

VARIETIES OF BALANCED WORDS, PART 1

REX GOOCH

Welwyn, Herts, England

INTRODUCTION

In *Making the Alphabet Dance* (MAD), Ross Eckler describes a number of types of words designated partly or wholly by the word "balanced". I discovered this after I thought I had almost finished this article, and had to have a major re-think (rewrite!). Not only are there a number of varieties of the type of word I thought was called "balanced", but the term seems to be applied to entirely different types of word, linked only by the use of the letter values A=1, B=2, etc. In attempting to make clear to the reader exactly what I am discussing, I have therefore left the word "balanced" as a rather general term, and necessarily given more specific terms to the four principal types discussed. These are: words whose average letter value is 13.5 (ALVs); numerical tautonyms; words consisting of pairs of letters, each pair adding to 27; and words which would literally balance about a significant point if each letter weighed according to its position in the alphabet. The last type I term "momentous" words, as their clockwise and anti-clockwise moments balance: a subset of these which balance about the centre of the word has been known as centrally balanced beam words (CBBs).

All words with Balanced Letter Pairs (BLPs) are necessarily ALVs, and are accordingly discussed with them in this part of the article, leaving numerical tautonyms and momentous words to Parts 2 and 3.

Of the very many words that will be discussed, VALORIZE stands out uniquely for its properties (apart from being longer than four letters). The reader is invited to complete the following sentence "VALORIZE is unique because it is the only word..." The answer, which is not difficult, will be given at the end of Part 3. Braver readers will attempt to disprove the proposition by providing another example (perhaps after they have completed a 10x10 word square). VOLE is also unique for having a certain combination of properties.

Through the three parts, the following applies. Words appear in Webster's Second, the Oxford English Dictionary, Pulliam and Carruth's The Complete Word Game Dictionary or Stedman's Medical Dictionary except when labeled as follows: ACCB = Richard Howard's A Complete Checklist of Birds of the World (1984), ATHS = American Thesaurus of Slang, BIW = Wordsworth Book of Intriguing Words, CIWL = C.F. and F.M.

Vöglein's Classification and Index of World's Languages (1977), DJE = Dictionary of Jamaican English, DMLR = Dictionary of Maori Language of Rarotonga, EDD = English Dialect Dictionary, EJ = Encyclopaedia Judaica, F&W NSD = Funk & Wagnalls New Standard Dictionary, OPC = Sandra Holmes's Outline of Plant Classification, PED = McManus's Palauan-English Dictionary (1977), Pughe = Pughe's Welsh-English Dictionary, Web 3 = Webster's Third, and Word Ways. I have inserted hyphens where I know they must be present; that does not mean that some other words should not be hyphenated. Words with a ? are unsourced.

WORDS WITH AN AVERAGE LETTER VALUE OF 13.5

Such words have been defined as balanced: one might call them ALV words. In *Beyond Language*, Dmitri Borgmann used the term Alphabetically Balanced Combinations. In *Language on Vacation* he reported the felicitous example LOGOLOGY in which the 8 letters add to $12+15+7+15+12+15+7+25 = 108$, an average of 13.5. This is the same as the sum of the values of the letters from A to Z, divided by 26. In order to get 13.5, the divisor must have a factor of 2, so all such words have an even number of letters. Clearly, all rearrangements of the same letters (anagrams, e.g. GIRT and GRIT) qualify. Equally clearly, as the definition requires that the sum divided by the (even) number of letters n is 13.5, the sum of letters is n times 13.5, so that the sum for words of lengths 2,4,6... is 27,54,81...

One could as well assign $Z=1$, $Y=2$, $X=3$, etc., where each occurrence of a letter counts as $(27-p)$ instead of p , its position in the alphabet. The sum of the n letters in a word would then be $27n$ less the sum of all the p s, which is $13.5n$ by reason of our first definition of an ALV word. So the sum with $Z=1$, etc., is $27n - 13.5n = 13.5n$, just as with $A=1$.

The longest such words from Webster are quoted in *Making the Alphabet Dance* as INTERCRYSTALLIZATION and UNCONTROVERTIBLENESS, both of 20 letters. I'm sure that is true, as Webster does not spell INSTITUTIONALISATION the way I do! There are however many (over 20) chemical or medical words of equal or longer length.

As we progress from 4- to 6- to 22-letter words, so the percentage of ALVs falls as follows: 2.45, 1.94, 1.53, 1.31, 1.18, 1.08, 1.08, 1.05, 0.7 and 0.8.

LONGER ALVs HAVE INCREASINGLY MORE LETTERS FROM THE SECOND HALF OF THE ALPHABET

Borgmann remarked that ALVs contain more letters from the second half of the alphabet. This is true, as 57.6% of the letters in my ALV words are N to Z, compared with 46.1% of the dictionary as a whole. This is not such a big difference, but remarkably the frequency of almost every one of the letters A to M drops in ALV words (and the two exceptions are trivial), and the frequency of every letter from O to Z increases. As an example, A drops from 8.5% of all letters to 5.1%, and U

increases from 3.3% to 4.8%. The result is that the most common letters are a little different from those in dictionary words in general, as the following table shows. As an example, the frequencies of E, O, and S all lie between 9 and 9.5%. Thus the second-half letters O and S have been promoted, and E demoted, so that they all approximately share the top spot in the case of ALVs. (The dictionary analysis is covered by me in more detail in the May 1997 Word Ways, which shows how letter frequencies are dependent on word length.)

Letter %	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11
in ALVs	N			I	R,T		E,O,S			
in Dict	N	T	R,S	O	A	I				E

The total frequency of the five vowels at 36.7% is a little lower in the case of ALVs than the 38.7% of the dictionary as a whole.

The fact that second-half letters are more common inevitably means that words with a majority of second-half letters are more common. The effect becomes more pronounced as the word length increases--you need only consider that it is easier to achieve 10 or more such letters in an 18-letter word than it is to achieve 5 or more in an 8-letter word. If we assume that letters are chosen independently with a 57.6 to 42.4 ratio for NZ letters to AM letters, then the probability that x letters in an n-letter word are from the second half of the alphabet is given by the binomial theorem. When we apply the theorem, we find what we predicted, that the number of words with a majority of second-half letters increases with length:

Length	4	6	8	10	12	14	16	18	20	22
Theory	43.9	49.6	53.9	57.3	60.1	62.5	64.6	66.5	68.1	69.7
Actual	25.2	43.7	55.8	67.2	76.0	79.6	82.2	87.5	86.7	100

Unfortunately, the actuality (which independently substantiates Susan Thorpe's graph on p 208 of the November 1994 Word Ways) is not entirely explained by the theory. In part this is due to the fact that the 0.576 used is only an average; the correct value increases with word length from 0.553 for 4-letter words to 0.591 for 22-letter words. However, making this correction makes relatively little difference in the theory. It follows that our assumption of letters being chosen independently of one another is wrong. Examination of the 22-letter words reveals that they all have 12 to 15 of the NZ letters, whereas our theory would have a much broader spread about the most popular value of 13, with 16% of words having 11 or fewer NZ letters.

For comparison, in dictionary words in general, the percentage of words with a majority of second-half letters is mainly about 30 for words of even length and about 40 for words of odd length.

In order to provide a more convincing explanation, we need to consider that the most common first-half letter in ALVs is still E, followed by I. To balance each of these single letters requires letters

positioned at 22 and 18 respectively, i.e. V and R. Now R is reasonably common, but V is not. Instead of V, we could have two letters adding to 3(13.5)-5 to balance the E, i.e. adding to 35.5--say, two Rs.

Thus the definition of an ALV, plus the popularity of E, forces more second-half letters. This bias becomes more pronounced the longer the word, as explained above, until almost all very long ALV words have a majority of letters from the second half of the alphabet.

GREATEST AND LEAST, LONGEST AND SHORTEST...

Here is a summary of all the ALV words I found: the percentage figures are similar to those of Susan Thorpe in her November 1994 article, but are rather larger for longer words:

Length	4	6	8	10	12	14	16	18	20	22
Words	322	1024	1264	1087	695	348	157	64	15	7
Percent	6.5	20.5	25.4	21.8	13.9	7.0	3.1	1.3	0.3	0.1

In addition, there was one ALV of 26 letters and two of 30 letters. Of the above words, almost 25% have all letters different. To Susan's longest examples of SULPHOVINATE and UNHOSPITABLY we may add CAVERNI-LOQUY, EUTHYSCOPING, HERNIOPLASTY, HYDROSULFITE, MUCK-THROWING? and ZYMOGRAPHIES (all 12 letters), and the 14-letter SYNWOCKLUMERIA.

To ISOVOLUMINAL, Susan's longest word with alternating vowels and consonants, we can add IRIDOTOMIZES and perhaps the unsourced RE-POPULARIZE and REPURITANIZE. If Y be regarded as a vowel, we may add PYRAMIDOTOMIZE and TOXINOGENICITY to her SERONEGATIVITY.

Likewise, we may add STRIIF, TERTII and LOLIISMS to OPIISM and TOXIINFECTIOUS as ALVs with a double I, and perhaps SWITCH-HITTER to ROUGHHOUSING as examples of an ALV with a double H.

Regarding two adjacent pairs of letters, we may offer LASSOO (Roget), SWEET-TALKS?, TITLE-ESSAY?, SWEET-TASTING?, VITTEE, POOR-RATE, PRE-ESSAY? and SHEEPPOX (and the phrases DEVIL'S TATTOO and SWEET TASTING) to add to Susan's UNTATTOED.

Tentatively, we offer GOODY-GOODYNESS as an ALV with three doubled letters.

Susan listed IXIL (a proper name) as the only ALV composed solely of Roman numerals. This is genuinely rare.

She listed AMOY, MATT, MAYO, VIVA, TAXI and MAMMUT? as ALVs composed solely of letters symmetric about a vertical line. We add AVIV?, AYTH, HAYT, HOWH, MOYA, THAY, YHAT, MUOHWA, THWAIT, WAIMTO, YAW-HAW and MOYAMOYA.

A new finding is ALV palindromes: AZZA (located in Iran) and LOOL.

Regarding ALVs with only one letter from the first half of the alphabet, Susan found that the longest was NONION, of length 6. I found also CROPON, NONENS, NONINO, OPPONE, and SENNON, in addition to 84 examples of length 4.

Here are improvements to her list of the maximum number of transposals for each word length. In the case of length 6, a joint effort was needed to exceed the previous record, and length 16 is the same as hers. (The number of transposals is in brackets). We also update her list of ALVs with exactly one each of AEIOU with an 18-letter record.

- Length 4 (8): EESY, EYES, EYSE, SEEY, SEYE, YEES, YESE, YSEE
or EVIR, IVER, REVI, RIVE, VEIR, VERI, VIER, VIRE
or ARPS (EDD), PARS, PRAS, RAPS, RASP, SARP, SPAR, SPRA (vf)
- Length 6 (17): ENTERS, ENTRES (vf), ERNEST, ESTREN, NERTES, NESTER, RENETS (= rennets), RENTES, RESENT, SENTRE, SERTEN (vf), STEREN, STERNE (vf), STREEN, STRENE, TENSER, TERNES
- Length 8 (7): OPERANTS, PARSONET, PASTRONE, PATERSON, PRONATES, PROTEANS, TROPANES
- Length 10 (3): INTERPONES, PERITENONS, PRETENSION
- Length 12 (3): MESOSTERNITE, SENSITOMETER, TENSIMETERS
- Length 14 (2): CONTRAVENTIONS & NONCONTRASTIVE (?); or INTERMENSTRUAL & INTERMENTRUALS; or HYDRONEPHROSES & NEPHROHYDROSES; or PERINEOSTOMIZE & PERINEOTOMIZES
- Length 16 (2): IMPRESSIVENESSES, PERMISSIVENESSES
- Length 18 (2): PHYTOTRICHOBEOARS, TRICHOPHYTOBEOARS
- Length 20 (2): CYSTOURETHROGRAPHIES, URETHROCYSTOGRAPHIES
- Length 22 (2): HYSTEROOOPHORECTOMIZED, OOPHOROXYSTERECTOMIZED
- Length 8: OUTRAISE, SAUTOIRE
- Length 10: AELUROPSIS, AEXTOXICUM, ANISOTELUS, ASOLENITUS, AUTHORISES, AUTOSEXING, EQUISONANT, EUCARYOSIS, EUSTRIGOTA, HARIOSTEUS, MOUSTERIAN, PEPTONURIA, PLESIOSAUR, QUASI-NOVEL(?), TROUVAILLE, VASIFEROUS
- Length 12: ASTEROCRINUS, CAVERNILOQUY, EUPROPHANTIS, EURYOPICALLY, FORMULARIZER (?), FOUR-PART TIME (?), HOUSE MARTINS, LISSADORETUS, MARSIKOMERUS, MASTHOTERUM, MASTOTHERIUM, MILLEROSAURS, MOUNTAINLESS, MYRSINACEOUS, NEISOPSALLUS, NEOPSITTACUS, NONPURGATIVE, NUGATORINESS, PORTLIGATURE, PRECARIOUSLY, QUAINTSPOKEN (?), RUSSIAN-OWNED (?), SCALISETOSUS, SEBIPAROUSLY, SIRENOCYAMUS, SULPHOVINATE, VIBROMASSEUR, WEWOKACRINUS
- Length 14: DYSREGULATIONS, EUHYDATOTHRIPS, LARYNGOFISSURE, NEMATOPTYCHIUS, PASSIONFULNESS, PIESTODACTYLUS, PROSPAPHELINUS, RETROLINGUALLY, SELFASSUMPTION (?), STEGANOSTIGMUS, STEPHANOPTILUM, SUPERSONICALLY, SYNWOCKLUMERIA, ULTRAMODERNIST
- Length 16: COUNTERTHWARTING, MICRODERMANYSSUS
- Length 18: TRICHAETEROPHYLLUM

My list of ALV reversible words is:

Length 4:	ARPS (EDD) / SPRA (vf)	ASUM / MUSA	AVIV (?) / VIVA
	AXON / NOXA	DRUK / KURD	EESY / YSEE
	ETON / NOTE	EYES / SEYE	GIRT / TRIG
	GOMS / SMOG	HOOP / POOH	IVER (=ivory) / REVI
	KAWS (?) / SWAK	KLOP / POLK	KNIT / TINK
	LATU / UTAL	MOKO / OKOM	NATS (?) / STAN
	NEPS (?) / SPEN	PLAY / YALP	PRAS / SARP
	RAPS / SPAR	SKAW / WAKS	SLAV / VALS
	SNAT / TANS		
Length 6:	ERRATS / STARRE	LETTE / SETTEL	LEVELY / YLEVEL (?)
	LEVINS / SNIVEL	NITRAS / SARTIN	NOSIES (?) / SEISON
	SINNET / TENNIS	REPINS / SNIPER	

For ALV tautonyms I found FUFU, LOLO, SH-SH, HUET-HUET, MOKO-MOKO, MOYAMOYA (moya = interjection), PHOOPHOO?, POOH-POOH, and SQUARE-SQUARE (= biquadrate). Note the new longest example. Some of these were also found by Susan. To complete the picture, add Susan's ZAZA (film), BY-BY, AZAZ (Bible), and KLOP-KLOP. She also mentioned the triple TORA! TORA! TORA! (film).

Susan talks of ALVs that are also pyramid words, called 1-2-3 words below. Widening the search as in my article "Polygonal, Pyramidal, Prismatic Words" (elsewhere in this issue), the only words I found that were also ALVs were

2-2 words: AZZA, FUFU, LOLO, LOOL, SH-SH

1-2-3 words: KOKOON, NESSES, NONINO, NONION, SENSES, SENSSE

The longest runs of NZ letters were 9 in PROSOPOTOCIA; 8 in ARROW-TOOTHED?, MISPRONOUNCE, SCHIZOPROSOPIA, ODONTOPTOTICALLY, SPORO-ZOOITICIDALLY, and CRYOPROSTATECTOMIZED. The shortest of the 26 words with a run of 7 letters were BANYROUSSA, COTTON-TREE, and UN-TROUNCED.

The longest runs of AM letters were 7 in UNRHYTHMICALLY and SPORO-ZOOITICIDALLY; 6 in ROYAL JELLY, UNSEEMLILY, PYOSPERMICALLY, UNAMBIDEXTROUSNESS (derived), and PHOTOAUTOTROPHICALLY. The shortest of the 83 words with a run of 5 letters were MAMMETRY, SEEMPLITY, SLIMMERS, SOLLIDLY, STELLIFY, STICKILY, TWILIGHT, and WHILLEST (Susan also had TUSK-LIKE).

The longest total runs of AM and NZ letters make 15 (7 and 8, respectively) in SPOROZOOITICIDALLY.

The largest number of AM letters (12) and the largest number of NZ letters (18) both occur in the same words: CONJUNCTIVODACRYOCYSTOSTOMIZED and HYSTEROSALPINGOOPHORECTOMIZES.

The following words contain the first-half letters AM in their first halves, and second-half letters NZ in their second halves: HEMELYTRON; ALLEYTOR, EMICTORY, GALLWORT, GALLYPOT, GAMESTRY, JEALOUSY; in 24 6-letter words like GLINTS; and in 34 4-letter words like JEST.

The following words contain the second-half letters NZ in their first halves, and first-half letters AM in their second halves: TROUVAILLE; OUTWEIGH, PROXIMAL, SNOWLILKE, SOUPLIKE, STROGELL, TOURELLE, TRUTH-LED; in 24 6-letter words like OXTAIL; and in 35 4-letter words like WOKE.

One should refer to Susan's November 1994 article "Balanced Words" for other types of ALVs such as balanced partners, split ALVs, worms and squares.

BALANCED LETTER PAIRS AND DOUBLE NUMERICAL TAUTONYMS

Ross talks about two categories of ALVs. The first category is words containing just balanced letter pairs (BLPs), by which is meant A and Z, B and Y, etc. (letters balanced about the centre of the alphabet whose numerical values add to 27). He said there are "a few", quoting OVERSLIGHT; in my researches, a few means about 2%. His second category he termed truly balanced, meaning that the first and second halves of the word had the same sum of letter values, e.g. EXPI-ATOR with half-totals of 54. These are (double) numerical tautonyms (DNTs). He said there were "some" like that; in my researches, some means about 2.5%. There is an overlap between the two categories of 0.5%.

Consider ALV words which are also DNT words. Because they are DNTs the sum of the letters in the first half, say h , equals the sum of the letters in the second half. Hence all the letters sum to $2h$. But to be ALV, this sum, divided by the number of letters n , equals 13.5. So $2h = 13.5n$. For this to be true, n must be a multiple of 4, so ALV words which are DNT can only have 4,8,12... letters.

To clarify, ALV words constitute about 0.75% of my word list. The breakdown into balanced letter pair (BLP) and double numerical tautonyms (DNT) as a percentage of total vocabulary is

	BLP	Not BLP	Total
DNT	0.004	0.013	0.02
Not DNT	0.014	0.684	0.70
Total	0.02	0.70	

Note that all BLP words must be ALV words as every pair adds to 27; however, the huge majority of DNTs are not ALV, since DNTs are much more common than ALVs, at over 2% of my word list. This makes ALVs quite scarce. The figure accompanying Part 2 of this article may provide an easier way of grasping these facts; it also considers numerical tautonyms.

1a. Words with wholly balanced letter pairs (hence ALVs), which are also double numerical tautonyms

4: AZZA, EVIR, FUFU, LOBY, LOIR, LOLO, LOOL, LORI, LOSH, LOVE, LOWD, NMOL, RIOL, RISH, RIVE, RIZA, SHIR, SHRI, SHSH?, SHUF, VEIR, VELO, VEOL, VERI

8: FLOURISH, RIVERISH

1b. Words with wholly balanced letter pairs (hence ALVs), but not also double numerical tautonyms

4: BAYZ, BEVY, BIRY, BOLY, BOYL, CLOX, DOWL, FOUL, GIRT, GLOT, GOLT, GRIT, HOLLS, IVER, IZAR, KLOP, LAZO, LEVO, OWLD, PIRK, PLOK, POLK, REVI, ROIL, RUIF, SLOH, TRIG, VIER, VIRE, VOEL, VOLE, WIRD, WOLD, YIRB, ZIRA, ZOLA (author)

6: AVELOZ, BOLSHY, BROILY, CERVIX, EVOLVE, FILOUR, FLOUSH, FRUISH, GIRRI, GIRTHS, GLOTRI, GRITHS, GRIVET, GYBLOT, HIVERS?, HOLLOS, HOVELS, HYBRIS, LOVIER, MERVIN (name), MONFUL, MUFLON?, OLIVER, PRIKAZ, RAZZIA, REVIVE, RIGHTS, RIVEIR, ROLLIO, RUBIFY, SHEVRI, SHIRAZ, SHIVER, SHOFUL, SHOLVE, SHOVEL, SHRIVE, SHSHSH, SRIGHT, UNFIRM, URBIFY, VERMIN, VEVERI, VIOLER, VIROLE, WIZARD, WOLVED?, WORDLI, ZARISH

8: FORGUILT, FULLMOON?, LINDWORM, LUNIFORM, MOLTLONG, MOLTRING, MORILLON, MORTLING, OVERGILT, OVERLIVE, OVERVEIL, OVERWILD, SIRRIGHT, VALORIZE, VENOMFUL, WORLDISH

10: OVERSLIGHT

1c. Words with average letter value, without wholly balanced letter pairs, but which are also double numerical tautonyms

8: ATHYMISM, CHRYSLER (corporation), CONVENTO, CONVOLVE, CORRANTS, CORROSOE, CRULLERS, CURLYCUE, ENTOZOAL, EXPIATOR, EYESTONE, FISTNOTE, FOUL PLAY, HUET-HUET (vf), HYPERGON?, HYPEROPE, IRRITANS, JETSTONE, MARVELLY, MAYORUNA?, MOKOMOKO, MOYAMOYA, MUDPROOF, OPERANTS, OPERATOR, OPINANTS (Web3), OPINATOR, PARSONET, PAVONIZE, PHOOPHOO?, PLAYPENS, PLAYSANT, POOHPOOH, POPGLOVE, PREOPENS, PUNCHILY?, PUNCTUAL, RAUNDOWN, REVILERS, REVIVALS, ROPE-GIRT?, RUFIOPIN, RUMBLERS, SALVATOR, SHRIMPET, SPARTANS, SPRATKIN, STIFLERS, SUBLUNAR, SUCKLERS, TEMPORAT, TINKLERS?, VAPORISH, WAGWANTS, WEFT-KNIT?, WHERITTE

12: ABSTRUSENESS, ABSTRUSITIES, AZOPHOSPHORE, GLOSSINESSES, GLOSSING OVER, INSOUCIANTLY, MYCETOGENOUS, PERSERVATION, PREAUTHORIZE, PREINSERTION, PRESERVATION, REPRESENTERS?, SELFSTARTERS, SHARPSHOOTER, SHARP-SMITTEN?, SINFULNESSES (inferred), SOFTFOOTEDLY?, SPECTROPHOBY, SPLENOGENOUS, SPLENOTOMIES, SQUARESQUARE, TOILET POWDER, TUBEROSITIES, UNEVENNESSES, UNGRATEFULLY

16: COMPULSIVENESSES (inferred), HYPOFUNCTIONALLY, IMPRESSIVENESSES, LEPTOSTAPHYLINES, MALNUTRITIONALLY, PEREMPTORINESSES (inferred), PERMISSIVENESSES, PERSUASIVENESSES, UNCONVENTIONALLY, VASOCONSTRICTION

20: SPECTROFLUOROMETRICS

1d. Words with average letter value, without wholly balanced letter pairs, and which are not double numerical tautonyms

I give a few samples from word lengths up to the record 20, then all that I found. The number at the left is the length of the words.

4: ANTS, BOWN, CURL, DUMP, EYES, FIST, GUHR, HOOP, IVIN, JEST, KNIT, LUNG, MOUE, NOTE, ORBS, PAWN, QUIG, ROOF, SUCK, TAXI, UNDO, VIVA, WOKE, XIPE?, YELL, ZEIN

6: ARREST, BOOZER, CENSUS, DUCTOR, ENTERS, FARROW, GOVERN, HONEST, IDYLLS, JUNKET, KISSER, LITANY, MATRON, NURSED, ORIENT, POWDER, QUEENS, RESUME, SUPERB, TENNIS, UNEVEN, VACUUM, WEEKLY, XMASES, YONDER, ZONATE

8: ASSURING, BOSSIEST, CONSUMER, DISPROVE, ENTIRELY, FLAUTIST, GEOMETRY, HOMEWORK, INTERIOR, JEALOUSY, KERPLUNK, LITERARY, MULTIPLE, NATIVELY, OUTGOING, PERVERSE, QUARRIES, RESCUERS, SCORNFUL, THUMPING, UPSTAGES, WARINESS, XANTHISM, YAWLSMAN, ZYGOMATA

10: ASPERSIONS, BOYISHNESS, COMPULSIVE, DISTINCTLY, ERGONOMIST, FUMIGATORY, GUILTINESS, HORSEWOMEN, IMMORALITY, JUSTICIARY, KITTLEPINS, LUXURIATED, MULTIPLIER, NORTHERNER, OXYGENATES, PERMISSIVE, QUADRUPLER, REVERSIBLY, SIMILARITY, TRANSPLANT, UNDERSTOOD, VANQUISHES, WELLSRING, XANTHODONT, YELLOWLEGS, ZENOGRAPHY

12: ATHWARTSHIPS, BARNSTORMERS, COPOLYMERIZE, DEMONSTRATOR, EFFORTLESSLY, FORESHORTENS, GASTROLOGIST, HUNTSMANSHIP, ILLUSTRATING, JUSTINIANEUS? or JUMP THE QUEUE, KURCHATOVIVUM, LUMINIFEROUS, MISPRONOUNCE, NECROTOMIZES, ORTHOGONALLY, PHILANTHROPY, QUADRUPEDOUS, REPERCUSSION, SKULLDUGGERY, TRANSLATIONS, UNAUTHORIZED, VAINGLORIOUS, WEATHERSTRIP, XANTHORRHIZA?, YOUNGMANSHIP, ZYMOGRAPHIES

14: ANTHROPOLOGIST, BUTYRYLCHOLINE, CRYPTOGRAPHERS, DISCONSOLATORY, EXTRAPROSTATIC, FULL EMPLOYMENT, GLOTTIDOSPASMS, HETEROGENOUSLY, ICHTHYOLOGISTS, JOURNEY-CHOPPER, KARYOLYTICALLY, LEPIDOPHYLLOUS, METEMPSYCHOSIS, NARCOSYNTHESIS, OVERENTHUSIASM, PERVERSENESSES, QUADRUMVIRATES?, REMORSEFULNESS, SHORTSIGHTEDLY, TRANQUILLIZING, UNENTERPRISING, VICTIMIZATIONS, WRETCHLESSNESS, XANTHOPHYLLITE

16: ADVENTITIOUSNESS, COPOLYMERIZATION, DYSARTEROTONIES, ELECTROSYNTHESIS, FASTIDUOUSNESSES, GASTROENTEROLOGY, HYSTERECTOMIZING, INTERCRYSTALLIZE, JUXTAARTICULARLY, LAPAROGASTROTOMY, MUCOALBUMINOUSLY, NEUROTRANSMITTED, OTHERWORLDLINESS, PSYCHOPHYSICALLY, QUANTITATIVENESS, RHINOSPORIDIOSIS, SPECTROCHEMISTRY, TRINITROGLYCERIN, UNCONSPIRINGNESS, VENTRICULOSCOPES

18: AUTOPSYCHOANALYSIS, BISHYDROXYCOUMARIN, CHOLECYSTOCOLOTOMY, DEPUTY COMMISSIONER, ELECTROFLUOROSCOPY, GRANULOCYTOPOIESIS, HYPERMETAMORPHOSIS, INTERTRANSVERSALIS, LYMPHORETICULOTICS, MYXOGLOBULOTICALLY, NEUROLYMPHOMATOTIC, ONYCHOGRYPTOTICALLY, PERCRYSTALLIZATION, STEREOPHOROMETRIES, TRIMETHYLETHYLENES, ULTRAMICROTOMIZING, UNCOMPROMISINGNESS, X-RAY CRYSTALLOGRAPH

20: AUTOTRANSPLANTATIONS, CHRONONHOTONTHOLOGOS (Roget), CRYOPROSTATECTOMIZED, CYSTOURETHROGRAPHIES, ERYTHROPHAGOCYTOTICS, GASTROENTEROTOMIZING, INSTITUTIONALISATION?, INTERCRYSTALLIZATION, MICROMYELOLYMPHOCYTE, ON THE SPUR OF THE MOMENT, PHOTOAUTOTROPHICALLY, PLATYSPONDYLITICALLY, POLYMICROLIPOMATOSES, TESTOCORTICOTROPHICS, UNCONTROVERTIBLENESS, URETHROCYSTOGRAPHIES

22: COSTOTRANSVERSECTOMIES, HYPOGRANULOCYTOTICALLY, HYSTEROOOPHORECTOMIZED, OOPHOROXYSTERECTOMIZED, PYROPHOSPHOTRANSFERASE, RETICULOHISTIOCYTOTICS, VESTIBULOEQUILIBRATORY

26: CYTOSPECTROPHOTOMETRICALLY

30: CONJUNCTIVODACRYOCYSTOSTOMIZED, HYSTEROSALPINGOOOPHORECTOMIZES