

NUMERICAL PALINDROMES: THE NEXT GENERATION

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Several types of numerical palindromes have appeared in *Word Ways* (Susan Thorpe, *Numerical Palindromes: Part 1* in Nov 1996 and Rex Gooch, *Numerical Palindromes: Part 2* in Feb 1997). However, I believe the current exercise is the first to make two or more numerically-palindromic 'offspring' from the letters of a numerically-palindromic 'parent'. In other words, numerical palindromes beget numerical palindromes.

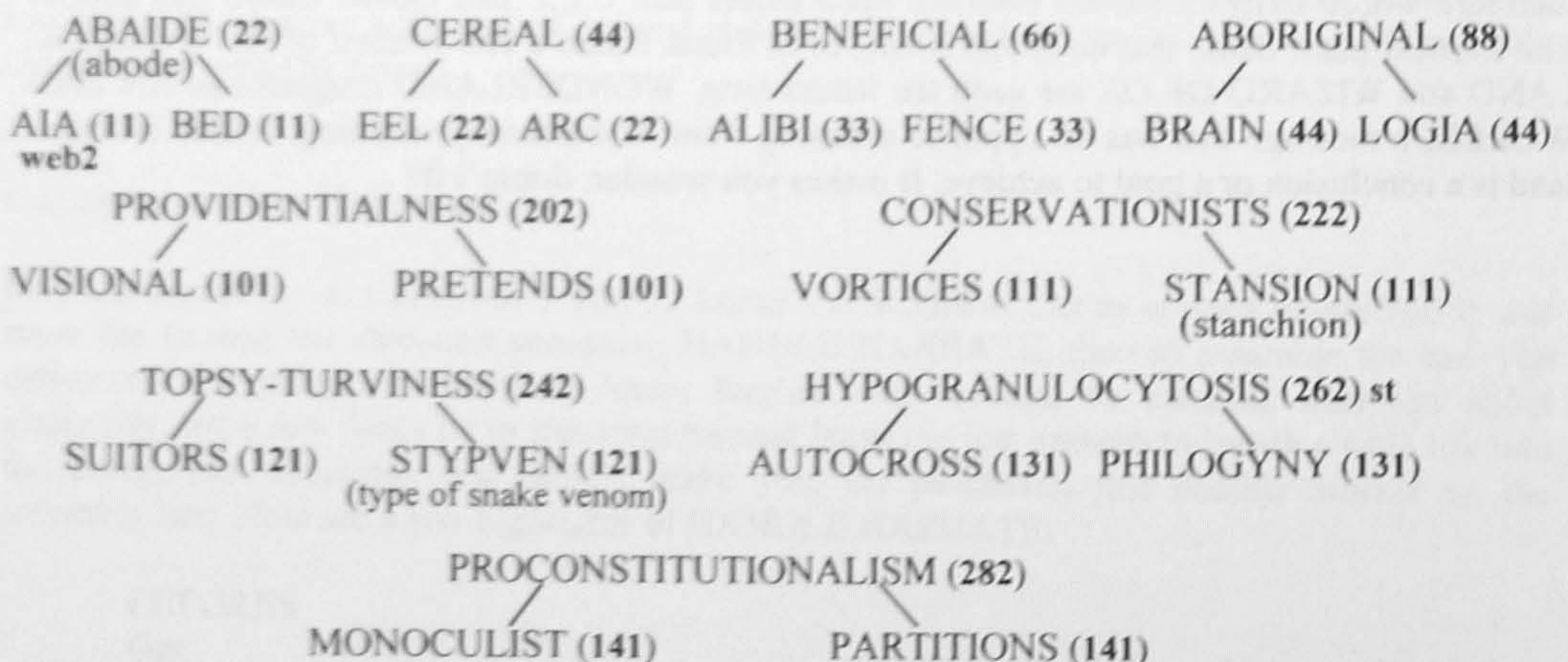
We start by assigning the 26 letters their numerical positions in the alphabet (A=1 to Z=26). The values of the individual letters are added to give the total weight of a word (shown in brackets). Only a parent with equal weight offspring, or whose offspring are each of a different weight, is considered. In either event, siblings must each have the same number of letters.

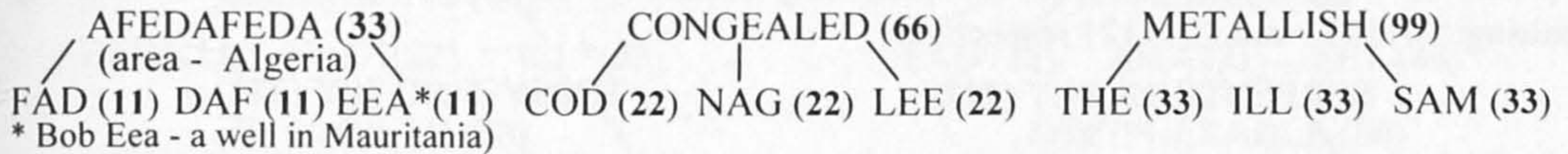
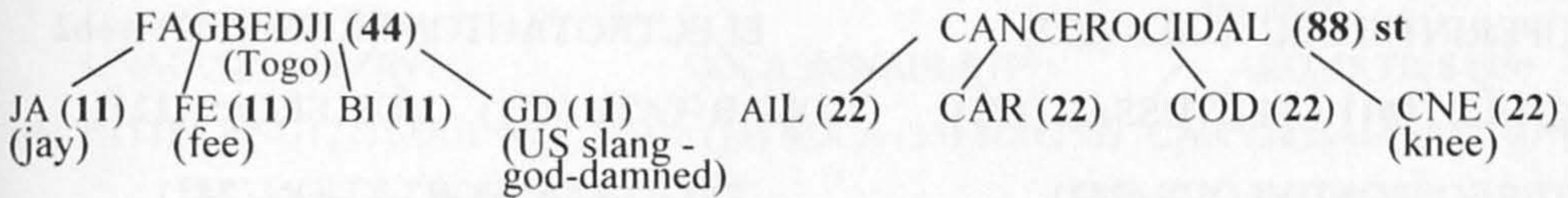
Most of the unreferenced words can be found in the Oxford English Dictionary, Second Edition, or are inferred from words therein. Locations are taken from The United States Board On Geographic Names and are populated places unless specified otherwise.

The other references are: **bt** = Bloomsbury Thesaurus, 1993; **ch** = Chambers English Dictionary; **dfpf** = A Dictionary of the Flowering Plants and Ferns by J.C. Willis, CUP 1966; **lae** = Longmans Illustrated Animal Encyclopedia, 1984; **nz** = Nomenclator Zoologicus; **ospd** = Official Scrabble Players Dictionary; **pull** = The Complete Word Game Dictionary by T. Pulliam and G. Carruth, 1984; **st** = Stedman's Medical Dictionary; **web2/3** = Websters Second/Third Edition.

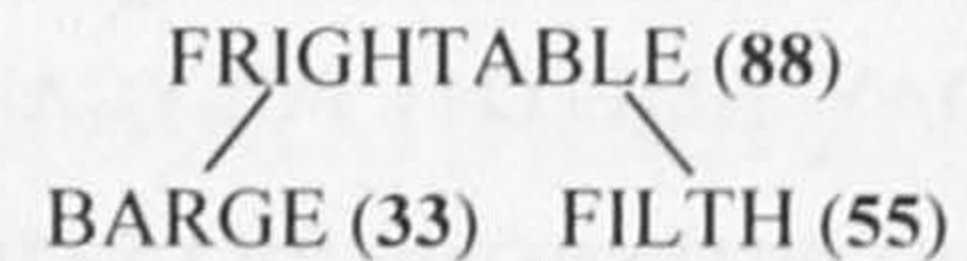
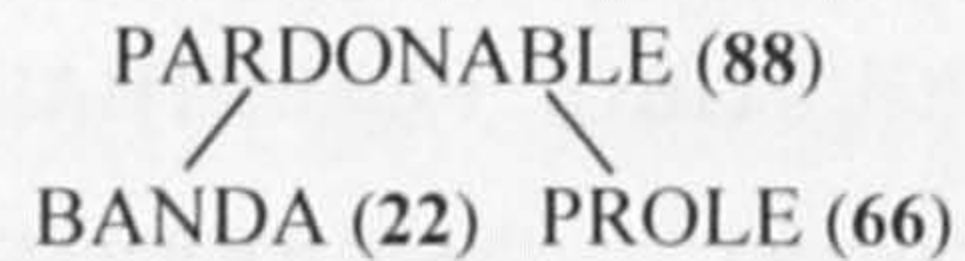
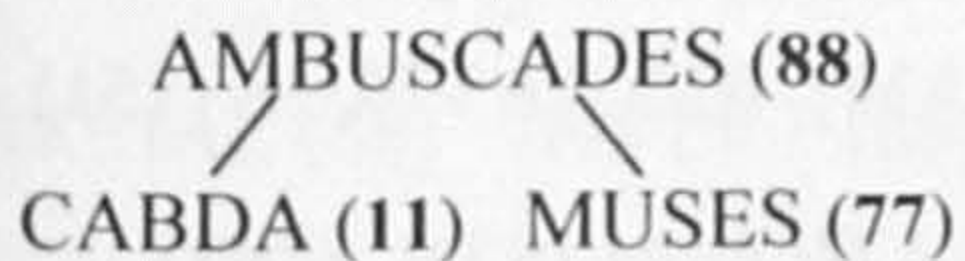
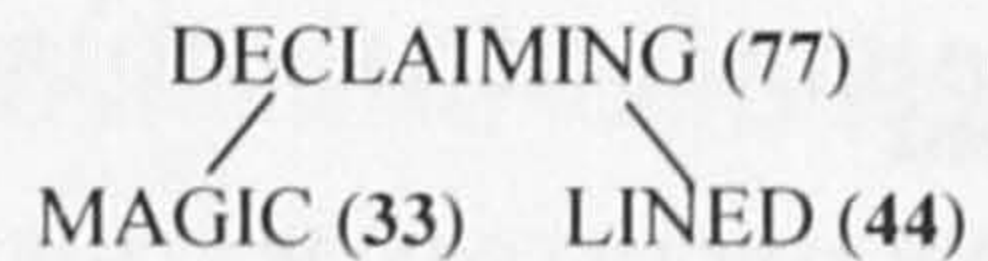
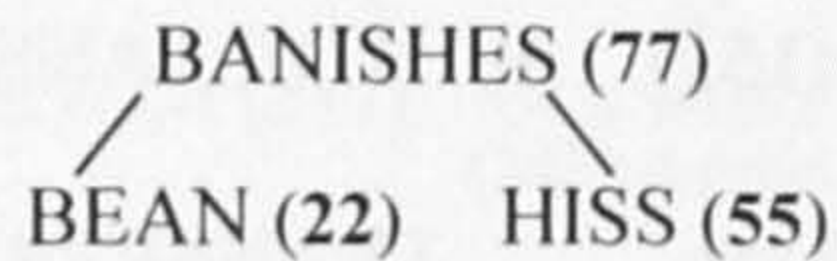
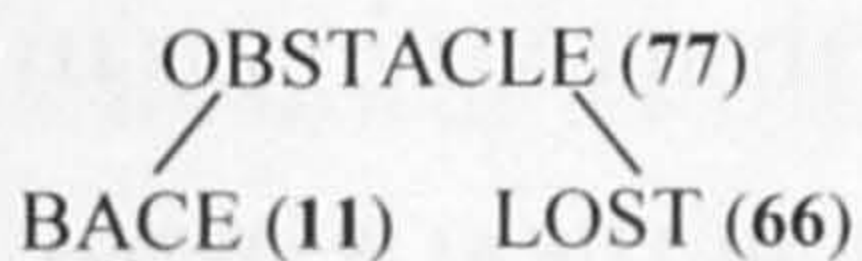
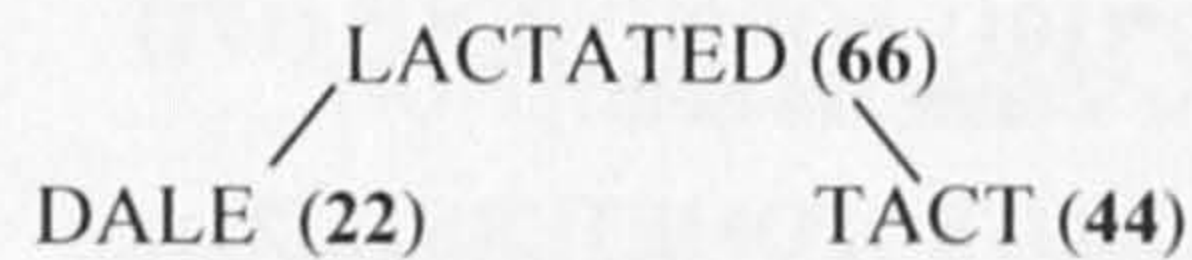
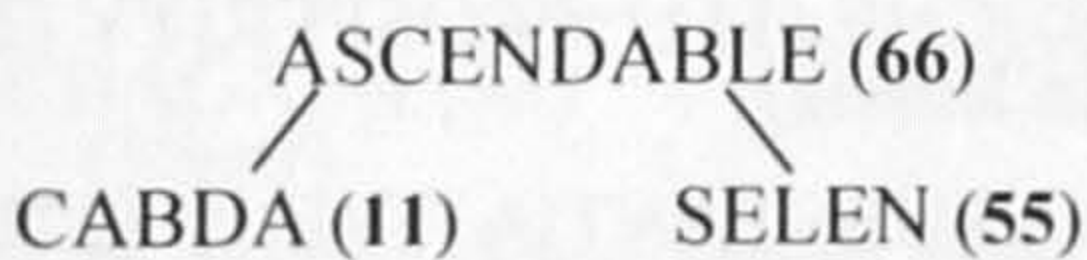
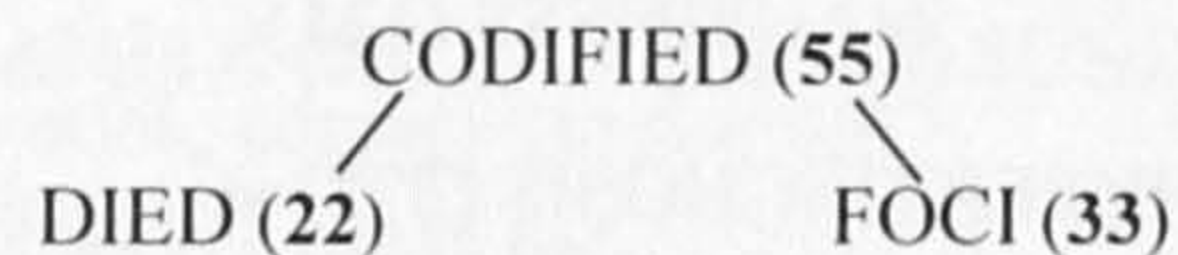
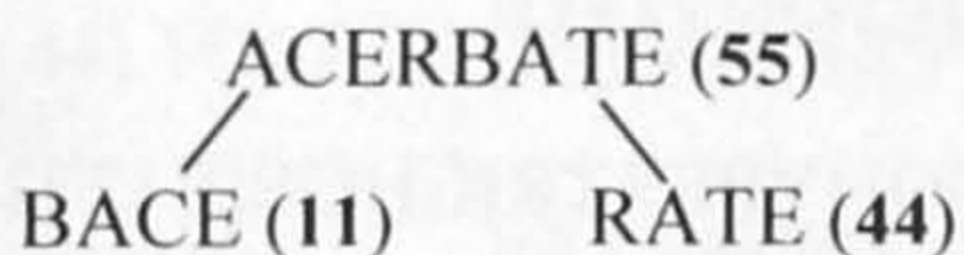
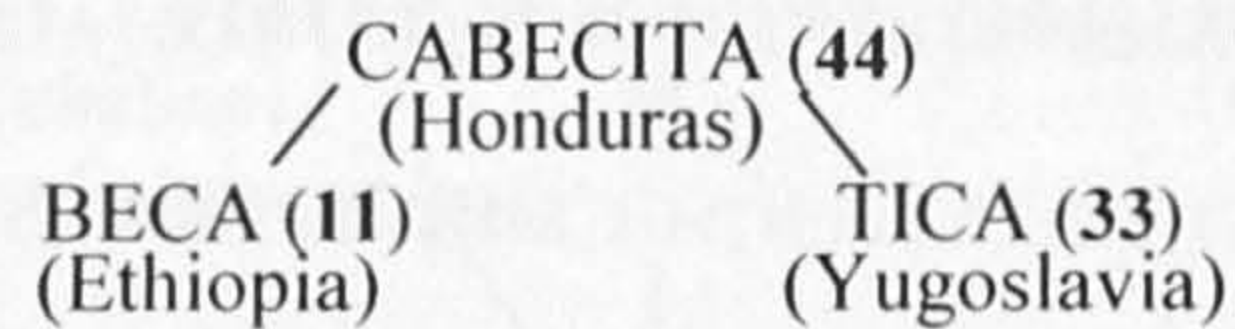
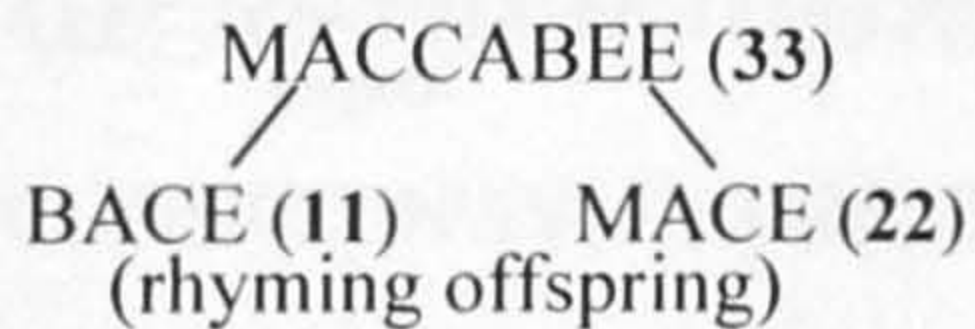
EQUAL WEIGHT OFFSPRING

Two offspring

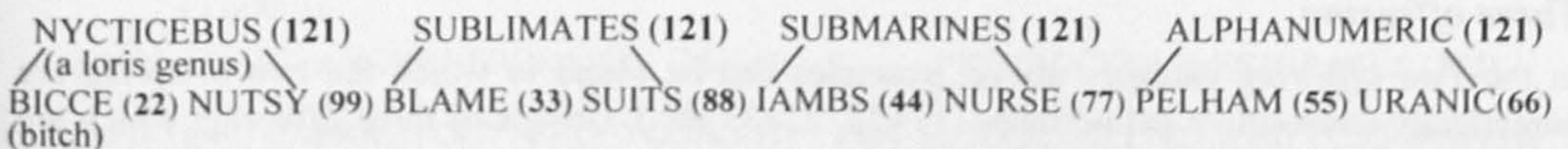
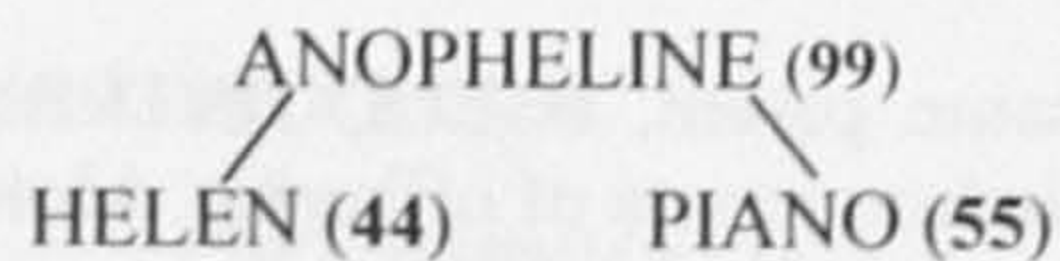
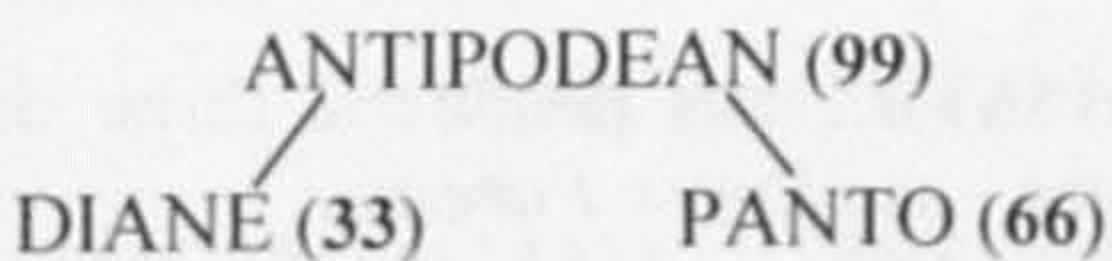
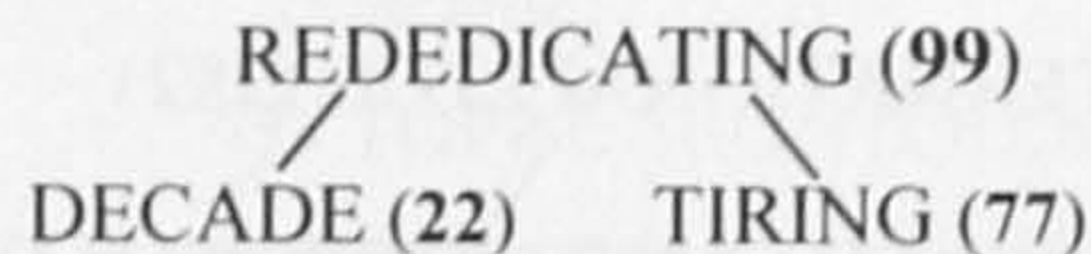
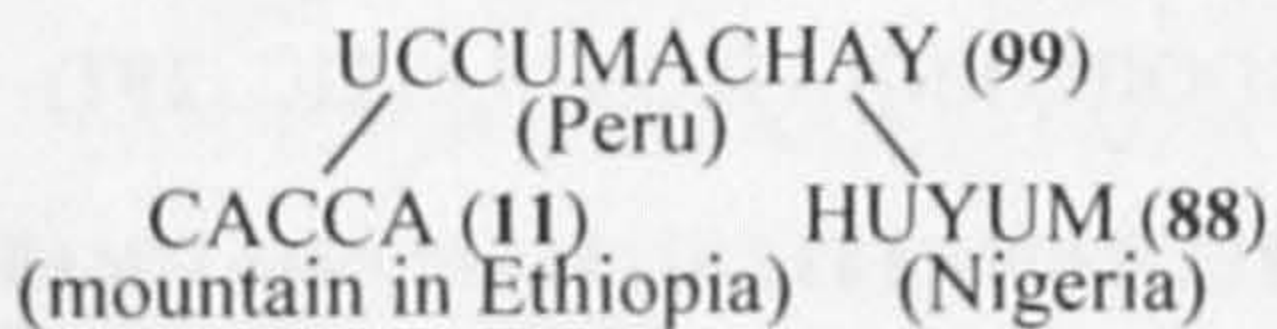


Three offspring*Four offspring***UNEQUAL WEIGHT OFFSPRING**

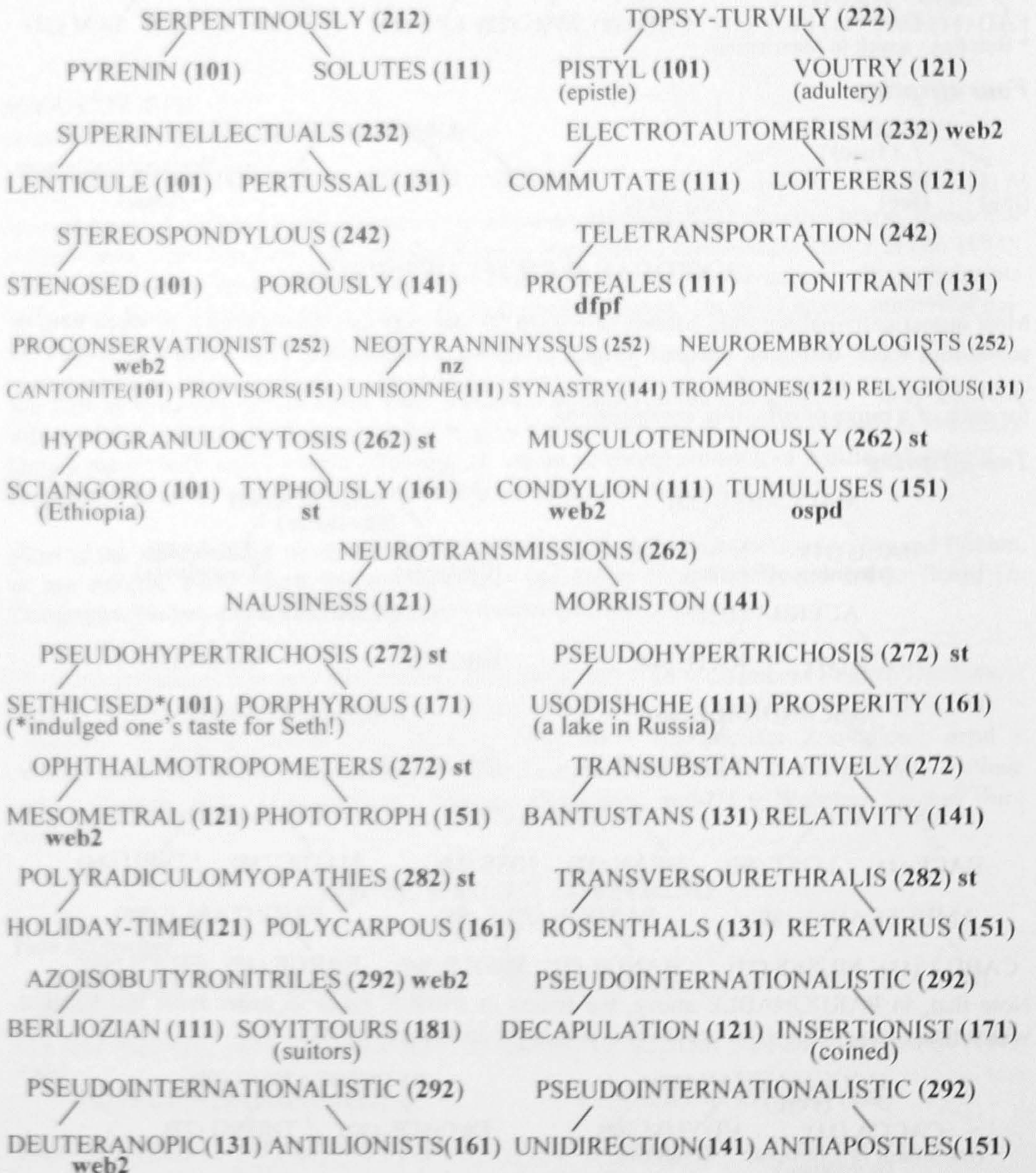
Most numerically-palindromic parents of weight 55 and over can, theoretically, produce two, or sometimes more, different, unequal weight, offspring combinations. Thus parents of weight 55 can produce one of two offspring pairings: 11+44 and 22+33. A single example is given below for each of a range of offspring combinations.

Two offspring

Note that, in PARDONABLE above, the letters of PROLE occur in order from left to right, whilst the letters of BANDA occur in reverse order from right to left.



Parents of weights 212 and 222 can each only produce a single, unequal weight, offspring pairing: 101+111 and 101+121 respectively.



Note that the same parent, PSEUDOINTERNATIONALISTIC, has produced three different numerically-palindromic sets of offspring. More of this later - see *Super Parents*.

Three offspring

In the *Two offspring* category above, examples can be found in which the two offspring are numerically-consecutive palindromes (11+22, 22+33 etc.). Groups of three offspring which are numerically-consecutive palindromes also exist and are identified below by asterisks*.

BELADLING (66)
 BED*(11) NAG*(22) ILL*(33)

FATALISED (77)
 FAD (11) AIL (22) SET (44)

ELIZABETH (88)
 BAH (11) LEE (22) ZIT (55)

DECIPHERABLE (88)
 BACE (11) HILD (33) PEER (44)
 (to skin)

UNACCORDABLE (99) OCCASIONABLE (99) AROMATICS (99)
 BACE (11) CAND (22) ROUL (66) BACE (11) NOCA (33) SOIL (55) CAR*(22) SAM*(33) TIO*(44)

INEXECUTABLE (121)
 BACE (11) EIEN (33) XTUL (77)
 (eye) (Mexico)

COMPOUNDABLE (121)
 BACE (11) MOLD (44) UPON (66)

ADMINISTERED (121)
 DIED (22) AMEN (33) STIR (66)

INPENETRABLE (121)
 BEAN (22) LIRE (44) PENT (55)

COTRANSUBSTANTIATE (222)
 CANABA (22) TOUTER (99) STINTS (101)

UNCONJECTURABILITY (222)
 CALICE (33) T-JOINT (88) UNBURY (101)
 (chalice)

TRICHOSTRONGYLIDAE (222) web3
 OIDCHE (44) TOLING (77) STARRY (101)
 (Irish: night)

UNTRANSCENDENTALLY (222)
 CANTLE (55) NANTLE (66) SUNDRY (101)
 (a nook, corner) (to rise up)

PALAEOPSYCHOLOGICALLY (232) bt
 CHAGALA (33) POCYLLE (88) ISOPOLY (111) web2
 (Niger)

MORPHODIFFERENTIATING (232)
 DIFFAME (44) NIGHTEN (77) PORTOIR (111)

PNEUMOENCEPHALOGRAPHS (232) st
 GOCHEPA (55) REEPHAM (66) NONPLUS (111)
 (Micronesia) (UK)

INTRAVENTRICULARLY (242)
 NARIAL (55) INVERT (88) CURTLY (99)

NONCOMMUTATIVENESS (242)
 MAMENT (66) OUNCES (77) NOVIST (99)

KATUKURUNDUGASYAYA (242) estate - Sri Lanka
 AAKARA (33) UGUNDU (88) KUTSYU (121)
 (spur - Lebanon) (DR Congo) (Ukraine)

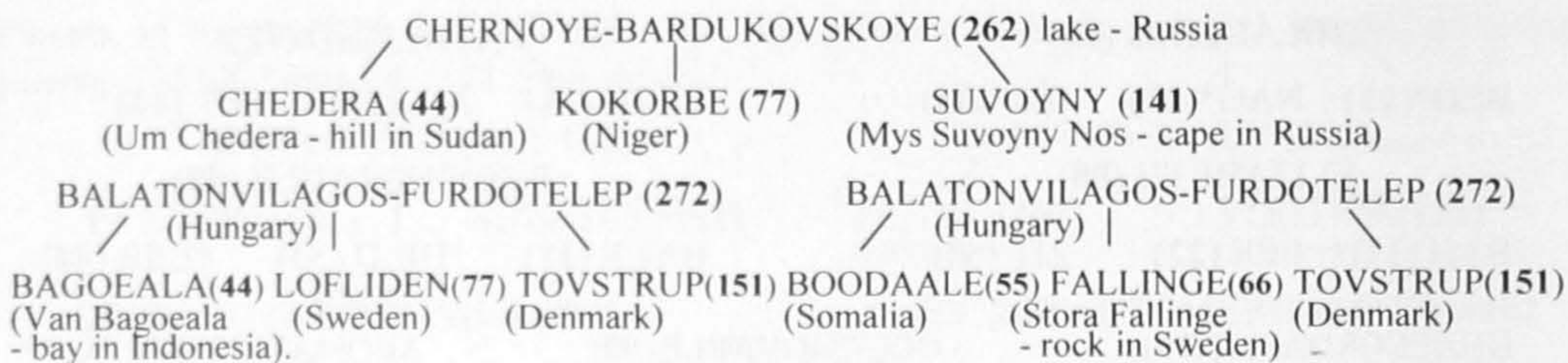
PANHYPOPITUITARIES (242) st
 HOEANA (44) PIPIRI (77) PUTTYS (121)
 (island - Indonesia) web2

PHYTOPALAEONTOLOGY (242)
 OOGLEA (55) PHONAL (66) PYOTTY (121)

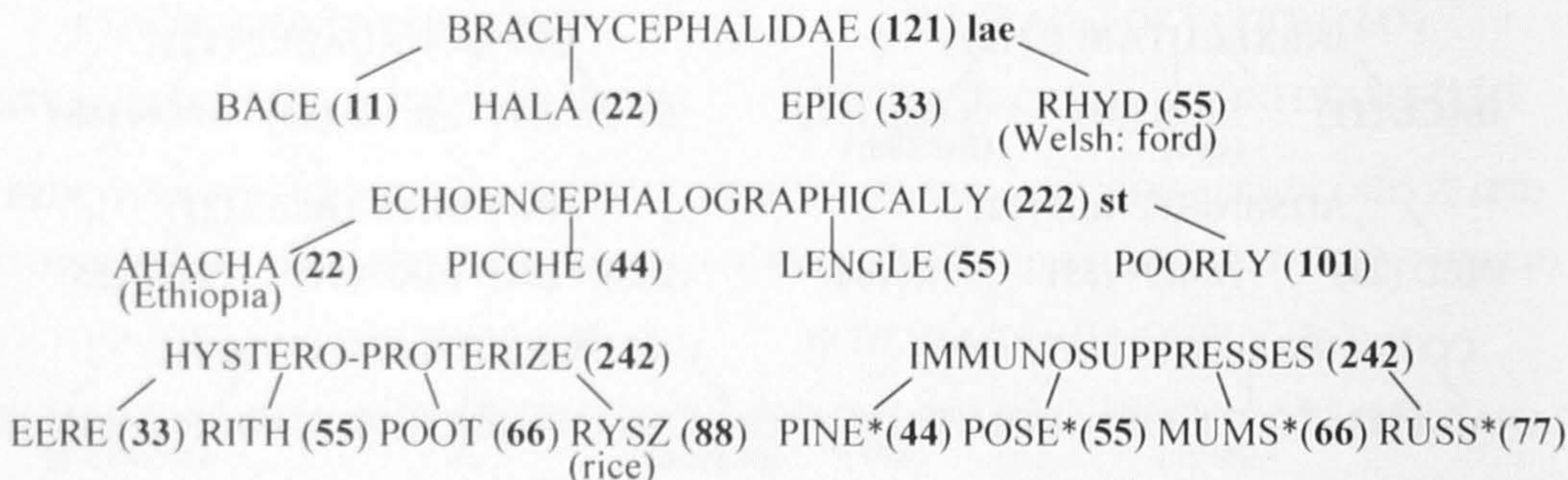
CHOLANGIOPANCREATOGRAPHY (252) st
 HACIAGAC (33) PERGONAL (88) ORTHOPNY (131)
 (Turkey)

CHOLANGIOPANCREATOGRAPHY (252) st
 CHAGIGAH (44) CAERANTO (77) PROPYLON (131)
 (stream - Peru)

PSEUDOCHOLINESTERASES (252)
 PEA-SEED (55) HELICON (66) TUSSORS (131)



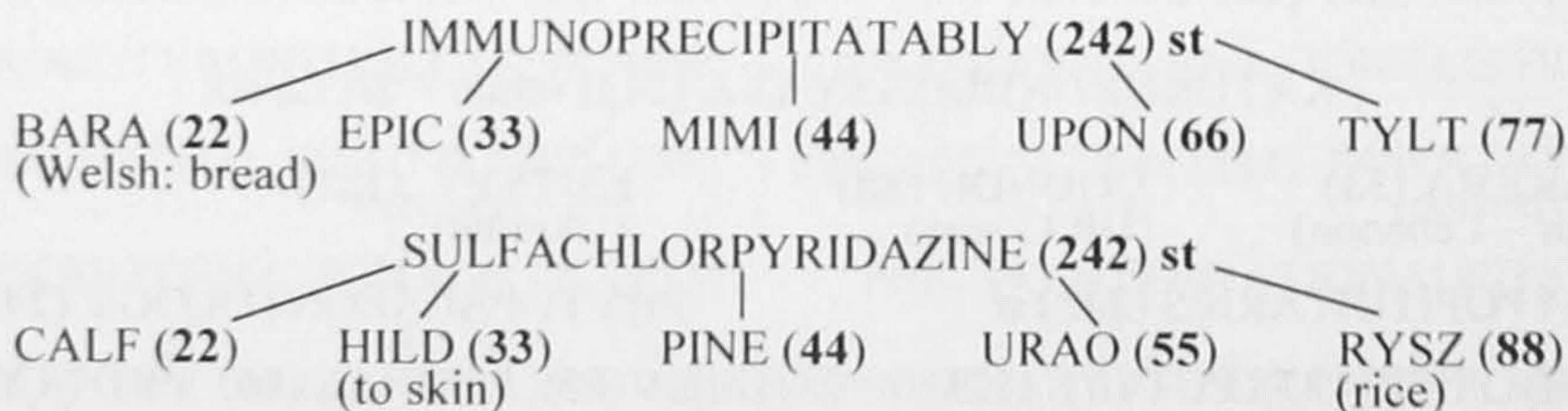
Four offspring



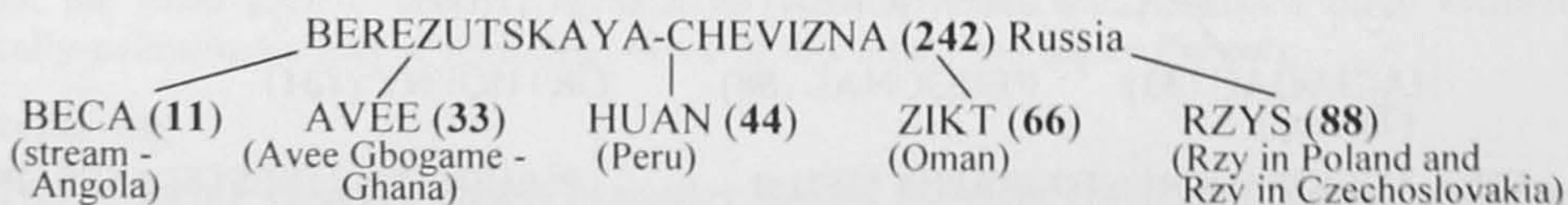
Five offspring

Theoretically, parents of weights 222, 232, 242, 252, 262, 272, 282 and 292 can each produce five numerically-palindromic offspring, each of a different weight, sometimes in more than one way. In practice, the feasibility of this is limited by the discrepancy in weight between the lightest and heaviest offspring. For example, in order to produce five offspring of weights 11+22+33+55+131, a parent of weight 252 would require at least 30 letters (or 35, 40 letters etc.). If such a parent only had 25 letters, rather than 30, the offspring of weight 131 would demand an average letter value of $131/5 = 26.2$. *C'est impossible*, however loud the snores! A similar problem is encountered at the lightweight end of the spectrum. Results, therefore, are most likely to emerge from sets of offspring which do not include the lightweight 11 or weights above 101.

The three parents below all have 20 letters and are of weight 242. The last one even has an offspring of weight 11.



In this third example, the parent and its five offspring are all locations:

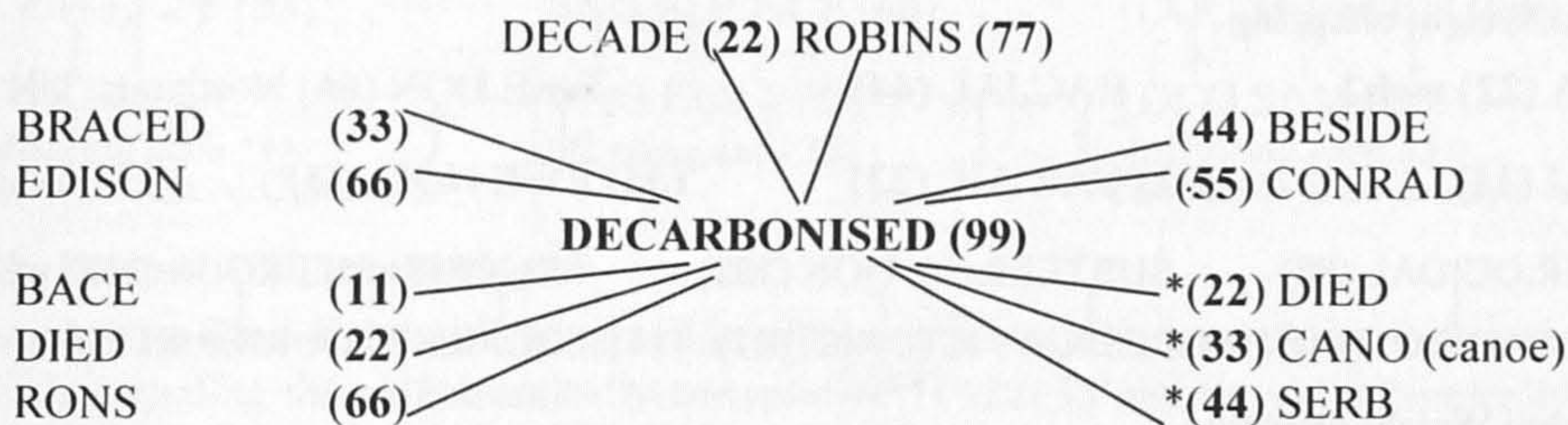


SUPER PARENTS

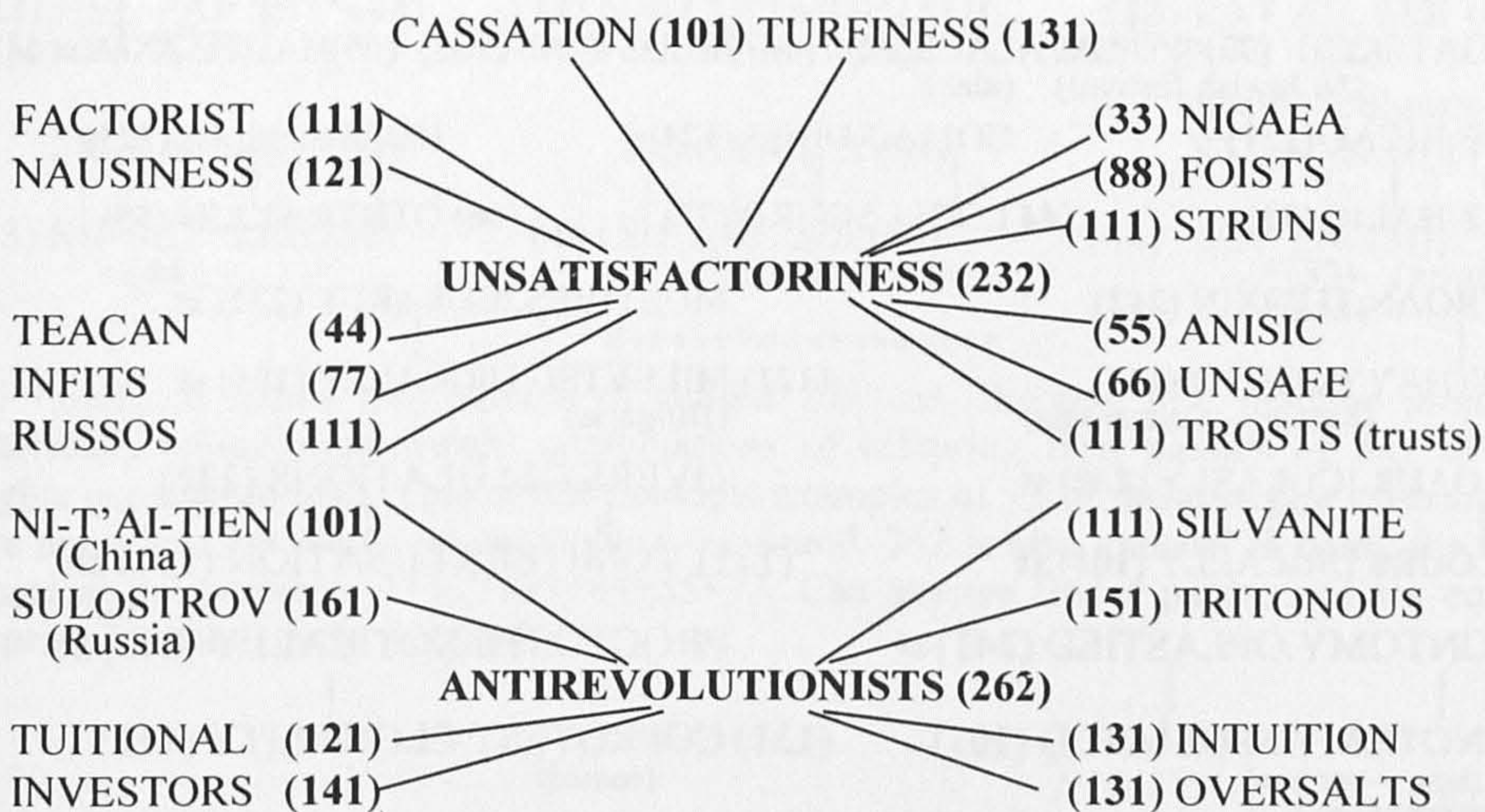
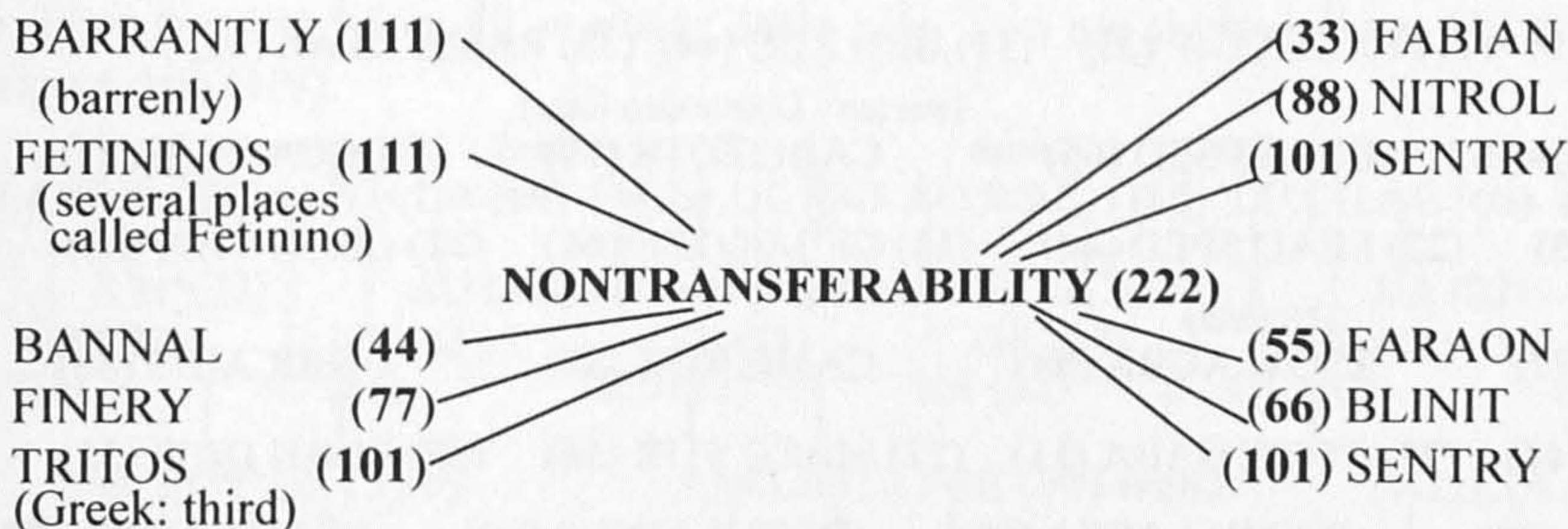
Any parent which produces five offspring is pretty impressive. No more impressive, however, than the parents shown below. These super parents fall into three categories: those which produce more than one set of offspring, each set with different weight combinations; those which produce two different sets of offspring with the same weight combinations; and those which split into two or more equal length letter groups as a prelude to forming offspring.

Same parent, different weight combinations of offspring

The reader might have noticed that several parents, including PSEUDOHYPERTRICHOSIS and BALATONVILAGOS-FURDOTELEP (see earlier), each produce more than one weight combination of offspring. Certain other parents behave similarly and some of these are even more fecund. Here are four parents with their multiple sets of offspring.



* the weights of the 3 offspring are numerically-consecutive palindromes (22, 33 and 44).



Same parent, 2 sets of offspring, same weight combinations**TELETRANSPORTATION (242)**

(like an *antrum* = cavity) ANTRAL (66) TANNEL (an open air fire)
 (treaty) TRETIE (77) TEAPOT
 (= punto, ace of red trump suit in card game Quadrille) PONTOS (99) TRIORS (triers)

Split parents

Each of these parents splits physically into two, each half with the same number of letters. The letters of the first and second halves, respectively, are rearranged to produce two numerically-palindromic offspring.

(a) Equal Weight offspring

BI.JA (22) web2 RAC.IAL (44) WEE.DON (66) Northants. UK
 (11) IB AJ (11) (22) CAR AIL (22) (33) EWE NOD (33)

CANCER.OCIDAL (88) SUBTERP.OSITION (202) TELIOSPO.RIFEROUS (222) web2
 (44)CRANCE ACIDOL(44) (101)BESPU RT ISTONIO(101) (111)LOOPIEST FOURIERS(111)
 (Italy)

(b) Unequal Weight offspring

CRA.BED (33) BECA.FICO (44) DEB.UER (55) ARMA.DALE (55) Canada
 (22) ARC DEB (11) (11) BACE COIF (33) (11) BED RUE (44) (33) RAMA DEAL (22)

BED.OYO(66)web2 DELA.PSED (66) CABE.ZOTE (77) OCCA.SIVE (77)
 (11) DEB YOO (55) (22) LEAD SPED (44) (11) CEBA OTZE (66) (22) COCA VIES (55)
 (yea) (Nigeria) (stream - Dominican Rep.) (Mozambique) (Germany)

DISA.PERE (77) TSOW.AGBA (88) CAME.RIST (88) UNBR.AIDS (88)
 (33) SAID PEER (44) (77) STOW GABA (11) (22) MACE STIR (66) (55) BURN DAIS (33)

SHEW.TAGE (88) PRIMU.LACEA (99) DESTR.AINED (99) EUTHA.NASIA(99)
 (55)HEWS GATE(33) (77)*PURIM ALACE(22) (66)TREDS DIANE(33) (55)HAUTE ASIAN(44)
 (*a Jewish festival) (alas)

STROP.HICAL (121) GOLIA.RDOUS (121) HORTE.NSIAL (121)
 (88) SPORT HALIC (33) (44) LOGIA SOURD (77) (66) OTHER SLAIN (55)

THYROAN.TITOXIN (212) MULTIVES.ICULARLY (222) st
 (101) NORTHAY IXTINTO (111) (121) MILEVTSU URICALLY (101) st
 (locality - Guatemala) (Bulgaria)

STYLOAUR.ICULARLY (232) st OVERSTIM.ULATIONS (232)
 (131) TAYLOURS URICALLY (101) st (121) VOMITERS LUSATION (111) ch

TENONTOMY.OPLASTIED (242) st PROCTOSTE.NOTICALLY (242) st
 (141) TENNOTOMY SPOLIATED (101) (131) COPROTEST CLONALITY (111)
 Coined word.(tenn = var.'ten', (coined)
 hence 'the cutting of ten')

CONSTITUT.IONALISMS (252)
 (141) CONSTITUT MOISLAINS (111)
 (letters same order) (France)

PROTELYT.ROPTERON (252)
 (131) PLOTTERY PROTERON (121)

OLIGOSYMP.TOMATICALLY (262) st
 (151) POLYGOTISM ATOMICALLY (111)
 A coined nonce word.
 (Got[ism] = var. Goth[ism],
 hence 'in very bad taste')

TRANSVERSO.URETHRALIS(282) st
 (151) OSTERVARN'S RURALISETH (131)
 (railroad station - Sweden)

These parents split into three, each third with the same number of letters.

(a) Equal Weight offspring

CH.EF.FE (33)
 *HC FE EF
 (offspring each 11)
 *abbrev: House of Commons

ANG.ELE.NCE (66)
 NAG EEL NEC
 (offspring each 22)

COO.MAS.SIE* (99)
 OCO SAM IES
 (offspring each 33)
 *Coomassie Blue is a dye - ch

(b) Unequal Weight offspring

Examples are provided for all six possible offspring permutations of the palindromic trio 11, 22 and 33, including the palindromically-consecutive 11+22+33 and the palindromically-regressive 33+22+11 (both asterisked*), The exercise is then repeated for all six offspring permutations of 22, 33 and 44. The 2-letter offspring are: UA = woe; S'N = soon; AJ = adze; HY = haste; AU = awe; FE = fee; LU = loo; UL = steam; IM = him. Two are abbreviations: HC (see above); RD = restricted data (US).

(mountains - Peru)		ospd		(Germany)	(Somalia)
CH.AU.NS (66)	JA.YH.UA (66)	DR.EF.UL (66)	AU.RO.CH (66)	LU.CH.AU (66)	LU.MI.CH (66)
	S'N*(33)				
UA*(22)	AU (22)	LU (33)	HC (11)	UA (22)	HC*(11)
HC*(11)	AJ (11)	FE (11)	OR (33)	HC (11)	IM*(22)
		RD (22)	UA (22)	UL (33)	UL*(33)

ENC.APP.EST (99)	ANG.IOT.OME (99) web2	TAL.LIA.TES (99)
(22) NEC PAP SET(44)	(22) NAG TIO MOE (33)	(33) LAT AIL SET (44)
(neck) *(33)	(44) (mow)	(a staff, pole) (22)

FIR.E-ST.EEL (99)	PIS.CAR.IES (99)	(heath - Belgium)
		STE.NEN.HEI (99)
(33) RIF SET LEE (22)	(44) SIP ARC SIE (33)	
(44)	(22) (to strain)	*(44) SET ENN HIE*(22)
		*(33) (house)
		(you)

And finally...it seems that parents of weight 242 can, theoretically, produce more different numerically-palindromic weight combinations of offspring than parents of any of the other weights considered here. This article contains examples of 13 of these weight combinations and there are others for which no examples were found. 242 is also unusual in being the sum of six numerical palindromes: 11+22+33+44+55+77. Can anyone find a parent and six equal length offspring to match these weights?