewd^{h}- 'arrive, reach' (cf. 5 and **17**) > *l^{y}əwt- > PT *l^{y}ut- in TB *lyutätär* '(s)he will set out (/depart)', TA *lyalyu(tu)* 'having dispersed [someone else's reason or common sense]'; within the paradigm of this verb, zero-grade *ǵlud^{h}- > *lət- → PT *lut- in TB *lutas(k)entr* 'they depart', TA *lutäsmāṃ* 'losing [one's senses]' (etymology first in Van Windekens 1949:301, though in 1976:259 he rejects the etymological connection with the following),

but PIE zero-grade *ǵlud^{h}- > PT *lət- and remains so in *lət- 'go out' > TB /lət-/, TA *lät-*, a verb in which all forms are zero-grade; cf. TB pres. /lən-əṣṣə-/ ~ /lən-əske-/, subj. /lən(n)-/ (< *ǵlu-n-d^{h}-??; see **17**), pret. 3sg. *lac* (< *ləcə́ < (post-) PIE aor. inj. *ǵlud^{h}ét, Cowgill apud Winter 1962b:22 with fn. 3; see 5 and **46**), TA pres. *länt-ṣä- ~ länt-sa-*, subj. *läñc-*, pret. 3sg. *läc* (*-nt-* and *-ñc-* are analogical (?)); this is a model case of paradigmatic split;

PIE *lewk- 'shine' > *l^{y}əwk- > PT *l^{y}uk- in TB *lyuketär* 'it shines'; hence zero-grade *luk- > *lək^{w}- → PT *luk- in TB *lukṣäṃ* 'it illuminates', TA *lukseñc* 'they make shine',

but PIE adj. *luk... (see **50**) > *lək^{w}... in PT *lək^{w}t^{s}ë 'shining' > TB *laktse*, cf. derivative *läktsauña* 'light, lamp', perl. *läk$_{u}$tsauwñaiysa* 214a2 (Krause and Thomas 1960:50);

PIE *seyk- 'reach by walking' or the like (see **16**) > *s^{y}əyk- > PT *ṣik- in TB *ṣiko* noun 'step'; hence zero-grade *sik- > *s^{y}ək- → PT *sik- in TB *siknaṃ* '(s)he steps' (etymology first in Van Windekens 1941:109).

The PIE ablaut patterns that did not involve *e were (presumably—the evidence is meager)

ā ~ a ~ Ø;
ō ~ o ~ Ø.

By the vowel changes dissussed in this chapter these patterns should have become

o ~ a ~ Ø;
a ~ ë ~ Ø.

The few Tocharian words and roots that clearly reflect these original a- and o-vowels exhibit no traces of ablaut (see **39**, **50**, and **51** for examples).

Ablaut patterns involving laryngeals are a more complex case. The pattern of roots exhibiting PIE *ǵe- fell together with that of nonlaryngeal roots with *e, on which see above (since word-initial laryngeals were lost both before nonsyllabics and before true vowels, see 3 and 5). PIE *xe- and *x^{w}e-roots fell together with a- and o-roots respectively and (like the latter) fail to exhibit ablaut in Tocharian. As in all IE languages, subsequent developments make it necessary to distinguish three patterns with PIE *eX, namely:

ēǵ ~	eǵ ~	ǵ ~	oǵ ~	ōǵ
ēx ~	ex ~	x ~	ox ~	ōx
ēx^{w} ~	ex^{w} ~	x^{w} ~	ox^{w} ~	ōx^{w}

In the post-PIE contraction of vowels with laryngeals (see 3) the last two grades would have fallen together; the system resulting from that contraction must have been

ē ~	ē ~	ǵ ~	ō
ē ~	ā ~	x ~	ō
ē ~	ō ~	x^{w} ~	ō.

Finally, the merger of interconsonantal laryngeals in *a (see **14**) and the vowel changes discussed in chapter 6 and this chapter would have caused the last two grades once again to fall together, giving

e ~	e ~	a
e ~	o ~	a
e ~	a ~	a.

Consonants preceding all the *e's in this chart would have been palatalized.

The only forms of the *ex- or *ex^{w}-series surviving in Tocharian that exhibit ē-grade are the following:

PIE *ǵnéx^{w}mn̥ 'name' (see 3) > *nḗmən > PT *ñémə > TB *ñem*, TA *ñom* (on TA *o* < PT *e see **A5**; cf. Van Windekens 1962a:187);

post-PIE s-aor. *ǵnēx^{w}-s- 'recognize' (see **3** and **47**) > *gn^{y}ēs- > PT *kñes- in TA pret. 2sg. *kñasäṣt* 'you have become acquainted'.
The former is an isolated lexeme, but it seems clear that the latter is still part of the paradigm of TA *knā-* 'know' < PT *kna- < *gnō- < PIE *ǵnex^{w}-, *ǵnox^{w}- (Hackstein 1993a). The rest of the PIE *ex-pattern, represented by PT *o ~ *a, apparently survives in the stem-final vowels of various Tocharian nouns. A plausible example is 'tongue' (see **18** and **41**):

TB *kantwo*, obl. *kantwa*, pl. nom. *käntwāñ* 'tongue' < PT *kəntwó, *kəntwá- < *ǵ^{h}ṇdwās, *ǵ^{h}ṇdwá- (or the like, see **18**) ←< *dṇǵ^{h}wéxs, *dṇǵ^{h}ux- (see Peters 1991a).
In at least some other examples this ablaut pattern can have been introduced analogically from elsewhere in the language (Marggraf 1975:201-2). It no longer survives in roots in the attested Tocharian languages; synchronically speaking, roots of the *ex- and *ex^{w}-series do not usually ablaut in Tocharian.

More abundant traces of the *eǵ-series survive in Tocharian roots; the following two verb roots are especially notable.

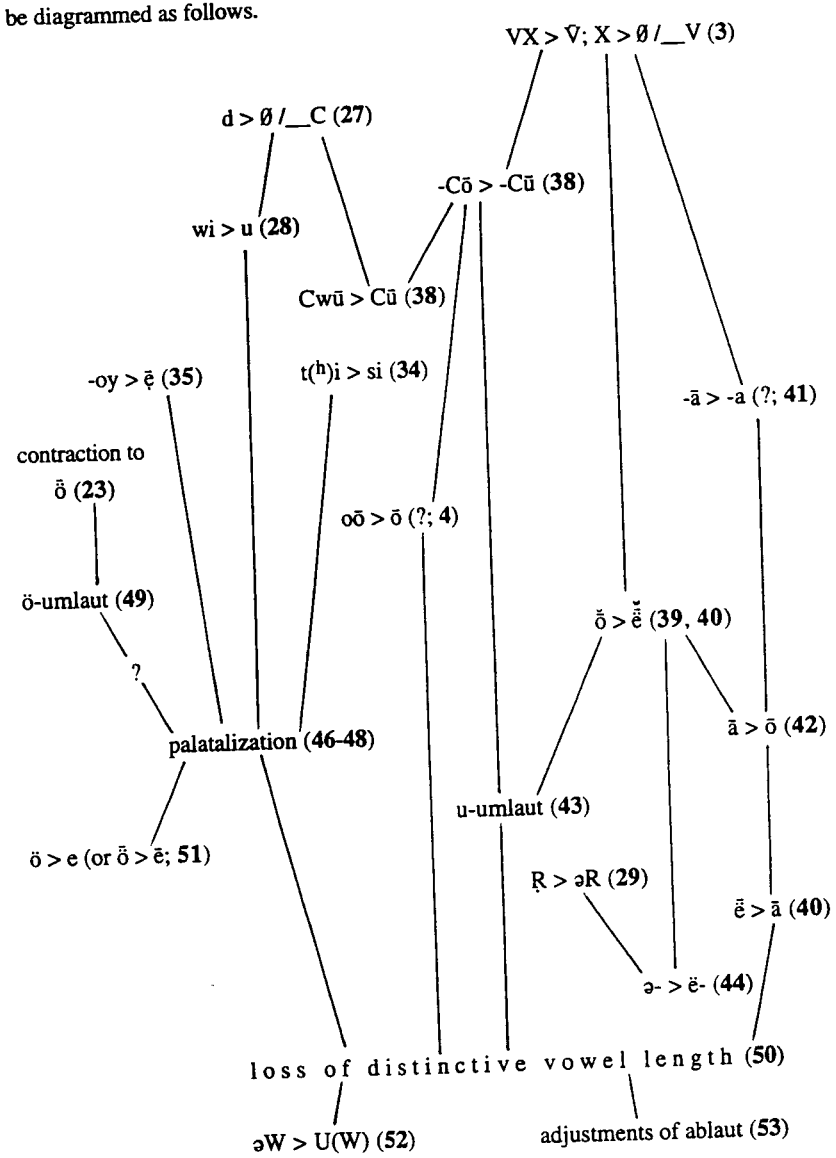
PIE *d^{h}eǵ- ~ *d^{h}ǵ- 'put' (Gk. ἔθηκε, Skt. *ádhāt* '(s)he put'; Gk. θετός 'adopted', Skt. *hitás* ptc. 'placed'), plus post-PIE s-aor. *d^{h}ēǵ-s-, > *t^{hy}es- ~ *t^{hy}e- ~ *t^{h}a- >→ PT *ces- ~ *tes- (depalatalization) ~ *ta(s)- ~ *təs- (new zero grade), e.g. in the following forms:
PT pret. 3sg. act. *cés-sa >→ TB *tessa* (depalatalization), TA *casäs* (*-äs* analogical on other active s-preterites, see **A17**);
PT iptv. 2sg. *pə-tes-ə > TB *ptes*, TA *ptas;*
PT pret. ptc. *tə-ta-wə (see **21** and **55**) > TB *tättā$_{w}$*, TA *to;*
PT ipf./opt. 3sg. mid. *taṣitər > TB ipf. *taṣītär*, TA opt. *tā(ṣi)trä;*
PT pret. 3sg. mid. *təs-satë, 3pl. *təs-santë > TB *tässäte*, TA *tsänt;*

post-PIE *deǵ- ~ *dǵ- 'touch' > PG *tēk- ~ *tak- (Goth. inf. *tekan*, ON inf. *taka* 'to take'), borrowed into pre-PT (see Ringe 1991a:105-15) as *tēk- ~ *tak- > *t^{y}ēk- ~ *tak- >→ PT *cek- ~ *tek- (depalatalization) ~ *tak- (?) ~ *tək- (new zero grade), e.g. in the following forms:
PT pres. 3sg. *ceśə (= Goth. *tekiþ*) > TB *ceśä-ṃ;*
PT derived noun *tetekor (see **64**) > TB *tetekor;*
PT opt. 3sg. *təśi > TB *taśi*.

Notes.

1. Osthoff's Law, which operated in a number of IE languages to shorten long vowels before *RC clusters, did not occur in Tocharian; cf. TB *yente*, TA *want* < PT *w^{y}entḗ < post-PIE *xwēntós (see **5** and **46**). A short *e would have given PT *ə. TA *wänt-* is the result of scribal error (**30** note 3); see Thomas 1977:113 fn. 6.

54. The relative chronology of the changes discussed in the last three chapters can be diagrammed as follows.



Chapter 9. Further restructuring of the consonant system.

The pre-PT consonant system outlined in **50** (ad fin.), characterized by the opposition palatalized : nonpalatalized at virtually every point and manner of articulation, underwent further changes before the PT stage. Most notably, the affrication of *d (and *dʸ) followed palatalization (see **57**), as the shape of TB *witsako* 'root', an early Iranian loanword, demonstrates. Since only old voiced dentals were affected, loss of the voicing contrast in Tocharian obstruents must in turn have followed the affrication of *d (see **62**). Most of the other phenomena discussed in this chapter are phonetic or analogical changes that presuppose palatalization. The changes discussed in **61** (*ml > *bl) and **63** (deaspiration) are difficult to date, but the former must at least have preceded liquid metathesis (**65**).

55. Analogical adjustments of palatalization.

Extensive analogical changes redistributed palatalized and nonpalatalized consonants, especially within verb paradigms. It seems clear that these processes operated more or less continuously through and beyond the PT period, since the attested languages often exhibit different developments in cognate lexemes. Here are a few examples.

In PIE simple thematic presents with e-grade roots, the initial consonant of the present stem must have been palatalized in pre-PT. In many cases the palatalization of the present was eliminated by analogy; thus one finds TB 3sg. *parä-ṃ* '(s)he is carrying', not *"pirä-ṃ"* < (pre-)PT *pʸərʸə reflecting PIE *bʰéreti. (However, TA mp. 3sg. *pärtär* etc. could reflect PT initial *pʸ or *p.) In a few verbs the initial palatalization of the present (and other e- and ē-grade forms) has been generalized throughout the paradigm. 'Be able' is a particularly clear example:

pres. and subj. 3sg. TB *campäṃ*, TA *cämpäṣ*, 3pl. TB *campeṃ*, TA *cämpe* < e-grade *tempe/o-;

pret. 3sg. TA *campäs* as if < *ē-grade s-aorist *tēmp-s-, but TB *campya* with /cəmp-/ from the pres. (cf. Winter 1977:143-4);

pret. ptc. TA *c(a)mpu* (or *c(ä)mpu?*) with *c-* on the analogy of the finite preterite.

Only the isolated noun TA *tampe* 'power, might' (with its derivatives) preserves a nonpalatalized initial consonant. (See also note 1.)

Thematic s-presents regularly exhibit nonpalatalized initial consonants in both languages (see Sieg, Siegling and Schulze 1931:358-61, Krause 1952:76-82, Krause

and Thomas 1960:206-9). Whether these presents reflect PIE s-aorist subjunctives or thematic desideratives, the absence of palatalization in the initial consonant must be analogical, since both those PIE categories exhibited e-grade roots.

TB active s-preterites provide a typical example of depalatalization after the PT stage. Though the root vowel of s-aorists (the PIE ancestor of this category) was *ē, though the vast majority of Tocharian s-preterites still exhibit the PT root vowel *e < PIE *ē, and though TA still exhibits regular palatalization of the initial consonant in this category (see note 2), the initial palatalization caused by *ē has largely been suppressed in TB. Note the following examples:

post-PIE s-aor. *dʰḗǵ-s- (see **46** and **53**) >→ *tʰēs- ~ *tʰas-; s-pret. recharacterized in 3sg. *tʰḗs-s-a(t), 3pl. *tʰḗs-s-rən(t) > PT *céssa, *césrə >→ TA *casäs* (again recharacterized!), *casär* but >→ TB *tessa, tesar;*

PIE *neḱ- ~ *nḱ- 'die, perish' >→ pre-PT *nek- ~ *nək- (mid.) 'perish', (act.) 'destroy', s-pret. 3sg. *nḗk-s-a(t), 3pl. *nḗk-s-rən(t) > PT *ñéksa, *ñékrə > TA *ñakäs, ñakär* but >→ TB *neksa, nekar.*

(Initial palatalization does occasionally survive even in TB; cf. 3sg. *lyauksa* 'illuminated' = TA *lyokäs* < PT *lʸéwksa.) Loss of palatalization in TB must have been encouraged by the nonpalatalized initials of the corresponding zero-grade middle paradigm and of the thematic s-presents (see above), to which s-preterites are often paradigmatically related. Another contributing factor can have been the regular depalatalization of *r and labials, which left no trace of palatalization before vowels other than *ə (see **B11** and **B13**). An example which lost its palatalization by regular sound change is the following:

PIE *pṛḱ- ~ *preḱ- ~ *prēḱ- 'ask' > pre-PT *pərk- ~ *prek- ~ *prēk-, s-pret. 3sg. *prḗk-s-a(t), 3pl. *prḗk-s-rən(t) > PT *prʸéksa, *prʸékrə > TB *preksa, prekar,* TA *prakäs, *prakär.*

As the example just cited demonstrates, this phonologically regular depalatalization occurred in both languages. In TA it may have had an opposite analogical effect: a number of TA s-preterites acquired irregular palatalization of the root-FINAL consonant or cluster, possibly because their initial consonants could no longer be distinctively palatalized. This is one available explanation for the palatalization in TA *palyä(ṣt)* 'you extinguished' (root *päl(ā)-*), *pyockäs* '(s)he created' (root *pyutk(ā)-*), and *wackwā* 'I separated' (root *wätk(ā)-*); analogical extension from such cases can account for the root-final palatalization of *plyocksā-m* 'it appeared before them' (root *plutk-*) and *lyock(s)-* 'caused to become', 1sg. *lyockwā*, 2sg. *lyockäṣt* (root *lutk(ā)-*), in which initial palatalization does survive. On the other hand, note that all these examples are causatives and might owe their palatalization to that fact. (The initial palatalization of the hapax legomenon *crakär* 'they lost (consciousness)' (beside usual a-preterite *tarkar;* Sieg, Siegling and Schulze 1931:375 fn. 2, 440) can only be analogical on sg. *cärk;* presumably it reveals nothing about normal s-preterites.)

Palatalization of consonants—especially root-initial consonants—has spread extensively by analogy in the paradigms of causative verbs; for examples see Krause 1952:87, Krause and Thomas 1960:61 and (especially for TA forms) 176-7, 244-7.

Depalatalized initial consonants of reduplicating syllables form a coherent group that merits separate treatment. The remainder of this section will be devoted to a discussion of those cases of depalatalization.

Preterites and preterite participles which are (synchronically) reduplicated in the attested Tocharian languages exhibit PT *ë as their reduplication vowel; typical are the following:

TB *kekesu,* TA *kaksu* ptc. 'extinguished' < PT *këḱésuwə;

TB *peparku,* TA *papräku* '(having) asked' < PT *pëpórkuwə;

TA *saspärkānt* 'they made . . . disappear' < PT *sëspórkantë; TB *spyarkatai* 'you made . . . disappear' (w. dial., = c./e. **ṣpyārkatai*) by contraction < PT *sëspórkatay (see **B27**);

TA *kakäl* '(s)he endured' with *a* (as if) < PT *ë (but TB has an s-preterite *keltsa*).

PT *ë (nonpalatalizing) is the usual reflex of PIE *o; PIE perfects, the etymological source of many Tocharian preterites and preterite participles, exhibited o-grade of the root in the indicative singular. It is therefore reasonable to suppose that the PIE *o of those roots (or its descendant *ë) was introduced into reduplicating syllables by a vowel-copying rule and then spread by analogy until it was the usual reduplicating vowel in Tocharian preterites (cf. Van Windekens 1982:111). If that happened before palatalization occurred, the reduplicating consonant was never palatalized; and even if vowel-copying took place after palatalization had occurred, one might expect the nonpalatalized consonant of the root to be copied with the root vowel. In either case the lack of palatalization in these reduplicating syllables is part of a more general phenomenon and is not surprising.

A form whose reduplicating vowel has not been replaced by PT *ë is TB *säsuwa,* which functions synchronically as the plural of *soy* 'son' but was originally the (fem./)neut. pl. of the participle of a verb descended from PIE *sewX- 'give birth' (Skt. *sū-;* see **12** and Winter 1985:260). It is possible that the PT *ə in the first syllable of this word reflects PIE *e, and that the reduplicating consonant has been depalatalized. But it is equally possible that the original reduplicating vowel *e was replaced by *u, copying the u-vowel of the root (as in Indic and Latin; cf. the copying of root *o noted above), before palatalization occurred; and *susū- would regularly have given PT *səsu- in the general loss of vowel length (**50**; so Winter loc. cit.). Thus this case of depalatalization too can have been part of a more general process.

However, the depalatalization of the reduplicating consonants in the following two examples can be explained ONLY by a special rule that operated soon after palatalization had occurred:

PIE zero-grade *d^{h}é-d^{h}ǵ- pres. 'be putting' (see **14**) > *déd^{h}a- (see **14** and **19**) > *dét^{h}a- (see **20**) → *tét^{h}a- (unless deaspiration occurred early, see **63**) > *t^{y}ót^{h}a- >→ PT *tóta- 'put' (deasp. at latest by that stage, plus analogical depalatalization) in TB pres. 3sg. act. *tattaṃ*, mp. *tättäträ* and pret. ptc. *tättā$_{u}$* = TA *to* (Lane 1959:163-4; see also note 3 below);

PIE *k^{w}ék^{w}los 'wheel' (Gk. κύκλος 'circle', pl. κύκλα 'wheels'; OE *hwēol*) > *k^{w}ék^{w}lë > *k^{wy}ók^{w}lë >→ PT *k^{w}ók^{w}lë 'chariot' (analogical depalatalization) > TB *kokale*, TA *kukäl*.

It seems unlikely that depalatalization could have occurred before palatalization had become phonemic (see **50**), since allophonic differences are seldom accessible to analogical manipulation (though see note 4 below). The second example shows that depalatalization probably took place before palatalized *k^{y} and *k^{wy} merged, as that merger would have made the reduplication of the word much less transparent. Taking these two considerations together, it seems likeliest that depalatalization in reduplicating syllables occurred soon after palatalization had become phonemic; probably the process represents a simplification in the reduplication rule that was productive at that time. (It also seems likely that depalatalization occurred before the changes that overtook palatalized coronal and dorsal obstruents—see **56** and **58** through **60**—but that does not reveal so much about the nature and date of the process.)

Notes.

1. Distinctive initial palatalization in the present is found only before the reflex of PT *e < pre-PT *ē. A typical example is TB pres. *c[e]ṃśträ* '(it) hinders' vs. inf. *tañktsi* etc. (etymology obscure, see **17**; TA has generalized zero-grade *täṅk-* (pres. 3sg. *täṅkäṣ* etc.) outside the s-preterite (3pl. *cañkär*)); another is TB pres. 3sg. *ceśäṃ* 'touches', etc. vs. subj. *tekä(ṃ)-me* 'he will touch them', etc. (see **53** and Ringe 1991a:105-15). More often one finds either a palatalized or a nonpalatalized initial consonant throughout the verb paradigm: cf. TB pres. *keṣäṃ* 'extinguishes' to root /kəs-/ (TA pres. uncertain, see Sieg, Siegling and Schulze 1931:433); PT invariant root *kl^{y}ews- 'hear' > TB /kl^{y}ews-/, TA *klyos-*; etc.

2. It should be emphasized that, in EVERY SINGLE ONE of the TA active s-preterites with a nonpalatalized initial consonant, either the consonant has been depalatalized by regular sound change (so *pätwär, palyä(ṣt), prakwā* and *prakäs, markäs, mäskäs* and *mäskär, raksā-ṃ* and *rakär, wackwā, wpäs, wläs* and *wälmä(s), wsā* and *wäs* and *wsr-äṃ*) or the root never contained *ē (so *kosā-m* and *wākär*), with the lone exception of (3sg.) *spärksā-m* 'their (thoughtfulness) disappeared', which occurs beside a-pret. *spärk* and can be an innovation (Sieg, Siegling and Schulze 1931: 375 fn. 2). Thus if we are willing to posit depalatalization in TB (as above), we do not need any of the hypotheses that recognize o-grade forms in the Tocharian s-preterite (e.g. Krause 1952:180, Krause and Thomas 1960:247, Jasanoff 1988c). For further discussion see Ringe 1990.

3. The medial *tt* in the TB forms of 'put' apparently shows that that stem continued to be regarded as (synchronically) reduplicated down into the individual history of TB; see ix for further discussion of this phenomenon.

4. It is clear that analogical change can take place during the period of variation which precedes the regular adoption of a sound change by a community (as in the split of /æ/ in North American English), but there is no evidence that that is what happened here.

56. *s^{y} > PT *ṣ.

Except when it was followed by *t^{y} (and possibly *k^{y}), palatalized *s^{y} lost its palatal articulation, becoming a sibilant written in both Tocharian languages as *ṣ*. Though I symbolize the PT ancestor of this sound as *ṣ, it is by no means clear that it was retroflex; what is clear is that it was no longer palatal, since in both languages *ś* was retroflex; what is clear is that it was no longer palatal, since in both languages *ś* (< PT *ś, see **58** and **59**) is the sibilant normally written before the palatal affricate *c*. See the careful discussion of Jasanoff 1989a:131-3 for further details; on the development of *s^{y}k^{y} and *s^{y}t^{y} see **59** and **60** respectively.

Since pre-PT palatalized *s^{y} was a very common consonant (see **46** and **47**), so was PT "*ṣ":

PIE *septḿ 'seven' (see **29**) > *septó > *s^{y}eptó > PT *ṣəptó > TB *ṣukt*, TA *ṣpät*;

PIE *swéḱs 'six' (see **16**) → *séḱs (see **A14**) > *s^{y}ék > PT *ṣák > TA *ṣäk*; similarly PIE *sweḱstós (see **31**) → *seḱstós > *s^{y}ekəstḗ > PT *ṣəkəstḗ > TB *ṣkaste*, TA *ṣkäṣt*;

PIE *sélpos, *sélpes- 'ointment' (see **46**) > *s^{y}élpë, *s^{y}él^{y}p^{y}- (see **47**) >→ PT *ṣól^{y}p^{y}ë 'ointment, fat' > TB *ṣalype*, TA *ṣälyp*;

PIE desiderative pres. 3sg. *-se-ti (see **46**) > *-s^{y}es^{y}i ~ *-s^{y}e (see **33**) > PT *-ṣəṣə ~ *-ṣə > TA *-(ä)ṣ*, >→ TB *-ṣä-ṃ*, e.g. in TA *äräṣ*, TB *erṣä-ṃ* 'it evokes';

PIE aor. subj. 3sg. *g^{w}émeti '(s)he will step' (see **33**) > *g^{w}y^{y}ém^{y}es^{y}i ~ *g^{w}y^{y}ém^{y}e > PT *ṣóm^{y}əṣə ~ *ṣóm^{y}ə > TA *śmäṣ* (also >→ TB *śam-n*; cf. Jasanoff 1987:110-1);

PIE *ǵid^{h}í ipv. 2sg. 'go' (see **34**) > *it^{h}í > *isí > *is^{y}í > *yəṣó >→ PT *piyəṣó > TA *piṣ*, (?) TB *paṣ* (Jasanoff 1987:108-9; see **B15**);

PIE *snéǵwr̥ or *snéwr̥ 'sinew' (see **32**) > *snéwər > *s^{y}n^{y}éwər > *ṣñéwər > PT *ṣñór (Þórhallsdóttir 1988:199; see **64**) > TB *ṣñor*;

PIE *swésorm̥ acc. 'sister' (see **39**) > *swésérə > *s^{y}w^{y}ésërə > PT nom./acc. *ṣw^{y}ósërə > TB *ṣer*, TA *ṣar*;

PIE *swépnos 'sleep' (see **47**) > *swépnë > *s^{y}w^{y}épnë > PT *ṣw^{y}ópnë > TB *ṣəpóne > *ṣpane*, TA *ṣpäṃ*;

PIE *swérmn̥ 'speech, pronouncement' (see **47**) > *swérmə > *s^{y}w^{y}érmə > PT *ṣw^{y}órmə 'cause' > TB *ṣarm* (pl. *ṣärmana*), TA *ṣurm* (Pedersen 1941:62 fn. 1);

PIE *spey-n- 'wooden pin' (see **47**) > *sʸpʸeyn- > *ṣpʸəyn- > PT *ṣpʸin- > TA *ṣpiṃ* 'nail, peg';

PIE *spey-k- 'wooden pin' (see **47**) > *sʸpʸeyk- > *ṣpʸəyk- > PT *ṣpʸik- > TB *ṣpīkiye* 'crutch' (Van Windekens 1941:125).

It is very likely that this change occurred before or concurrently with the creation of new palatal sibilants from other palatalized consonants (see **58** and **59**), though perhaps it is not completely impossible that two phonemically distinct voiceless palatal sibilants, differing in some phonetic feature, could have coexisted for a time.

57. Affrication of *d and *dʸ.

Pre-PT *d and *dʸ were affricated to *dᶻ and *dᶻʸ, except (apparently) when they were followed by consonants. The history of the loanword TB *witsako* 'root' shows that the affrication occurred after palatalization had become phonemic. 'Root' must have been borrowed from a form very similar to pre-Proto-Ossetic *wēdāga (Iron *wídag*, Digor *yedagä;* see Miller 1903:25 and Winter 1971:222 with bibliography). That it was borrowed with a nonpalatalized *w in spite of the following front vowel shows that at the time of the borrowing palatalization had already run its course. The subsequent history of the word was approximately as follows:

*wẹdəga- > *wẹdᶻəga- > PT *wẹtˢəka- (see **62**) > TB /witˢəka-/, nom. sg. *witsako*.

(For a more detailed discussion of this example see Ringe 1991a:109-10.)

It is true (as Jay Jasanoff reminds me) that this is a very narrow base on which to build an inference about the relative chronology of sound changes; but the nature of the case is such that ONLY words which entered the language from outside after palatalization had become phonemic could reveal the chronology posited here, and it happens that relatively few pre-PT borrowings can be identified. One might try to argue that 'root' was borrowed with a nonfront vowel in its initial syllable, but the only plausible candidate would be the diphthong *ay (the PIr. ancestor of the *ē in *wēdāga), which was not monophthongized in PT, nor in TB. The only viable alternative is to reject the evidence of TB *witsako* and profess agnosticism about the reason for its nonpalatalized *w*, and I do not see that such a course is preferable.

Other examples of this affrication include the following:

PIE *déḱmt 'ten' (see **16**) > *dékə > *dʸə́kə > *dᶻʸə́kə > PT *ś́əkə > TB *śak*, TA *śäk;*

PIE *demx- ~ *dmx- 'build' (see **14**) > *dema- ~ *dəm- >⟶ *dᶻəma- > PT *tˢəma- 'grow' in TB 3pl. pres. *tsmentär*, subj. *tsmāntär*, TA pret. ptc. *tsmo* (Winter 1962b:26-7; cf. Pedersen 1944:21 fn. 1);

PIE *dewx- ~ *dux- 'fit together' (see **12**, note 1) > *dewa- ~ *dū- >⟶ *dᶻəwa- > PT *tˢuwa- 'fit (intrans.)' in TB pres. 3sg. *tswetär*, TA pres. or subj. 3sg. *tswātär* (Krause 1961a:265-6);

PIE *der- ~ *dr- 'split' (see **46**) > *der- ~ *dər- >⟶ *dᶻər- > PT *tˢər-a- 'be separated' in TB pres. 1sg. *tsremar*, TA pret. ptc. *tsro;*

PIE *dʰeyǵʰ- 'form (out of clay)' (see **19**) > *deygʰ- > *deykʰ- (see **20**) >⟶ *dᶻəykʰ- > PT *tˢik-a- in TB gerundive *tsikale* 'should be made'; ablauting pret. ptc. *tˢatˢáykawə > TA *tsātseku* (with remodelled ending), TB fem. pl. *(tsa)tsaikau(wa);*

PIE *dʰegʷʰ- 'burn' (see **19**) > *degʷʰ- > *dekʷʰ- (see **20**) >⟶ *dᶻəkʷʰ- > *tˢəkʷ- → PT *tˢək- (see **59** and **A14**) in pres. 3sg. mp. TB *tsakṣträ*, TA *tsäknäṣtär.*

See **58** for the subsequent history of palatalized *dᶻʸ.

Note the lack of affrication before consonants in at least the following examples:

PIE pres. *ked-né-x- (or *ḱed-né-x-) 'strew, spread' (see **14**) >⟶ *kədná- (with *d restored by analogy, see **27**; cf. **41** on the ablaut of the suffix) > PT *kətná- in TB pres. 3sg. *katnaṃ* 'it strews', whence unaffricated *d (or *t after devoicing, see **62**) must have been introduced analogically in PT *kətówə 'sown' > TB *ktau*, TA *kto-r-äṣ* 'having sown', etc. (Van Windekens 1963:464-5);

PIE *ǵʰod-mVr- 'dung' (see **16**) > *kʰə́dmVr- > PT *kënmër- (or *kënmʸer-; Calvert Watkins, p.c.) > TB *kenmer* (K. Schmidt 1980:409; see also the discussion in **27**);

PIE *nud- 'push' (see **27**) + pres. *-sḱé/ó- >⟶ *nətsk- > PT *nətk-a-, e.g. in pret. ptc. *nətkówə > TB *nätkau* 'prompted' (Jasanoff 1975:111, Melchert 1977: 123-4).

A possible fourth example is 'tongue', on which see the discussion in **18**. It is not clear that all these forms still contained *d when affrication occurred; on the contrary, it is likely that *d had already been devoiced in 'prompt' and nasalized in 'dung'. But at least the shape of 'strew, sow' (and perhaps 'tongue') is best explained by the hypothesis that affrication of voiced dentals was restricted to prevocalic position.

58. Deaffrication of palatalized affricates.

Though nonpalatalized *tˢ and *dᶻ remained affricates, palatalized *dᶻʸ (and perhaps *tˢʸ, if such a consonant existed; see **34** and **46**) lost its stop component and became a fricative. If devoicing of obstruents (see **62**) had not yet occurred, the change was *dᶻʸ > *ź; if devoicing preceded deaffrication, *dᶻʸ passed through a stage *tˢʸ in the course of its development into PT *ś. In either case, the PT reflex of palatalized *dʸ is the palatal sibilant *ś, which functioned synchronically as the palatalized sound corresponding to PT *tˢ.

Unfortunately there is only one certain example with a PIE pedigree:

PIE *déḱmt 'ten' (see **16**) > *dékə > *dʸə́kə > *dᶻʸə́kə > PT *ś́əkə > TB *śak*, TA *śäk.*

A further possible example is

TB *śuke*, TA *śuk* 'juice, taste, savor' < PT *śukë < (?) *dʸəwkë (root PIE *dewk- 'draw') or *dʸəwkʰë (root PIE *dʰewgʰ- 'produce (milk)'); see **19** with fn. 1 and cf. Krause and Thomas 1960:64.

Examples of PT *ś < (originally voiceless) *tˢʸ with a PIE pedigree do not seem to exist.

The alternation *tˢ ~ *ś survives only in TA (Krause and Thomas 1960:63-4); typical examples are the following:

TA pres. 3pl. *śamantär* 'they grow', pret. ptc. *tsmo* (but TB *tsmentär*, with zero-grade root like ptc. *tsmau*);

TA caus. pret. 2sg. *śaśrāṣt* 'you separated', inf. *tsrässi* (but TB *tsyārasta*, with contraction (see **B27**) and non-palatalized initial like pres. 3sg. *tsarästär*);

TA s-pret. 3pl. *śepär* 'they danced', pres. 3pl. *tsipiñc* (TB pres. ptc. *tsipamane*, pret. not attested);

TA dual *klošäṃ* 'ears', sg. *[k]los* for **klots* (but TB *klautsne*, *klausane* for **klautsane* like sg. *klautso*).

It is possible that PT *tˢ with secondary (analogical) palatalization appears in TB imperative *ptsilpär-ñ* 'release me' (root /tˢəlpa-/) and *tsirauñe* 'strength' (TA *tsraṣṣune*); see **B11**.

59. The development of palatalized dorsals.

Palatalized velars and palatalized labiovelars merged. Apparently they became palatal affricates; subsequently the affricates became fricatives (as also in **58**). The exact chronology of these changes is unclear, and it is also unclear at what point in the sequence the devoicing of obstruents occurred. In other words, the development could have been

*kʷʸ > *kʸ, then *kʸ > *čʸ (= *tˢʸ in **58**?) > *ś > PT *ś (so also the aspirates, if they still survived—see **63**);

*gʷʸ > *gʸ, then *gʸ > *ǰʸ (= *dᶻʸ in **58**?) > *ź > PT *ś.

Alternatively, it could have been

*kʸ > *čʸ and *kʷʸ > *čʷʸ, then *čʷʸ > *čʸ etc.;

*gʸ > *ǰʸ and *gʷʸ > *ǰʷʸ, then *ǰʷʸ > *ǰʸ etc.

Delabialization might not have occurred until the fricative stage had been reached; and obstruent devoicing could have occurred at virtually any point in any of the possible sequences of changes.

The PT result was *ś. Examples of etymological (palatals and) velars are fairly numerous:

PIE *ḱēruos 'stag-hunter' (see **22**) > *kēruwë > *kʸēruwë > PT *śeruwë 'hunter' > TB *śerwe*, obl. *śeruwe-ṃ* 255a7, TA *śaru* (Jasanoff apud Nussbaum 1986:8);

PIE aor.subj. *léwk-e- 'shine' (see **46**) > *lʸewkʸe- > PT trans. subj. *lʸuśə- in TB inf. *lyuśsi;*

PIE aor. *kedx- (or *ḱedx-) 'strew, spread' (see **14**, and note that the PIE nasal-infixed present of this verb implies the existence of a root aorist) > *keda- > *kʸeda- >→ PT pret. *śəta- (see **57**) > TB /śəta-/ in 2sg. *śtasta*, 3pl. *śtare* (w. dialect; Van Windekens 1963:464-5);

PIE *xégeti 'is driving' (see **16** and **33**) > *ágesi ~ *áget > *ágʸesʸi ~ *ágʸe > PT *aśəṣə ~ *aśə 'is leading' > TB *āśä-ṃ;* PIE passive *xégetor (Lat. *agitur*) > *ágʸetur > PT *aśətər > TA *āśträ;*

PIE *ǵenu- 'jaw' (see **35**), possibly lengthened-grade *ǵēnu- in PT dual *śenüwʸe-në > TA *śanweṃ;*

PIE *gʰebʰal- or *ǵʰebʰal- 'head' (see **46**) > *gebʰal- > *gʸepʰal- > PT *śəpal- > TA *śpāl*, also in TB *śpālmeṃ* 'excellent';

PIE *ǵʰew- 'pour' (see **16**) in post-PIE s-aor. *ǵʰēw-s- > *kʰēws- > *kʰʸēws- > PT *śews- in 3sg. *śéwsa > TA *śosā-ṃ* 'he poured (water) for him' (Couvreur 1947:78);

PIE aor. subj. *légʰeti '(s)he will lie down' (see **46**) > *lékʰesi ~ *lékʰe > *lʸékʰʸesʸi ~ *lʸékʰʸe > PT pres. *lʸəśəṣə ~ *lʸəśə '(s)he lies' > TB *lyaśä-ṃ.*

There are also a fair number of labiovelar examples:

PIE *kʷetwóres masc. 'four' (see **32**) > *kʷetwére > *kʷʸetwérʸe > PT *śətwérʸə > TB *śtwer*, TA *śtwar;*

PIE *xʷkʷíḱ 'two eyes' (see **46**) >→ *okʷíḱ > *okʷí? or → *okʷé? (see **11**); in either case > *ëkʷʸV > PT *ëśə > TB *eś* (Winter 1962a:115, 129);

PIE *gʷḗn 'woman' (see **46**) → *gʷenā́ > *gʷená > *gʷʸená > PT *śəná > TB *śana*, TA *śäṃ;*

PIE aor. subj. 3sg. *gʷémeti '(s)he will step' (see **46**) > *gʷémesi ~ *gʷéme > *gʷʸémʸesʸi ~ *gʷʸémʸe > PT *śəmʸəṣə ~ *śəmʸə '(s)he will come' > TA *śmäṣ* but >→ TB *śam-n* (prevocalic, in verse);

PIE *gʷʰermos 'heat' or 'hot' (see **46**) > *kʷʰermë > *kʷʰʸermë > PT *śərmë apparently in TA *śärme* 'heat (of summer)' (but TA *-e* cannot reflect PT *-ë; loanword from TB?).

Good examples of these consonants after nasals seem to survive only in TB:

PIE *xŋḱ-iḱ- aor. opt. 'would reach' (?; see **6**, note 1) > *ëńʸkʸī- > PT *ëñśi- in TB 3sg. *eñcīträ* 'would grasp';

PIE *pénkʷe 'five' (see **46**) > *pʸéńkʷʸe > PT *pʸəñśə > TB *piś* (see **B12** on the loss of the nasal).

The palatalized cluster *sʸkʸ appears in PT as *ṣṣ. In effect there is one example, the sk-suffix of numerous PT presents and subjunctives:

PIE pres. 3sg. *-skḗ-ti (see **47**) > *-skesi ~ *-ske > *-sʸkʸesʸi ~ *-sʸkʸe > PT pres. class IX, X, XI 3sg. *-ṣṣəṣə ~ *-ṣṣə > TA *-ṣəṣ > *-ṣ*, >→ TB *-ṣṣä-ṃ*, e.g. in PT *ayṣṣəṣə ~ *ayṣṣə '(s)he gives' > TA *āyṣəṣ > *eṣ*, TB *aiṣṣä-ṃ.*

The exact sequence of changes in this development is unclear. It looks as though *s^y lost its palatal articulation not only before vowels and sonorant consonants, but also before some stops (see **56**); thus the sequence of changes might have been approximately *s^yk^y > *$šk^y$ > *$šč$ > *$šš$ (i.e. PT "*$ṣṣ$"; see **56** on the phonetic nature of the sibilant "*$ṣ$"). On the other hand, it is also possible that *s^y remained palatal before *k^y until this cluster became a geminate consonant, in which case a development such as *s^yk^y > *$s^yč^y$ > *s^ys^y > "*$ṣṣ$" must be hypothesized. If the latter scenario is the correct one, it seems likely that *s^ys^y > *$ṣṣ$ and *s^y > *$ṣ$ occurred simultaneously; presumably the reflexes of *k^y (in other positions), *k^{wy}, *d^y, etc. were all still affricates at that time, since they did not cease to be palatal.

The merger of palatalized velars and labiovelars had important consequences for the history of two verb roots. PIE *pek^w- 'cook' and *d^heg^{wh}- 'burn' appear in PT not as the expected "*pək^w-" and "*$t^sək^w$-" (see **16**, **19**, **46**, and **55**), but as *pək- and *$t^sək$-. The loss of labialization in the final consonants of these roots is unparalleled and does not appear to be the result of regular sound change (see note 1); rather, it appears that the alternation *k$^{(h)w}$ ~ *$ś$ was analogically replaced by *k$^{(h)}$ ~ *$ś$ within or immediately before the PT period:

PIE *d^heg^{wh}- 'burn' (see **19**) > *deg^{wh}- > *$d^{zy}ək^{wh}$- ~ *$d^{zy}ək^{why}$- → *$d^zək^{wh}$- ~ *$d^zək^{why}$- (with analogical depalatalization of the initial consonant, see **55**) > *$t^sək^w$- ~ *$t^səś$- → PT *$t^sək$- ~ *$t^səś$- in pres. 3sg. TB *tsakṣträ*, TA *tsäknäṣtär* 'it burns (intr.)', etc., but TB opt. *tsśīträ* 'it would burn';

PIE *pek^w- 'cook' (pres. 3sg. *pék^{w}eti > Skt. *pácati*, Lat. *coquit*) > *p^yek^w- ~ *p^yek^{wy}- >→ *pək^w- ~ *pəś- (analogical depalatalization) → PT *pək- ~ *pəś- in pres. 3sg. TB *pakṣträ*, TA *päknäṣtr-äṃ* 'it ripens'.

The "pivot" of this analogical change can only have been palatal *ś*, in which the palatalization product of all dorsals was neutralized; yet the scarcity of forms exhibiting root-final *ś* in the attested paradigms of these verbs is very striking. It seems clear that such an analogical change could not have occurred in the Tocharian paradigms as we find them. However, note that PIE simple thematic presents are reconstructable for both these verbs. If those presents survived until palatalization had run its course and the reflexes of palatalized velars and labiovelars had merged, they would have included examples of pre-PT *ś in salient forms, especially in the 3sg.:

PIE *$d^hég^{wh}$-e-ti '(s)he is burning it', mid. *$d^hég^{wh}$-e-tor 'it is burning' (Skt. *dáhati, dáhate*) > *$d^yék^{why}esyi$ ~ *$d^yék^{why}e$, *$d^yék^{why}etur$ >→ pre-PT *$t^səśəṣə$ ~ *$t^səśə$, *$t^səśətər$;

PIE *pék^w-e-ti '(s)he is cooking it', mid. *pék^w-e-tor 'it is cooking' (Lat. *coquit, coquitur*) > *$p^yék^{wy}esyi$ ~ *$p^yék^{wy}e$, *$p^yék^{wy}etur$ >→ pre-PT *$pəśəṣə$ ~ *$pəśə$, *$pəśətər$.

This creates a reasonably strong presumption that the PIE presents of these verbs survived in some function (perhaps as subjunctives?) until shortly before the PT period.

Notes.

1. Jay Jasanoff (p.c.) suggests that we should account for this lack of rounding by positing delabialization of labiovelars before *s. This will work for such cases as TA *luksamāṃ* 'shining', which can contain PT *u (as an analogical zero-grade; see **53**, and cf. TB *lukṣäṃ* 'it illuminates'), but not for TA *$l_uku_ṣ$* ~ *$l_ukä_ṣ$* 'it illuminates', which clearly contains pre-TA *ŭk < PT *ək^w before *$ṣ$ < *s^y < *s (see **A14**). The analysis given above therefore seems preferable.

60. Affrication of *t^y.

Palatalized *t^y (and *t^{hy}, if the two voiceless dentals had not merged; see **63**) was also affricated, but did not subsequently become a fricative; it appears in PT as the palatal affricate *c. Note the following examples:

PIE *ték^{w}os '(act of) running' (see **16**) > *tékwë > *$t^yék^wë$ > PT *cák^{w}ë 'river' > TB *cake* (Van Windekens 1976:249);

PIE *pxtḗr 'father' (see **3**) > *patḗr > *$pat^yḗr$ > PT *pacér > TB *pācer*, TA *pācar* (so also other kinship terms; see **14** and **42**);

PIE nom. pl. masc. *tritṓs 'third ones' (see **35**) → *tritóy > *tritḗ > *$tr^yit^yḗ$ > *$tr^yəcḗ$ > PT *$tr^yicḗ$ (?; see **65**) > TB *trici*, TA *trice;*

(post-)PIE aor. inj. *$ǵlud^hét$ '(s)he arrived' (see **5**) > *$lut^hé$ > *$lut^hyé$ > PT *ləcá '(s)he went out' > TB *lac*, TA *läc* (Cowgill apud Winter 1962b:22 with fn. 3);

PIE *$d^heǵ$-s- 'put' (see **46**) in post-PIE s-aor. *$d^hēǵ$-s- > *$t^hēs$- > *$t^hyēs$- > PT pret. *ces- in 3pl. *césrə > TA *casär* (but the initial of TB *tesar* has been depalatalized);

PIE *pántes nom. pl. masc. 'all' (see **32**) > *pónte > *$pón^yt^ye$ > PT *póñcə > TB *poñc*, TA *poñś;*

PIE *xster- 'star' (see **5**) > *ster- > *s^yt^yer- > PT *ścər- in pl. *$ścər^yeñə$ > TB *ściriñ*, TA *śreñ;*

PIE *ster- 'hard' (see **47**) > *s^yt^yer- > PT *ścər-ḗ > TB *ścire;*

PIE aor. inj. 3sg. *stémb^{h}Xt '(s)he propped' (see **14**) > *$s^yt^yéma$ > PT pret. 3sg. *ścáma '(s)he stood' > TB *śama, ścmā-c*, TA *śäm, śmā-ṃ* (etymology in Van Windekens 1976:463-4);

PIE acc. *mustím 'fist' (see **22**) > *$mus^ytʸí$ > PT *məścə́ > TB obl. *maś(c)-*, cf. nom. sg. *maśce* (*mäṣce* 142a3, *maśśe* 152b1; Pisani 1965:316);

PIE *psténos 'breast' (see **31**) > *$pəs^yt^yénë$ > (pre-)PT *pəścánë; PT dual *pəścánë-në (?) > *pəścánë > TB *päścane*, TA *päśśäṃ* (Duchesne-Guillemin 1940: 169).

Apparently the affrication of *t^y did not occur until the palatal affricates discussed in **58** and **59** had become fricatives (or at least were in the process of doing so); it seems much less likely that a *$č^y{}_1$ (< *k^y and *k^{wy}) and a *$č^y{}_2$ (< *t^y) coexisted for an appreciable period of time.

There is no clear evidence that palatalized *s^y ever lost its palatal articulation when it was followed by palatalized *t^y (see **56**).

61. *ml > *bl.

Apparently the labial nasal *m was denasalized to *b before liquids, or at least before *l, to judge from the following example:

PIE *mlewX- ~ *mluX- 'talk' or the like (see **13**) > *ml^yəwa- ~ *mlū- >⟶ *mlu-a- > *blua- > *pluwa- > PT *pəlwa- (see **65**) > TB /pəlwa-/ 'lament', e.g. in pres. ptc. *pälwāmane* (K. Schmidt 1982:365).

This would most naturally have occurred before obstruent devoicing (see **62**), since *ml > *pl seems less probable phonetically; it must have occurred before metathesis in /Cluw-/ sequences (see **65**), which would have separated the *m from the *l.

62. Devoicing of obstruents.

All voiced obstruents became voiceless, at least on the phonemic level. In other words:

*b g g^w > *p k k^w respectively, and likewise *b^y (if any existed) > *p^y;

*d^z (see **57**) > *t^s;

*d^{zy} or *ź (see **58**) > *t^{sy} or *ś, ultimately PT *ś;

whatever the reflex of *g^y and *g^{wy} was at this stage (see **59**), it was devoiced, ultimately giving PT *ś.

For examples of *d^z and the palatalized sounds see the sections just cited; for examples of nonpalatalized *g see **16**. Typical examples of *b and *g^w are:

PIE *d^hubrós 'deep' (see **46**) > *t^hubrə́ > PT *təprə́ 'high' > TB *tapre*, TA *tpär* (Krause 1958:54);

PIE *b^hāǵ^{h}u- 'arm' (see **16**) > *bāg^{h}u- > *bōk^{h}u- (see **20**) > PT *pok- in TB obl. *pokai*, TA *poke*;

PIE *b^hŗǵ^{h}rós 'lofty, tall' (see **16**) > *bərg^{h}rós > *bərk^{h}rə́ (see **20**) > PT *pərkrə́ 'long' > TB *pärkare*, TA *pärkär*;

PIE zero-grade *g^wm- 'step, go, come' (see **46**) > *g^wəm- > PT *k^wəm- > TB /kəm-/, TA *kum-* ~ *kn-*, e.g. in pres. 3sg. PT *k^wəmnəṣṣəṣə ~ *k^wəmnəṣṣə > TA *kumnäṣ*, TB *känmaṣṣä-ṃ*;

PIE *g^wŗxwón- 'millstone' (see **8**) > *g^wərwə́n- > PT *k^wərwə́n- in TB *kärweñe* 'stone' (Van Windekens 1960:39-40);

PIE *g^wroxmVr- 'heavy load' (see **3**) > *g^wrōmVr- > PT *k^wramər > TB *krämär* 'burden' (cf. Schindler 1972:149);

PIE *(ǵ)ŗg^wónt- 'dark' (see **6**) > *ərg^{w}ə́nt- > PT *ërk^{w}ə́nt- 'black' in TB obl. [illegible] TA nom. pl. masc. *arkaś* (Krause and Thomas 1960:57, 66);

PIE *lugrós 'mournful, sad' (← *'broken'; see **50** with note 1) >⟶ *luglə́ > *ləg^{w}lə́ > PT *lək^{w}lə́ 'pain, suffering' > TB *lakle*.

63. Deaspiration.

All aspirated consonants lost their aspiration at some time after the devoicing of aspirates but before the PT period. There is no way to determine the date of this change more closely; all the changes that affect voiceless stops (*-ti > *-si and *t^y > *t^s, see **34**; palatalization and subsequent changes of palatalized consonants, see **46** through **48** and the earlier sections of this chapter) could have affected aspirates either before or after their deaspiration. (If a general deaspiration did not occur until after the other changes had run their course, those changes that created affricates or fricatives were probably accompanied by automatic deaspiration—at least, that seems likeliest phonetically.) Typical examples are the following:

PIE *b^hágos 'share' (see **16**) > *p^hágë > PT *pákë 'part' > TB *pāke*, TA *pāk* (Van Windekens 1941:87);

PIE *b^hŗg- 'burn, flare' (see **16**) > *p^həlg- > PT *pəlk- in TB intrans. 3sg. *pälketär*, TA trans. inf. *pälkässi*;

PIE *b^hréxtēr 'brother' (see **3**) > *p^hrə́t^{y}ēr > PT *prócer > TB *procer*, TA *pracar*;

PIE *x^wb^hruX- 'eyebrow' (see **5**) >⟶ *p^hrua- (see **13**) > PT *pərwa- (see **65**) > in dual *pərwa-në > TB *pärwā-ne*, TA *pärwā-ṃ*;

PIE *web^{h}X- ~ *ub^{h}X- ~ *wob^{h}X- 'weave' (see **14**) > *w^{y}əp^{h}a- ~ *wəp^{h}a- ~ *wëp^{h}a- >⟶ PT *wəpa- ~ *wapa- in TB inf. *wāpatsi*, pret. ptc. *(wa)wāpau*, TA pres. 3pl. *wpanträ* (?) (Couvreur 1947:9);

PIE *g^{h}eb^{h}al- or *ǵ^{h}eb^{h}al- 'head' (see **46**) > *geb^{h}al- > *g^yep^{h}al- > PT *śəpal- > TA *śpāl*, also in TB *śpālmeṃ* 'excellent';

PIE *d^hugxtə́r 'daughter' (see **14**) > *t^hugat^{y}ə́r > PT *təkacér > TB *tkācer*, TA *ckācar*;

PIE *d^hoXnéx 'grain' (see **40**) > *t^hānə́ > PT *taná- > TB *tāno*, pl. *tanāñ*;

PIE *d^hubrós 'deep, concave' (see **46**) > *t^hubrə́ > PT *təprə́ 'high' > TB *tapre*, TA *tpär* (Krause 1958:54);

PIE *d^hux- 'smoke' (see **22**) > *t^hu-V... > PT *t(u)wëyë 'dust' > TB *tweye*, TA *twe* (cf. Lane 1938:33);

PIE *ǵrud^{h}rós 'red' (see **5**) > *rut^{h}rə́ > PT *rətrə́ > TB *ratre*, TA *rtär*;

PIE *méd^{h}u neut. 'sweet; honey, mead' (see **46**) > *mét^{h}u > PT *m^{y}śtə 'honey' > TB *mit*;

PIE *ǵ^{h}ew- ~ *ǵ^{h}u- 'pour' (see **16**) >⟶ *k^{h}əw- > PT *ku-, e.g. in TB *kuṣän-* '(s)he is pouring', TA *kuṣā-* '(s)he was pouring' (Couvreur 1947:78);

PIE *ǵ^{h}od-mVr- 'dung' (see **16**) > *k^{h}ədmVr- > PT *kënmër- (or *k[illegible]mVr- Calvert Watkins (p.c.)) > TB *kenmer* (K. Schmidt 1980:409);

PIE *dʰéǵʰōm acc. 'earth' (see **16**) → *dʰǵʰómm̥ >→ *dʰgʰónən > *t(ʰ)kʰéne > PT *tkéne > TB *keṃ*, TA *tkaṃ* (nom. and obl.);

PIE *bʰāǵʰu- 'arm' (see **16**) > *bāgʰu- > *bōkʰu- > PT *pok- in TB obl. *pokai*, TA *poke;*

PIE *weǵʰ-nó- 'cart-road' or the like (see **16**) > *wekʰné > PT *wʸəkné 'way' > TB *yakne*, TA *wkäṃ;*

PIE *bʰr̥ǵʰrós 'lofty, tall' (see **16**) > *bərgʰrós > *bərkʰré > PT *pərkré 'long' > TB *pärkare*, TA *pärkär;*

PIE *gʰréwr̥ 'horn' (see **16**) > *kʰr̥éwər > *kʰr̥ʸéwər > *krʸéwər > PT *krʸóṛ 'crescent' in TB obl. *krorīyai*, TA *kror* (Hilmarsson 1985);

PIE *xʷnogʰ- 'fingernail, claw' (see **5**) > *nëkʰ- → *nëkʰu- >→ PT pl. *mëkuwa 'fingernails' > TB *mekwa*, TA *maku* (Krause 1951b:203, 1956:196);

PIE zero-grade *gʷʰn̥- ~ *gʷʰn- 'smite' (see **46**) > *kʷʰ(ə)n- > PT *kʷ(ə)n- in TA *kᵤñaś* 'quarrel, strife' (Van Windekens 1941:48);

PIE *ḱln̥gʷʰ- 'light' (see **5**) > *lənkʷʰ- (or *lənʷ-?; see **17**) > PT *lən(k)ʷ- > TB *lañktse, lañtse*, obl. *lañwce*, pl. *lärikᵤci* (Van Windekens 1941:54).

Chapter 10. Late sound changes.

I include here changes which clearly presuppose the general restructuring of the Tocharian vowel and consonant systems discussed in the last three chapters, as well as pre-PT changes which can be shown to be relatively late on various grounds. At the end of this chapter is a brief description of the sound system of PT.

64. Loss of intervocalic *w and contraction of adjacent vowels.

In a large class of cases intervocalic *w was lost and the adjacent vowels underwent contraction; the result was a round vowel if one of the vowels was *ə, but *awë > *a and *ëwë > *ë (Þórhallsdóttir 1988:203). The conditions under which these changes occurred will be discussed below; the details of the process—e.g., exactly how loss of *w and vowel rounding interacted—do not seem to be recoverable. This complex of changes was first explored in Þórhallsdóttir 1988; see also Winter 1988 and Ringe 1989.

Numerous examples of these changes can be found in preterite participles, nouns in *-wër and *-wər, adjectives in *-wənt-, and reduplicating syllables; many have been obscured by analogy in one language or the other. The following are typical:

pre-PT *tëtémuwə 'born' (TB *tetemu*, TA *tatmu*): nom. pl. masc. *tëtémuwëṣə > PT *tëtémoṣə (or *tëtémoṣə?) > TB *tetemoṣ* (but TA *tatmuṣ* has *-u-* by analogy with the nom. sg.);

pre-PT *kʷëkʷəmuwër '(act of) coming' (on the ablaut of the suffix see Þórhallsdóttir 1988:193) > PT *kʷëkʷəmor (*-o̯r?) > TB *kekamor* 'arrival' (but TA *kakmur-äṣ* 'having come' has *-u-* by analogy with the ptc. *kakmu*);

pre-PT *spëltkëssuwə 'zealous' (TB *spelkessu*, TA *spaltkasū*): obl. sg. masc. *spëltkëssuwëntə > PT *spëltkëssontə (*-o̯ntə?) > TB *spelkessont* (but TA *spaltkasunt*—cf. *äkärnunt* 'tearful'—has *-u-* by analogy with the nom. sg.);

pre-PT *klʸuwëmo 'famous' (see **4** and **16**) > PT *klʸomo (*klʸo̯mo?) 'noble' > TB *klyomo*, TA *klyom;*

pre-PT iptv. *pə-wëkʷ-ññə 'say!' (Ringe 1989:44 fn. 19; see **52** and **68**) > *puwëññə > PT *poññə (*po̯ññə?) > TB *poñ*, TA *poyñə > *poyn > *peṃ* (see **A10** and **A11**);

PIE *gʰréwr̥ 'horn' (see **16**) > *krʸéwər > PT *krʸóṛ 'crescent' > TA *kror*, TB obl. *kror-īyai* (Hilmarsson 1985);

PIE *snéx̑wr̥ or *snéwr̥ 'sinew' (see **47**) > *ṣñéwər > PT *ṣño̯ṛ > TB *ṣñor;*

We also have no reason to suppose that *w or *wʸ was lost after *y, but there is no proof either way, since the only clear examples are followed by word-final vowels:

PIE *moywos 'little' (see **35**) > PT *mëywë > TB *maiwe* 'young' (Lane 1938:24);

post-PIE *suywes nom. pl. 'sons' (see **25**) > *soywes > PT *sëywʸə > TA *sew → *sewāñ*.

Finally, we must reckon with widespread analogical restoration of intervocalic *w* in paradigms (e.g. in that of the verb 'live').

PT *klʸomo (*klʸǫmo?) 'noble' shows that the loss of intervocalic *w must have occurred before liquid metathesis (see **65**), since the *w of its pre-PT etymon *klʸuwëmo would no longer have been intervocalic after metathesis occurred. The exceptions listed under (b) above suggest that the loss of *w followed the general change of *əw to *uw (see **52**), since it seems more likely on phonetic grounds that accented *ú would have inhibited the loss of a following *w than that accented *ś would have done so. It follows that the change of *əw to *uw probably occurred before liquid metathesis—and that is interesting, because in that sound change the *u of *uw certainly behaved like any other underlying */ə/ (cf. the remarks in **52**).

65. Liquid metathesis and the problem of 'third'.

Sequences of the shape *CRəCV-, where *R is *r, *rʸ, *l, or *lʸ, underwent metathesis to *CəRCV-. Note the following examples:

PIE *klep- 'steal' (see **16**) > *klʸəp- > PT *kəlʸp- in TB inf. *kälypītsi* (Van Windekens 1960:39);

PIE *ḱléwos 'fame' (see **16**) > *klʸə́wë > *klʸúwë (= */klʸə́wë/) > PT *-kəlʸwë 'fame' in TB *ñem-kälywe*, TA *ñom-klyu* (TB *ñem*, TA *ñom* 'name'; the second element of the compound has been destressed, at least in TB and perhaps in PT);

PIE zero-grade *ḱli- 'lean' (see **35** and **47**) in nominal deriv. *ḱli-m... > *klim- > *klʸim- > *klʸəm- > PT *kəlʸm- in *kəlʸmǫye 'direction' > TB *kälymiye*, TA *kälyme* (Schneider 1940:204);

PIE zero-grade mid. root-aor. *ḱli- 'lean' (cf. Skt. act. aor. 3sg. *áśret*, 3pl. *áśriyan* 'direct towards, lay on', Gk. pass. aor. ἐκλίθη 'it tipped') > *klʸə- > *kəlʸ-, or possibly post-PIE thematized (subjunctive?) *ḱli-e- > *klʸiye- > *klʸiyə- (= */klʸəyə-/) > *kəlʸyə-, in PT pres. 3sg. *kəlʸ(lʸ)ətər 'it stands' > TB *kalträ*, TA *kälytär* (etymology in Van Windekens 1941:33). This present had become thematic by the PT period; it is not clear how early that thematization occurred, and in general the details of this stem's development are not completely recoverable.

PIE *mlewX- ~ *mluX- 'speak' (see **13**) > *mlʸuwa- ~ *mlū- >→ *bluwa > *pluwa- > PT *pəlwa- > TB /pəlwa-/ 'lament' in pres. 3sg. *palwaṃ* (K. Schmidt 1982:365);

PIE *xʷbʰruX- 'eyebrow' (see **5** and **13**) > *phrū- >→ *pruwa- > PT *pərwa- in dual *pərwanë > TB *pärwäne*, TA *pärwāṃ;*

PIE *kʷrix- 'buy' (see **9**) > *kʷria- > *kʷrʸiya- > PT *kʷərʸya- > TB /kərya-/, e.g. in pret. 1pl. *käryāmte* 'we bought' (K. Schmidt 1982:364-5);

post-PIE derived noun *kʷrix-wr̥ (see **9** and **64**) > *kʷriawər > *kʷrʸiyor > PT *kʷərʸyor 'trade' (Þórhallsdóttir 1988:193-4) > TB *karyor*, TA *kuryar;*

PIE *tríx neut. 'three' (see **9**) > *tria > *trʸiya > PT *tərʸya fem. 'three' > TB *tarya*, TA *təry > *tərəy > *trəy > *tri* (see **A8**, **A16**, and **A20**);

PIE *tríx (d)ḱṓmt 'three tens' (see **9**) > *triakā > *trʸiyaka > PT *tərʸyaka 'thirty' > TB *täryāka* (Schindler 1967b:240);

pre-PT *rətrʸ-iya fem. 'red' > PT *rətərʸya > TB *rtarya*, TA gen. sg. *rtäry-e;* the masc. is TB *ratre*, TA *rtär* < PT *rətrḗ < PIE *ǵrudʰrós (see **5**).

Note that all *i before *y, and all *u before *w, behave like *ə in this change, showing that they were underlyingly */ə/ (cf. **52**).

Most forms which do not exhibit metathesis, such as TB *pluwälyñe* 'vacillation' (*plu(w)- = /pləw-/ 'swing'), are evidently the result of paradigmatic analogy (Schindler 1967b:242). However, there is one lexeme which appears to be a genuine counterexample to the sound change posited here:

PIE *tritós 'third' (see **47** and **50**; cf. also **35**, **46**, and **60**) > *trʸitḗ > *trʸətḗ (see **50**) > PT *trʸitḗ (?) > TB *trite*, TA *trit* (cf. Martinet 1974:130).

It seems possible that the sequence *rʸə between consonants had become *rʸi in PT before liquid metathesis occurred, effectively blocking the latter change. But this is the only potential example of such a change; word-final *rʸə clearly was not affected—cf. TB *śtwer*, TA *śtwar* masc. 'four' < PT *śətwḗrʸə < PIE *kʷetwóres (see **22**)—and the phonemic status of the sequence *rʸiyV = */rʸəyV/ evidently was not altered either (as the examples of metathesis cited above demonstrate). Rather than posit a doubtful sound change to account for this single example, we might prefer the suggestion that PT *trʸitḗ is an analogical remodelling of *trʸiyḗ < PIE *triós (see Penney 1976:83 with references). If that is what actually happened, note that the remodelling must have occurred before liquid metathesis took place; otherwise *trʸiyḗ would have become "*tərʸyḗ", and the result of remodelling could not have been PT *trʸitḗ.

It should be emphasized that the sound change under discussion is best stated as a metathesis. There was no general epenthesis of *ə in initial *CR-clusters; that is demonstrated by the operation of the TB "accent-throwing" rule in PT *prḗtˢakʷa- 'chest' > TB /pratˢáka-/, which could not have occurred if the PT stressed syllable were not word-initial (see **B6**). In other words, *ə was inserted only into those initial *CR-clusters that were already followed by *ə; and I can discover no plausible reason why such clusters should have been broken up ONLY when *ə already followed. But if it makes no sense to posit a development *CRəC- > *CəRəC- > *CəRC-, metathesis is the only alternative.

pre-PT *wëwə́suwə 'having put on (clothing)' (see Ringe 1989) > PT *wósuwə > TA *wasu* (but TB → *wowə́suwə > *wowsuwə (see **B15**) > *owsuwə (see **B21**) > *ausu*);

pre-PT *përnëwə 'worthy' (TB *perne$_u$*, TA *parno*): obl. sg. masc. *përnëwëntə > PT *përnëntə > TB *pernent* (but TA *parnont* probably has *-o-* by analogy with the nom. sg.);

pre-PT *kəlpówə 'having attained' (TB *kälpau*, TA *kälpo*): nom. pl. masc. *kəlpówëṣə > PT *kəlpóṣə > TB *kälpoṣ* (but TA *kälpoṣ* probably has *-o-* by analogy with the nom. sg.);

pre-PT *kəlpówër 'attainment' > PT *kəlpór in TB *kälpormeṃ* 'having attained' (but TA *kälporäṣ* probably has *-o-* by analogy with the ptc.);

pre-PT *k^{w}ər^{y}yawər 'trade' (see **9**; cf. Þórhallsdóttir 1988:193-5 on the identities of the vowels) > PT *k^{w}ər^{y}yor > TB *karyor*, TA *kuryar;*

pre-PT *wëwálawə ptc. 'covered' (TB *wawälau;* the ending of TA *wäwlu* is analogical): nom. pl. masc. *wëwálawëṣə > PT *wawálaṣə (see also **66**) > TB *wawälaṣ* (but TA *wäwluṣ* has *-u-* by analogy with the nom. sg.);

pre-PT *këkámawër 'act of bringing' > PT *kakámar (see also **66**) in TB *kakämarmeṃ* 'having brought' (but TA *käkmuräṣ* has *-u-* by analogy with the ptc. *käkmu*);

pre-PT *tëlnáwə 'poor' (TB *tallä$_u$*, TA *tälo;* derivative of *təlná- 'endure' (see **29**), Duchesne-Guillemin 1940:163): obl. sg. masc. *tëlnáwëntə > PT *tallántə (see also **66**) > TB *tallänt* (but TA **tälont*—cf. fem. pl. *tälont*—has *-o-* by analogy with the nom. sg.);

pre-PT *śawëmanë 'living' (root *śaw- 'live', see **10**) > PT *śamanë > TB *śamäne*, TA *śämäṃ* (Winter 1988).

As the above examples show, the ultimate PT outcomes of the various contractions were as follows:

*uwë > PT *o or *ǫ—we can't tell which, because the only clear TA example, *klyom* 'noble', could exhibit *o* < *ǫ or *o* < *o next to a nonpalatalized labial (see **A4**);

*ewə > PT *ǫ;

*ëwə and *awə > PT *o;

*ëwë > PT *ë; likewise *owë > PT *o, and *awë > PT *a.

It is clear that *w was NOT lost (and therefore no contraction occurred) under at least two conditions:

a) when the vowel following the *w was word-final; cf. the nom. sg. forms in *-Vwə in the list above, which remained unchanged in PT, and also such forms as PT *nëwë 'roar' > TB *newe* (and TA *nawem* with secondary suffix);

b) when the vowel before the *w was stressed *ú.

Compare the following examples:

pre-PT *këkúwër 'act of pouring' (root *ku- 'pour' ←< PIE *ǵ^{h}ew-, see **16**) > PT *këkúwër > TB *kekuwer;*

pre-PT *lətúwëṣə nom. pl. masc. 'having gone out' (root *lət- 'go out' < PIE *ślud^{h}- 'arrive', see **5**) > PT *lətúwëṣə > TB *ltuweṣ;*

pre-PT *nëwṣúwëntə obl. sg. masc. 'earlier' (cf. TB adv. *nauṣ ~ ne$_u$ṣ*) > PT *nëwṣúwëntə > TB *nauṣuwent.*

(On the origin of *u in the preterite participles and adjectives see Þórhallsdóttir 1988: 189-90, 196-7.) Some examples fail to lose *w for both the reasons given above:

PIE *néwos 'new' (see **46**) > PT *ñúwë > TB *ñuwe*, TA *ñu* (Van Windekens 1941:77).

It appears that *w was not dropped in the sequence *uwə, at least to judge from cases like the following:

pre-PT *ñuwəntḗ 'ninth' (see **30**) > PT *ñuwəntḗ > TB *ñunte;*

pre-PT iptv. 2sg. *pu-wərpar 'enjoy!' (root *wərpa-) > PT *puwərpar > TA *purpār*, TB *purpar, purwar* (the latter with *-w-* for *-p-*, see **ix**).

However, in all such cases that have come to my attention there is a plausible source for the reintroduction of *-w- by analogy; in 'ninth', for example, it might have been reintroduced by analogy with 'nine', in which the sequence *uwə was word-final (with stressed *ú) and therefore exempt from these changes (see above):

PIE ǵnéwn̥ 'nine' (see **5**) > PT *ñúwə > TB, TA *ñu.*

Apparently there were some other sequences of vowels between which *w was not lost no matter where the accent fell; such a conclusion seems to be forced by the following example:

PIE *péxwōr coll. 'fire' (see **7**) → *pxuór > PT *puwár > TB *puwar*, TA *por,*

in which pre-PT *uwá (with UNSTRESSED *u) clearly remained unchanged in PT and TB.

Moreover, in spite of the contraction in PT *k^{w}ər^{y}yór 'trade' < *k^{w}ər^{y}yáwər, it is possible that *awə lost its *w and contracted only under some circumstances (e.g. if the second syllable was closed?); in that case TB *śaumo* 'human being', TA *śom* 'young man' might reflect PT and pre-PT *śawəmo, with a stem-vowel *ə that perhaps reflects the expected thematic vowel *e (with analogical depalatalization)—though it is also possible that the word contained no *ə (cf. Winter 1988: 214-5). Probably TB *ṣñaura* 'sinews' (pl. of *ṣñor*) < PT *ṣñewra is not a parallel case; the root-syllable contained *e (not *a), and there is no positive reason to expect any *ə following the *w.

There is no good evidence that palatalized *w^{y} was lost between vowels (see the discussion in Þórhallsdóttir 1988:208 fn. 14).

We also have no reason to suppose that *w or *w^{y} was lost after *y, but there is no proof either way, since the only clear examples are followed by word-final vowels:

PIE *moywos 'little' (see **35**) > PT *mëywë > TB *maiwe* 'young' (Lane 1938:24);

post-PIE *suywes nom. pl. 'sons' (see **25**) > *soywes > PT *sëyw^{y}ə > TA *sew → *sewāñ*.

Finally, we must reckon with widespread analogical restoration of intervocalic *w* in paradigms (e.g. in that of the verb 'live').

PT *kl^{y}omo (*kl^{y}ǫmo?) 'noble' shows that the loss of intervocalic *w must have occurred before liquid metathesis (see **65**), since the *w of its pre-PT etymon *kl^{y}uwëmo would no longer have been intervocalic after metathesis occurred. The exceptions listed under (b) above suggest that the loss of *w followed the general change of *əw to *uw (see **52**), since it seems more likely on phonetic grounds that accented *ú would have inhibited the loss of a following *w than that accented *ə́ would have done so. It follows that the change of *əw to *uw probably occurred before liquid metathesis—and that is interesting, because in that sound change the *u of *uw certainly behaved like any other underlying */ə/ (cf. the remarks in **52**).

65. Liquid metathesis and the problem of 'third'.

Sequences of the shape *CRəCV-, where *R is *r, *r^{y}, *l, or *l^{y}, underwent metathesis to *CəRCV-. Note the following examples:

PIE *klep- 'steal' (see **16**) > *kl^{y}əp- > PT *kəl^{y}p- in TB inf. *kälypūtsi* (Van Windekens 1960:39);

PIE *ḱléwos 'fame' (see **16**) > *kl^{y}ə́wë > *kl^{y}úwë (= */kl^{y}ə́wë/) > PT *-kəl^{y}wë 'fame' in TB *ñem-kälywe*, TA *ñom-klyu* (TB *ñem*, TA *ñom* 'name'; the second element of the compound has been destressed, at least in TB and perhaps in PT);

PIE zero-grade *ḱli- 'lean' (see **35** and **47**) in nominal deriv. *ḱli-m... > *klim- > *kl^{y}im- > *kl^{y}əm- > PT *kəl^{y}m- in *kəl^{y}mǫye 'direction' > TB *kälymiye*, TA *kälyme* (Schneider 1940:204);

PIE zero-grade mid. root-aor. *ḱli- 'lean' (cf. Skt. act. aor. 3sg. *áśret*, 3pl. *áśriyan* 'direct towards, lay on', Gk. pass. aor. ἐκλίθη 'it tipped') > *kl^{y}ə- > *kəl^{y}-, or possibly post-PIE thematized (subjunctive?) *ḱli-e- > *kl^{y}iye- > *kl^{y}iyə- (= */kl^{y}əyə-/) > *kəl^{y}yə-, in PT pres. 3sg. *kəl^{y}(l^{y})ətər 'it stands' > TB *kalträ*, TA *kälytär* (etymology in Van Windekens 1941:33). This present had become thematic by the PT period; it is not clear how early that thematization occurred, and in general the details of this stem's development are not completely recoverable.

PIE *mlewX- ~ *mluX- 'speak' (see **13**) > *ml^{y}uwa- ~ *mlū- >→ *bluwa > *pluwa- > PT *pəlwa- > TB /pəlwa-/ 'lament' in pres. 3sg. *palwaṃ* (K. Schmidt 1982:365);

PIE *x^{w}b^{h}ruX- 'eyebrow' (see **5** and **13**) > *phrū- >→ *pruwa- > PT *pərwa- in dual *pərwanë > TB *pärwāne*, TA *pärwāṃ;*

PIE *k^{w}rix- 'buy' (see **9**) > *k^{w}ria- > *k^{w}r^{y}iya- > PT *k^{w}ər^{y}ya- > TB /kərya-/, e.g. in pret. 1pl. *käryāmte* 'we bought' (K. Schmidt 1982:364-5);

post-PIE derived noun *k^{w}rix-wr̥ (see **9** and **64**) > *k^{w}riawər > *k^{w}r^{y}iyor > PT *k^{w}ər^{y}yor 'trade' (Þórhallsdóttir 1988:193-4) > TB *karyor*, TA *kuryar;*

PIE *tríx neut. 'three' (see **9**) > *tria > *tr^{y}iya > PT *tər^{y}ya fem. 'three' > TB *tarya*, TA *təry* > *tərəy > *trəy > *tri* (see **A8**, **A16**, and **A20**);

PIE *tríx (d)ḱə́mt 'three tens' (see **9**) > *triakā > *tr^{y}iyaka > PT *tər^{y}yaka 'thirty' > TB *täryāka* (Schindler 1967b:240);

pre-PT *rətr^{y}-iya fem. 'red' > PT *rətər^{y}ya > TB *rtarya*, TA gen. sg. *rtäry-e;* the masc. is TB *ratre*, TA *rtär* < PT *rətrə́ < PIE *ǵrud^{h}rós (see **5**).

Note that all *i before *y, and all *u before *w, behave like *ə in this change, showing that they were underlyingly */ə/ (cf. **52**).

Most forms which do not exhibit metathesis, such as TB *pluwälyñe* 'vacillation' (*plu(w)-* = /pləw-/ 'swing'), are evidently the result of paradigmatic analogy (Schindler 1967b:242). However, there is one lexeme which appears to be a genuine counterexample to the sound change posited here:

PIE *tritós 'third' (see **47** and **50**; cf. also **35**, **46**, and **60**) > *tr^{y}ité́ > *tr^{y}ətə́ (see **50**) > PT *tr^{y}ité́ (?) > TB *trite*, TA *trit* (cf. Martinet 1974:130).

It seems possible that the sequence *r^{y}ə between consonants had become *r^{y}i in PT before liquid metathesis occurred, effectively blocking the latter change. But this is the only potential example of such a change; word-final *r^{y}ə clearly was not affected—cf. TB *śtwer*, TA *śtwar* masc. 'four' < PT *śətwə́r^{y}ə < PIE *k^{w}etwóres (see **22**)—and the phonemic status of the sequence *r^{y}iyV = */r^{y}əyV/ evidently was not altered either (as the examples of metathesis cited above demonstrate). Rather than posit a doubtful sound change to account for this single example, we might prefer the suggestion that PT *tr^{y}ité́ is an analogical remodelling of *tr^{y}iyé́ < PIE *tríos (see Penney 1976:83 with references). If that is what actually happened, note that the remodelling must have occurred before liquid metathesis took place; otherwise *tr^{y}iyé́ would have become "*tər^{y}yé́", and the result of remodelling could not have been PT *tr^{y}ité́.

It should be emphasized that the sound change under discussion is best stated as a metathesis. There was no general epenthesis of *ə in initial *CR-clusters; that is demonstrated by the operation of the TB "accent-throwing" rule in PT *pré́t^{s}ak^{w}a- 'chest' > TB /prat^{s}áka-/, which could not have occurred if the PT stressed syllable were not word-initial (see **B6**). In other words, *ə was inserted only into those initial *CR-clusters that were already followed by *ə; and I can discover no plausible reason why such clusters should have been broken up ONLY when *ə already followed. But if it makes no sense to posit a development *CRəC- > *CəRəC- > *CəRC-, metathesis is the only alternative.

On the relative chronology of liquid metathesis see the remarks at the end of section **64**.

66. A-umlaut.

In both Tocharian languages we find reflexes of PT *a for expected *ë when the next syllable contains *a; this is evidently the result of a sound change (cf. Winter 1962b:32-3), which can reasonably be called "a-umlaut". The conditions under which a-umlaut occurred are slightly different in the two languages: in TB all *ë were umlauted by the *a of a following syllable, but in TA only unaccented *ë were subject to umlaut (Cowgill 1967:176-7; cf. Ringe 1987b:262). One might therefore conclude that the whole a-umlaut process was a post-PT phenomenon (so Cowgill loc. cit.); however, I shall adduce evidence below which suggests that unstressed *ë underwent a-umlaut in PT.

Examples of unstressed *ë which has been umlauted to *a in both attested languages include especially the reduplicating syllables of preterite participles made to verb roots with medial *a, and the negative prefix before syllables that contain *a (cf. Winter 1952:187-8, van Brock 1971:282); the following examples are typical:

pre-PT *nënákuwə 'having (been) reproached' > PT *nanákuwə > TB *nanāku*, TA *nānku;*

pre-PT *pëpáṣṣuwə 'having (been) kept' > PT *papáṣṣuwə > TB *papāṣṣu*, TA *pāpṣu;*

pre-PT *këkámawə '(having) brought' > PT *kakámawə > TB *kakāmau*, >→ TA *kākmu* (with *-u* for expected *-*o*);

pre-PT *këkráwpawə 'having (been) collected' > PT *kakráwpawə > TB *kakraupau*, >→ TA *kākropu;*

pre-PT *ënáywat^{s}ë 'unpleasant' > PT *anáywat^{s}ë.> TB *anaiwatse*, TA *ānewāts;*

pre-PT *ëknát^{s}a 'unknowing, ignorant' > PT *aknát^{s}a > TB *aknātsa*, TA *āknats.*

Contrast un-umlauted *ë in examples like the following:

PT *k^{w}ëk^{w}ómuwə 'having come' > TB *kekamu*, TA *kakmu;*

PT *tëtḗmuwə 'born' > TB *tetemu*, TA *tatmu;*

PT *tëtrḗkuwə 'false' > TB *tetriku*, TA *tatriku;*

PT *pëprútkuwə 'having fulfilled' > TB *peprutku*, TA *paprutku;*

PT *ëtṓṅkəttë 'unhindered' > TB *etaṅkätte*, TA *atäṅkät;*

PT *ëṅklyéwṣəttë 'unheard of' > TB *eṅklyauṣätte.*

More isolated examples can occasionally be found; the following have come to my attention:

pre-PT pres. *təl-ná- 'endure' (e.g. in TB 3pl. *tallaṃ*) → o-grade deriv. *tël-ná-wə 'poor' > PT *talláwə (see **69**) > TB *tallā$_{u}$*, TA *tālo* (Duchesne-Guillemin 1949:163);

pre-PT *spëltká- 'be zealous' (cf. PT *spëltkë 'zeal' > TB *spelke*, TA *spaltäk*) > PT *spaltká- in TB pret. 3sg. *spalkāte;* in TA is attested only the infixed pres. *spāltäṅkā-*, which must be an innovation;

PIE *mégx- 'big' (Gk. μέγας) → (?) pre-PT o-grade deriv. *mëk-á- 'much, many' > PT *maká > TB *māka*, TA *māk;* this is rather speculative, but it is the only plausible explanation I can devise for the medial *a of the PT form. (See **67** on another form related to this last.)

Examples of a-umlaut in TB but not in TA will be adduced in **B1**; they include numerous verb forms and (again) a handful of isolated words.

The evidence that a-umlaut of unaccented *ë occurred already at the PT stage is indirect but fairly strong; it includes numerous examples of secondary ablaut *a in verb roots, which can only be explained as the result of analogical changes presupposing a-umlaut of unaccented *ë. Consider, for example, the following preterite participles:

PT *papáykawə '(having) written' > TB *(pa)paikau*, >→ TA *pāpeku* (with *-u* for expected *-*o*);

PT *papálawə 'having (been) praised' > TB *papālau*, >→ TA *pāplu.*

The accent of the reconstructed forms is virtually certain; the reduplicating syllables of PT preterites (and of the PIE perfects ancestral to them) were never accented, so far as we can tell, and if the accent had fallen on either of the last two syllables the TB forms would end in *"-ā$_{u}$"* rather than *-au* (cf. PT *talláwə 'poor' cited immediately above, and see **B29** and **viii**). The *a of the reduplicating syllables is evidently the result of a-umlaut; but what are we to make of the stressed *á of the root syllables? It does not represent an expected ablaut grade of the root. These roots are PT *pik-(a-) (= */pəyk-(a-)/) and *pəla- respectively, as the following forms demonstrate:

TB pres. 3sg. *piṅkäṃ* '(s)he writes' ←< PT *piṅkə ←< PIE (zero-grade) pres. *pi-n-ḱ- 'decorate' (cf. Skt. *piṃśáti*, and see **53** on PT *i in zero-grade forms); TA *pikäṣ* ←< PT *piṅkəṣə has lost the nasal infix (and so reveals the basic grade *pik- more clearly);

TB pres. 3pl. *pällāntär* 'they praise' < PT *pəllántər < *pəl-n-á-, root *pəla- 'praise' (on TA *pällānträ* see **69**).

In a form reflecting the PIE perfect—as the reduplicated preterite participles must, though probably indirectly—one would expect to find either a zero-grade root (which *-páyka- and *-pála- cannot be) or an o-grade root, which in PT should be *-péyka- and *-péla- respectively for these verbs. It would seem that the expected *é has somehow been replaced by *á; and while that could be the result of a-umlaut in TB, it cannot be so in TA or PT, in which STRESSED *é did not undergo a-umlaut (see also **B1**). Instead it must be the result of analogical change: *a must have been introduced into the roots of these participles from some other form(s) of the paradigm in which UNSTRESSED *ë had become *a by the regular operation of a-umlaut.

Finding where in the paradigm the sound change operated is likewise a matter of inference. TB, the only language which preserves any information about PT stress, possesses some a-subjunctives with stem-final accent; but since virtually all of these are middle, and thus have zero-grade roots, none exhibits ablaut *a < *ë in the root. Presents in /-á-/ and /-ná-/ are disappointing for the same reason: the root is virtually always zero-grade. It would seem that medial *a in such verb roots can only have arisen by a-umlaut in the a-preterite, which (when it did not ablaut, see Jasanoff 1983) seems to have had an accented suffix *-á-. The development must have been as follows:

pre-PT pret. *pëyká- 'wrote' > *payká- (e.g. in 3sg. mid. TB *paiykāte*, TA *pekat*), whence ptc. *pëpéykawə → *pëpáykawə > *papáykawə;

pre-PT pret. *pëlá- 'praised' > *palá- (e.g. in 3sg. mid. TB *palāte*, TA *pāl(a)[t]*), whence ptc. *pëpélawə → *pëpálawə > *papálawə.

Of course we might suggest that this happened independently in the two languages after the breakup of PT, were it not for a final fact about verbs of this type: they are firmly entrenched in both attested languages, and several are securely reconstructable for PT. In addition to the two used as examples here, they include at least *mənta- 'hurt', *lik-(a-) 'wash', *lita- 'fall out/down', *lup-(a-) 'throw', *wəpa- 'weave', and *tˢika- 'form (out of clay)'. Moreover, various roots which appear only or mostly in the shape *CaCa- in the attested languages probably once had zero-grade forms of the shape *CəCa-; typical examples are *kama- 'bring' (on which see **14**) and *spartwa- 'turn' (with TB causative preterite participle *peṣpirttu* apparently < *pʸëṣpʸərtwuwə). Given this distribution of examples, it actually seems simpler to posit a-umlaut of unaccented *ë, and the analogical changes that followed, within the PT period.

It is possible that the a-umlaut of accented *é in TB was a change completely independent of the a-umlaut of unaccented *ë in PT; but it seems much more likely that the two were parts of the same process, and that the PT sound change was generalized to all *ë in TB. If that is what happened, a-umlaut must have been one of the last sound changes of the PT period, and its generalization to all *ë must have been one of the first independent TB changes.

Notes.

1. Since PT *ë and *e merged in most environments in both attested languages (see **A6** and **B2**), it is natural to ask whether PT *e was also affected by a-umlaut. The evidence is meager and equivocal. Such s-preterite 3sg. forms as PT *ñéksa '(s)he destroyed' (> TA *ñakäs*, >→ TB *neksa;* see **32**) are not probative counterevidence, since they can have escaped a-umlaut in PT because their root-vowels were stressed; in addition, many forms of the paradigm contained no *a, so that there was a standing model for the analogical reintroduction of the un-umlauted shape of the root. Similar considerations destroy the probative value of TB *ñemna* 'names', a form which must have undergone extensive analogical changes within the independent development of TB (see **B5**, note 2). On the other side of the ledger, TB *ṣñaura* 'sinews'< PT *ṣñewra (see **64**) does not clearly exhibit a-umlaut of PT *e, because its lone occurrence (in 603a2) is found in a central dialect text (Winter 1955:218), and the central dialect of TB merged PT *aw and *ew in preconsonantal position. A more promising example is

TB *pišāka* 'fifty' < PT *pʸəñśaka (see **B11** and **B12**; TA has *pñāk*, with analogical loss of *ś) < pre-PT *pʸəñśeka < *peńkʷēkā < PIE *pénkʷe dḱṓmt 'five tens' (?; cf. 'thirty' in **9**);

but can we be sure that the ending of this decad has not been influenced by that of PT *tərʸyaka 'thirty'?

67. O-umlaut.

There is no doubt that TB exhibits o-umlaut of *ë; wherever we expect to find a sequence of vowels *ë . . . o in successive syllables, TB shows *o . . . o* (and not *"e . . . o"*, though TB *e* is the usual reflex of PT *ë). Thus the negative prefix appears as *o(n)-*, and the reduplicating syllable of preterite participles as *Co-*, before root-syllables that contain PT *o (see **66**; cf. Winter 1952:187-8, van Brock 1971: 283):

TB *ontsoytte* 'insatiable' < (pre-)PT *ën-sóyəttë;

TB *sosoyu* 'sated' (= TA *sasyu*) < (pre-)PT *sësóyuwə.

Note also the following isolated word, which might be an example of o-umlaut:

TB *prosko* 'fear' < (pre-)PT *prësko to root *prëska- ~ *pərska- 'fear' (cf. TB subj. 3sg. *prāskaṃ*, 3pl. *parskaṃ*, etc., the former showing a-umlaut of root-internal *ë; see **66**); presumably the root-vowel of the synonym TB *proskiye* is analogical on that of *prosko* (Ringe 1987a:99-100; I am no longer sure what to make of TB *somo* fem. 'one').

Since a-umlaut was in part a PT process, it is worth asking whether o-umlaut might not also have begun to operate in the PT period.

The evidence for PT o-umlaut cannot be extensive, since any PT reconstruction must rest on a comparison of TB and TA, and most PT *o merged with *ë in TA *a* (see **A6**), thereby obliterating most of the potential evidence for PT o-umlaut (e.g. in TA *sasyu* 'sated' and *praska-ñi* 'fearful'). However, this TA merger failed to affect PT *o next to nonpalatalized labials (other than *w); in that position PT *o appears in TA as *o* rather than *a* (see **A4** and **A5**). It is therefore interesting to find both TB and TA *o* in the root of the following word:

TB *moko*, TA *mok* 'elder' < PT *moko < pre-PT *mëk-o-, ultimately reflecting an o-grade form of PIE *mégx- 'big' (see **66**).

Though this lone form can hardly be probative, it raises the possibility that o-umlaut, like a-umlaut, traces at least its beginnings back to the PT stage. Any more definitive statement must await further evidence (if any can be found).

68. Loss of stops before nasals.

An oral stop was lost when immediately followed by a nasal, provided that the consonant cluster affected contained at least three consonants before the loss occurred. Two examples are found in both attested languages:

pre-PT *wék^{w}ə 'voice' (see **39**) → *wëk^{w}-ñña/ë- 'say' > PT subj. *wëñña/ë-, e.g. in 3pl. *wëññën > TB *w(e)ñeṃ*, TA *weñe-ñc* (see Winter 1977, especially pp. 133-4; cf. also **A10** and **B31**);

pre-PT pres. 3sg. *kərstnáṣə ~ *kərstná '(s)he is cutting it off/up' (see **31**) > PT *kərsnáṣə ~ *kərsná >→ TB *karsna-ṃ*, TA *kärṣnāṣ* (with *-rṣ-* on the analogy of pret. ptc. *kärṣto*, etc., in which PT *st > *ṣt* (see **A25**)).

A few examples are found in only one attested language because the other has restored the lost stop by analogy:

pre-PT pres. *kəlpnáṣə ~ *kəlpná '(s)he attains' > *kəlnáṣə ~ *kəlná > PT *kəlláṣə ~ *kəllá (see **69**) >→ TB subj. *kalla-ṃ* (but TA has restored *-lpn-*, e.g. in pres. 3sg. *kälpnātär*, on the analogy of pret. ptc. *kälpo*, etc.);

pre-PT pres. *tərknáṣə ~ *tərkná '(s)he lets (it) go' > PT *tərnáṣə ~ *tərná > TA *tärnāṣ* (but TB has restored *-rkn-*, e.g. in pres. ptc. mid. *tär(k)nāmane*, or preferred the suffix alternant *-əna-, e.g. in 3sg. *tärkanaṃ*).

A number of other presents in *-ná- have restored the lost stop in both attested languages; examples can be found in Krause 1952:72-4 and Krause and Thomas 1960: 204-5.

One example of this change happens to be attested only in TB (there is no TA cognate):

pre-PT *t^{s}ërëkuwa 'lies' (TB *tserekwa;* either of the first two vowels could be *e rather than *ë) → *t^{s}ërëk-ñña/ë- 'deceive' > PT *t^{s}ërëñña/ë-, e.g. in pres. 3sg. *t^{s}ërëññətər > TB *tserenträ* (Winter 1977:134).

Similarly, one example is confined to TA:

pre-PT (?) *karpnáṣə ~ *karpná '(s)he descends' > PT *karnáṣə ~ *karná > TA *kārnaṣ* (but TB has a class IV pres., e.g. 3sg. *korpotär*).

This sound change must have occurred late in the prehistory of PT, since most of the stems that it affected are strictly Tocharian formations (but see note 1); in fact, the whole class of presents in *-ñña- ~ *-ññë- is of secondary origin (see **48**) and has no parallel outside of Tocharian. One example even seems to show that the change had not completely run its course when TB and TA began to diverge:

PT *añcmə-, nom. *añcm^{y}e 'self' > TB nom. *āñme*, obl. *āñm*, gen. *añmantse*, etc.; TA nom./obl. *āñcäm*, stem *āñma-*, e.g. in adj. *āñmaṣi*.

The PT form must have contained a cluster *-ñcm-, since otherwise the *-c- could not have survived in the TA nom./obl. (with regular apocope, see **A8**); it would seem that the change under discussion must have occurred independently in the two languages. However, there may be other explanations. Note that the TA stem vowel *-a-* does not correspond to TB /-ə-/; is it possible that TA *āñma-* was somehow borrowed from the (pre-)TB nominative? If that is what happened, this word must somehow have escaped the expected loss of *-c- in PT (probably because it entered the language after the sound change under discussion had run its course), and the consonant cluster must have been reduced later in TB—and perhaps independently in TA.

Notes.

1. It seems possible that *kəlpná- 'attain' is cognate with Vedic Sanskrit pres. (3sg.) *gṛbhṇắti* '(s)he takes' (Warren Cowgill, p.c. 1980), in which case the ancestral PIE present must have been (3sg.) *g(ʰ)ḭbʰ-né-X-ti; for other possibilities see Van Windekens 1976:201.

69. *ln > *ll.

Several examples of this change can be found among presents and subjunctives with nasal suffixes; the following are typical:

PIE pres. 3sg. *tḭnéxti '(s)he is lifting' (see **29**) > *tḭnắti >→ *təlnáṣə ~ *təlná (see **41**) > PT *təlláṣə ~ *təllá >→ TB *talla-ṃ* 'endures';

pre-PT *pəla- 'praise' (see **66**), pres. 3pl. *pəlnántər > PT *pəllántər > TB *pällāntär* (but the *-ll-* of TA *pällānträ* has developed from restored *ln, see **A17**);

pre-PT *kəla- 'bring', pres. 3sg. *kəlnáṣə ~ *kəlná > PT *kəlláṣə ~ *kəllá → TB *kəlláṣṣə (sk-pres.) >→ *källāṣṣä-ṃ* (but the *-ll-* of TA *källāṣ* has developed from restored *ln, see **A17**);

pre-PT *wəl- 'die', pres. 3sg. *wəlnəṣṣətər > PT *wəlləṣṣətər > TA *wäläṣätär (see **A17**) > *wläṣtär* (beside *wälläṣtär* with restored *-ln- > *-ll-*).

Note also the following adjective:

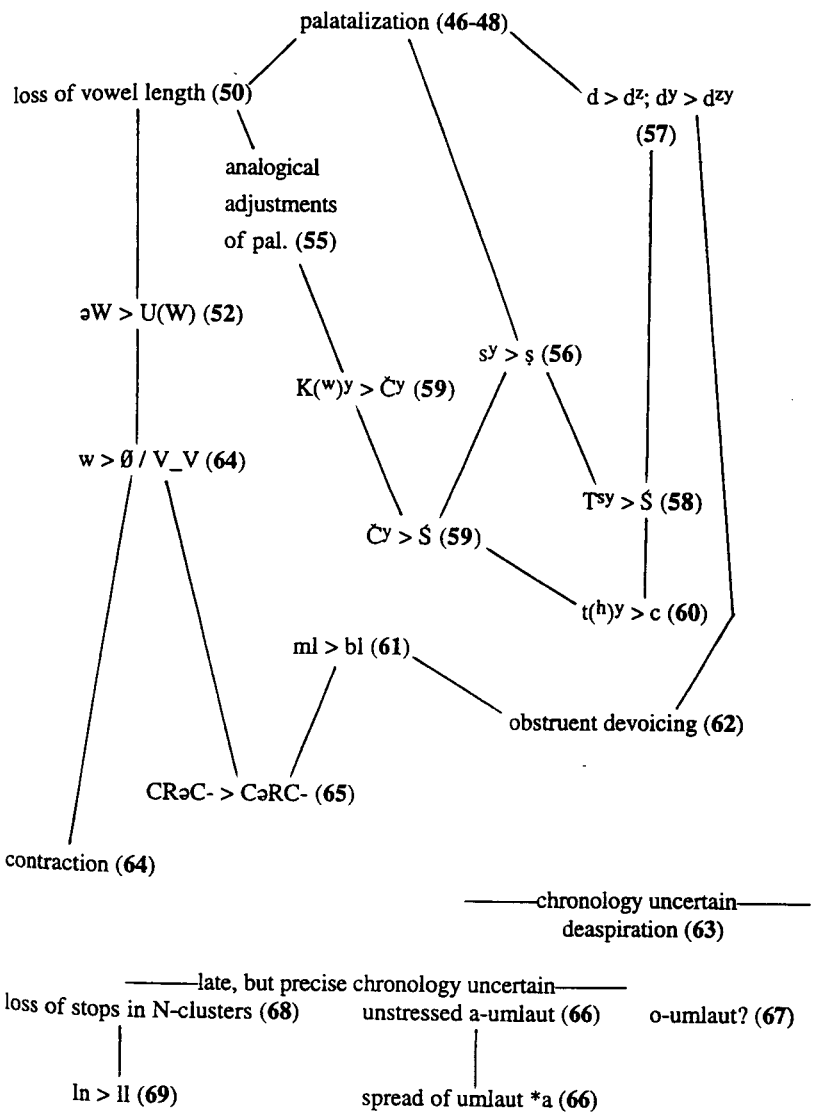
pre-PT *tëlnáwə 'poor' (see **66**) > PT *talláwə > TB *tallāu*, TA *tālo* (to *təllá- 'endure', Duchesne-Guillemin 1940:163).

Finally, there is an example which demonstrates that this sound change must have followed the loss of stops before nasals discussed in **68**:

pre-PT pres. *kəlpnáṣə ~ *kəlpná '(s)he attains' > *kəlnáṣə ~ *kəlná > PT *kəlláṣə ~ *kəllá (see **69**) >→ TB subj. *kalla-ṃ* (but TA has restored *-lpn-*, e.g. in pres. 3sg. *kälpnātär*, on the analogy of pret. ptc. *kälpo*, etc.).

Since it chiefly affects forms that are Tocharian innovations, and since it must have followed the change discussed in **68**, the change of *ln to *ll was probably among the latest pre-PT changes.

70. The relative chronology of the changes discussed in the last two chapters is diagrammed in the chart on the following page. (Capital letters indicate classes of phonemes.) Note that the ordering of phonetic changes of palatalized consonants given here is tentative; see **56** through **60** for discussion.



71. The PT phonemic system.

As a consequence of all the above changes, the PT phonemic system was the following:

p	p^y	t	t^s		c	k	k^w		ə	
			s	ṣ	ś			ę		ǫ
m	m^y	n			ñ	ṅ?	$ṅ^w$?	e	ë	o
		l			ļy				a	
				r	r^y					
w	w^y				y					

There was also a phonemic contrast between accented and unaccented syllables. So far as can be determined, the PT accent normally falls on the same syllable as the PIE accent; that is, there have been no regular accent shifts in the development of PIE to PT (cf. Ringe 1987b:257, 267). Whether the PT accent was still a pitch accent (as in PIE) is a matter of phonetic detail, and as such is not accessible to the comparative method; however, the clear stress conditions on several pre-PT sound changes (see **64** and **66**) and the fact that the TB accent behaves like a stress accent (see **B30**) strongly suggest that PT had a stress accent, and I have operated on that assumption throughout this chapter.

There was a contrast between single and geminate consonants (see **48** and **69**), but not between short and long vowels (see **50**). Sequences of syllabic vowels did not occur.

Preconsonantal /əy/ was [i], while prevocalic /əy/ was [iy]; similarly, preconsonantal /əw/ was [u], while prevocalic /əw/ was [uw] (see **52**).

The following PT morphophonemic alternations were widespread enough to be considered regular:

p ~ p^y	t ~ c	t^s ~ ś	k ~ ś	ə ~ ë ~ e
m ~ m^y	n ~ ñ	s ~ ṣ	k^w ~ ś	ə ~ a
w ~ w^y	l ~ ļy	r ~ r^y	ṅk ~ ñś	a ~ o
	st ~ śc		sk ~ ṣṣ	

Other morphophonemic alternations are reconstructable for PT, but they were confined to specific grammatical categories or lexemes.

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PIE Index

Doubtful roots, and forms which are doubtfully reconstructable or clearly post-PIE, are given in brackets. Grammatically related forms are usually listed together; if the root or stem is cited separately, it is listed first. Numerals indicate sections (not pages).

Alphabetization: a, ā, b, b^h, d, d^h, e, ē, [ə,] g, g^h, g^w, g^{wh}, ǵ, $ǵ^h$, i, ī, k, k^w, ǩ, l, ḷ, m, ṃ, n, ṇ, o, ō, p, r, ṛ, s, t, u, ū, w, x, x^w, ẋ, (X,) y.

[*aǩsti-] 22 n. 2
*alb^{h}os 1 n. 3
*ályos 48, 50
*awi- 1 n. 3
*b^{h}ágos 16, 46, 49, 50, 63
*b^{h}āǵ^{h}u- 16, 42, 46, 50, 62, 63
*b^{h}éreti 55
*b^{h}éretor 46
*b^{h}oréyox 4
*b^{h}ór-oy- 35 n. 2
*b^{h}éyd^{h}ō 4, 4 n. 2
*b^{h}leg- ~ *b^{h}lg- 16, 46 (2x), 63
*b^{h}lgéẋ- 23, 29, 50
*b^{h}réxtēr 3, 42, 46 (2x), 50 (2x), 63
*b^{h}ṛǵ^{h}éẋ 23
*b^{h}ṛǵ^{h}rós 16, 29, 46, 50, 62, 63
*b^{h}uX- 1 n. 3
*b^{h}eb^{h}úXe 1 n. 3
*éb^{h}uXt 1 n. 3
*dáǩru 12
*dáǩrux 12, 16, 50 (2x)
*déǩṃt 16, 29, 32, 46, 50, 57, 58
*dǩṓmt, see *pénk^{w}e and *tríx
*kṃtóm, see s.v.
*demx- ~ *dṃx- 'build' 14, 46, 57
*denǩ- 9 n. 1
*der- ~ *dṛ- 46, 57
[illegible]
*dex^w- 21
[*deẋg- ~ *dẋg-] 53
*dṇǵ^{h}wéx- ~ *dṇǵ^{h}ux- 18, 29, 41, 53
*dṇǵ^{h}wéxṃ 18
*dṇǵ^{h}wéxs 41, 50, 53
*dóru ~ *dréw- 43, 46, 50
*duo- 26 n. 1
*duóẋ 3, 26, 27, 38, 50
*duóyẋ 11 n. 2, 35
*dwi- 26 n. 1
*dwitós 27, 28, 46, 50
*dwey- 27
*d^{h}eg^{wh}- 'burn' 19, 46 (2x), 57, 59
*d^{h}ég^{wh}eti 59
*d^{h}ég^{wh}ox 4
*d^{h}eg^{wh}- 'pass' 8 n. 2
*d^{h}g^{wh}ṇx- 8 n. 2
*d^{h}éǵ^{h}ōm → *d^{h}ǵ^{h}ómṃ 16, 16 n. 1, 30 n. 1, 39, 63
*d^{h}ǵ^{h}ém 30
*d^{h}eng^h- 17
*d^{h}erǵ^h- 17 n. 3
*d^{h}ewg^h- ~ *d^{h}ug^h- 19, 58
*d^{h}eẋ- ~ *d^{h}ẋ- 46, 53, 60
*d^{h}é-d^{h}ẋ- ix, 14, 21, 55
[*d^{h}eẋ-s-] 46, 53, 55, 60
*d^{h}eyǵ^h- ~ *d^{h}iǵ^h- 1 n. 4, 19, 46, 57
*d^{h}ixg^w- 9, 20, 34, 46, 62
*d^{h}oXnéx 40, 46, 50, 63
*d^{h}reng^h- 17
*d^{h}ubrós 46 (2x), 50, 62, 63
*d^{h}ugxtḗr 14, 16, 46, 49, 50, 63
*d^{h}ux- 22, 46, 63
*-d^{h}yōy 34
*-e (dual), see *-ẋe
*éǩwos, *-om 16, 32, 39, 50
[illegible]
*-nti 33 n. 2
*-ṇti 33
*-onti 32 n. 2
*-es (nom. pl.) 32
*-esi, see *-si
*-eti, see *-ti
*-ewes, see *-us
*-ex- (factitive) 41

(fem., nt. pl.) 3, 3 n. 3, 9 n. 3, 12, 14, 41, 41 n. 1, 42, 50
*-exn̥s 3 n. 3, 41, 41 n. 4
23
5 n. 1, 14
om.) 22
22
sg.) (4 n. 2,) 35
g.) 35
23, 23 n. 1, 49, 51
- *gyu(X)- 12 n. 2, 13, 48
Xti] 68 n. 1
g^h-?) 46 (3x), 50, 59, 63
16, 47, 50, 63, 64
$g^wn̥$- 46, 62
eti 33, 34, 46 (2x), 50, 56, 59
is ~ *$g^wn̥$téy- 46
^{w}enā̆ 46, 59
s 24
10, 48
wesi 33
weti 10, 46
3, 8 n. 1, 40, 46, 50, 62
3
ón- 8, 29, 46, 62
$g^{wh}n̥$- ~ *g^{wh}n- 46, 63
ti 46
46 (2x), 59
35, 46, 59
8, 16, 48
or 8, 8 n. 2, 8 n. 3, 16, 23, 29, 48
3, 8 n. 1, 16, 40, 46, 47, 50, 53
s-] 3, 47, 50, 53
3, 16, 17, 39, 46
16, 35, 43 n. 1, 52
27
Vr- 3, 16, 27, 57, 63
u- 12 n. 2, 16, 46, 59, 63, 64
-] 46, 59
^{h}weX-?) 13, 13 n. 2
47
4, 22, 48 n. 1
9, 41, 41 n. 1, 48, 52
11
11, 14, 35, 50
ee *-yéx-
*kaw- 16, 50
*kedx- (*k̑-?) 14, 27, 46, 59
*kednéx- (*k̑-?) (27,) 57
*kes- 1 n. 6
*klep- 16, 22, 47, 65
*$k^wék^wlos$ 55
*$k^wék^wlōs$ → *$k^wék^wloy$ 35, 47, 50
*$k^wetwóres$ 22, 32, 39, 46 (3x), 59, 65
*k^wi- 28, 50
*$k^wíd$ 1 n. 6
*$k^wólos$ 16, 46
*$k^woteros$ 2 (d)
*$k^wóti$ 2 (d)
*k^wreyx- ~ *k^wrix- 9, 9 n. 2, 46, 47, 65
[*$k^wrixwr̥$] 9, 46, 47, 65
*k̑emx- ~ *k̑m̥x- ~ *k̑omx- 14
*k̑erwos 4
*k̑ēruos 4, 22, 46, 47, 50 (2x), 52, 59
*k̑ērue-yé- 22
*k̑erx- 7
*k̑éyor 1 n. 6
*k̑léwos 4, 16, 32, 47, 65
*k̑li- 35, 47, 50, 65
*k̑lim... (35,) 47, 50, 65
*k̑litós 35
*k̑m̥tóm 16, 29, 30, 32, 39, 46, 50
*k̑onk- 1 n. 3
*k̑uó 16, 26, 27, 38, 50
*k̑wónm̥ 16, 29, 32, 38, 39, 46
*ladrós 9, 27, 46, 50 (2x), 52
*leg^h- ~ *log^h- 35
*$lég^heti$ 46 (2x), 59
*$lég^hyeti$ 46
*$lóg^h$-oy- (35,) 35 n. 2, 50
[*leng(^{h})-] 17
*lewk- ~ *luk- 16, 50, 53
*léwk-e- 16, 46 (2x), 52, 59
*lewX- ~ *luX- 12 n. 2
*léymon- ~ *limn-´ ~ *limén 46, 50
*leyt- ~ *lit- 31
*-lo- (adj.) 48
*loḱs- 39 n. 1
*lugrós 50, 50 n. 1, 62
*méd^hu 46 (2x), 50 (2x), 63
*mégx- 66, 67
*men- ~ *m̥n- 'wait' 31, 46, 51
[*meng^h-] 17
*menk- 17
*mewsX- ~ *musX- 14, 46
*mextḗr 42 n. 1
*mexnes- 3, 46 (2x), 50
*méms- ~ *méms- 30 n. 3, 46
*mēmsex 30 n. 3
*-mḗr 36 n. 1
*mlewX- ~ *mluX- 13, 61, 65
*mléwXti 13
*-m̥n 32
*mosgos 16, 39, 46 (2x)
*moy 47 n. 2
*moywos 35, 46, 64
*-mō 4, 50
*mr̥s- 29, 51
*musti- 22
*mustím 46, 47, 50 (2x), 60
*-mxnos 14, 49
*-m̥ 32
*-o-m 32, 35
*-n- (stem C) 32 n. 1, 48, 48 n. 1
*nās- ~ *nas- ~ *n̥s- 1 n. 3
*neḱ- ~ *n̥ḱ- 16, 29, 55
[*néḱs-] 46, 50, 55
[*néḱs] 31
[*néḱsm̥e] 31
[*néḱst] 32
*n̥ḱ-ix- 16, 29
*n̥ḱwós 44
*néwos 46 (2x), 52, 64
*-né-x- ~ *-n̥x- et sim. 41
*-né-x-ti 41
*-nó- (adj.) 23
*-ns ~ *-n̥s 32 n. 1
*-ont 32, 32 n. 2
*-nti, see *-énti
*-ntor 36, 46
*nu 47
*nud- 27, 31, 46, 50, 57
*n̥- 31, 44
*-n̥ti, see *-énti
*-o-ey > *-ōy (dat. sg.) 4
*oḱtṓ(w) 16, 38, 43, 50
*-om, see *-6
*-ont 32, 32 n. 2
*-ónt- (adj.) 6 n. 2
*-os (o-stem nom. sg.) 32, 35, 41
*-os (s-stem nom./acc. sg. neut.) 32
*-ox (1sg.) 3, 38, 38 n. 1, 50
*-o-xō 4
*-oy (nom. pl.) 11 n. 2, 22, 35
*-oy- (opt.) 11, 22 n. 3, 35
*-oy- ~ *-y- 35
*óywos 35
*-oyx (dual), see *-ix
*-ō (nom. sg.) 4, 4 n. 2
*ómsos 3, 30, 40, 46, 50
*-ōs → *-oy 35
*pānt- 41, 42
*pánt 32, 41
*pántes 32, 47, 50, 60
*pántix 9, 34, 46
*pánts 32, 41
*pek^w- 46, 59
*$pék^weti$ 59
*pénk^{w}e 46, 47, 59
*pénk^{w}e dḱómt 66 n. 1
*penk^{w}tós 46 (2x)
*péxwōr → *pxuṓr 7, 26, 40, 50, 64
*pinéḱ- ~ *pinḱ- 16, 66
*pl̥xnós 8, 29, 46
*pod- (11)
*-pod-wn̥t- 11
[*pod-yo-] 11
*pótis 1 n. 3, 34, 39
*poty- 34, 39, 46
*prek̑- ~ *pr̥k̑- 2 (g), 29, 47, 55
*pr̥sḱé/ó- 2 (g)
[*préḱs-] 47, 50, 55
*próti 2 (d)
*prótix$^wk^wom$ 10, 34, 46
*pr̥Xwós 8, 29, 46 (2x)
*psténos 31, 47, 50, 60
*px-sḱé- ~ *px-sḱó- 14
*pxsḱóntor 16, 39, 49
*pxtḗr 3, 14, 32, 46 (2x), 49, 50, 60
*pxtréy 32, 35, 47, 52
[*rek- ~ *rok-] 35
*-ró-s 35
*-s- (stem C) 32 n. 1, 48 n. 1
*-s (nom. sg.) 4 n. 2
*sal- 46, 50
*se, see *swé
*selp- 47 n. 3
*sélpos, *sélpes- 46, 47, 56
*solpéx 47 n. 3
*septm̥ vi, 29, 32, 46, 47 n. 1, 56

*-se-ti 46, 56
*sewX- ~ *suX- 'give birth' 4, 12, 25, 50, 55
*suXiw- 'son' 4, 25
*suXiwós 4, 25, 32
*suXyús 25
*séx 41, 46, 50
*seyk- ~ *sik- 16, 53
*sḗm 50
*-si 33, 34 n. 1
*-e-si 33
*skewX- ~ *skuX- 7 n. 2
*-sḱé/ó- 2 (g), 5, 8 n. 2, 14, 22, 27, 31, 46, 50, 51, 57
*-sḱé-ti 47, 59
*sḱexi- ~ *sḱxi- 7, 7 n. 4
*sḱéxix ~ *sḱxiéx- 7, 16
*sḱe(x́)i- 7 n. 4
*smeru- 47
*smirós (?) 47
snéx́wr̥ (-ḗ-?) 29, 32, 46 (2x), 47, 50, 56, 64
*sókʷxō 4 n. 2, 35
*sókʷxoyr̥ 35
*sokʷxiéy 35
*speyk- ~ *spik- ~ *spoyk- 47, 56
*speyn- ~ *spin- 47, 52, 56
*stembʰX- ~ *stn̥bʰX- 14, 17
*stémbʰXt 14, 47, 60
*ster- 'hard' 47, 60
*sux- 'pour' 12, 13, 46, 50
*suXiw-, see *sewX-
*sū- 'pig' 13, 50
*swād- ~ *swad- ~ *sud- 1 n. 3
*swadrós 3, 25, 27, 46, 49, 50
*swé 47
*se 47
[*swoyos] 25
*sweḱs → *séḱs 16, 32, 46, 47, 47 n. 1, 56
*sweḱstós 31, 46, 47, 50, 56
*swépnos 47, 50, 56
*swérm̥ 47, 56
*swésorm̥ 39, 47, 56
*swidyé- 27, 28, 50, 51, 52
*syuXmḗn 4 n. 2
*te, see *túX
*tékʷos 16, 32, 46 (2x), 60
*temp- 55
[*tengʰ-] 17
*-ti 33, 41
*-e-ti 33, 34
*-tí- 23, 34
*-téy-ey 34
*tl̥néx- 29, 46
*tl̥néxti 69
*to- 11, 35 n. 3
*téxes viii, 4, 24, 41, 42, 50
*téxm̥ >⟶ *tā́m 41
*téxn̥s >⟶ *tā́s viii, 24
*tód 32, 39, 46
*tóy 35 n. 3, 47 n. 2
*tóyx́ 11 n. 2, 35
*-tó- (adj.) 23
*-tor 32, 36, 46
*toy (encl.), see *túX
*tri- 22
*tréyes 22
*tríx 9, 22, 47, 50 (2x), 65
*tríx (d)ḱómt 9, 16, 32, 40, 50, 65
*triós 65
*tritós 47, 50, 65
*tritṓs → *tritóy 35, 46, 50, 60
*troyo- 22
*-tu- 23
*túX → *tuXóm 4, 46, 47
*te 47
*toy (encl.) 47
*twé 47
[*tu] 33
*-txe 31, 33
*udro- 4
*udriós 4, 27, 50 (2x), 52
*udstVro- 31, 50
*uksḗn 4, 4 n. 2, 50 (2x)
*-us, *-um, *-uns 22, 39 n. 1
*-ewes 22, 39 n. 1, 52
*-u-x (nt. pl.) 12
*wā́stu ~ *wástu- 1 n. 3, 3, 42, 46, 50 (2x)
*webʰX- ~ *ubʰX- ~ *wobʰX- 14, 46, 49 n. 1, 63
*wédōr → *udṓr 7
*wegʰnó- 16, 46 (2x), 63
*wendʰ- 17 n. 2
*-wents 32
*-wn̥t(-) 11, 32
*wexg- ~ *uxg- 49

*-wēr 36 n. 1
*wisó- 28, 46, 50
*wiXrós 11, 46, 50
*wḯḱn̥tix́ 11, 16, 29, 30, 33, 46 (2x), 50
*wĺ̥kʷos 29 n. 3
*wókʷn̥ 39, 46 (2x), 50
*wos (encl.) 22
*wr̥sḗn 29, 32, 35, 46, 47, 50
*-x (fem. and nt. pl.) 7, 14, 41, 41 n. 1
(see also *-e-x-, *-ex)
*-xe (mp.) 4 n. 1
*-xer 4, 4 n. 1
*-o-xer 4
*xégeti 46, 59
*xégetor 46, 59
*xégomx́nos 16, 39, 46, 50
*xégonti 3, 33, 39, 49
*xéḱmō 4
*xéḱos 16, 49, 50
*xḱ-xows-ié/ó- 5 n. 1
*xent- 6
*xn̥tbʰí 6
*xn̥tbʰóx́ 3, 6, 11, 17, 38, 50
*xn̥tbʰóyx́ 11, 11 n. 2
*xenx́- 14, 46, 49, 50
*xénx́mos 14 n. 1
*xerǵ- ~ *xr̥ǵ- 6 n. 2
*xérgu- ~ *xr̥ǵéw- 6
*xr̥ǵi- 6
*xr̥ǵrós 6
*xesti- ~ *xostéy- 22 n. 2
*xex́s- or *xexʷs- 49
*xmelǵ- ~ *xml̥ǵ- ~ *xmolǵ- 5, 16
*xne(n)ḱ- ~ *xn̥ḱ- 6, 6 n. 1
*éxneḱt 6
*xexnónḱe 6
*xēnḱ- 6 n. 1
*xn̥ḱ-ix́- 47, 50, 59
[*xonḱ-] 6 n. 1
*xówis, *xéwi- 2 (d)
*xpélos 5, 39, 46 (2x)
*xster- 5, 47, 60
*xweg- → *xewg- 16, 50
*xwes- ~ *xus- 7, 22, 35
*xwex́- 5, 50
*xux́ónts 5
*xwéx́n̥tos >⟶ *xwēntós 5, 30 n. 3, 46, 50, 53 n. 1
*xʷbʰruX- 5, 13, 46, 63, 65
*xʷén(X)os (*ónXos?) 2 (d)
*xʷer- 3, 39
*xʷérō 4 n. 2
*xʷokʷ- (*xʷekʷ-?) 39, 46
*xʷkʷíx́ 46, 59
*xʷnogʰ- 5, 16, 43 n. 1, 63
*xʷreǵ- 5
*-x́e (dual) 11, 13
*x́ey- ~ *x́i- 7
*x́idʰí 20, 22, 33 n. 1, 34, 46, 50, 52, 56
*x́i(y)éx́t 26, 48
*x́lewdʰ- ~ *x́ludʰ- 17, 17 n. 1, 52, 53, 64
*x́ludʰét 5, 32, 46 (2x), 50 (2x), 53, 60
[*x́lunédʰ- ~ *x́lundʰ-] 17, 53
*x́lṇgʷʰ- 5, 17, 29, 46, 63
*x́néwn̥ 5, 29, 32, 46, 50, 52, 64
*x́néx́ʷm7 3, 5, 32, 46 (2x), 47 n. 4, 50, 53
*(x́)regʷ- 6 n. 2
*(x́)régʷos 6
*(x́)r̥gʷónt- 6, 6 n. 2, 39, 44, 46, 62
*x́rudʰrós, *-om 5, 9, 32, 35, 39, 46 (2x), 50, 63, 65
*x́rudʰróey 4
*x́siéx́t 26, 32, 48, 50
*(X)rótoey 4
*(X)rótox́ 4
*-X-t (aor. 3sg.) 41
*Xyaǵ- 5 n. 2
*XiXiǵ- 5 n. 2
*Xyewdⁿ- ~ *Xyudⁿ- 5, 5 n. 2, 22, 31
*-yé/ó- ~ *-ié/ó- 22, 22 n. 3, 23, 48
*yes- ~ *yos- 22
*-yéx́- ~ *-iéx́- ~ *-ix́- 11, 35, 48 n. 2, 50
*-yéx́-t 32
*-yo- ~ *-io- (adj.) 4, 22, 48, 48 n. 1
*yúX 22

PT Index

Grammatically related forms are usually listed together; if the root or stem is cited rately, it is listed first. Doubtful byforms of a headword are listed in parentheses h a question mark; other doubtful forms are listed in brackets. Other conventions as for the PIE index.

Alphabetization: a, i, u, ü, e, ę, ë, o, ǫ, ə, (V,) k, k^w, ṅ, c, ñ, t, n, p, p^y, m, m^y, r, r^y, l, l^y, w, w^y, ś, ṣ, s, t^s.

(fem.) 9 n. 3, 14, 41, 41 n. 1
(nt. pl.) 41, 41 n. 1
(pret. 3sg.) 41
16, 49, 50
ëmanë 16, 39, 46, 50
*akëñcə ~ *akën 3, 33, 39, 49
*aśətər 46, 59
*aśəṣə ~ *aśə 46, 59
rə 12
*ákru 12, 16, 50 (2x)
ks- 'proclaim' 5 n. 1, 14
ñcmə- 14 n. 1, 68
*añcm^{y}e 68
ñywat^{s}ë 66
nask- 14, 46, 50
ntpú 3, 6, 17, 38, 50
antp^{y}ĺ (-p-?) 11
nsë 3, 30, 40, 46, 50
*ánsənë 31 n. 1
-ey (1sg.) 4 n. 1
aytə 22
*ayṣṣəṣə ~ *ayṣṣə 22, 47, 59
-arë (3pl.) 32
arkwi- 6
*arkwəñña 9, 48
*al^{y}l^{y}ëkə 48, 50
*awks- 16, 50
*awkṣuwə 16, 50
*astróna 42, 50
*-i(-) (opt.) 11, 32, 50
*-i (dual) 11
*-(i)ya (fem.) (9,) 9 n. 3
*-iyë 4, 22
*-^{y}iyə (nom. pl.) 22
*-u (1sg.) 3, 38, 50
*-uwa (nt. pl.) 12, 13, 22 n. 1
*-^{y}üw^{y}ə (nom. pl.) 22, 22 n. 1, 39 n. 1, 52
*-é- (subj.) 23 n. 1, 49, 51
*-é- ~ *-ó- (pres.) 23 n. 1, 49, 51
*-elmë (23 n. 2,) 49, 51
*-ę (dual) (35,) 50
*-ę (nom. pl.) 22, 35
*-ę- (noun suff.) 35
*-ë (o-stem nom./obl. sg.) 35
*ëk^{w}ə 39, 46
*ëśś 46, 59
*ëśənë 11
*ëṅk- 6, 6 n. 1
*ëñśi- 47, 50, 59
*ëṅkwë 44
*ën- ~ *-ë- (etc.) 'un-' 31, 44
*ënṣ(ə)kë 31 n. 2
*(-)ëywë- 35
*ër- 3, 39
*ërṣəṣə ~ *ërṣə 3, 39
*ërk^{w}ënt- 6, 39, 44, 46, 62
[*ǫrk^{w}əmo] 44 n. 1
*-o- (fem.) 42, 50
*-ona (pl.) 42, 50
*onolmë 49
*oso- 49, 49 n. 1
*ǫktə 16, 38, 38 n. 2, 43, 50
*ǫ́rə 43, 46, 50
*-ə (endg. of old u-stems) 22, 39 n. 1
*-^{y}ə (dual) 11, 11 n. 1
*-əñcə ~ *-ən (3pl.) 33
*-(ə)na (pres. 3sg.) 41
*kama- 14, 14 n. 3, 66
*kakámar 64
*kakámawə 66
*karpa-
*karnáṣə ~ *karná 68
*kaw- 16, 50
*kawṣënta 16, 50
*ku- 12 n. 2, 16, 63
*këkúwër 64

*śews- 46, 59
*śéwsa 46, 59
*kú 16, 26, 38, 50
*kwénə 16, 26, 29, 32, 38, 39, 46
*kuwa- (*kwa-?) 13, 13 n. 2
*kënuwa 11
*kënüw^{y}ę(në) 11, 16, 35, 43 n. 1, 50, 52
kënmër- (-m^{y}er-?) 16, 27, 57, 63
*kémë 3, 16, 17, 39, 46
*kəñ(ñ)ətər 8, 16, 29, 48
*kənétər 8 n. 3
*kəta- ~ *śəta- 14, 27
*kətówə 57
*kətná(-) (14,) 18, 27, 57
*śəta- (pret.) 46, 59
*kətk- 8 n. 2
*k(ə)təṅk- 8 n. 2
*kəntə́ 16, 29, 30, 32, 39, 46, 50
*kəntwá- 18, 27, 29, 53
*kəntwó 18, 41, 50, 53
*kəla- 'bring'
*kəllášə ~ *kəllá 69
*kəlpa-
*kəlpór 64
*kəlpóṣə 64
*kəllášə ~ *kəllá 68, 69
*kəl^y- 35
*kəl^y(l^y)ətər 65
*kəl^{y}męye 35, 47, 50, 65
*kəl^{y}p- 16, 47, 65
[*kəl^{y}p^{y}iyə-] 22
*-kəl^{y}wë, see *ñeməkəl^{y}wë
*kəs- ~ *kës-
*këkésuwə 55
*kna- 3, 8 n. 1, 16, 40, 46, 50, 53
*aknát^{s}a 3, 8 n. 1, 16, 40, 44, 46, 50, 66
*kñes- 3, 47, 53
*krasta- ~ *kərsta-
*kərsnáṣə ~ *kərsná 31, 68
*pəkrásta 31
*krëwp-, *krawpa-
*kakráwpawə 66
*kr^{y}ǫ́r 16, 47, 50, 63, 64
*klVwt^{s}o 11
*klVwśənë ← *klVwśə 11
*kl^{y}ews- 55 n. 1
*ëṅkl^{y}éwṣəttë 44, 66
*kl^{y}omo (*kl^{y}ǫmo?) 4, 50, 64
*k^{w}élë 16, 46
*k^{w}ëw(u)wər(^{y})ṣe 29, 32, 35, 46, 47, 50
*k^{w}ə́k^{w}lë 55
*k^{w}ə́k^{w}l^{y}ę 35, 47, 50
*k^w(ə)n- 46, 63
*k^{w}əm- 46, 62
*ëk^{w}ə́mətië 31
*k^{w}ëk^{w}ə́muwə 66
k^{w}ëk^{w}ə́mor (-ǫr?) 64
*k^{w}əmnəṣṣəṣə ~ *k^{w}əmnəṣṣə 46, 62
*śə́m^{y}əṣə ~ *śə́m^{y}ə 33, 34, 46 (2x), 50, 56, 59
*k^{w}ərwén- 8, 29, 46, 62
*k^{w}ər^{y}ya- 9, 9 n. 3, 46, 65
*k^{w}ər^{y}yor 9, 9 n. 3, 46, 47, 64, 65
*k^{w}əsé 28, 50
*k^{w}əcé 28, 50
*k^{w}ramər 3, 40, 46, 50, 62
*cek- ~ *tek- ~ *tək- 53
*ceśə 53
*tetekor 53
*təśi 53
*cə́k^{w}ë 16, 32, 46 (2x), 60
*cəmp- ~ *tëmp- 35
*cəmpën 33
*tëmpę 35
*-ñiyë (adj.) 48 n. 1
*ñúwë 46 (2x), 52, 64
*ñúwə 5, 16, 29, 30, 32, 38, 46, 50 (2x), 52, 64
*ñu(wə)m(ə)ka 30
*ñuwəntë 30, 64
*ñémə 3, 5, 32, 46 (2x), 47 n. 4, 50, 53
*ñeməkəl^{y}wë 16, 32, 47, 65
*-ñə (1sg. clitic pron.) 33 n. 1
*-ñ-ə (nom. pl. of n-stems) 11 n. 4, 35
*ñəktë 4
*ñəkciyë 4
*-ñc-ə (nom. pl. of nt-stems) 33 n. 1
*-ññə- ~ *-ññë- (pres.) 48
[*ñw^{y}əkë] 47
*ta-, *ces- ~ *tes- ~ *tas- ~ *təs- 53
*ces- (pret.) 46, 60
*césrə 46, 55, 60

*céssa 53, 55
*taşitər 53
*tóta- 14, 21, 55
*tətawə 53
*təssantë 53
*təssatë 53
*pətesə 53
*-ta (pret. 2sg.) 33
*takarë 32
*taná- 40, 46, 50, 63
*tutë 9
*tuciya 9
*tuwa- (*twa-?) 12 n. 2
*t(u)wé 4, 46, 47
*cę 47
*cə 47
*t(u)wëyë 22, 46, 63
*të 32, 39, 46
*téy (dual) 35
*tóy 4, 24, 41, 42, 50
*tëlkę 35
*-tə (pres. 2sg.) 33
*təkacér 14, 16, 46, 49, 50, 63
*tənk- 17
*ëtśńkəttë 31, 66
*təpré 46 (2x), 50, 62, 63
*təm-
*cəmé- 51
*cəmél 32, 51
*cəmétər 51
*tëtëmuwə 66
tëtémoşə (-o̧şə?) 64
*-tər 32, 36, 46
*tərka- 'let go'
*tərnáşə ~ *tərná 68
*təllá- 29, 46, 69
*təllášə ~ *təllá 69
*tallántə 64
*talláwə 66, 69
*tkénə 16, 30, 30 n. 1, 39, 63
*trik-
*tëtríkuwə 66
[*tréyə] 22
*tərʸya 9, 9 n. 3, 22, 47, 50 (2x), 65
*tərʸyaka 9, 16, 32, 40, 50, 65, 66 n. 1
[*trʸité] 47, 50, 65
[*trʸicé] 35, 46, 50, 60
*trəńk- ~ *trëńk- 'cling' 17, 17 n. 3
*nak-
*nanákuwə 66
*-në (3sg. clitic pron.) 33 n. 1
*nëwë 64
*nëwşúwëntə 64
*-n-ə (n-stem obl. pl.) 32 n. 1, 39 n. 1
*nək-
*ñékəsta 31
*ñékmʸə 31
*ñékrə 55
*ñeks- 46
*ñéksa 32, 46, 55, 66 n. 1
*nəśi- 16, 29
*nəśitər 16, 29
*nətka- 27, 31, 46, 50, 57
*nətkówə (27,) 31, 46, 50, 57
*-nta (pl.) 11 n. 4
*-ntər 36, 46
*pákë 16, 46, 49, 50, 63
*pacér 3, 14, 32, 46 (2x), 49, 50, 60
*patrʸí 32, 35, 47, 52
*paşşə- ~ *paskë- 14
*papáşşuwə 66
*paskéntər 16, 39, 49
*pik-, *payka-
*papáykawə 52, 66
*payká- (pret.) 66
*piŋk- 16
*piŋkəşə ~ *piŋkə 16, 66
*puwár 7, 25, 26, 40, 50, 64
*pëy- 27
*pëye (*pëyë? *pëy(ə)ye?) 11
*pëyənë ← *pëyə (?) 11
*-pëwə 11, 27
*përnëwə 32
*përnëntə 64
*pëtˢ- 34, 39, 46
*pok- 16, 42, 46, 50, 62, 63
*pont- 41, 42
*pó 32
*póñcə 32, 47, 50, 60
*póntˢa 9, 34, 46
*pək- 'cook' 59
*pər-
*përę 35, 35 n. 2
*pərʸə (*pʸərʸə?) 55
[*pʸérʸətər] 46
*pərka- 23
*pərké- 23
*pərkétər 23
*pərkré 16, 29, 46, 50, 62, 63
*pərwa- 5, 13, 46, 63, 65
*pərwanë 13, 46, 63, 65
*pərwé 8, 29, 46 (2x)
*pəla- ~ *pala- 'praise'
*papálawə 66
*palá- (pret.) 66
*pəllántər 66, 69
*pəlk-, *pəlka- 'burn' 16, 23, 46 (2x), 63
*pəlké- 23, 29, 50
*pəlkétər 23, 29, 50
*pəllë 8, 29, 46
*pəlwa- 13, 61, 65
*pəścánë(në) 31, 47, 50, 60
*prutk-
*pëprútkuwə 66
*prëk- ~ *pərk-
*pëpórkuwə 55
*prʸékrə 55
*prʸeks- 47, 50
*prʸéksa 47, 50, 55
*pərksa- 29
*prëska- ~ *pərska- 67
*prësko (*prosko?) 67
*prétˢakʷa- 10, 34, 46, 65
*prócer 3, 42, 46 (2x), 50 (2x), 63
*pláska 31
*pəlskatë 31
*pʸə́ñśə 46, 47, 59
*pʸəńkʷtë 46 (2x)
*pʸəñśaka 66 n. 1
*pʸə́lë 5, 39, 46 (2x)
*pʸəlta 46
*maká 66
[*moko] 67
*macér 42 n. 1
*-mana 14, 39
*-mar 4, 4 n. 1
*musa- 14, 46
*musówə (14,) 46
*mëkuwa 5, 16, 43 n. 1, 63
*mëywë 35, 46, 64
*mëskë 16, 39, 46 (2x)
*-mo (adj. suff.) (4,) 50
*məńka- 17, 35
*mëńkę 35
*mëńkë 35
*manta- 66
*mərsétər 51
*mərsówə 29
*məlk- ~ *mëlk- 5, 16
*məścə- 22
*məścə́ (obl.) 46, 47, 50 (2x), 60
*məska- 31, 46
*məskétər 31, 32, 46, 51
*mʸeñə- 3, 46 (2x), 50
*mʸeñe 46 (2x), 50
[*-mʸer] 36 n. 1
*mʸə́tə 46 (2x), 50 (2x), 63
*mʸənsa 30 n. 3, 46
*yam(ə)mar 4
*yamʸi 11, 32, 50
*yamʸitər 11
*yayátawə 22
*yutka- 5, 22, 31
*-(y)e (nom. sg.) 35
*yësə 22
*yolo 9
*yolʸiya 9
*yə- 7, 7 n. 1
*piyəşə́ 20, 22, 34, 46, 50, 52, 56
*yéy (*yéi?) 26, 48
*yətˢi 7
*-(y)ə (dual) 11
*yə́kwë 16, 32, 35, 39, 50
*yə́kwę 35
*yərp-
*piyərpəsə 52
*yəśelmë 23 n. 2, 51
*yəs-, *yasa- 'boil' 22
*-rë (adj. suff.) 9, 35
*rëkę 35
*rək- 5
*rərékuwə 5
*rətrë 5, 9, 32, 35, 39, 46 (2x), 50, 63, 65
*rətərʸya 9, 65
*laré 9, 27, 46, 50
*larʸiya 9, 50, 52
*lik-, *layka- 66
*lita- ~ *layta- 31, 66
*litka- 31

*litkówə 31
_ *ǀʸuk- 16, 53
*ǀʸuśə- 16, 46 (2x), 52, 59
*ǀʸéwksa 52, 55
_ *ǀʸut- 52, 53
*lawpa- 66
_ ~ *ǀʸuwa- 12 n. 2
_ *ǀʸək- 'lie' 35
*ṃkç 35, 35 n. 2, 50
*ǀʸəśəṣə ~ *ǀʸəśə 46 (2x), 59
*ñé 50, 50 n. 1, 62
*ñ́ṣ́ 50, 53
_ 17
*ñonkəmanë 17
*(k)ʷ- 5, 17, 29, 46, 63
17 n. 1, 53
*ṇacó 5, 32, 46 (2x), 50 (2x), 53, 60
*ṇatúwëṣə 64
[*ṇən-] 17
_ 35
*ṇëmç 35
*ṇś 22
*ṇʸəśúwʸə 22, 22 n. 1
[*ṇʸəkənə] 22
*ṇçnë 35
*ṇə 46, 50
*ṇʸē (gerundive) 48
_
*ṇwawálaṣə 64
27
3, 26, 27, 38, 50
*ṇ́ç 35
*ṇoka- 57
*ṇʷə 39, 46 (2x), 50
*ṇ́ëññə- ~ *ṇ́ëññë- 68
*ṇ́ëññën 68
ṇ́poññə (-o-?) 64
*ṇ́o- 49
*ṇ́ə 3, 42, 46, 50 (2x)
*ṇ́ə (adj. suff.) 32
*ṇ́ʷśó 4, 50 (2x)
27, 28, 46, 50
_ 17 n. 2
*ṇ́wəntówə 17 n. 2
*ṇ́wa- ~ *wapa- 14, 23 n. 2, 46, 63, 66
*ṇ́wapá- (pret.) 49 n. 1
[*ṇ́wopo-, pres.] 49 n. 1

*wərpa-
*puwərpar 64
*warʸiyë 4, 27, 50 (2x), 52
*wəl-
*wəlləṣṣətar 69
*wəlo 4
*lant- 4
*lantˢa 9, 34
*lantˢoy 24
[*wəlkʷë] 29 n. 3
*wəs- 'rest, stay' 7, 35
[*wəṣiyə-] 22
*wʸəṣçye 35
*wəs- 'clothe'
*wósuwə 64
*wəsë́ 28, 46, 50
*wəstərʸyë 31, 50
*wʸíkən 11, 16, 29, 30, 33, 46 (2x), 50
*wʸirë́ 11, 46, 50
*wʸentë́ 5, 30 n. 3, 46, 50, 53 n. 1
*wʸəknë́ 16, 46 (2x), 63
*śaw- 10, 48
*śamanë 64
*śaw(ə)mo 64
*śawʸətə 33
*śawʸəṣə ~ *śawʸə 10, 46, 48
*śu-, *śuwa- 12 n. 2, 13, 48
*śuwatˢi 48
*śukë 58
*śen(ü)wʸẹnë 35, 46, 59
*śeruwë 4, 22, 22 n. 3, 46, 47, 50 (2x), 52, 59
*śeruwënsë 52
[*śerüwʸiyś-] 22, 22 n. 3
*śákə 16, 29, 32, 46, 50, 57, 58
*śakəntë́ 30
*śətwérʸə 32, 39, 46 (3x), 59, 65
*śəná 24, 46, 59
*xśóy 24
*śəpal- 46 (3x), 50, 59, 63
*śərmë 46 (2x), 59
*ścər- 5, 47, 60
*ścərʸẹñə 5, 47, 60
*ścarë́ 47, 60
*-şiyë (adj.) 48 n. 1
*şé 50
*séy (*şéi?) 26, 32, 48, 50
*şotre 35

*śák 16, 32, 46, 47, 56
*śəkəstë́ 31, 46, 47, 50, 56
*śəptś 16, 29, 32, 38, 46, 50, 56
*śəptəńka 30
*śəptəntë́ 30
*śálʸpʸë 46, 47, 47 n. 4, 56
*-śəśə ~ *-śə (pres. 3sg.) 46, 56
*śñór 29, 32, 46 (2x), 47, 50, 56, 64
*śñewra 64, 66 n. 1
*śpʸik- 47, 56
*śpʸin- 47, 52, 56
[*śmʸərë́] 47
*śwʸəñə or *śəñə 47
*śwʸápnë 47, 50, 56
*śwʸármə 47, 56
*śwʸáśërə 39, 47, 56
*-śśəśə ~ *-śśə (pres. 3sg.) 47, 59
*sá 41, 41 n. 1, 46, 50
*santkë 35
santkẹnawə (-owə?) 35
*sal- 46, 50
*sik- ~ *şik- 16, 53
*siyá- 23 n. 2, 27, 28, 50, 51, 52
*siyelmë 51
*su- 'rain' 12, 46, 50
*su- 'give birth' (vel sim.) 12, 25, 50
*səsu- 55
*su- 'pig' 13, 50
*soy-
*ënsóyəttë (*on-?) 67
*sësóyuwə (*so-?) 67
*sọyś 13, 25

*sëyúwʸi (*sëywʸi?) 25
*sëyéw 25, 32
*sëywʸə 25, 64
*-s-ə (s-stem obl. pl.) 32 n. 1
*skiyá- 7, 16, 22
*stəma- ~ *ścəma- 14, 17
*ścáma (14,) 17, 47, 60
*stəmówə (14,) 17
*spartwa- (~ *spərtwa-) 66
*ëspʸórtwattë 31
*pʸëspʸórtwuwə 66
*spëltkë 66
spëltkëssontə (-ọntə?) 64
*spaltká- 66
*spərka-
*sëspórkatay 55
*sëspórkantë 55
*swarë́ 3, 25, 27, 46, 49, 50
*tˢakʷ(a)- 9, 9 n. 3, 20, 34, 46, 62
-tˢi (-tˢʸi?) 34
*tˢika- ~ *tˢayka- 19, 46, 57, 66
*tˢatˢáykawə 19, 46, 57
*tˢuk(a)- 19, 19 n. 1
*tˢuwa- 12 n. 2, 46, 57
*tˢëññə 9
*tˢërëkuwa (68)
*tˢërëññə/ë- 68
*tˢërëññətər 68
*tˢək- ~ *tˢəś- 'burn' 19, 46, 57, 59
*tˢəma- 14, 46, 57
*tˢəra- 46, 57

TA Index

Grammatically related forms are usually listed together; if the root or stem is cited separately, it is usually listed first. The alphabetization is that of Thomas 1964.

-a- (pres. cl. III/IV suffix) 49 n. 3, 51
-a- (subj. cl. III suffix) 51
-aṃ (obl. sg.) 35 n. 1
ak 39, 46
aśäṃ 11
-añ (nom. pl.) 35
aräṣ 3, 39, 46
arkant- 44
arkaś 6, 39, 46, 62
-as (obl. pl.) 35 n. 1
asa- 49 n. 1
asaträ 49
āk 16, 49, 50
āk-
ākeñc 3, 33, 39, 49
ākmāṃ 16, 39, 46, 50

āśträ 46, 59
(see also wāwi-)
ākär 12
ākärnunt 64
ākrunt 12, 16, 22 n. 1, 50 (2x)
āṅkarū ~ āṅkari 22 n. 1, 52
āṅkaräs 22 n. 1
āñcäm 14 n. 1, 68
āñmaṃ-, āñmaṣi 68
ānewāts 66
āp-äṣ, āp-aṃ 24 n. 1
āmpi 11, 11 n. 2, 35
āmpuk 3, 6, 11, 38, 50
ārki 6, 9
ārkiṃ 9, 48
ālak 48, 50
ālakäṃ ~ ālyakäṃ 48
ālamwäc 30 n. 2
āṣtraṃ 42, 50
-i (nom. pl.) 11 n. 3, 22, 35 n. 1
-i(-) (dual) 11
-i(-) (opt.) 11, 35
-iñc ~ -i (3pl.) 33, 33 n. 2
-u (ptc. and adj. suffix) 38 n. 3
-u (nom. pl.) 22, 22 n. 1
e-
et 22
eṣ 22, 47, 59
(see also wäs)
-e (nom. pl.) 22, 35
-e, -we (1sg.) 4 n. 1
-eñc ~ -e (3pl.) 33 n. 2
eṣäk 31 n. 2
es 3, 30, 31 n. 1, 40, 46, 50
ok-
okṣu 16, 50
okät 16, 38, 43, 50
oktuk 30, 38, 43, 50
oṅk 44
opṣäly, opṣiyantu, -antu 24 n. 1
or 43, 46, 50
orkäm 44 n. 1
kanweṃ 11, 16, 35, 50, 52
kapśañi, kapśiññäñ 24 n. 1
kam 3, 16, 17, 39, 46
kayurṣ 29, 32, 35, 46, 47, 50
kāmanträ 14
kākmu, kākmuräṣ 64, 66
kārpa-
kārnaṣ 68
kätā-
ktoräṣ 14, 57
känt 16, 29, 30, 32, 39, 46, 50
käntu 18, 27, 29, 50
käntwāñ 18
kärṣto 68
kärṣnāṣ 31, 68
käl- 'endure'
kakäl 55
kälā- 'bring'
källāṣ 69
kälpo 64, 68, 69
kälpoṣ, kälporäṣ 64
kälpnätär 68, 69
kälytär 65
(see also ṣtämā-)
kälyme 35, 47, 50, 65
käs-
kaksu 55
ku 16, 26, 38, 50
koṃ 16, 26, 29, 32, 39, 46
ku-
kuṣā-ṃ 12 n. 2, 16, 63
śoṣā-ṃ 46, 59
kukäl 55
kum- ~ km- 46, 62
kakmu, kakmuräṣ 64, 66
kumnäṣ 46, 62
śmäṣ 33, 34, 46 (2x), 50, 56, 59
kuryar 9, 9 n. 3, 46, 47, 64, 65
kurtsru ~ kursärwā 22 n. 1
kus, kuc 28, 50
kuñaś 46, 63
ko 'mouth' 24 n. 2
koṣant 16, 50
kosā-m 55 n. 2
knatr- 3 n. 3
kna- 3, 8 n. 1, 16, 40, 46, 50, 66
āknats 3, 8 n. 1, 16, 40, 44, 46, 50, 66
kñasäṣt 3, 47, 53
knānmāṃ 3, 16, 40, 46, 50
krop-
käkropu 66
kror 16, 47, 50, 63, 64
[k]los, *klots, klośäṃ 11, 58

klyokäśśäs-äṣ 24 n. 1
klyom 4, 9, 50, 64
klyomiṃ 9
klyos- 55 n. 1
cämp-
campäs 55
c(a)mpu (c(ä)mpu?) 55
cämpäṣ 35, 55
cämpe 33, 55
ckācar 14, 16, 46, 49, 50, 63
-ñi (1sg. encl.) 47 n. 2
-ñi (adj. suffix) 48 n. 1
ñu 'nine' 5, 29, 32, 46, 50, 52, 64
ṇmuk 30
ñu 'new' 46 (2x), 52, 64
ñwaṃ 52
ñom 3, 5, 32, 46 (2x), 50, 53, 65
ñomklyu 16, 32, 47, 65
ñkät 4
ñäkci 4, 52
ñäkcyäñ 52
-ñc (3pl.) 33 n. 1, 34
-ñś ~ -ṃś (nom. pl. of nt-stems) 33 n. 1
ta- (demonstrative stem)
ceṣ 35 n. 3
ti- 11 n. 2
tiṃ 11, 35
tine 11
tim 11, 35
to-, tos- 24 n. 2
(see also säm)
tampe 35, 55
taryäk 9
talke 35
tā-, tās-
casär 46, 55, 60
casäs 53, 55
tā(ṣi)trä 53
to 53, 55
tsänt 53
tākar 32
tālo, tālont 64, 66, 69
täṅk-
atäṅkät 31, 66
caṅkär 55 n. 1
täṅkäṣ 55 n. 1
täṅkässi 17
täm-
cmatär 8 n. 3, 51
cmol 32, 51
cmolu ~ cmoläntu 22 n. 1
tatmu, tatmuṣ 64, 66
-tär (3sg.) 36, 46
tärkā-
cärk, crakär, tarkar 55
tärnāṣ 68
tu 4, 46, 47
-ci 47, 47 n. 2
cu 47
tuṅkiñtsi, (t)[u]ṅkiññantāṃ 48
tkaṃ 16, 24 n. 1, 30, 39, 63
tkaṃs-, tkañi, tkani 24 n. 1
tpär 46 (2x), 50, 62, 63
träṅkäṣtär 17
träṅkiñc ~ träṅki 33
tri 9, 47, 50 (2x), 65
trice 35, 46, 50, 60
trit 47, 50, 65
tre 22
trik-
tatriku 66
twāsiṣ 12 n. 2
twe 22, 46, 63
naweṃ 64
nas-, see tākar and ṣeṣ
näk-
nänku 66
näk-
ñakär 55
ñakäs 32, 46, 55, 66 n. 1
nkatär 8 n. 3
nśitär 16, 29
-nt-, fem. -ṃts (adj. suffix) 9
-ntär (3pl.) 36, 46
pare 35, 35 n. 2
parno 32, 64
pats 34, 39, 46
päk 16, 46, 49, 50, 63
pācar 3, 14, 32, 35, 46 (2x), 47, 49, 50, 60
pācri 24, 32, 35, 47, 52
pās-
pāpṣu 66
pāṣtär 14

ñiştr-äṃ 59
46, 47
päṅt 46 (2x)
pläk 66 n. 1
ṣär 55 n. 2
pärtär 46, 55
(see also kāmanträ)
ṣatär 23
ṣär 16, 29, 46, 50, 62, 63
ṣwat 8, 29, 46 (2x)
ṣwäṃ 5, 13, 46, 63, 65
5, 39, 46 (2x)
- 'be extinguished' 55
palyä(ṣt) 55, 55 n. 2
-'praise'
pāl(a)[t] 66
pāplu 66
pällānträ 66, 69
lässi 16, 46 (2x), 63
46
kät 31
käṃ 31, 47, 50, 60
käṣ 52, 66
pāpeku 52, 66
pekat 66
peṃ 11
16, 42, 46, 50, 62, 63
- 41, 42
poñś 32, 47, 50, 60
pontsäṃ 9, 34, 46
7, 25, 40, 50, 64
kä-, pyockäs 55
k- ~ pärk-
papräku 55
pärksät 29
prakäs 47, 50, 55, 55 n. 2
prakwä 55 n. 2
präksät, -änt 29
car 3, 42, 46 (2x), 50 (2x), 63
pratri 11, 11 n. 3
kañi 67
tsak 10, 34, 46
k-
paprutku 66
, plätän- 24 n. 1
k-, plyocksä-m 55
(demonstrative particle) 24 n. 2

maku 5, 16, 63
mańk 35
mañ 3, 46 (2x), 50
mar (yutkatär) 5
malke 5, 16
masäk 16, 39, 46 (2x)
-māṃ 14, 49
māk 66
mācar 42 n. 1
-mär 4
mäṅkālune 17, 35
märk-
markäs 55 n. 2
märso 29
mäskatär 31, 32, 46, 51
mäskäs, mäskär 55 n. 2
muso 14, 46
musnäträ 14
mok 67
yas 22
yāta-
yāytu 22
yāmitär 11
yāmiṣ 11, 32, 50
yämmär 4
yä- 7
piṣ 20, 22, 34, 46, 50, 52, 56
yeṣ 26, 48
ytsi 7
yäs-
y[sä]ṣ 22
yuk 16, 32, 35, 39, 50
yutkā-, (mar) yutkatär 5, 22, 31
yetuntiṃ 11
yśalmañ 23 n. 2, 51
rake 35
räk-
raksā-ṃ, rakär 55 n. 2
rarku 5
riṣak, -äṃ, -i, -äs 35 n. 1
rtär 5, 9, 32, 35, 39, 46 (2x), 50, 63, 65
rtärye 9, 65
-l (gerundive suffix) 48
lake 35, 50
lame 35
lānt-, lānts: see wäl
läṅkmāṃ, läṅmāṃ 17

la[lä]ṅkuntiṃ 11
lät- 53
läc-, lcā, lcär 17 n. 1
läc 5, 32, 46 (2x), 50 (2x), 53, 60
läñc- 17 n. 1, 53
läñceñc 17 n. 1
länt-şä- ~ länt-sa- 53
länt-s-, läntseñc 17 n. 1
lāmā-
lmo 35
litanträ, letse(ñc?) 49 n. 3
litko 31
luksamāṃ 16, 59 n. 1
lukseñc 53
$l_u$kuṣ ~ $l_u$käṣ 59 n. 1
lyokäs 52, 55
lutäsmāṃ 53
lyalyu(tu) 52, 53
lutkā-, lyockwā, lyockäşt 55
luwā-
lawam 12 n. 2
lyäm 46, 50
lymeṃ 35
lyśi 22, 22 n. 1
wak 39, 46 (2x), 50
want 5, 24 n. 1, 30 n. 3, 46, 50, 53 n. 1
wänt-, wäntyo 30 n. 3, 53 n. 1
waşt 3, 42, 46, 50 (2x)
waştu 50
wākär, wäkä[s] 55 n. 2
wāla-
wāwlu, wāwluṣ 64
wāwi- 22
wät 27, 28, 46, 50
wätkā- 55
wackwā 55, 55 n. 2
wänto 17 n. 2
wäpā-
wpanträ (?) 14, 46, 63
wpäs 55 n. 2
wärpā-
purpār 64
wäl 4, 9
lānt- 4, 9
lānts 9, 34
läntse 24

wäl-
wälmä(s), wläs 55 n. 2
wlatär 51
wläştär, wälläştär 69
wäs 'poison' 28, 46, 50
wäs 'gave', wsā, wsr-äṃ 55 n. 2
wäs- 'clothe'
wasu 64
wi-
wiyo 27
wiki 11, 16, 29, 30, 33, 46 (2x), 50
wir 11, 46, 50
wu 3, 26, 27, 38, 50
we 35
-we (1sg.): see -e
weñeñc 68
peṃ 64
wkäṃ 16, 46 (2x), 63
wriṃ 4, 27, 50 (2x), 52
wşe 35
śanweṃ 35, 46, 59
śaru 22, 46, 47, 50 (2x), 52, 59
śarwes 52
śalpeṃ 35
śāṃ 46, 59
śäk 16, 29, 32, 46, 50, 57, 58
śkänt 30
śärme 46 (2x), 59
śuk 58
śo- 10, 48
śāmāṃ 64
śot 33
śoṣ 10, 46, 48
śom 64
śtwar 32, 39, 46 (3x), 59, 65
śpāl 46 (3x), 50, 59, 63
śreñ 5, 47, 60
śwā- 48
śwāṣ 12 n. 2
śwātsi 12 n. 2, 48
-ṣ (3sg.) 34 n. 1
-ṣ < *-şəş < PT *-ṣəṣə 56
-ṣ < *-şəş < PT *-ṣṣəṣə 47, 59
-ṣ (abl.) 34 n. 2
ṣar 39, 47, 56
ṣäk 16, 32, 46, 47, 56
ṣkäşt 31, 46, 47, 50, 56
ṣäm-, see lämā-

ṣalyp 46, 47, 47 n. 3, 56
ṣälypas 47
-ṣi (adj. suffix) 48 n. 1
ṣurm 47, 56
ṣeṣ (ipf.) 26, 32, 48, 50
ṣotre 35
ṣñi 47
ṣtämä-
śäm 14, 17, 47, 60
śmä-ṃ 14, 47, 60
ṣtmo 14, 17
ṣpäṃ 47, 50, 56
ṣpät 29, 32, 46, 56
ṣäptänt 30
ṣäptuk 30
ṣpiṃ 47, 52, 56
-s (obl. pl.) 24 n. 2, 32 n. 1
säntäk, säṃtkenu 35
säle 46, 50
säm 30 n. 2
si-
sasyu 67
su- 12, 12 n. 1, 13, 46, 50
sūmäṃ 12, 46, 50
swiñc 12, 50
se 13, 22, 25, 32
sey- 25
seyo 25, 32
sewäñ, sewäs 25, 64
sparcwaträ 49 n. 1
spaltäk 66
spaltkasū 64
spältäṅkä- 66
spärkä-
saspärkänt 55
spärk, spärksä-m 55 n. 2
swär 3, 25, 27, 46, 49, 50
tsäknäṣtär 19, 46, 57, 59
tsämä-
śamantär 49 n. 3, 58
tsmo 14, 46, 57, 58
tsärä-
śaśrāṣt 58
tsrässi 58
tsro 46, 57
tsälpä-
śalpatär, (śa)lpmäṃ 49 n. 3
-tsi (inf.) 34
tsikä-
tsätseku 19, 46, 57
tsip-
śepär 58
tsipiñc 58
tsukä-, tsuko 19
tsuwä-
tswätär 12 n. 2, 46, 57
tseṃ, tseññäñ 9

TB Index

Grammatically related forms are usually listed together; if the root or stem is cited separately, it is usually listed first. The alphabetization is that of Thomas 1964; in the case of roots cited in morphophonemic shape, /a/ is alphabetized as ā, /ə/ as ä, /lʸ/ as ly, and /tˢ/ as ts.

-a (fem.) 41
-a (fem./nt. pl.) 11, 35, 41
pret. (sg.) 41
(obl. sg.) 35 n. 1
akalye 22
aknätsa 3, 8 n. 1, 16, 40, 44, 46, 50, 66
akrūna 12, 16, 50 (2x)
-anaṃ ~ -naṃ (pres. cl. VI 3sg.) 41
-ane (dual) 11
anaiwatse 66
antapi 41, 11 n. 2, 24
ануєк ~ anek 46, 50
alyaik 35
askwace, askwaśi 24 n. 1
astarona 42, 50
/ak-/
akemane 16, 39, 46, 50
ākeṃ 3, 33, 39, 49
āśäṃ 46, 59
(see also wāyoy-)
āke 16, 49, 50
/akl-/
aklyī-, āklu 22
/aksa-/ 5 n. 1
āṅkär 22 n. 1
āñme 14 n. 1, 68
añmantse, āñm 68
/añmə-/ 14 n. 1
/anask-/ 14, 46, 50
anāṣṣäṃ 46, 50
āntse 3, 30, 31 n. 1, 40, 46, 50
antsane 31 n. 1
āp, āpäṃ 24 n. 1
/ay-/
āyu (subj.) 3, 38, 50
āyor, ait 22
aiṣṣäṃ 22, 47, 59
/aywa-/, aiwoträ 49 n. 2
ārkwi 6, 9
arkwaññä 9, 48
āśce 22, 22 n. 2, 24 n. 1
aścī 22, 24 n. 1
āś, aśca-, āstäṃ 24 n. 1
/asa-/
oso- 49 n. 1
osonträ 49, 49 n. 2
-äṃ (obl. pl.) 35 n. 1, 39 n. 1
-äṃ (3pl.) 33
-i (nom. pl.) (11 n. 2,) 22, 24, 24 n. 1, 35, 35 n. 1, 39 n. 1, 52
-i (dual) 11, 35
-i(-) (opt.) 11, 35
-i- (subjunctive) 22, 22 n. 3
ikäṃ 11, 16, 29, 30, 33, 46 (2x), 50
-u (1sg.) 3, 38, 38 n. 1, 50
-u (ptc. and adj. suffix) 38 n. 3
-e (nom. sg.) 35, 35 n. 1
-e- (thematic vowel) 38 n. 1
-e- (pres. cl. III suffix) 51
-e- (subj. cl. III suffix) 51
-e, -a (them. adj. stem vowel) 41
-e$_u$ ~ -au (them. 1sg.) 38 n. 1
-eṃ (obl. sg./pl.) 35 n. 1
-eṃ (3pl.) 32
eṃṣke 31 n. 2
ek 39, 46
eś 11, 46, 59
eś lmau, eśane 11
ekṣalye, ekṣaly 24 n. 1
ekṣalyi, ekṣalyän- 24 n. 1
eṅk-, eṅkastär, eṅktär 6
eñcīträ 47, 50, 59
eṅkwe 44
-eñ (nom. pl.) 35
er-
erṣäṃ 3, 39, 46, 56
erkent- 44
erkeṃt 6, 39, 46, 62
-aiwe-nta 35
-aisäñ, -aisi (gen. dual) 35
-o$_u$ ~ -au (ptc. suffix) 12 n. 2
-auwa (fem. pl.) 12, 12 n. 2
okt 16, 38, 43, 50
oktaṅka 30
okso 4, 11 n. 5, 50 (2x)
onolme 23 n. 2, 49, 49 n. 3
or 43, 46, 50
ārwa 50
orkamo 44 n. 1
ost 3, 42, 46, 50 (2x)
ostuwa 12, 50
-au (ptc. suffix) 66
aukṣu 16, 50
-ṃ, /-nə/ (obl. pl.) 32 n. 1, 35 n. 1
-ṃ (3sg.) (33,) 34 n. 1, 41
-ṃ (3pl.) 33
kante 16, 29, 30, 32, 39, 46, 50
kantwo 18, 27, 29, 50, 53
kantwa 53
/kəntwá-/, käntwā- 18, 27, 29
käntwāñ 18, 53
/kama-/
kakāmarmeṃ 64
kakāmau 14, 66
/karpa-/
korpotär 58
/kaw-/
kawam 31
kauṣenta 16, 50
/kəta-/
katnaṃ 14, 27, 57
ktau 14, 57
/śəta-/, śtare 46, 59

…ta 14, 46, 59
…tär 8, 8 n. 2, 16, 29, 48
…kentär 8
…ñ 8 n. 3
… 46, 62
…nätte 31
…eṃ 32 n. 2
…naṣṣäṃ 46, 62
…mu 66
…mor 64
… 33, 34, 46 (2x), 50, 56, 59
… käryämte 9, 46, 65
…yor 9, 46, 47, 64, 65
… 8, 24 n. 1, 29, 46, 62
…dure'
…a 55
…oring'
…ṣäṃ 69
…
…ṃ 68, 69
…pormeṃ 64
…pau, kälpoṣ 64
…
…ñ 65
…e also /stəma-/)
…i 16, 22, 47, 65
…e 35, 47, 50, 65
… 55 n. 1
…esu 55
…ṃ 55 n. 1
…tär 8 n. 3
… 16, 26, 27, 38, 50
…ṃ 16, 26, 29, 32, 39, 46
… 12 n. 2
…ñ-ne 12 n. 2, 16, 63
…kuwer 12 n. 2, 64
…-/, kwātär 13, 13 n. 1
…ce 28, 50
… 24 n. 1
… 16, 24 n. 1, 30, 39, 63
…e 24 n. 1
…saine 11, 16, 35, 50, 52
… 3, 16, 27, 36, 36 n. 1, 57, 63
… 3, 16, 17, 39, 46
… 16, 46
… 55
…kalyi 35, 47, 50

koyṃ 24 n. 2
kau$_u$rṣe, kaurṣe 11 n. 5, 29, 32, 35, 46, 47, 50
kau$_u$rṣa- 29, 32, 35, 46, 47
krämär 3, 8 n. 1, 40, 46, 50, 62
/krasta-/ ~ /kərsta-/
karsnaṃ 31, 68
pkrästa 31
kreñc, krent 11
/krewp(a)-/
kakraupau 66
krorīyai 16, 47, 50, 63, 64
/klayksa-/, (mä) klaiksotar 49 n. 2
/klawa-/
klowoträ, klyowonträ 49 n. 3
/klawtka-/, klautkonträ 49 n. 2
klokaśce, klokaśśi, klokastämn- 24 n. 1
klautso, klautsne 11, 58
klausane 58
/kl^{y}ews-/ 55 n. 1
enklyauṣätte 44, 66
klyomo 4, 9, 50, 64
klyomña 9
kwrāṣe, kwrāṣäṃ 24 n. 1
ktsaitse 1 n. 9
cake 16, 32, 46 (2x), 60
campäṃ 35, 55
campeṃ 33, 55
campya 55
-ñ (1sg. enclitic) 47 n. 2
ñake 47
ñakte 4
ñäkciye 4, 52
ñäkcyane 52
-ñäkte, ñäkteñña 24 n. 1
ñi (47 n. 2)
ñu 5, 29, 32, 46, 50, 52, 64
ñunte 30, 64
ñumka 30
ñuwe 46 (2x), 52, 64
ñiwemne 52
ñem 3, 5, 32, 46 (2x), 50, 53, 65
ñemkälywe 16, 32, 47, 65
ñemna 66 n. 1
-ñc (dual) 48
-ññe (adj. suffix) 48 n. 1
-ta (2sg.) 33
taktsäntsa 1 n. 9

tapre 46 (2x), 50, 62, 63
tallā$_u$ 64, 66, 69
tallänt 64
/ta-/, /tas-/
taṣītär, tässäte 53
tesar 46, 55, 60
tessa 53, 55
ptes 53
(see also /təttá-/)
/taka-/
takāre 32
tāno, tanāñ 40, 46, 50, 63
/təṅk-/
etaṅkätte 31, 66
c[e]ṃśträ 55 n. 1
taṅktsi 17, 55 n. 1
täṅwañññeñca 48
/təttá-/ 14, 21
tattaṃ 14, 21, 55
tättā$_u$ 14, 21, 53, 55
tättäträ 55
/təm-/
camel 32, 51
/cəméla/, cmela 32
cmetär 8 n. 3, 51
tetemu 64, 66
tetemoṣ 64
-tär 36, 46
tärkanaṃ, tär(k)nämane 68
/təllá-/ 29
tallaṃ 29, 46, 66, 69
tällän-[n]e 29
tute, tuciyai 9
/tuwa-/ (/twa-?/), twāṣṣäṃ 12 n. 2
[t]woṣ 12 n. 2
te 32, 39, 46
œ 41
ceṃ 24
cey ~ cai 24, 35, 35 n. 3
ceyna, ceynaṃts 24
tā 41
täy 24
tai 35
toy 4, 24, 24 n. 2, 41, 42, 50
toyna, toynaṃts 24
(see also sā)
/tek-/ ~ /tək-/
ceśäṃ 53, 55 n. 1
taśi 53
tekä(ṃ)-me 55 n. 1
tetekor 53
telki 35
tkäcer 14, 16, 46, 49, 50, 63
/trik-/
tetriku 66
treṅkasträ 17
trey ~ trai 22
tarya 9, 47, 50 (2x), 65
täryāka 9, 16, 32, 40, 50, 65
trici 35, 46, 50, 60
trite 47, 50, 65
treyameskeṃ, treyasaim 22
/treyś-/ 22
twe 4, 46, 47
-c 47, 47 n. 2
-ci 47, (47 n. 2)
tweye 22, 46, 63
/nak-/
nanāku 66
/-nə/, see -ṃ
/nək-/
nekar 55
nekasta 31
neksa 32, 46, 55, 66 n. 1
nketär 8 n. 3
nśī[t](rä), näśītär 16, 29
/nətka-/ 27
nätkau 27, 31, 46, 50, 57
newe 64
/nes-/, see ṣey
nauṣ ~ ne$_u$ṣ, nauṣuwent 64
-nt-, fem. -ntsa (adj. suffix) 9
-ntär 36, 46
parwe, yparwe, pärweṣṣe 8, 29, 46 (2x)
pāke 11, 16, 46, 49, 50, 63
pakeñc, pakenta 11
pācer 3, 14, 32, 46 (2x), 49, 50, 60
pātri 24, 32, 35, 47, 52
/pawta-/, pautoträ 49 n. 2
/pask-/
papāṣṣu 66
paskenträ 14, 16, 39, 49
pāṣtär 14
/pək-/ 'ripen'
pakṣträ 59

/pər-/
paräṃ 46, 55
(see also /kama-/)
pärkare 16, 29, 46, 50, 62, 63
pärwäne 5, 13, 46, 63, 65
/pəla-/
papālau, palāte 66
pälläntär 66, 69
pälketär 16, 46 (2x), 63
pälketär-ne 23, 29, 50
pällent 8, 29, 46
/pəlwa-/ 13, 61, 65
/pəlwá-/ (pres. stem) 13
palwaṃ 13, 65
pälwāmane 13, 61
päścane 31, 47, 50, 60
/pik-/
(pa)paikau 52, 66
piṅkäṃ (3sg.) 16, 52, 66
piṅkäṃ (3pl.) 33
paiykāte 66
pīle 5, 39, 46 (2x)
pilta 11, 46
piltāṣ 11, 48
piltāsa 11
piś 46, 47, 59
piṅkte 46 (2x)
piśāka 66 n. 1
puwar 7, 25, 40, 50, 52, 64
pwāra 11, 52
pwāri 11, 11 n. 1
pwārine 11
pekwe, pekwi, pekweṃ 24 n. 1
peri 35, 35 n. 2
perne$_u$ 32, 64
(p)er(n)eñc 11
pernent 11, 64
petso 34, 39, 46
paiyye, paine, paiñe 11
po 32, 41
poñc 32, 47, 50, 60
pont- 41, 42
pokai 16, 42, 46, 50, 62, 63
pratsāko 10, 34, 46
/prat^{s}āka-/ 65
/praska-/ ~ /pərska-/
präskaṃ, parskaṃ 67
/prutk-/
peprutku 66
/prek-/ ~ /pərk-/
pariksante-ne 29
peparku, prekar 55
preksa 47, 50, 55
procer 3, 42, 46 (2x), 50 (2x), 63
proskiye, prosko 67
pläce, plāc, plātäṃ 24 n. 1
/plaska-/ ~ /pəlska-/
pälskāte, plāskaṃ 31
/pləṅk-/
plyeṅkam 31
/plu(w)-/, pluwälyñe 65
-mane 14, 49
malkwer 5, 16, 36
maśśe, mäṣce 22, 46, 47, 60
mañc-äś, maś-ne 22
mañc, mäś- 24 n. 1
maś(c)- 46, 47, 50 (2x), 60
māka 66
mācer 42 n. 1
mäṅketrä 17
mäṅkau 35
(mä)rseträ 51
märsau 29
mäsketär 31, 32, 46, 51
mit 46 (2x), 50 (2x), 63
mīsa 30 n. 3, 46
musau 14, 46
musnāträ 14
-meṃ 34 n. 2
mekwa 5, 16, 63
meṅki 35
meñe 3, 46 (2x), 50
meske 16, 39, 46 (2x)
-mai 4 n. 1
maiwe 35, 46, 64
moko 67
-m-ña (fem.) 9
yakne 16, 46 (2x), 63
yakwe 16, 32, 35, 39, 50
yakwi 35
yal
ylyī 52
/yata-/
yayātau 22
/yam-/
yamītär 11
yāmi 11, 32, 50
yāmu (subj.) 3, 38, 50
yāmmar 4
/yasa-/
yayāsaṣ 22
/yə-/, yatsi 7
paṣ 20, 22, 34, 46, 50, 52, 56
yey ~ yai 26, 48
/yərp-/
pirpso 52
/yuwa-/, yuwäṣṣäṃ, ywauwa 12 n. 2
yente 5, 24 n. 1, 30 n. 3, 46, 50, 53 n. 1
yenti, yenteṃ 24 n. 1
yes 22
yolo, yolyiyai 9
yśelme 23 n. 2, 51
yṣiye 35
ratre 5, 9, 32, 35, 39, 46 (2x), 50, 63, 65
rtarya 9, 65
raso, rsonta 11
rsoñc 11, 11 n. 1, 48
räksemane 5
-re (adj. suffix) 35
-ri (pl.) 11 n. 2
reki 35
rṣāke, rṣāki 35 n. 1
lakle 50, 50 n. 1, 62
*laks, läks, laksäṃ 39 n. 1
läkṣi 39 n. 1, 52
laktse, läktsauña 50, 53
läk$_u$tsauwñaiysa 50, 53
laṅktse 5, 29, 46, 63
laṅtse, laṅwce, läṅk$_u$ci 17, 46, 63
läṅktsa 17
lalyiye 22
lāre 9, 27, 46, 50
lariya 9, 50, 52
/lal-/
lalālu, lalyi- 22
/layta-/ 49 n. 2
laitonträ 49 n. 2, 49 n. 3
läṅkamane 17
/lət-/ 17, 53
lac 5, 32, 46 (2x), 50 (2x), 53, 60
laṃññi, läññi-ñ 17
lateṃ 17 n. 1, 32 n. 2
latau 32 n. 2
lannu, lantsi, lnaṣṣäṃ 17
/lən(n)-/ 17 n. 1, 53
/lənəṣṣə-/ ~ /lənəske-/ 53
ltuweṣ 64
lyñit, läñi 17
/ləma-/
lmau 35
/lita-/ ~ /l^{y}ita-/
lyitälle 49 n. 3
/luk-/ ~ /l^{y}uk-/
lukṣäṃ 53, 59 n. 1
lyuketrä 16, 52, 53
lyuśsi 16, 46 (2x), 52, 59
lyauksa 52, 55
/lut-/ ~ /l^{y}ut-/
lutas(k)entr 53
lyutätär 52, 53
/luwa-/ ~ /l^{y}uwa-/ 12 n. 2
läwaṃ, lyewentär 12 n. 2
lwoṣ, lypauwa 12 n. 2
leki 35, 50
lyak, lykaṃ 22
lyśi 22, 22 n. 1, 52
lyam 46, 50
/l^{y}ək-/
lyaśäṃ 46 (2x), 59
lykemāne 35
-lye ~ -lle (gerundive suffix) 41, 48
-lya (fem.) 41
lymine 35
wate 27, 28, 46, 50
walo, lānt- 4, 9
läntsa 9, 34
läntsoy 24
wallkwe 29 n. 3
wase 28, 46, 50
/waka-/
wokonträṃ 49
/wapa-/
(wa)wāpau, wāpatsi 14, 46, 63
w(o)p(o)trä 49 n. 1
wāyoy- 22
/wala-/
wawālau, wawālaṣ 64
wäntau 17 n. 2

64
ṃ 7
2
64
31, 50
11 n. 2, 35
27
/ 57
39, 46 (2x), 50
64
68
11
23 n. 2
4, 27, 50 (2x), 52
16, 29, 32, 46, 50, 57, 58
30
46, 59
41
24
10, 48
64
10, 46, 48
33
12 n. 2, (13,) 13 n. 1, 48
12 n. 2, 48
12 n. 2
12 n. 2, 13 n. 1
s. stem) 13 n. 1
13 n. 1
12 n. 2, 48
58
22
4, 22, 46, 47, 50 (2x), 52, 59
4, 22, 46, 52, 59
64
inutive suffix) 41
5, 47, 60
47, 60
32, 39, 46 (3x), 59, 65
d 11
46 (3x), 50, 59, 63
47
47, 56
46, 47, 47 n. 3, 56
47

-ṣäṃ (pres. cl. VIII 3sg.) 46, 56
/ṣəm-/, see /ləma-/
ṣiko 16, 53
ṣim 11 n. 5
ṣukt 29, 32, 46, 56
ṣuktaṅka, ṣuktante 30
ṣe 50
somo 67
ṣey ~ ṣai (ipf.) 26, 32, 48, 50
ṣer 39, 47, 56
ṣotri 35
ṣkas 32 n. 4, 47, 47 n. 1
ṣkaste 31, 32 n. 4, 46, 47, 50, 56
ṣñor 29, 32, 46 (2x), 47, 50, 56, 64
ṣñaura 64, 66 n. 1
ṣpane 47, 50, 56
ṣpīkiye 47, 56
ṣmare 47
-ṣṣäṃ (sk-pres. 3sg.) 47, 59
-ṣṣe (adj. suffix) 41, 48 n. 1
-ṣṣa (fem.) 41
salyiye 46, 50
sā 41, 46, 50
se 41
sāṃtke, saṃtkinau 35
siknaṃ 16, 53
/s(i)ya-/ 27, 28, 50, 51, 52
syālñe 27, 50, 52
/suwa-/ 12, 12 n. 1, 13, 46
swāmane 46
suwo 13, 50
swāññe 13
soy 13, 22, 25, 43, 55
sᾱsuwa 12, 12 n. 2, 25, 50, 55
seyi 25, 43
/soy-/
ontsoytte, sosoyu 67
skiyo 7, 7 n. 2, 16
skiyai 7, 16
/stəma-/
śama, ścmā-c 14, 17, 47, 60
stamatsi 14
stmau 14, 17
/spartta-/
eṣpirtatte 31
peṣpirttu 49 n. 1, 66
spertte, sporttotär 49 n. 1

/spalka-/
spalkāte 66
/spərka-/
ṣpyarkatai 55
spelke 66
spelkessu, spelkessont 64
syelme 23 n. 2, 51
swāre 3, 25, 27, 46, 49, 50
/t^{s}aka-/ 9, 9 n. 1, 20, 34, 46, 62
tsatsākau 9, 34, 46, 62
tsākaṃ 20
/t^{s}ək-/
tsakṣträ 19, 46, 57, 59
tsśīträ 59
/t^{s}əma-/
tsmāntär 14, 46, 57
tsmentär 14, 46, 49 n. 3, 57, 58
tsmau 58
/t^{s}əra-/
tsarästär, tsyārasta 58
tsremar 46, 57
/t^{s}əlpa-/ 58
tsälpetär 49 n. 3
ptsilpär-ñ 58
-tsi (inf.) 34
tsikale, (tsa)tsaikau(wa) 19, 46, 57
tsipamane 58
tsirauñe 58
/t^{s}uk-/ 19, 19 n. 1
tsukäle 19
/t^{s}uwa-/, tswauwa 12 n. 2
tswetär 12 n. 2, 46, 57
tseṃ, tseññna 9
tserekwa, tserenträ 68
-tstse, -tstsa (adj. suffix) 41